

316 D/2004  
A VALUABLE GIFT FOR READERS

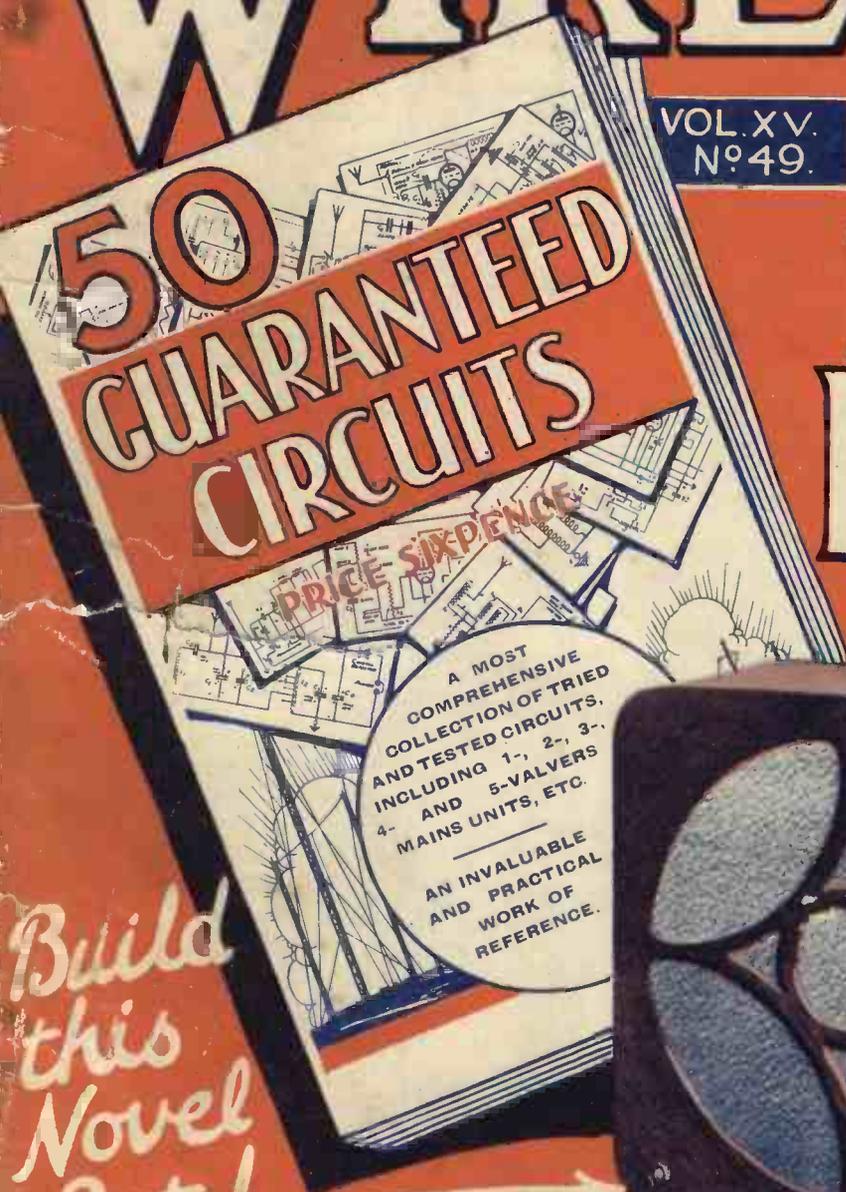
# MODERN WIRELESS

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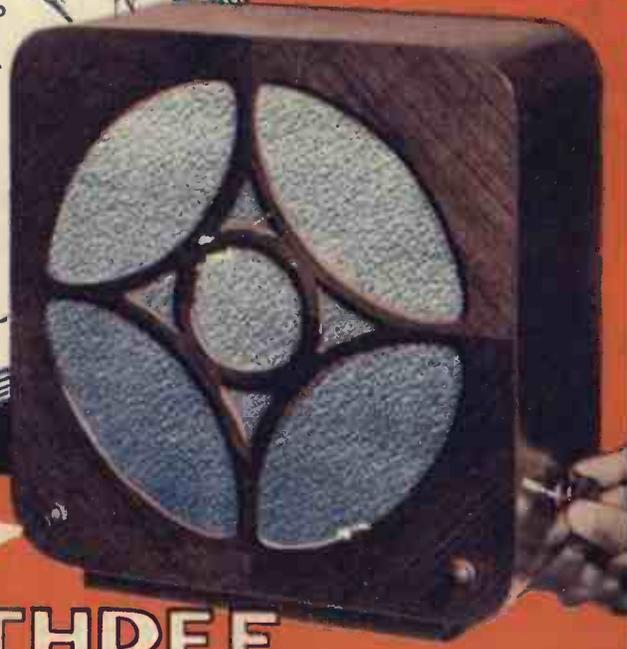
VOL. XV.  
No. 49.

JANUARY  
1931

## THIS BOOK FREE! INSIDE



*Build this Novel Set!*



### THE "L.S." THREE

RADIO CONSULTANT-IN-CHIEF CAPT. P. PECKERSLEY M.I.E.E.

#### ALSO THIS MONTH

##### THE "M.W." FOUR

A powerful, selective set for long-distance loud-speaker reception.

##### THE "TRIPLE" TWO

One of the finest little sets ever described. Three versions are given, so making it available for battery, or A.C. or D.C. mains operation.

##### MAKING PORTABLES SELECTIVE

A special article detailing novel and simple methods of overcoming one of radio's most urgent problems.

##### THE WORLD'S PROGRAMMES

How, when and where to listen to those foreign stations.

REPRODUCTION..... THAT MAKES YOU VISUALISE

# Follow the game

SEE WITHOUT SEEING

The ball goes out to the threequarters . . . is passed like lightning out to the wing man, who snaps it up and flies down the touchline . . . dodging, leaping, staggering . . . to be brought down by a heroic tackle! . . . and so the game grows in excitement, and a TELSEN transformer in your set faithfully reproduces every thrill . . . every inflection in the commentator's voice . . . as the game grows more tense, he cannot keep the excitement out of his voice . . . you, too, have lost all sense of location . . . you not only hear, but in your mind . . . you SEE. TELSEN Transformers are the direct result of years and years of practical radio experience . . . included in any set they will give not only greater volume . . . greater purity, but a clarity and realism never before attained. For true reproduction fit . . . TELSEN.



# TELSEN TRANSFORMERS

"ACE" TRANSFORMER - 8/6

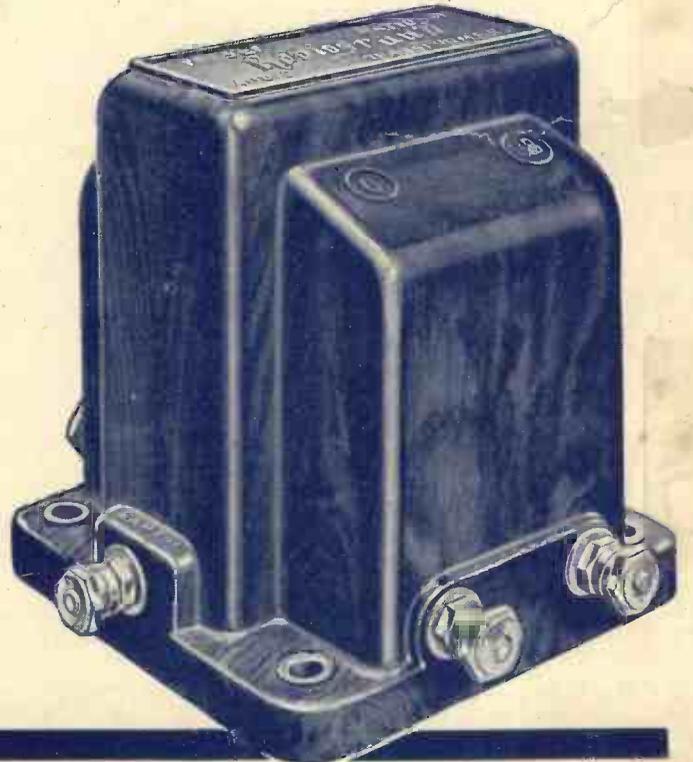
Ratios 3-1 and 5-1.

"RADIOGRAND" - - - 12/6

Ratios 3-1 and 5-1.

"RADIOGRAND" - - - 17/6

Super Ratio 7-1



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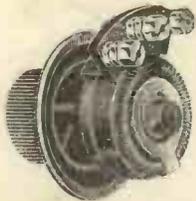
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*As some of the arrangements and specialities described in this Journal may be the subject of Letters Patent the amateur and trader would be well advised to obtain permission of the patentees to use the patents before using so*

Edited by **NORMAN EDWARDS.**  
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 Scientific Adviser: **J. H. T. ROBERTS, D.Sc. F.Inst.P.**

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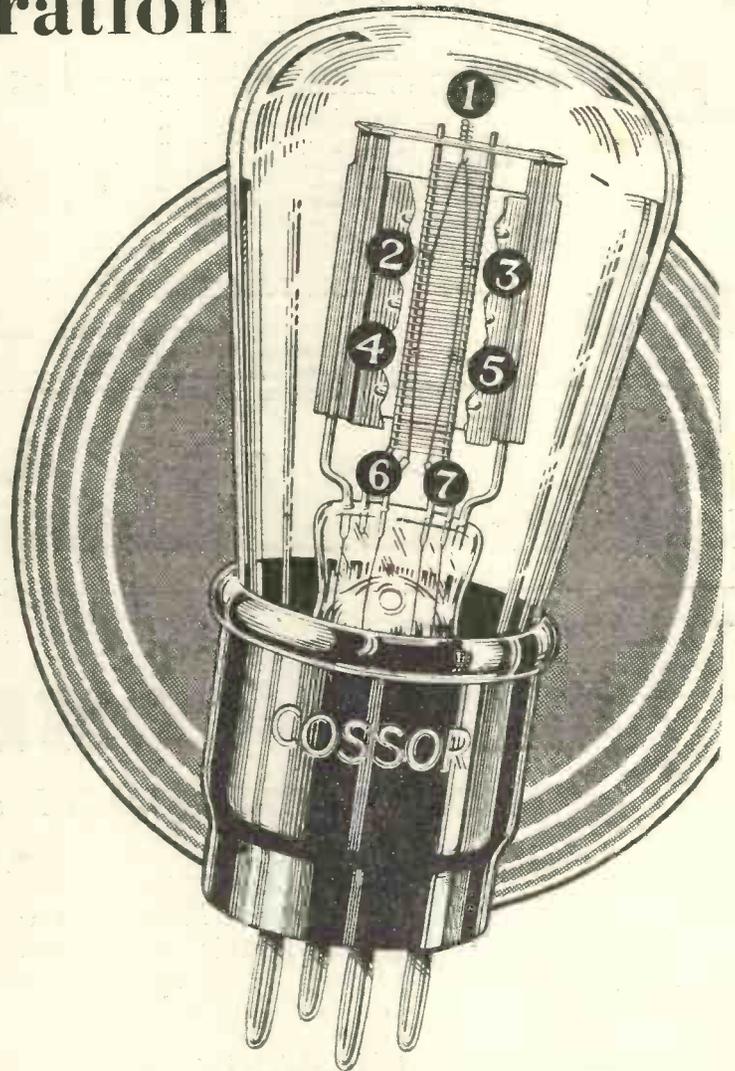
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 Midget Switch  
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# Seven point suspension *definitely prevents* filament vibration

—the primary cause of  
microphonic noises

The cause of microphonic noises in a Receiving Set is generally to be found in a faulty Detector Valve. Usually it is due to filament vibration. The new Cossor Detector Valve (210 Det.) has been specially designed to overcome this fault. Filament vibration is rendered impossible by a new method of seven point suspension. The diagram shows the four insulated hooks which secure the filament in position and damp out any tendency to vibration. The use of this "steep slope" Cossor Detector Valve not only eliminates microphonic noises, but ensures great volume with exceptional purity of tone.



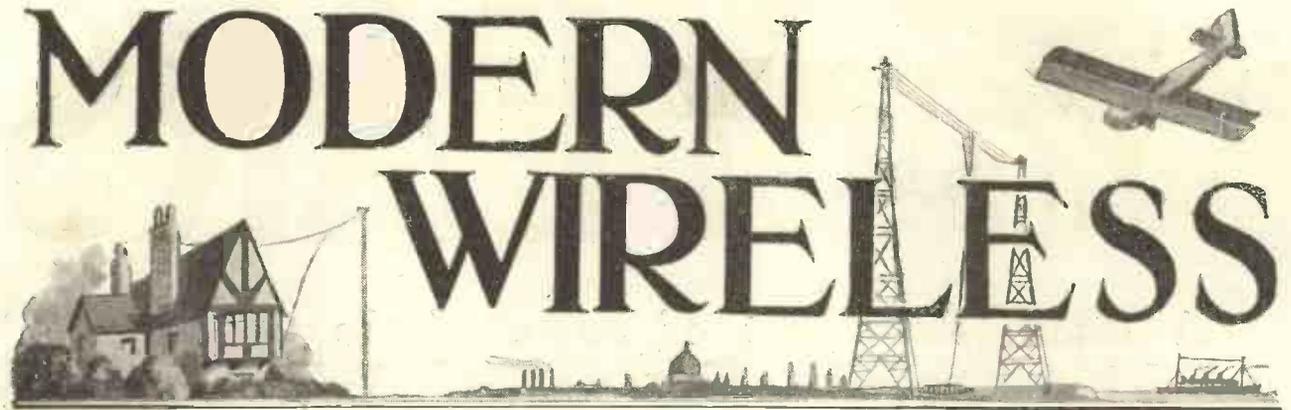
The New Cossor 210 DET.,  
2 volts, .1 amp. Impedance  
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15. Mutual Conductance  
1.15 m.a./v. Normal working  
Anode Voltage 8/6  
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THE NEW  
**COSSOR**  
**DETECTOR**

**DEFINITELY FREE FROM MICROPHONIC NOISES**

# MODERN WIRELESS



Vol. XV. No. 49.

JANUARY, 1931

*A Departure in Designs—A Set in a Loud Speaker—The New B.B.C. Handbook—The Question of an Opera Grant.*

## *A Departure in Designs*

THE "Triple" Two, which is fully described in this issue, is a first-class set in which the "M.W." "Star-Turn" and "Interwave" principles are combined, and the new "M.W." coil unit is used. A better two-valver it would be difficult to imagine.

Despite its comparatively simple, inexpensive construction, this set has power and selectivity out of all proportion with its size. None of those little troubles encountered in two- or three-valve sets, such as "breaking through" on long waves, are met with.

Now this set is described in *three* forms; there is a battery-valve model, a D.C. version, and an A.C. model, so that *whatever* your power supply, or even if you have no mains, it is suitable for you. It has, of course, an efficient wave-change, and is in every way a right-up-to-the-minute product.

## *A Set in a Loud Speaker*

THE "L.S." Three is a radical "breakaway" in set design for the home-constructor. It looks like a loud speaker, and it *is* a loud speaker—with an efficient "M.W." three-valver built into it.

\* \* \*

THE "Super-Simple" A.C. Mains Unit is an A.C. version of the successful D.C. unit we described last month. It is a scientifically simplified design in which expensive components have been saved without sacrificing efficiency.

\* \* \*

THE "M.W." Four is a 2 S.G., Det., L.F. set, extremely powerful and extremely selective. Its circuit includes several special "M.W." features.

## *The New B.B.C. Handbook*

IT is pointed out in the B.B.C. Handbook for 1931 that broadcasting is entering on a phase of development in which its needs in the way of revenue and capital expenditure are bound greatly to exceed its present financial resources, and it is obvious that some of the

existing limitations of its resources will have to be overcome very shortly if its progress is not to be unduly impeded.

The statement is in reference to the fact that out of the licence revenue last year of £1,470,000, £183,750 was taken by the Post Office for collection and £341,949 by the Treasury, leaving the Corporation an income of £944,301. Last year the Corporation received 6s. 5d. from every 10s. licence, as against 6s. 8d. the previous year.

These figures bring home again, with extra emphasis, the very unsatisfactory conditions which exist in connection with B.B.C. finance. The licence fees paid by listeners should be devoted *entirely* to broadcasting, and if the B.B.C. finds its resources insufficient next year we hope that steps will be taken to make the Treasury disgorge.

## *The Question of an Opera Grant*

IT now seems—as we go to Press with this number of "M.W."—that the opera grant from the Treasury (that is, from the fund formed by the Treasury out of listeners' licence money) will have to receive parliamentary sanction.

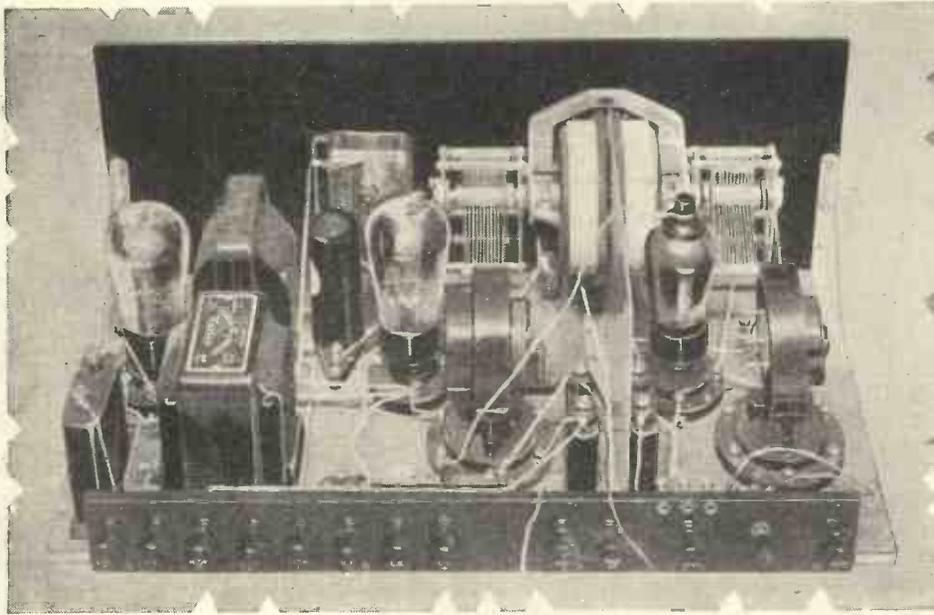
And it may not get it. Political prejudice and a good deal of ignorance and general misrepresentation have combined to create an aura of hostility around Mr. Snowden's opera scheme. His idea of letting listeners get some real value for their share of the licence money held by the Treasury has been met with rebuff from many quarters, and so intense has been the adverse propaganda—mainly based on the erroneous assumption that the Treasury would be paying out "taxpayers'" money—that it is quite on the cards the scheme will be dropped. In which case the Treasury fund formed out of licence money remains untouched—and the listener suffers because he gets no return on his money.

The B.B.C. may find *all* the money for this opera scheme out of its allotted income. If it does it will be spending more on opera than it should. What with a £100,000 British National Orchestra, the Regional Scheme, and one or two other such trifles, it's easy to see why the B.B.C. income is not by any manner of means sufficient for its needs.



# The YEARS

*A Radio Retrospect of Some of the Out-*



A  
*Fascinating  
Summary*

**D**URING the last twelve months steady progress has been made in perfecting the technical details of known types of circuit as well as in the manufacturing methods used in assembling sets ready for the market. On the whole, it would be fair to say that there have been many useful, but few startling, innovations, with the possible exception of the Stenode Radiostat receiver, which stands in a class by itself.

As regards the general run of broadcast receivers, last year's standards have definitely been surpassed. In the first place, there is a welcome reduction in price. This is due to a large extent to improved methods of manufacture—particularly to the use of mass-production methods—but it has also been helped in part by the recent "cut" in the price of three-electrode valves.

### *Cheaper and Better Sets*

One result is that the simplest form of loud-speaker set is now within the reach of thousands who had previously to be content with crystal and headphones. Alternatively, a

listener is now able to receive Continental programmes on a loud-speaker set which costs no more than he formerly had to pay for the privilege of listening to the local B.B.C. station.

Quite apart from cost, however, the general level of performance has been raised both as regards selectivity and quality. For instance, the ability to separate the London National and Regional programmes is now regarded as a minimum qualification, and not as the hall-mark of selectivity.

### *Modern Selectivity*

Stabilised high-frequency amplification has reached the stage where the range of a set is practically limited only by the background of static noise—which must inevitably mask the more distant signals. Similarly, the problem of selectivity is no longer so much a question of receiver design as of maintaining law and order in the ether. So long as two transmitting stations do not actually heterodyne each other, the modern set is capable of separating them for the loud speaker.

The new Stenode Radiostat receiver claims to go even farther than this. The generally accepted limits of selectivity are based upon a minimum frequency gap of nine kilocycles between two different programmes; this being necessary to prevent overlap between the side-band fringes. With the Stenode system, stations separated by only a few hundred cycles can be heard without mutual interference.

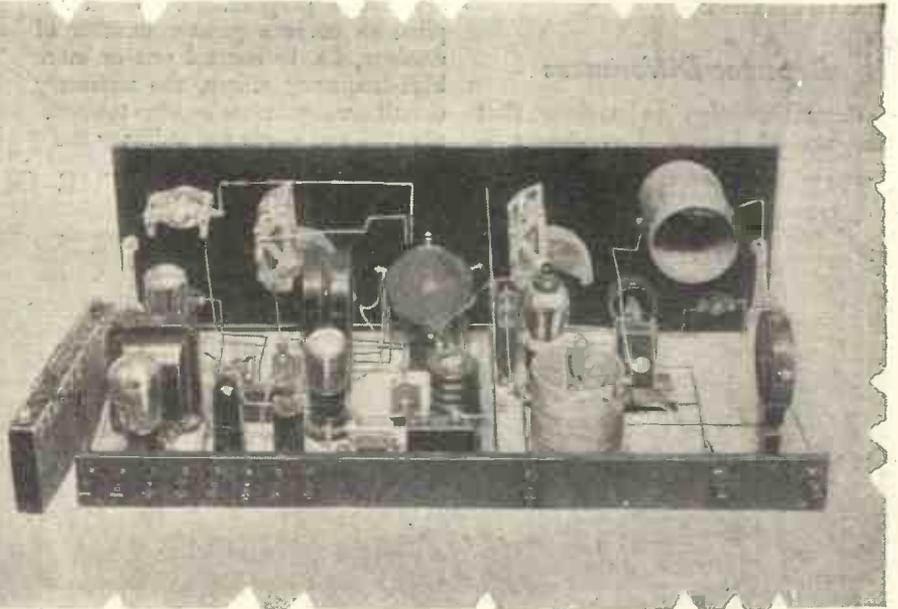
This extraordinary result is secured by passing the incoming signals through a sharply tuned circuit, controlled by a piezo-electric crystal, so that the frequency band is reduced to very narrow limits. By forcing the signals to pass through this narrow channel some of the essential side-band frequencies must be cut out, or at least reduced to very small proportions.

### *The Stenode Radiostat*

In order to readjust matters, the sharply tuned "gate" or filter is followed by a special "shaping circuit," which restores the high-frequency notes to their original value and so gives a properly balanced reproduction of the original signal.

# PROGRESS

*standing Advances Made During 1930.*



*By*  
**F. GILLETTE.**

Since the crystal "gate" is tuned to a fixed frequency, it is necessary to convert incoming signals to this frequency by using an input circuit of the super-heterodyne type. Of course, this is bound to make the entire combination pretty expensive.

### *A Simpler Form*

There is a simpler form of Stenode circuit in which the crystal "gate" is replaced by an ordinary sharply tuned circuit which is subjected to periodic phase-reversals by a local oscillator. Although less expensive than the first arrangement, this has been found to give highly satisfactory results.

At the time of writing neither form of Stenode circuit has yet reached the open market, so that it is difficult to say how it will compare in the hands of the ordinary listener with, say, the performance of a standard super-het or other known type of highly selective receiver.

Incidentally, there are signs that the super-heterodyne circuit is coming back into favour on its own merits.

It is admittedly one of the most selective circuits known, but has previously been handicapped on account of expense.

Conditions are more favourable now that the cost both of valves and of patent royalties has been reduced, and the problem of H.T. and L.T. supply simplified by the use of the mains, so future prospects appear promising.

The superiority of many modern receivers is due to the fact that they are mains-driven. The operating voltages are consequently higher than those derived from dry-cell batteries.

Also, mains-driven valves work on an equi-potential cathode, and can be designed to give a higher "figure of merit" than the battery-driven type.

### *Mains-Driven Sets*

Generally speaking, a three-valve set worked from the mains is equal to a four-valve circuit depending upon batteries. From another point of view, the use of the mains will in general give the same range of reception on an indoor frame as

can be secured with an equal number of valves fed from an outside aerial.

The gradual disappearance of the garden pole is, in fact, one of the signs of the times. As more and more listeners change over from batteries to the electric supply the outside aerial should vanish from the scheme of wireless, to the immense satisfaction of most listeners.

### *Quality First*

The portable set—the first to be independent of the outside aerial—seems to be waning in favour, chiefly on account of the expense of continual battery replacements. Its place is being taken by the so-called transportable model, adapted to be driven from the mains and to work on a frame aerial, but made sufficiently compact to be moved from room to room as desired.

There is a growing demand for sets designed from the point of view of "quality first," designed not so much for receiving distant stations as for getting the highest possible musical response from,

## Power Detection and Band-Pass Filters

say, the National and Regional stations.

In such a set special care must be given both to detection and to the low-frequency stages. Until recently anode-bend rectification was favoured by the majority of designers as being less subject to distortion than the grid-leak and condenser. This year has, however, produced an interesting innovation in the form of "power" grid rectification.

### Detector Differences

Careful investigation has shown that the use of leak and condenser is

to be found in many of the new models. Instead of having to turn one or more tuning condensers, the circuits are so arranged that the simple operation of a tumbler switch is sufficient to change from one given station to another. This method of tuning is comparatively inexpensive and "fool-proof."

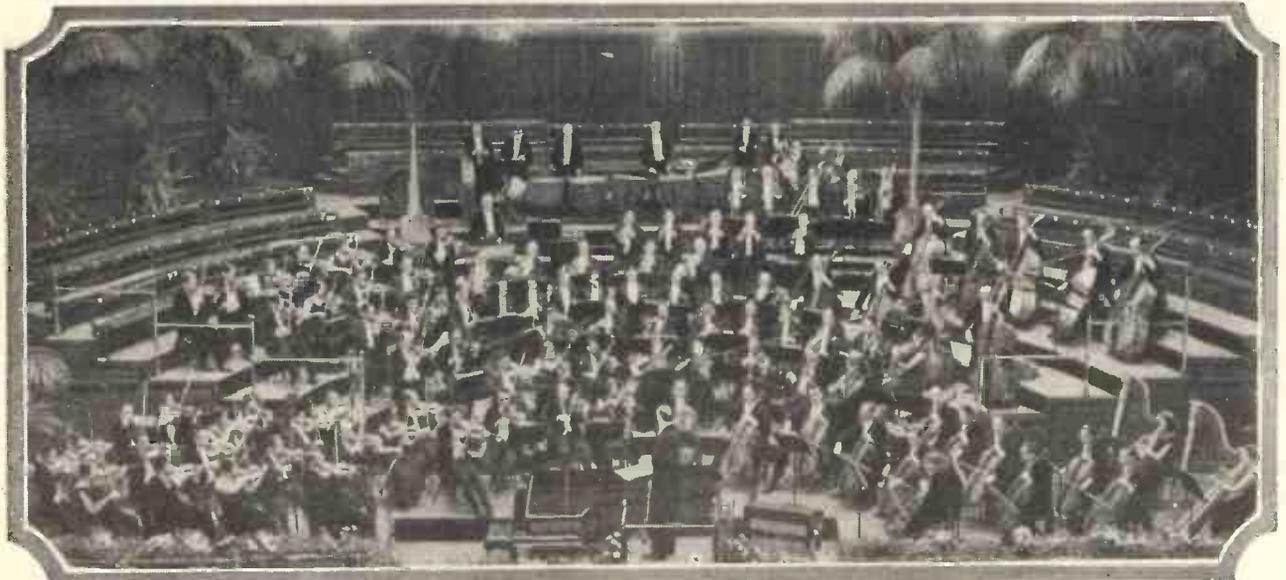
It is particularly suitable for short-range sets designed to give, say, two alternative programmes. When applied to cover a greater number of stations, i.e. to control one or more high-frequency stages, the necessary circuit arrangements become too complicated and costly for ordinary use.

It is generally thought that selectivity and quality are, to a certain extent, opposing factors. If a set is designed to give a very high degree of selectivity, it must necessarily fall short in quality, and vice versa. The reason is that for selectivity one must make use of very sharply tuned circuits, which inevitably cut off some of the side-band frequencies, and so reduce the higher musical notes.

### Band-pass Coupling

It is now possible to produce sets having a comparatively high degree of selectivity without making any sacrifice as regards quality. A band-

## THE WIRELESS SYMPHONY ORCHESTRA AT THE QUEEN'S HALL, LONDON



One of the great achievements of British broadcasting during 1930 was the formation of the Wireless Symphony Orchestra. Consisting of 114 players, this combination has already made a great name for itself, and promises to become a prime favourite with listeners on the Continent, as well as in this country.

capable of giving even better results than the heavily-biased grid necessary for anode rectification. A higher voltage is now applied to the plate of the detector valve, whilst the values of grid condenser and leak resistance are reduced, so that none of the musical frequencies are lost. The result is the new "power" grid rectifier, as incorporated in many of the latest mains-driven sets.

Switch tuning is another feature

As a matter of fact, the tuning of multi-stage amplifiers has now been so simplified by methods of "ganged" control that there is little justification for an expensive system of switch control.

### Simplified Tuning

A large proportion of the long-range sets now on the market are controlled from a single knob, and can easily be handled by the most inexperienced listener.

pass input circuit accepts not only the carrier-wave, but also the essential fringe of side-bands.

In this way all the transmitted musical frequencies are fed into the detector valve and reappear in the loud speaker. At the same time, the cut-off action of the band-pass is sufficiently sharp on each side of the carrier and side-bands to prevent interference from any station which does not actually heterodyne the programme being received.

## Look out for NEXT MONTH'S Enlarged Number.

THREE SPECIAL SUPPLEMENTS AND ANOTHER GIFT BOOK!

"Making Your Own Loud Speakers" ❖❖

"The "M.W." Kit Set Review" ❖❖

"Modern Radio Components" ❖❖

50 More Guaranteed Circuits

On Sale January 31st. 1s. 6d.

Order Your Copy Now.

# The "SUPER-SIMPLE" A.C. MAINS UNIT

Has the need of the home-constructor with regards to mains units been neglected by many set designers? It would appear so judging from the complicated mains units one often sees. Here is a really simple all-power unit that will appeal to all set owners having A.C. mains.

Designed and Described by the "M.W." Research Dept.

THE "Super-Simple" H.T. unit for D.C. mains which we presented last month seems to have been something of an eye-opener to a large section of our readers. (We rather thought it would be!)

For so long has it been assumed that a mains H.T. unit for home-construction must be elaborate and expensive, copiously de-coupled and

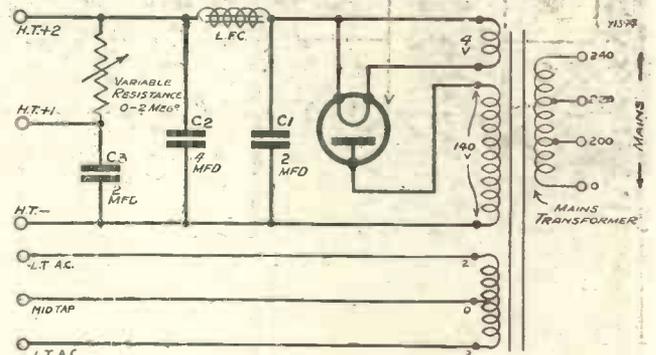
prices at which many manufacturers now offer them. Why, then, should not the home-constructor be provided with designs for units which he can make up proportionately cheaply?

That was what we set out to do when we embarked upon this programme of strictly practical, simplified mains units and mains-operated receivers, and it is gratifying to note that a good proportion of our readers have been quick to appreciate the soundness of the arguments we set forth last month.

It was only to be expected that we should receive an immediate demand

for a similar simple and inexpensive H.T. unit for alternating current mains, and for that demand we duly prepared. The A.C. instrument was actually built simul-

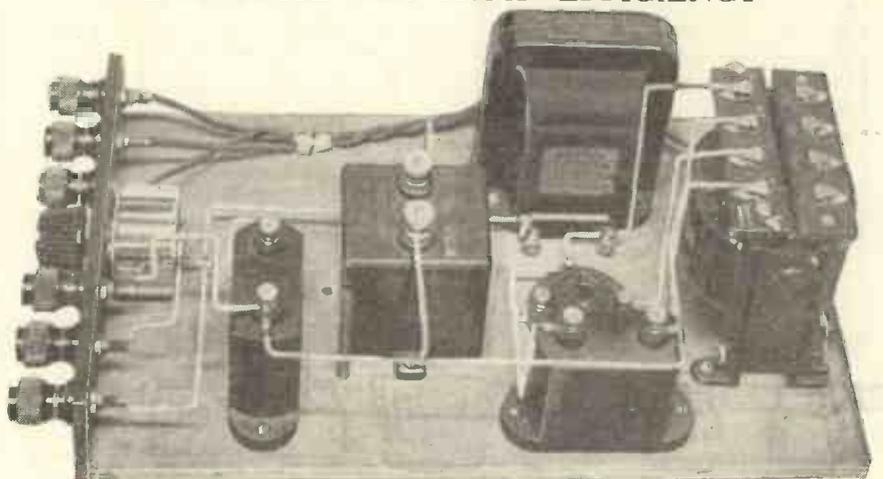
## "ALL-POWER" SUPPLY



Few components are required to build this remarkable unit.

taneously with its D.C. sister, and held in readiness for the need we knew would arise.

## LOW PRICE BUT HIGH EFFICIENCY



Nothing much in it, is there? And yet the results it will give will surprise you, for a perfect all-power supply is assured.

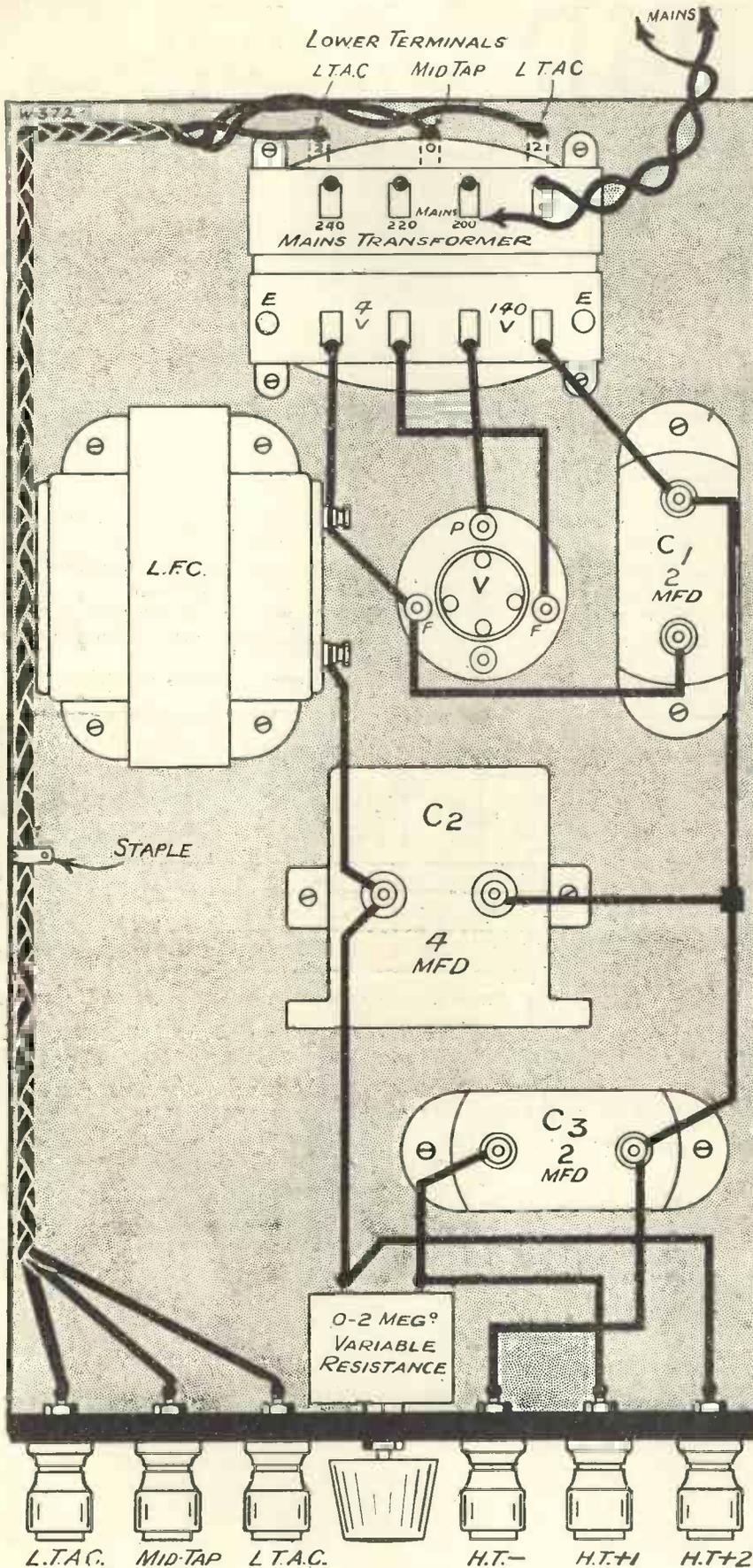
### WHAT'S IN IT

- BASEBOARD**  
12 x 7 in., about 3/8 in. thick.
- POWER TRANSFORMER**  
Half-wave type, giving the following outputs: 4 volts 1 amp. (rectifier filament), 4 volts 4 amps. (centre-tapped), 140 or 150 volts 30 millamps (H.T.). Specify mains voltage and periodicity when ordering (Wearite, or Atlas, R.I., etc.).
- SMOOTHING CHOKE**  
Medium duty type, of about 20 henries (Lissen, or Wearite, Igranic, etc.).
- VALVE HOLDER**  
Ordinary 4-pin type, need not be sprung (W.B., or Igranic, Telsen, Benjamin, Lotus, Lissen, Bulgin, Dario, Magnum, Junit, Wearite, etc.).
- CONDENSERS**  
2 of 2 mfd. and 1 of 4 mfd., working voltage rating of 200 (T.C.C. and Lissen in original, or other good makes—e.g. Dubilier, Ferranti, Hydra, Mullard, Formo, etc.).
- VARIABLE RESISTANCE**  
Atlas Rheograd, "Universat" model, or similar type.
- MISCELLANEOUS**  
Terminal strip, 7 x 2 in.,  
6 terminals (Belling & Lee, or similar insulated type).  
Wire, screws, flex, mains plug or adaptor, etc.

smoothed with extravagant thoroughness, that it appears we are regarded as having taken a very bold step.

### Not Elaborate

We do not agree. Are commercial H.T. units all of this elaborate type? Of course they are not, or they could never be sold at the low



Quite likely many readers with A.C. mains will have paid only passing attention to the D.C. model, so for their benefit we will just explain as briefly as possible what it is all about.

It began in this way. We were reviewing the whole question of mains units and all-mains sets for our 1930-1931 programme, and we came to the conclusion that a radical departure from previous practice was urgently required.

### That Big Margin

In the past the guiding principle of the designer of mains sets and units for home-construction has been to allow a big margin of smoothing, and so on, for even the worst possible mains and the heaviest possible loads. All very well as an ideal, but is it practical?

Most decidedly it is not, for observe the result: the average home-

#### WHAT IT GIVES

150 volts max. H.T. Variable det. control. Up to 30 milli-amps max. current. Automatic detector de-coupling.

built H.T. unit has cost so much for parts that it would have been no more expensive to buy a ready-made commercial one!

True, the commercial model of low price very likely would not have been capable of working so well on very bad mains or of running so big a set, but that is a point of no importance to probably ninety-nine per cent of potential users. They don't use very big sets, neither are they cursed with phenomenally bad mains. This tremendous margin of "safety" has merely been something which meant heavy expense and no particular benefit so far as they were concerned.

### The Reason

Why designers of home-construction units should thus concentrate on an enormous margin is obvious enough. They have been desperately afraid of the consequences of someone with very bad mains and a big set building a small unit.

They knew that the bad results which would follow might be attributed to their lack of skill, and so would reflect upon the journal in which the design appeared. While this frame of mind is easy to understand, it has produced a most grievous neglect of the needs of the average constructor.

## Smooth, Silent, and Safe H.T. Supply

He, of course, uses a receiver of only moderate size, and seeing nothing but unit designs capable of running five-valvers, and correspondingly expensive, he has been driven to the purchase of a commercial unit of the modest type and price he wants. He has consequently been missing the pleasure and interest of building his own mains gear in the same way as he builds his receiving equipment.

So much impressed were we by the importance of the matter that we determined upon a complete break-away from previous ideas. If there is an element of risk in so doing, we accept it gladly in the interests of what we believe to be a very large section of our readers.

### A Series of Units

This is what we have decided to do: we are presenting a series of units and all-mains sets in which the margin is only sufficient to cover with just a reasonable surplus the needs of the *average* user.

To guard against the risk of disappointment due to too much being expected from these designs, we shall explain very carefully and definitely the exact types of sets they are intended to serve. We believe that if we do this with painstaking accuracy we can trust to the good sense of our readers to see that there is no trouble.

We are making a start with a pair of H.T. units for sets of the following types: single-valvers, two-valvers of the detector and one low-frequency type, three-valvers of the "det. and 2 L.F." variety. These they will serve satisfactorily, but *no others*.

The model for direct-current mains we described last month, and now comes the alternating current equivalent. This is, naturally, a little more elaborate, because it is necessary to rectify the alternating current before it can be smoothed and delivered to the set, but its general lines are very similar.

### "Humless Operation"

It is intended for precisely the same types of sets, and gives a similar output. With receivers of the specified classes it will give efficient and humless operation, and there need be no fear of any difficulties of any kind.

It is exceedingly inexpensive and easy to construct, very simple to adjust, and its running costs are so low as to be negligible. It will give

up to 30 milliamps of current, which is more than ample for sets of the types it is intended to serve, and it has two separate positive output terminals.

One of these (H.T. + 2) is intended for the L.F. and power valves in the receiver, and gives a fixed output of round about 150 volts. The other (H.T. + 1) gives adjustable voltages of the usual range required for the detector valve, and this includes a voltage-adjusting device which also serves as a de-coupling filter for the prevention of motor-boating.

The extreme simplicity of the unit you will readily gather from the photos and diagrams, but its efficiency in operation we must explain here. It is indeed so simple that you may be inclined to wonder how it can possibly give hum-free working!

The explanation of the puzzle is to be found very largely in the fact that half-wave rectification has been used.

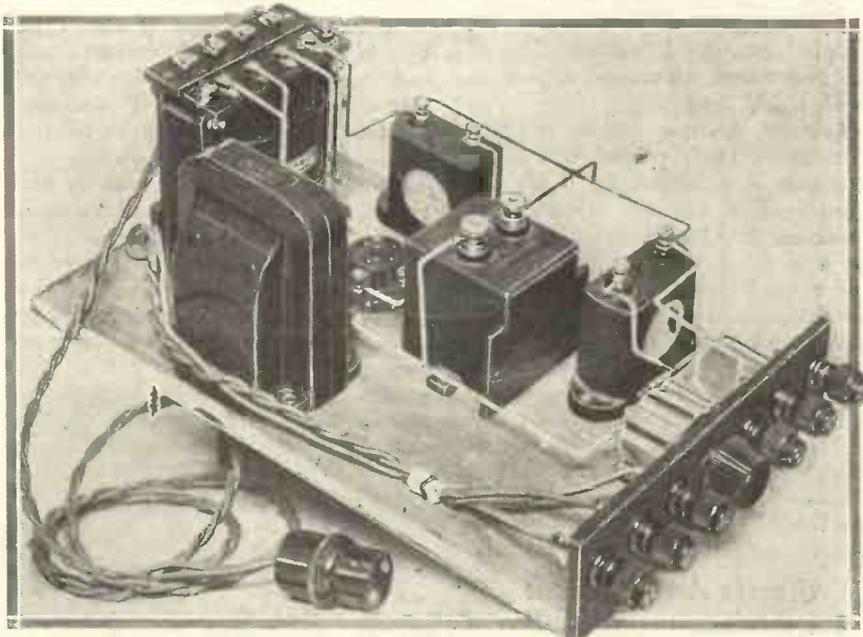
The result is that after some experimenting with values we found we could get rid of hum in the present unit with only one choke and a total smoothing capacity of only eight microfarads.

### L.T. as Well as H.T.

The way these smoothing devices are arranged you will see in the circuit diagram. Across the output of the valve there is a 2-mfd. condenser, then comes the choke and a condenser of 4 mfd. These parts constitute the main smoothing filter, but the resistance and condenser which form the combined voltage adjuster and de-coupler for the detector also serve to provide that valve with a little extra smoothing.

So much for the functioning of the unit as a supplier of H.T. It has another use, and that is to supply the necessary low-tension alternating

### THE RUNNING COSTS ARE NEGLIGIBLE



This little unit is inexpensive to build and to run, and will provide up to 30 milliamps of properly smoothed H.T. current—more than ample for the majority of home-constructed receivers.

There is a good deal of misapprehension about this method of rectification, for many people infer from its name that it is something inefficient, only used because of its cheapness.

The fact of the matter is, on the contrary, that where only modest outputs are required it permits *simpler* smoothing circuits to be used than are required in a full-wave circuit!

current for the heaters of A.C. valves of the "indirect" type.

On the power transformer you will find another winding, giving a supply of alternating current at 4 volts, sufficient for up to four A.C. valves. This has a centre-tap, and its three terminal points are connected with flex (one double lead for outer points

(Continued on page 106.)



An intriguing experiment that radio-gram owners should try.

By HAROLD E. COWLEY.

WE have within the past few years noted, and perhaps enjoyed, one of the biggest advances made in the gramophone industry since the advent of the disc itself. I refer to electric recording.

The next step forward—and undoubtedly an obvious step—was the production of the electric reproducer.

### "Concert Hall" Atmosphere

It will often be found, however, that electrical reproduction is often inclined to give prominence to the bass, while mechanical instruments are somewhat "high" toned. A combination of the two would, therefore, appear to be an ideal.

Another feature found to give pleasure to most people is a slight existence of echo, for by it we can more readily visualise "space" or "Concert Hall" atmosphere. These three features, all of which can be under control, are secured by the simultaneous reproduction of a single gramophone record by both electrical and mechanical means.

The apparatus needed is not extraordinary, and, other than one adaptor, will be found in the possession of most wireless experimenters.

The first essential is a good mechanical gramophone. The others a pick-up, amplifier and loud speaker.

### Simple Arrangement

The simultaneous reproduction of a gramophone record by both electrical and mechanical means should excite no fear, but its synchronisation may give rise to speculation. However, seeing that echo is also sought, then the problem resolves itself into the simple arrangement of allowing a gramophone sound-box closely to follow a pick-up in precisely the same record groove.

Although I have suggested that the sound-box should be the follower, it has been found that the louder of the two systems is best given the lead in

order to obtain the most pleasing results.

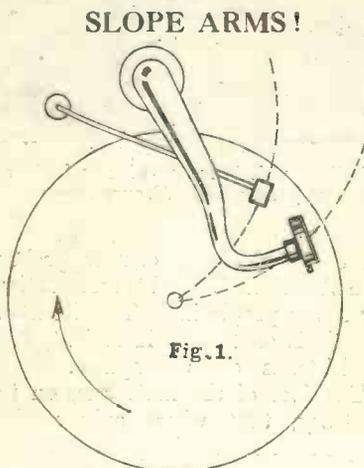
### Spacing the Needles

Experiments have shown that the two needles may be from one inch to one inch and a half apart, without fear of securing a ludicrous effect.

Broadly speaking, there are two methods of supporting the two "pick-up" units. They may be held by one arm—the tone-arm, or the alternative is an independent support for the electric pick-up.

In the case of the former, some type of adaptor would be necessary, and owing to the immense number of tone-arm designs in existence it is wholly impossible for the writer to offer a fixed solution applicable to all.

In the event of a decision to use two carrying arms—and maybe such a decision is wise—an important fact comes to our assistance. I refer to the difference in linear speed of the grooves at the outside of a record to those at the centre. The linear or surface speed, i.e. track passing the needle in a given time, is approximately three times greater on the outside groove than that on the inside



One way of arranging the sound-box and pick-up arms.

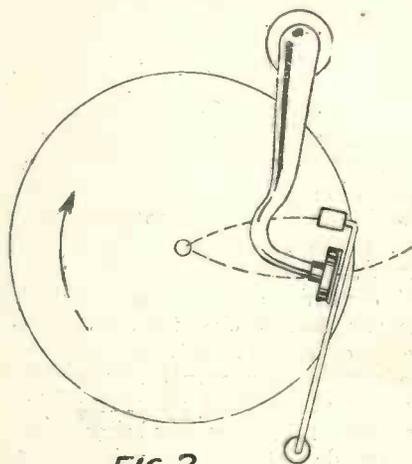
groove, and therefore the space occupied by a similar note is three times greater at the periphery than at the centre.

### Approximate Distances

It will follow that in the case of a decision to run the pick-ups 1 in. apart, we can, with greater efficiency, give a 3-in. gap at the beginning, and 1 in. at the end.

Having now decided upon the spacing, the actual layout becomes simple, and would somewhat resemble the illustration at Fig. 1. Should any difficulty be experienced by the fouling of the two arms, then a special bent arm for the electric

### ANOTHER WAY



It is necessary to get the two needles fairly close together in the same groove. Here is another method of arranging the two arms.

pick-up would not be difficult to procure.

In special cases it may be necessary to mount the arm in the opposite direction to that usually employed, as in Fig. 2. In this case care must be taken to reverse the pick-up in order that the needle continues to meet the record at the usual angle.

### The Synchronised Start

To obtain a synchronised start, both needles should be held on the plain edge of the record, and then gently and simultaneously moved into the first groove.

Some discretion should be used in the choice of suitable records for dual reproduction. It is not suggested that every record is improved by this system of playing, but very pleasing results can in most cases be secured.

This scheme can also be used with a certain amount of effect employing two pick-ups (in parallel or series) on a radio-gram set.



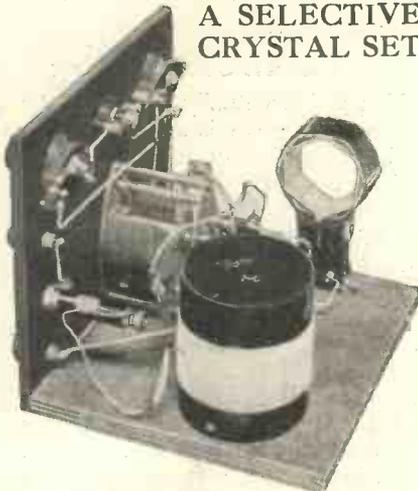
# CHOOSING YOUR CIRCUITS

*With each copy of "Modern Wireless" this month is given away a free book containing 50 Guaranteed Circuits. In addition to the data provided in that book the following notes on circuit choice may be useful to the prospective constructor.*

A .0005 variable tuning condenser works in just the same way whether it is used in a simple crystal set or an elaborate five-valver. It is not necessarily the components used which give a circuit its individuality, but the manner in which they are arranged.

To rough-out a circuit which will give some sort of results does not

## A SELECTIVE CRYSTAL SET



You will find the circuit of this set in Diagram No. 3.

require a very advanced knowledge of radio. But to draw up a really efficient circuit that can be guaranteed to give good results under specified conditions is the work of an expert.

It requires an extensive knowledge of the relations of one component to another, and what values to employ to obtain certain effects. Mathematical calculations are often necessary, and sometimes practical experiments of the "trial and error" type have to be made.

## Combining Ideas

But once a set of tried and tested circuits are available the constructor can often combine an idea in one with a scheme in another, and so produce a circuit to meet his requirements exactly.

It thus becomes apparent that the value of the information contained

in our special presentation book this month is far, far more even than that of 50 different circuits alone.

## Inside History

Of course, to make the fullest use of these circuits a certain understanding of the composition of circuit diagrams, and their transition into actual receivers, is required. It is the purpose of this article to tell you something of the "inside history" of a circuit.

Not only should it enable you to obtain the utmost value from "50 Guaranteed Circuits," and to choose an arrangement to suit your requirements, but will help you to get a lot of interest out of any circuit diagram you may come across.

First of all, a few words about the way to go about choosing a circuit for some set you want to make up. Don't go about it in a haphazard manner.

Some constructors are rather inclined to be led astray by the appearance of a completed set. If you

want a powerful set, don't choose one just because it has a large number of valves, or many controls on the panel.

On the contrary, if you want a simple receiver for the local programmes, don't go for a set just because it has few controls or appears to have little inside it. In this way you may get just the opposite to what you require.

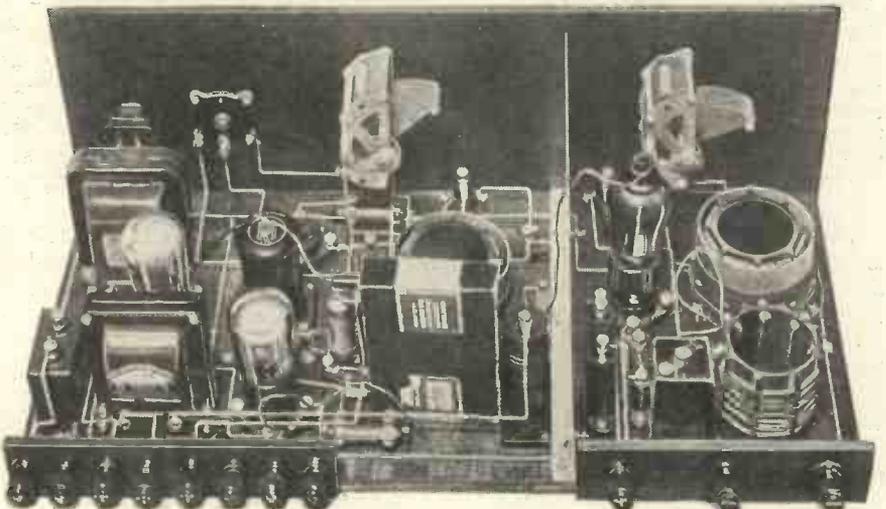
You must get right down to vital points, and these are shown in a clear manner in the circuit of a receiver.

## Here is a Suggestion

Before you attempt to choose a circuit, jot down your requirements on a slip of paper. Let us work through a possible instance, and you will then get the idea right away.

We will suppose the requirements are as follow. The set is to work a loud speaker at sufficient strength for a moderate-size living-room. Good quality is naturally required, and some Continental stations must come in sufficiently well to provide entertainment.

## AN IDEAL GENERAL-PURPOSE RECEIVER



An up-to-date four-valver using dual-range coils and a screened-grid valve. Note how the screen (shown as a double line in Diagram No. 38) is arranged between the H.F. and Det. sections of the set.

The set is to be a "home" receiver, and therefore moderately easy to control. Lastly, the set is limited to three valves because of the question of expense.

Well, here goes! The last point has decided the number of valves, so we turn to page 8, where the three-valvers start.

We do not want to use a pick-up, or to work on short waves, mains are not available, and the set is not to be a portable.

### Narrowing Things Down

These points crop up as we look through the circuits and automatically narrows down the number to choose from.

Then we note that many of the circuits have wave-change switching, and realise that this is desirable. Our choice is now narrowed down to about six circuits, when we note that some circuits are mentioned as being extra selective.

sirable for distance work, we choose Circuit No. 28.

So far we have not considered the question of ease of control. On checking this up we find there are two tuning condensers and a reaction condenser to operate. This is O.K.

The .001 series aerial condenser once set can be forgotten, the variable resistance in series with the screening-grid H.T. lead is simple. The potentiometer, like the series aerial condenser, once set can be forgotten.

It helps to give smooth reaction and thus simplifies distant reception. So all is well, but how about turning out a practical version?

If you are to turn the circuit into a really reliable and efficient receiver you must be able to read your circuit intelligently.

### An Interesting Diversion

Here, by "read" we do not mean merely being able to recognise the component symbols and their con-

ceded to find to what section of the circuit it belongs.

You find one side of it is joined to the plate of a valve, and the other to a coil which is coupled to the valve's grid circuit. Therefore this condenser provides some sort of variable coupling between the plate and grid circuits of the valve.

"If you want a powerful set don't choose one just because it has a large number of valves or many controls on the panel you must get right down to the vital points."

Naturally, you immediately think about reaction, and a look at the plate circuit of the detector valve, where reaction arrangements are usually found, confirms this; for the half-expected reaction condenser is absent. This leads you to wonder why.

### Circuit Sections

You will eventually solve this by noting that there is no coil in the grid circuit of the detector valve to which a reaction coil could be coupled. This will lead you to note that both the S.G. stages are aperiodic.

And so we could go on giving instances of how to analyse a circuit. Actually, the idea to keep in mind is to split the circuit up into sections, such as grid circuits, anode circuits, filament circuits, and so on.

A tuned circuit practically always takes the form of a coil with a variable condenser across it, and you will be able to pick out such circuits in the simple crystal sets as well as in the multi-valve circuits.

Grid circuits should always be traced from grid to filament, and anode circuits from anode to filament.

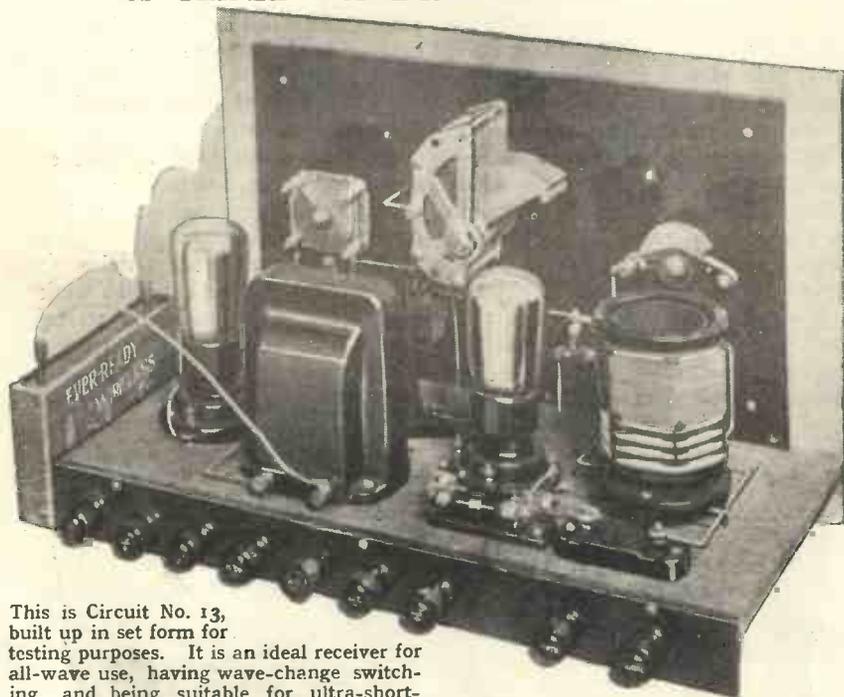
Of course, you must remember whether you are tracing an H.F. circuit or an L.F. one, as the different currents are mainly dealt with by different types of circuits. An illustration of this is given in Circuit No. 16.

### To Separate Paths

Consider the anode circuit of the detector valve. The anode circuit for H.F. currents is via the differential reaction condenser and reaction coil to filament, whilst the L.F. anode path to filament is through the H.F. choke, L.F. transformer primary, and H.T. battery in series.

The same principle of splitting a circuit up into sections and following out one section at a time applies to

## A TRIPLE WAVE-RANGE RECEIVER



This is Circuit No. 13, built up in set form for testing purposes. It is an ideal receiver for all-wave use, having wave-change switching, and being suitable for ultra-short-wave reception as well.

We rule these out because our set is to be used out in the country well away from "swamp" areas. This leaves us Circuits Nos. 20, 24 and 28.

Good quality applies to them all, for we know every set in the booklet is up to standard in this respect. What about Continental stations?

Another look at the circuits tells us that Nos. 20 and 24 are det. and 2 L.F. arrangements, whilst No. 28 has an S.G. H.F. stage. High-frequency amplification being de-

nections, but being able to separate the various sections of the circuit and work out the whys and wherefores of things.

Puzzling out the reasons for things is extremely interesting, and will give you a remarkable insight into the working of radio apparatus.

For instance, what is that neut.-type condenser doing to the left of the screen in Circuit No. 39?

It can't be to neutralise, because an S.G. valve is employed. So you pro-

## A Wonderfully Varied Selection of Designs

all circuits. It is equally applicable to single-valvers and multi-valvers.

Once you have thoroughly grasped these essential ideas you are half-way to being able to "read" a circuit as easily as an expert set designer.

It is quite easy to pick up the idea, even if you are at present able only to

### LISTEN ANYWHERE!



This portable was built from circuit No. 31. It is an excellent three-valve self-contained receiver capable of providing extraordinarily fine results.

recognise a few symbols. "Fifty Guaranteed Circuits" gives you a fine opportunity to practise.

You will be surprised how much a circuit can tell you, and eventually you will be able to visualise a set made up from any circuit. You will be able to imagine what results it will give; in fact, you will almost be able to feel your hands on the dials!

There is actually no reason why you should not eventually be able to compose efficient circuits for yourself without reference to any books or periodicals at all.

### Planning Layouts

The splitting of the circuits up into sections will tell you quite a number of things which you must know before you can lay out the components. First of all, you pick out the various components which require continually adjustment.

These, of course, you will mount on the panel, all the others going on the baseboard. You will know which are H.F. components and which L.F. The former require careful separation, and therefore you will allot them the larger part of the baseboard.

The grid circuit components of an H.F. valve must be kept away from those in the anode circuit of the

same valve. Usually a screen of some sort will be placed between these.

In some cases the valve itself will pass through the screen, while in others the flex lead from the anode will pass through the screen. The positions of the screens in the theoretical circuit diagrams show clearly which method to employ.

### Some Wiring Pointers

There are certain leads over which particular care must be spent to keep them short. The most important of these are the grid and plate leads of the H.F. valves and the aerial lead.

Actually, all leads carrying H.F. should be kept as short and direct as possible. All by-pass condensers, whether H.F. or L.F., should be placed as near as possible to the points from which they are to by-pass currents.

Keeping leads short is chiefly a matter of the arrangement of components. A little time spent in shifting components around before-

Wiring-up is merely a matter of joining up the components that are connected by lines in the circuit diagram, paying attention, of course, to directness, and keeping vital leads, such as grid and plate-leads, carrying H.F. currents well away from other wiring.

If you thoroughly understand your circuit diagram you will find it as easy to wire-up from as an actual wiring diagram.

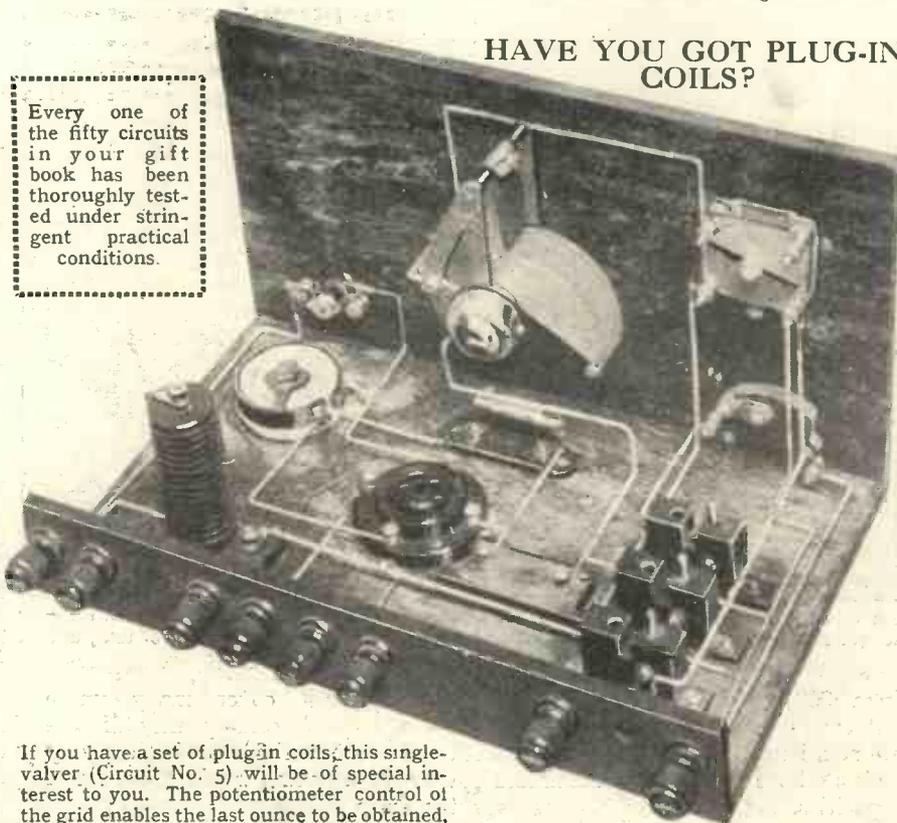
There are a number of points in connection with the circuits given in the handbook which are worthy of special mention. These are, therefore, dealt with in the remaining paragraphs of this article, which contain information that will be especially useful in building up sets from these circuit diagrams.

### Choosing the Coils

You will note that ordinary plug-in coils are used in a large number of cases, and suitable sizes for reception on both medium and long broadcast

### HAVE YOU GOT PLUG-IN COILS?

Every one of the fifty circuits in your gift book has been thoroughly tested under stringent practical conditions.



If you have a set of plug-in coils, this single-valver (Circuit No. 5) will be of special interest to you. The potentiometer control of the grid enables the last ounce to be obtained, and the set is really a very efficient little DX receiver.

hand and trying them in different positions, to find which give the shortest wiring, will be well repaid by good results.

waves are given in almost every case. On comparing the sizes you will note that they are practically the same for any type of circuit.

## Always Check Your Connections Carefully

This fact will enable you to substitute plug-in coils, in many cases, for special types of coils. The coil for a tuned circuit, no matter whether of the plain centre-tapped or "X" type, should be a No. 60 for medium waves and No. 250 for long waves.

### Concerning the Reaction

Coupling coils, whether in the aerial circuit or anode circuit of an H.F. valve, will vary from No. 25 to No. 50 for medium waves, and No. 75 to No. 150 for long waves.

Reaction coil sizes will also vary in the same way, but the smaller numbers will seldom be required. The smaller the size of coupling coil the sharper the tuning will be.

Differential reaction condensers are used in the majority of the circuits, and their values will be found to vary

are given, so that they may be constructed at home. Either the reference letters and figures, or the name of the type, is given for all commercially obtainable coils and coil units.

You will find some circuits which are mentioned as being specially intended for short waves, and others which are suitable for both broadcast and short waves as well. A few lines, therefore, on the essential differences between "broadcast" and short-wave circuits will not be out of place.

### Short-Wave Modifications

Apart from the coils, which naturally have only a few turns, the capacity of the tuning condenser is the most noticeable feature. This must be much smaller for short waves, because on this band a given

(usually .0005 mfd.) in series with the tuning condenser.

This fixed condenser is shorted for broadcast waves. For short waves it has the effect of giving a .00025 variable tuning capacity across the coil. Note that it is connected on the grid side of the variable condenser. This is so that the moving vanes may always be joined to earth or L.T. negative.

### Note this Coil Point

The H.F. choke for a short-waver should be specially intended for working on short waves. On the dual type of set a universal choke which covers short and broadcast waves is needed.

One very important point in connection with the use of "X" coils should be emphasised. It is this, the pin of the holder for the "X" coil must be joined to earth or filament.

If this is not done, the taps on the coil will be at the wrong end, and too much inductance will be included in the aerial circuit. The result of this will be that the selectivity will not be anywhere near up to what it should be.

When wiring up the reaction coil holder you will find that if the connections are arranged so that the grid connection of the tuned coil holder is diagonally opposite the plate side of the reaction coil holder, reaction will be obtained.

The need for reversing connections if reaction is the wrong way will thus be avoided. The above applies quite irrespective of the orientation of the pins and sockets of the holders.

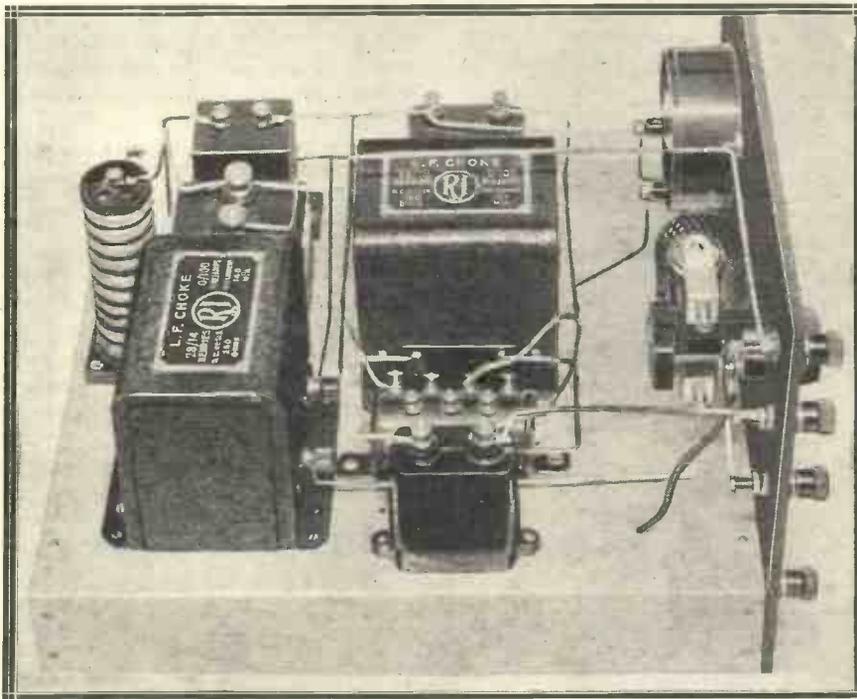
### Transformer Terminal Markings

The usual method of marking the four terminals of an L.F. intervalve transformer is G., G.B., H.T., and P. or A. This marking has therefore been adopted throughout the booklet, but it is not improbable that you might desire to use a transformer which is marked in the older style of I.P., O.P., I.S., and O.S.

If you do you should connect up the transformer in accordance with the following: Treat I.P. as P. or A., O.P. as H.T., O.S. as G., and I.S. as G.B. Sometimes, however, you may get better results by interchanging I.S. and O.S. and/or I.P. and O.P.

Don't omit components because their use is not quite obvious. To do so may mean that the set will become unstable, or distort.

### A PERFECT POWER SUPPLY



Smooth, rippleless power for your H.T. is assured if you use this D.C. mains unit on your set (Circuit No. 40). If you are on A.C., of course, you need another type of unit, and in this case we suggest Circuits Nos. 42 or 43.

from .0001 to .00015. Any of these values will be suitable, the reason they are mentioned being because different makes have different maximum capacities.

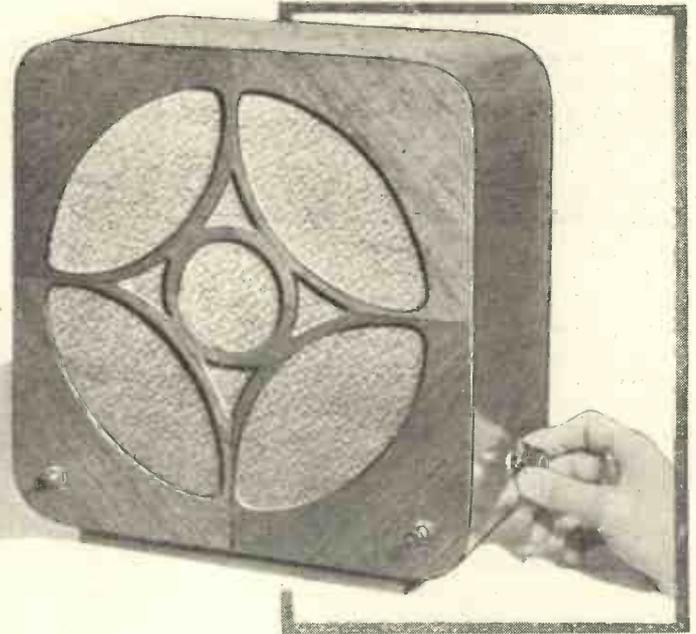
Practically all the types of special coils shown can be obtained completely made-up by radio manufacturers. In the few cases where this is not the case, the sizes of formers, gauge of wire and number of turns

capacity will cover many more stations, and consequently if the usual .0005 variable tuning capacity were used tuning would prove much too sharp.

On special short-wave sets a .00025, or near value, is used for the tuning condenser, which is connected directly across the coil. In circuits for both short and broadcast waves you will find a fixed condenser

# THE "L.S." THREE

Designed and Described  
by the  
"M.W." Research Department.



**H**AVE you ever wished for something a little less conventional-looking than the ordinary receiver, with its plain upright panel and baseboard?

The vertical panel and horizontal baseboard system of construction has many and obvious practical advantages, but it surely does tend to make all sets look alike.

### Too Much "Sameness"

We do not know whether our readers have similar feelings, but we ourselves are certainly getting a little tired of the sameness of appearance which the panel-and-baseboard system produces.

So much so, in fact, that we have been experimenting with all sorts of special ways of making sets, in hopes of finding something as practical as

Here's a surprise set—all packed inside the speaker! It will not only astonish your friends, but the power and purity will surprise you when you test it!

UNIQUE DESIGN      A N D      UNIQUE RESULTS

the panel-and-baseboard scheme, yet having some element of freshness about it.

Very probably the strictly practical constructor will have little sympathy with this point of view, his main concern being with the performance of a set. To the rest of us, however, something out of the ordinary in appearance appeals strongly, and we imagine a considerable body of our

readers will wish us success in our endeavours.

In the course of trying out various different methods of construction we have come across several quite interesting and promising schemes, and practical applications of a number of these will be seen in future issues.

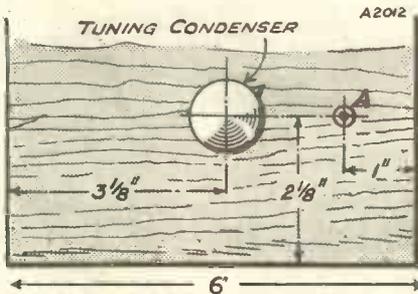
### A Really Novel Set

These, by the way, will not be universal systems of construction, capable of displacing the ordinary scheme of panel and baseboard, but just interesting methods of building one particular type of set which we have chanced upon in the course of our experimenting. The real displacer of the conventional upright panel and horizontal baseboard of equal or superior practical merits is hard to evolve, and we fully expect

## THESE ARE THE PARTS YOU PACK INTO THE LOUD SPEAKER

NOTE.—Alternative components of good make may be substituted if desired in this list, but care must be taken to see that they are of suitable dimensions.

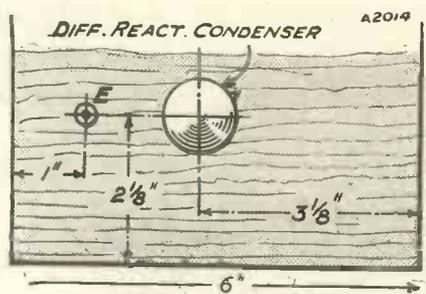
- 1 .0005-mfd. Brookmans condenser (Ready Radio).



The tuning control is on the side of the cabinet, as shown in the photograph above.

- 1 .0001-, .00013-, .00015-mfd. differential reaction condenser (Ready Radio).
- 1 L.T. switch (Red Diamond).
- 1 3-pole push-pull wave-change switch (Red Diamond).
- 1 "M.W." dual-range coil (Magnum).
- 1 .001-mfd. max. compression type condenser (Formo).
- 1 .002-mfd. fixed condenser (T.C.C.).
- 3 Sprung-type valve holders (Formo).
- 1 .0003-mfd. fixed condenser (T.C.C.).
- 1 2-meg. grid leak and holder (Dubilier).
- 1 R.C. unit, with 1/4-meg. anode resistance and 1- or 2-meg. grid leak (Lissen).
- 1 H.F. choke (Ready Radio).
- 1 L.F. transformer (Igranic "Midget").

- Blue Spot "51R" loud speaker.
- 2 Sockets, flex, wire, etc.



The reaction condenser is mounted on the side opposite to the tuning control.

that it will be some time before any such revolutionary change takes place in real home-construction receivers.

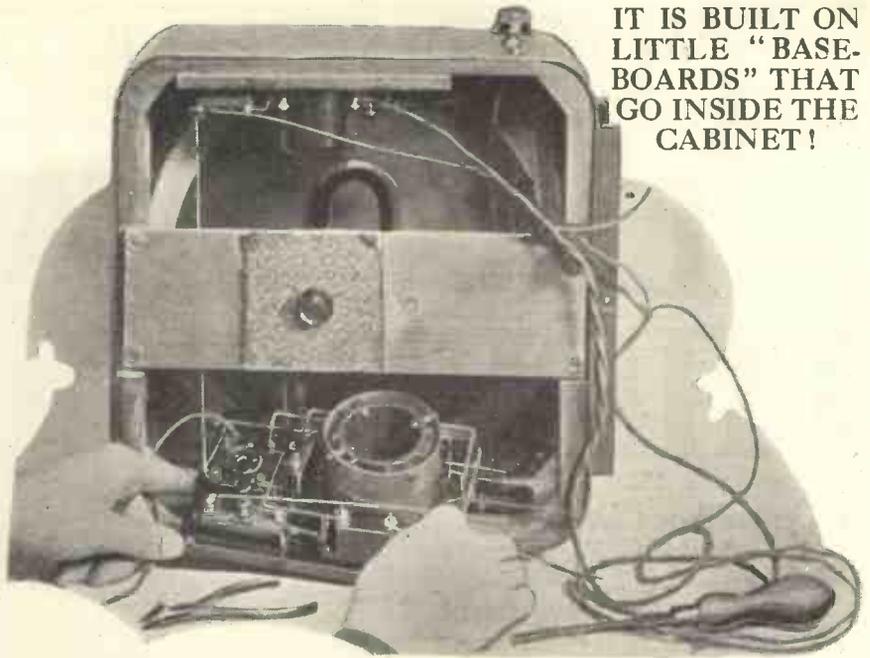
Meanwhile, however, we propose to issue a few designs for specialised sets, exploiting such of the unconventional methods of construction as we have found suited to each type.

This month, for example, we are presenting the "L.S." Three. This intriguing little set is intended to appeal where something very compact and of pleasing and unusual appearance is desired. It is an approach to a self-contained receiver in that set and loud speaker form a single unit, although separately accommodated H.T. and L.T. batteries are required (the G.B. unit is fitted inside as usual).

**The Cabinet "Free"**

No special cabinet-work is required, and in one sense the cabinet costs you nothing! What that really means you will probably have discovered from the photos by now.

The scheme is simple enough, and depends on the fact that in a cabinet loud speaker of the cone type there is usually a considerable amount of unused space. If one takes advantage of this space and exercises a certain amount of ingenuity it is usually quite possible to build the



**IT IS BUILT ON LITTLE "BASE-BOARDS" THAT GO INSIDE THE CABINET!**

The special system of construction makes it a surprisingly easy set to assemble and wire.

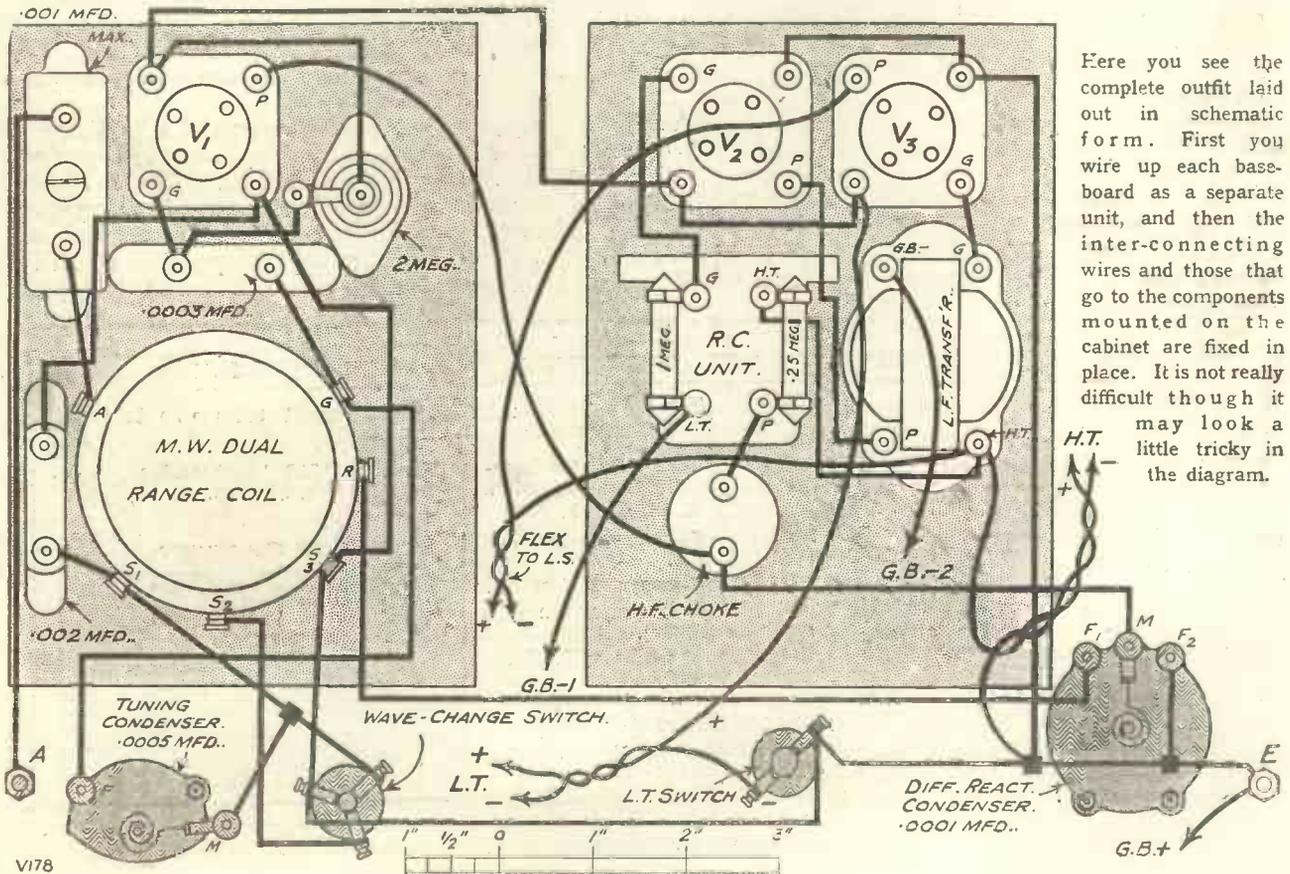
receiver actually into the speaker cabinet.

A careful choice of very compact types of components is obviously called for, and some experimenting to find an efficient layout in the necessarily rather cramped space, but these points we have attended to in pro-

ducing the "L.S." Three, and you have only to follow instructions with reasonable care.

The loud speaker we used was one of the "Blue Spot" range, and the details which follow assume the use of one of these instruments. No doubt a little modification here and there

**HOW THE PARTS ARE PLACED AND WIRED TOGETHER**

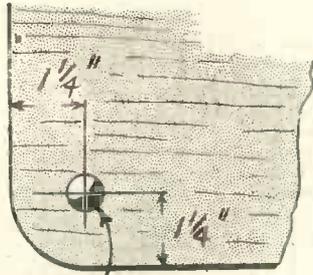


V178

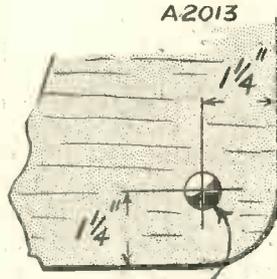
## The Whole Set is Inside the Loud Speaker!

would permit the scheme to be applied to other types of speakers.

To make a start, note where the controls are placed. The on-off and wave-change switches are located in the lower left- and right-hand corners



L.T. SWITCH



WAVE-CHANGE SWITCH

A2013

Looking at the front of the cabinet, these are the positions for the two switches—L.T. and wave-change.

of the speaker front, and these should be fitted with some care in the positions shown in a special diagram.

The tuning and reaction condensers are in the right- and left-hand sides of the speaker, rather low down so that they come to hand conveniently. Incidentally, there is a good deal to be said for controls so placed on the score of easy manipulation.

Beside each of these condensers is a small socket, one for the aerial and one for the earth lead, which, of course, must be fitted with small plugs to match. Separate diagrams show suitable placings for these components.

### In Two Sections

The remainder of the gear is laid out on two small baseboards. One of these is mounted on the left upper side of the speaker, and the other in a corresponding position on the right, both inside the cabinet, of course.

The baseboard on the left (looking at the cabinet from the back) carries the detector valve and most of its associated components, e.g. dual-range coil, etc. The other carries the two low-frequency valves and the intervalve coupling devices (one R.C. unit and one L.F. transformer).

The baseboards are held in place with screws passing into the framework of the cabinet, and you will encounter no difficulty in assembly here. Be careful in laying out the parts on the bases, however, to see that the valves come in the positions shown, or they may foul parts of the speaker when in place.

When it comes to the wiring-up stage of the proceedings, a certain amount of dexterity will be needed in

view of the rather cramped space in which some of the work must be done.

There will be no real difficulty, however, if you adopt certain little dodges we devised in building the unit. First, wire-up the two separate

course, but those you can get from the photos and other diagrams.

It is also advisable to attach suitable lengths of wire to the two switches *before* they are fixed in place. With the aid of these expedients you will find it becomes a simple task.

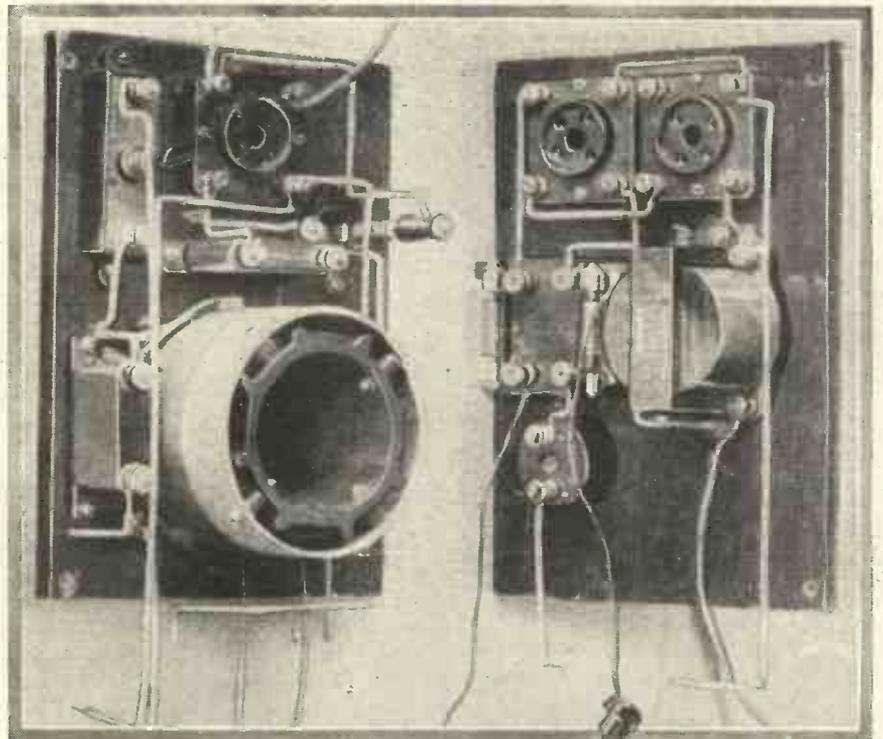
### No Battery Terminals

The battery leads, by the by, come straight off appropriate points in the circuits in the form of flexes, and these all go out through a hole bored in the bottom of the speaker. Similarly, the speaker leads go straight to suitable points on the L.F. section, no terminals being necessary.

A good deal of real constructional work is involved in building this attractive little set, but we think you will now have no difficulty in completing it, and we are sure you will be pleased with its performance. It uses a good and straightforward circuit of the detector and two L.F. type, with the high efficiency always obtained when the "M.W." dual-range coil is used, and it will give excellent results.

We are getting near the end of our allotted space, so we must be rather brief over our remaining details.

### The Two Sections—Detector and L.F.



Here are the two wired-up sections all ready to be slipped in place from the back of the loud speaker. Compare these with the wiring diagram on the preceding page, noting the leads going off to the separate components.

## Unconventional—But Uncommonly Good!

One point which we must cover with some care concerns the possibility of microphonic howl troubles, which are always expected to be troublesome with sets in which the sound from the speaker can fall directly upon the detector valve. The "L.S." Three is obviously such a set, and we fully expected to have to take steps to stop it from misbehaving.

To our no small surprise it gave no sign of microphonic howl whatever with any normal selection of valves! We found considerable difficulty in picking valves which could be provoked into a howl.

### We Wanted It To Howl!

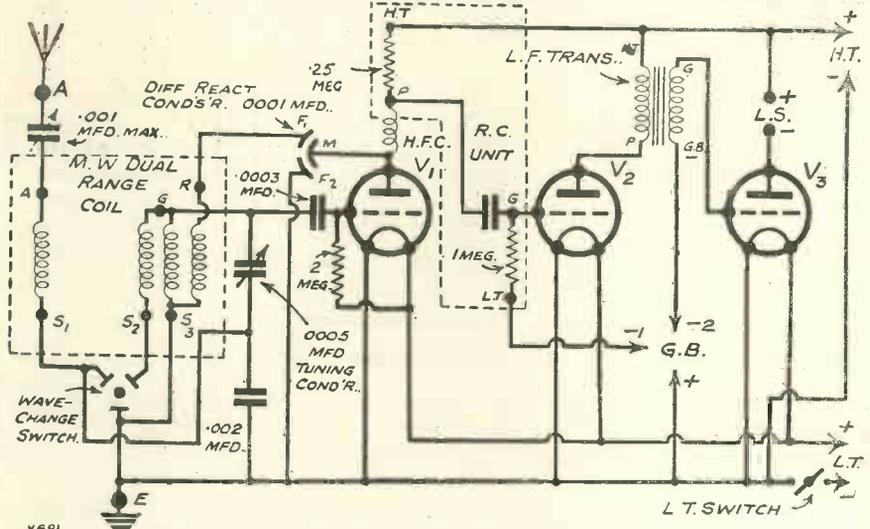
It was necessary to find a method of setting up such a howl, of course, in order to be able to find a cure for it, and so forearm any constructor who might have difficulty of this sort.

In the end we found that by using such an entirely unsuitable combination as two R.C. valves and an L.F. type as the third—we could set up a howl when the detector valve was given a jar to start it off.

No one is ever likely to use such a trio of misfits, but it gave us our chance to find a remedy. This proved

We pass this tip on for what it is worth. You are never likely to need it, because we found it impossible to

### A CIRCUIT WITH PLENTY OF POINTS—



x681

The dual-range coil gives you long or ordinary waves at a touch of the switch, and differential reaction makes the most of stations that need strengthening. There is one R.C. and one transformer L.F. coupling on the L.F. side.

to be the use of a sort of "cosy" of felt fitted to the bulb of the detector valve.

get a howl with any normal group of valves, but it is as well to know what to do if you should chance upon a most exceptionally microphonic detector.

Here we might as well indicate a suitable choice of valves for the set. For the detector you want one of the H.F. or "special detector" type, the none of the L.F. type for the second socket and, finally, a power or super-power for the third position.

### Working Voltages

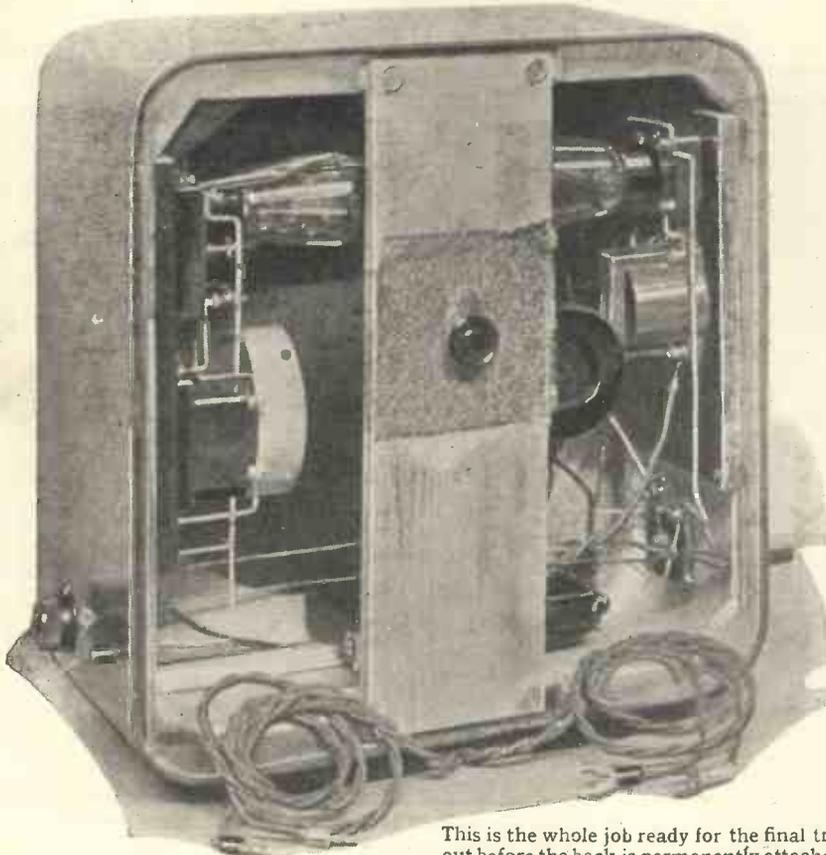
The H.T. connections are simple, because there is only one positive lead with no separate tap for the detector. We found it satisfactory to arrange matters in this way in the present receiver, and obtain the desired voltage for the detector valve by the use of a higher anode resistance than usual.

All that is to be done, therefore, is to apply the usual 120 volts between H.T. — and H.T. + and adjust the grid bias.

The use of the controls you will probably have grasped already, but we may as well summarise the matter for you in closing.

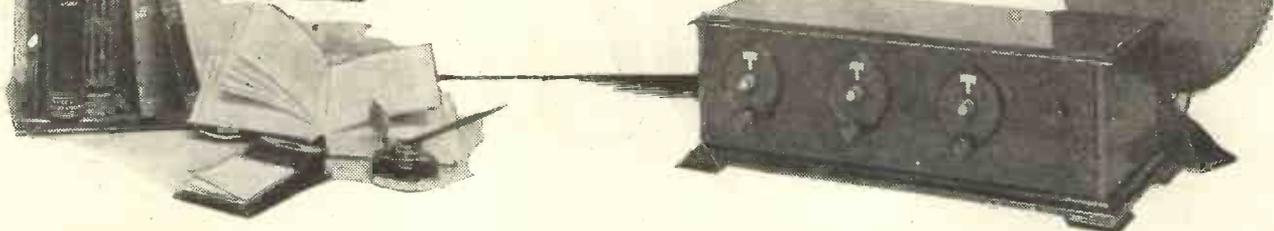
Push the wave-change switch knob inwards for long waves, pull it outwards for medium. Adjust compression condenser on tuning unit to give the desired degree of selectivity. Keep it set to as large a capacity as you can, however, in the interests of good volume.

### —AND IT'S NOT DIFFICULT TO BUILD!



This is the whole job ready for the final try-out before the back is permanently attached.

# QUESTIONS ANSWERED



## Transformer Saturation

N. D. S. (Cardiff).—“In view of the popularity of nickel-iron-cored L.F. transformers, is it true that they saturate more easily than the stalloy-cored type? If so, doesn't this tend to nullify their advantages?”

Yes and no. It is true that these transformers do saturate on comparatively small magnetising currents, but it is not difficult to keep down the current to within safe limits by choosing the valve and H.T. voltage intelligently. If you buy a good make, the makers will tell you how much current it is safe to pass through the windings. There is no need to worry if you treat the transformer properly, and use it as the designers intend it to be used. Parallel-feed helps matters considerably.

## Loud-Speaker Sensitivity

M. H. (Woodford) asks us whether the average permanent-magnet moving-coil speaker is as sensitive as the popular cone types. He is thinking of purchasing a coil-drive speaker, and is not sure whether his set is suitable. He is using a det. and 2 L.F. with a super-power valve in the last stage, the H.T. being 150 volts from accumulators.

Speaking generally, the cone types are the more sensitive, but permanent-magnet coil-drive speakers have vastly improved in this respect, and you can purchase one safe in the knowledge that your set is capable of working it. Of course, these coil-driven speakers want plenty of punch if the bass is to be brought out effectively, so don't skimp the H.T.

## Direction of Windings

B. S. (Addiscombe).—“I am very interested in the new ‘M.W.’ dual-range coil, and I would like to ask two questions:

“1. Can this coil be used in my present set, which is a detector and

two L.F.? My existing tuner is of an old type, and was designed to cover a wide band of wave-lengths. It is unselective, and I cannot separate the two London transmissions properly.

“2. Is the reaction winding wound in the same direction as the long-wave secondary, or in the opposite direction? My friend and I have been having an argument—he says it should be in the opposite direction.”

## TECHNICAL QUERIES DEPARTMENT

Are you in trouble with your set?

The MODERN WIRELESS Technical Queries Department is now in a position to give an unrivalled service. The aim of the department is to furnish really helpful advice in connection with any radio problem, theoretical or practical. Full details can be obtained direct from the MODERN WIRELESS Technical Queries Department, Fleetway House, Farringdon Street, London, E.C.4.

A postcard will do. On receipt of this all the necessary literature will be sent to you, free and post free, immediately. This application will place you under no obligation whatever. Every reader of MODERN WIRELESS should have these details by him. An application form is included which will enable you to ask your questions so that we can deal with them expeditiously and with the minimum of delay. Having this form you will know exactly what information we require to have before us in order to solve your problems.

London readers, please note: Inquiries should not be made in person at Fleetway House or Tallis House.

Yes, there is no reason at all why this coil should not be used in the place of your tuner. It is a very efficient job from the radio point of view, and will overcome the trouble you are experiencing regarding selectivity. You can incorporate differential reaction if you care to purchase a .00015 differential condenser. Your set will then be right up to date.

With regard to the reaction winding, you are quite correct, it is in the same direction as the secondary. This applies in general to all reaction windings, and you can prove it to your own satisfaction by winding it

in the other direction. You will not then obtain any reaction effect.

## Dry H.T. Batteries

H. L. (Southampton). — “How quickly will a new dry H.T. battery run down if it is left standing without being used? I am asking this question because I have bought a new battery to replace one which is at present working the set, and I do not want to scrap the old battery just yet if possible.”

Your question is one that cannot be answered in terms of days, weeks, or months. There are so many factors which have to be considered, but it is quite definitely the case that a battery does run down in time when it is kept on the “shelf.”

If your old battery is in a poor condition, throw it away and use the new one. Think of all the troubles that a run-down battery can cause—distortion, crackling noises, L.F. howling, weak signals, no reaction, and a whole host of others.

While on this question of “shelf life,” it is as well for us to remember that we should purchase our batteries from a dealer with a fairly quick turnover, to make sure always of getting fresh stock.

## An Electrical Discharge

R. E. (Plaistow).—“Can you explain this? A short while ago, during a sleet storm, I accidentally touched the aerial lead-in, and to my surprise I received a shock. I cannot understand this, because there was no lightning about. I noticed that the earthing switch was ‘open,’ and on closing it there was a tiny spark.”

In the first instance, the aerial was not earthed, and it had become charged up owing to the atmospheric conditions prevailing at the time. When you touched the aerial lead-in you released the charge. You therefore received a shock.

# A "BEST - LOOKS AT



Mr. Gilbert Frankau—author of "Peter Jackson, Cigar Merchant" and many other very popular novels.

It is a peculiarity of broadcasters that they almost all claim at some time or other to have made a record—even though it be a record of futility. We all know the soprano who claims to have been the first to take the high notes without "wobbling" and the comedian who is proud to have made the first tour of the stations, thereby cracking the same set of jokes on so many consecutive nights.

These people—goodness knows why!—will discourse for hours on the fascinating topic of how they did it, and they thus give themselves away. The makers of real records, the men who deserve to go down on the scroll of broadcasting history, keep quiet about their achievements.

Gilbert Frankau is such a man. His is a unique feat. Years ago he sat in a little room at the top of a block of offices and shouted a short story into a tin trumpet; so history was made.

## *The Very First Ether Drama*

He was the first modern exponent of the public storytelling beloved by the ancients, the first author to broadcast his own work, and the forerunner of A. J. Alan and a host of others. It might be said, indeed, that he was the first person to send an artificial drama pulsating through the ether—the legitimate predecessor of the radio playwright.

That is not the only reason why he is remarkable. That first broadcast of his might have been due to sheer luck, but it takes a brainy man to remain a "best seller" throughout a troublous and changeful decade as has Frankau, and then to carry on into the next. His latest novel, "Martin Make Believe," is still selling a steady 300 copies a day some six months after the date of initial publication. Not every author could deserve such a success.

The man's vitality is amazing. H. G. Wells is slothful in comparison. The day I interviewed Gilbert Frankau was for him the first day of complete consciousness after a major operation. He was still in bed and in great

pain—yet receiving interviewers and arranging his business affairs!

And managing withal to be exceedingly original. I expected him to hand out the usual dope about the listening public—those poor people who are beginning to supplant the proud position formerly held by English policemen. I was bitterly mistaken.

### *Compliments Fly—Away*

"What do you think of listeners?" My first question. I anticipated the obvious answer. I should have known better.

"Most listeners must be half-wits!"  
Consternation.

### "I HAVE NO EAR FOR



"I abhor the peculiar sounds made by musical instruments. ever reached the standing it has. I cannot

"Half-wits!" he continued. "With all the means of recreation and entertainment offered by the democratic sports and arts of a modern civilisation, I cannot understand sensible people resorting to wireless.

"For education, perhaps. For pleasure, no. It seems to me to amount to a self-admitted inability to entertain oneself.

"On the other hand, I may be prejudiced. I have no ear for music. An orchestra once played 'Rule, Britannia!' and I stood up thinking that it was 'God Save the King.' I abhor the peculiar sounds made by musical instruments. I cannot understand why they were invented, or why music ever reached the standing it has.

"I cannot eat in a restaurant that boasts an orchestra.

# SELLER "MR. GILBERT FRANKAU, IN AN INTERVIEW WITH HAROLD A. ALBERT, HAS SOME AMUSING THINGS TO SAY ABOUT BROADCASTING.

## THE B.B.C.

I have listened on what my friends tell me are the most up-to-date sets. They stand by and usually appear to be entranced, but I hear only a racket which does not seem to bear any resemblance to life."

"And not only music. Take the announcer's voice. If anything, worse than the broadcast music. When I hear it, I want to scream. Oxford accent? The Boxford accent! No one ever spoke like that in the spired city. But I have heard those tones in Borstal. All the Borstal boys use them. Terrible! And listeners——"

I hurriedly changed the subject.

"The B.B.C.?"

"All wrong. Too aesthetic. Rather snobbish. I deplore their attempts to excuse the programmes by

**MUSIC," SAYS GILBERT FRANKAU**



"I cannot understand why they were invented, or why music eat in a restaurant that boasts an orchestra."

saying that they educate the masses. I deplore the way in which they treat the individual broadcaster. Very courteously, but that is not everything. The absurd fees!

### *Even the Fees are Wrong!*

"They ask me to broadcast for thirty minutes, but this means that I have to write the MS., submit it for approval, and pass a microphone test. Practically a day's work, yet for this I am paid perhaps ten guineas. It is not worth it. In a day I could make far more than that. And, to top all, they are even frightened to mention my books because such an act would be a form of publicity. I believe they would have complete anonymity if they could.

"Again, they call broadcasting an art, and have evolved a broadcast drama. I have never been able to follow a word of it. People shouting and a lot of queer noises!

### *Shocks for the Interviewer*

"Take the rural aspect. Town-stuff making the country people dissatisfied. No, broadcast entertainment is not justified in the least."

### CURRENT EVENTS



"I want to hear the actual things as they happen," says Gilbert Frankau. And this photo shows the scene during an auction sale that was broadcast some months ago.

Another shock! Frankau should make Shaw blush. G. B. S. on a sick-bed would probably give a wan smile, and perhaps declare that there is no such thing as illness. Frankau, almost the first day after an operation, shoots



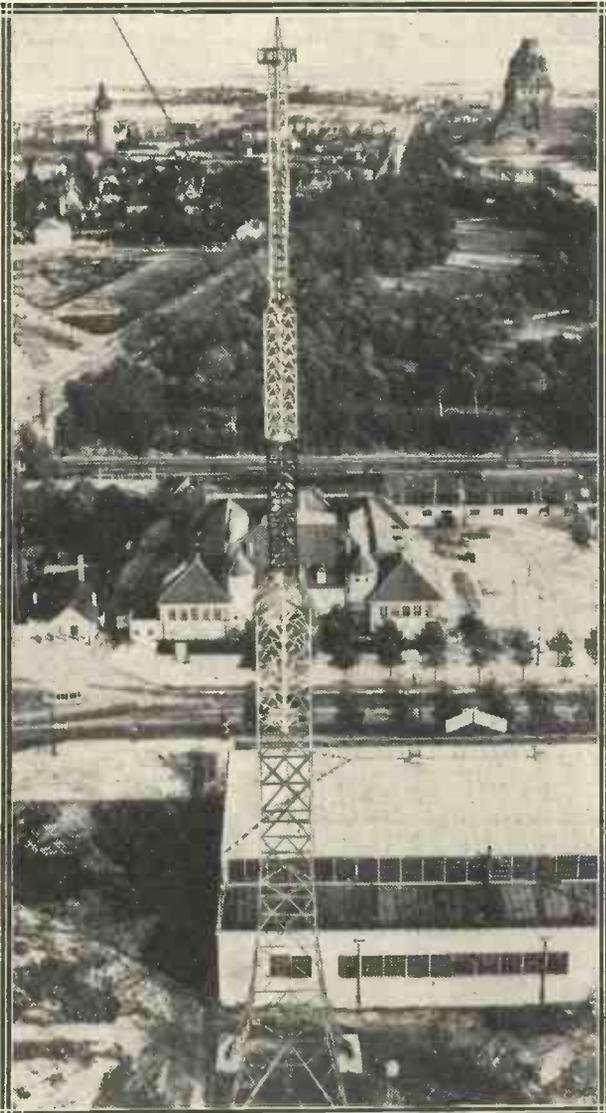
"don't want to hear somebody say that it is very misty, etc., etc."

## “One Station Should Transmit Continual Dance Music”

out brand new ideas with a suddenness that almost appals one.

“The proper function of broadcasting is the dissemination of news and publicity, and that is something the B.B.C. do not give. Oh, yes, I know you get the news

### A FAVOURITE “FOREIGNER”



A wonderful view of the Leipzig broadcasting station and the surrounding country. At the top, right, you can see the famous memorial erected in honour of those who took part in the “Battle of Nations” (1813). Leipzig uses 2.3 kw. of power on a 253-metre wave-length.

bulletins, information of events in potted form. But that is not enough.

“I want to hear the news at any time I like, and I want to hear any news item I wish. I don’t want to hear some gentleman saying that it is very misty, but he can see that the horses are now coming down the straight. I

want to hear the things that are worth hearing, that are essentially hearable.

“The proceedings in Parliament, the Budget Speech, a company meeting—the actual things as they happen. We were told years ago that wireless would mean hearing anything at any time. That is precisely what it has not meant.

\* \* \*

“We have been compelled to take what we have been given, although we have not been given the right things, and we have not been given enough. For instance, people surely do not ask to hear a thin imitation of chamber music. Folk who love that kind of stuff sufficiently well to listen to it should patronise the concert halls. Real lovers do!

### Why Not Free Broadcasting?

“Dance music? Yes, I suppose people want that. Some keep radio sets simply for the dance music. And save for a brief excerpt after tea, they have to wait for that until nearly ten o’clock. No good! One station should transmit continual dance music, another continual news.

\* \* \*

“Broadcasting in England in its present fashion cannot last. We cannot have a monopoly, least of all a State monopoly. *I am in favour of free broadcasting*, not necessarily from the point of view of the licence holder, but from that of the broadcaster.

“Anybody should be able to command the air, and at any time they choose. Parliament, Messrs. Harridges, and the Imperial Theatre should be allowed to have their own transmitters. The obvious answer to this is that the ether would be overcrowded—but what about America? Chicago has about 200 broadcasting stations, and your set should be sufficiently selective to pick out any one of them without interference. True, you are occasionally told about somebody’s soap, but why mind that?

“I read the newspaper advertisements sometimes. So do most people. And as long as I can hear the things I want to hear, I do not mind being forcibly given information about some commodity which might at some time or other prove useful to me.”

\* \* \*

Mr. Frankau stopped short. Perhaps he wondered whether he had said too much. At any rate, he changed his tactics.

### “The Average Listener Cannot Grumble”

“And now let’s hand out a few bouquets. Under present conditions, the B.B.C., doing what they are, are doing it in the best way possible. The Government will not allow advertising, the newspapers will not permit continual news. I suppose the average listener cannot grumble. The B.B.C. know the listening public, and give that public what it wants”—and so on, all the usual compliments.

But Gilbert Frankau had already delivered his deadly ammunition. And if these words of his do not cause interest in the camps of listeners, broadcasters, and civil servants (let alone newspaper men) I’ll eat my hat!



# MAKING PORTABLES SELECTIVE

by G.V. DOWDING, ASSOCIATE I.E.E.



*For the first time this really pressing radio problem has been thoroughly tackled. There are tens of thousands of portables in use that are not sufficiently selective for present-day conditions. If you know anyone who has such a receiver, tell him about this article, for it will probably enable him easily to separate those overlapping stations and turn an otherwise practically useless set to good account.*

**T**HERE are tens of thousands of inselective portable sets in use. That is a statement of fact, not one of mere personal opinion! No doubt it will surprise many amateurs with little or no practical experience of such instruments, and that is natural enough, for it appears to be one of the most deep-rooted of all traditions that if a portable is nothing else it is at least very selective.

## The First Essential

Unfortunately it is not one of those fallacies that can lightly be dismissed. The whole cause of the trouble is to be found in our changed conditions. Our standards of selectivity have had to be revised since the opening of the Brookmans Park transmitters.

The most inselective portable set of to-day would show up very well against the average open-aerial type of set of five or six years ago, but then at that time the ether was clearer, and it did not take much of a set to separate the comparatively few broadcasting stations in operation.

At the present time the first essential in a radio set, especially in the case of one used in London, is a fairly high degree of selectivity.

And soon the North, West, and Scottish Regional transmitters will be working, and tens of thousands more listeners will discover to their discomfort that their sets are giving them two simultaneous programmes instead of alternatives!

## Hard Hit!

I have long been exercised in mind concerning portable sets and their station-separation qualities, but only recently have I been able to carry out the innumerable experiments I planned. Even so, I am afraid I can offer no guaranteed cure for all cases with a small device readily adaptable and costing only a few pence to make. That I must make very clear at the outset.

The main difficulty lies in the

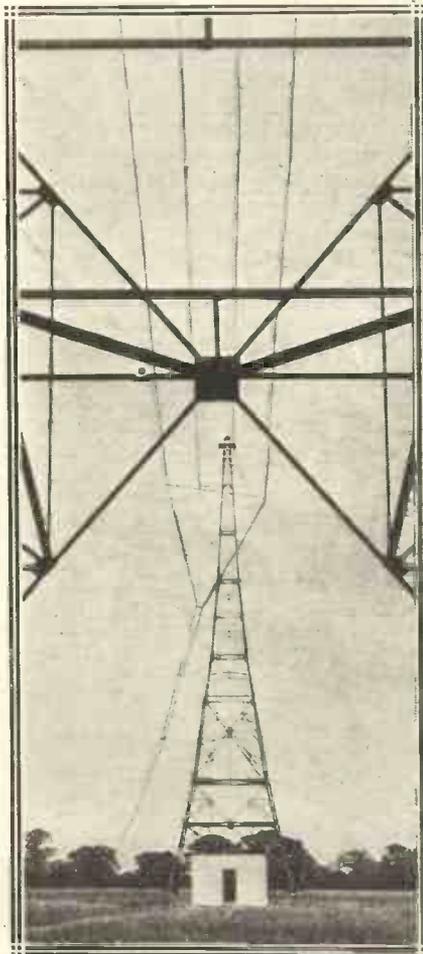
diversity of design found in various makes of portables in use. They are indeed an amazingly varied lot. However, I have a series of suggestions to make, and I think that among them a large number of portable set users will find complete cures.

The portables being sold to-day are, on the whole, quite good. It is in the 1929 and earlier vintages that you

find the worst inselectivity. The Brookmans Park transmitters hit them hard, for the reason that no advantage can be taken of the directional qualities of the frame aerals.

When you get two mixed-up stations located at different points of the compass, you can vary the position of the frame aerial so that the reception of the one is good and of the other poor, but the two Brookmans Park transmitters come along from exactly the same point.

## LOUD-VOICED TWINS!



An unusual view through the base of one of the Brookmans masts. The dual transmissions are not always easily separated even by a portable.

## Interference in Line

Very much the same sort of thing applies to 5 X X and one or other of the long-wave continentals, according to your location. In London you find yourself almost on the bee-line from Radio-Paris to 5 X X, and as a frame aerial receives equally well from exactly opposite directions, the position is much the same as with the two Brookmans.

Where there is only a slight angle in the line of direction of two interfering stations, you may be able to take advantage of the directional qualities of the frame aerial in the set to some extent, but remember that the position of maximum power of reception is not so sharply defined as that of the minimum.

## A Tuning Tip

Therefore, do not aim at shifting the set around, striving to obtain the strongest reception from the one station, but arrange the set so that you get the *minimum* volume from the *interfering* station. Quite a different business. And while you are doing this, do not worry about the other programme, but, having settled the interference, then by using reaction tune up the station you want.

In a similar sort of way, it is often possible to overcome a slight amount

of overlapping due to two programmes coming in from the same compass bearing, such as the London Regional and National, or from two stations at opposite directions.

Tune the one station in at its loudest, and then turn the set slowly around until you find a position where it comes in worst of all. There may be a point where it actually vanishes entirely, and the finest tuning and the most robust reaction will not bring it in.

### Introducing a Trap

Creep back a little from this minimum point until, by conjuring with the controls, you can get sufficient volume for your purpose. If there is still overlap, then you will have to try something more drastic. But it is surprising what can be done by carefully placing and tuning the set.

As I write I have before me a portable bought only some six months ago and bearing an extremely well-known name, which at ten miles from Brookmans Park will not provide sufficient separation between the National and the Regional in unskilled hands.

I am able to get either programme quite clear of the other, but I have another set made at about the same time and bearing an almost equally well-known name which would not respond to this treatment.

Like many other portables, it is a five-valver resistance-capacity coupled throughout, with only the one tuned circuit—the frame aerial is tuned by a variable condenser.

This set is of the suit-case variety, the aerial being wound around the lid; the lid also accommodates a loud speaker.

Four flexible leads pass from the main body of the set to the frame aerial, and I decided to break one of these leads and insert an "M.W." Standard Wave-trap in it. (Not the "Kendall" Rejector, for this would introduce a series capacity that might break a grid return.)

Now, those four leads might have comprised two pairs of connections going to two separate frame aerials, one for short and one for long waves, but that was very unlikely in this particular case for several reasons.

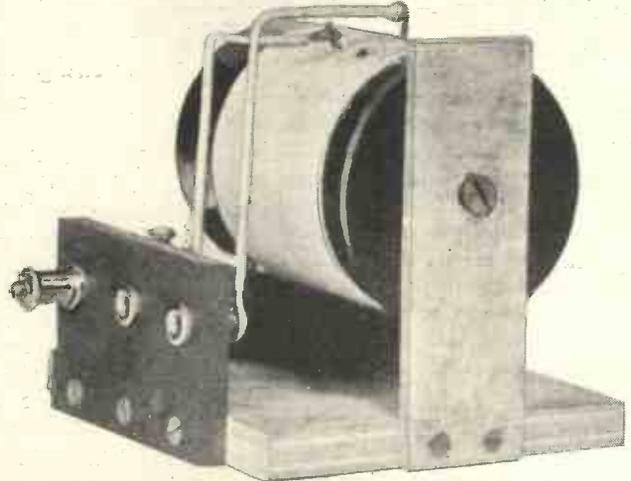
Of course, I could easily have found out exactly how the connections ran, but as I had in mind the preparation of an article on the subject for listeners

not too well up in set design and construction, I thought it best to face it from their angle.

### For Accessible Leads

Anyway, I considered it probable that the two outer leads went to the ends of the frame winding. I therefore broke one of these wires and

## THE ORIGINAL "M.W." WAVE-TRAP



One of the standard designs produced by the "M.W." Research Department, and described in the November 1927 issue of "M.W."

joined the one end to the aerial terminal on the Standard Wave-trap and the other end to its "set" terminal.

I had hit the right lead, and the wave-trap was quite effective. The tuning of the set was altered slightly, but that was only to be expected in view of the introduction of a little extra inductance in the form of the wave-trap winding.

Therefore, if you have a portable set in which the leads to the frame aerial are really accessible, it will be well worth your while to try a similar scheme; but there is one important thing to note about it. It does not matter which of the wires you break—you can break them all in turn, trying the wave-trap in each—but make sure that you join them up again properly, and do not forget that the re-joining may shorten the leads, and in this case you can join the bare ends with a tiny piece of new wire. A well-twisted joint will be quite O.K., and it can be covered with a little medical adhesive plaster.

### Disconnect First

If the loud speaker is in the lid, that, too, may have flexible leads going to it, and a wave-trap inserted in one of these would do little good.

Just one more point. Make sure that all the batteries are removed completely while you are breaking or mending a lead.

## A Novel Type of Portable



A little portable outfit that employs an improvised extended aerial. Greater selectivity is possible with a frame, although all frame-aerial sets are not necessarily sufficiently selective for modern conditions, as many set-owners have found!

## How to Deal with Very Stubborn Cases

Mind you, I am not very keen on this haphazard breaking of leads, although there are some who may be so badly jammed by interference that they are prepared to try almost anything to remedy it.

### The A. and E. Terminals

In many cases the aerial of a portable will be built in, and none of it be readily accessible. Especially will this be so with the upright cabinet types. I have one of those, too, and it is just about as inselective as it could be. However much you play about with its positioning and tuning, it is impossible to disentangle the two Brookmans programmes, and this, too, in a set that is not a year old.

I tried several stunts with the "M.W." Standard Wave-trap, and met with varying success. (By the way, this efficient device is obtainable at a cost of a few shillings from either Lewcos or Burne-Jones.)

Well, on this particular set there are two terminals provided for external aerial and earth connections. I rigged up a very short indoor aerial and connected this via the wave-trap to the portable. A careful adjustment of the wave-trap resulted in a certain amount of trapping, but not sufficient.

The addition of an earth connection in the shape of a wire joined to a large fire-grate improved matters considerably. There was then sufficient trapping to enable a complete separation between the Brookmans stations to be effected.

### Screening and Tuning

But it occurred to me that there would be many portables in which such easy aerial and earth connections would be impossible. I then applied the idea of inserting the wave-trap in an earth lead joined to the L.T. — of the portable. I screwed a bit of wire under the negative terminal of the accumulator and joined this lead to one terminal of the wave-trap; the other terminal of the wave-trap went to a lead on a water-pipe.

There was a little trapping, but nothing much. I then joined a short aerial comprising a 15-ft. length of wire, loosely hitched behind pictures on the wall, direct to the grid leg of the first valve in the set. The effectiveness of the trapping was improved.

That concluded the Standard Wave-trap experiments, although I must add that the addition of the earth and external aerial in all cases vastly increased the range of reception of the set.

Subsequently I experimented with the "pick-up" of the set. I placed the set near large metal objects in order to reduce the efficiency of its receptive powers. I stood large metal teatrays against it. But it is surprising how much such treatment a portable will stand before you seriously decrease its working capacity.

### Reducing Pick-Up

I had four metal trays going before I concluded this test! I found it better to place the set close to large metal objects such as big firegrates, gas stoves, etc. The shielding reduced the pick-up of the set, and with one or two types of portables the application of the methods I mentioned earlier in this article, turning the outfit round to the minimum position,

fine tuning and close reaction, resulted in all the separation desired.

### An Absorption 'Trap

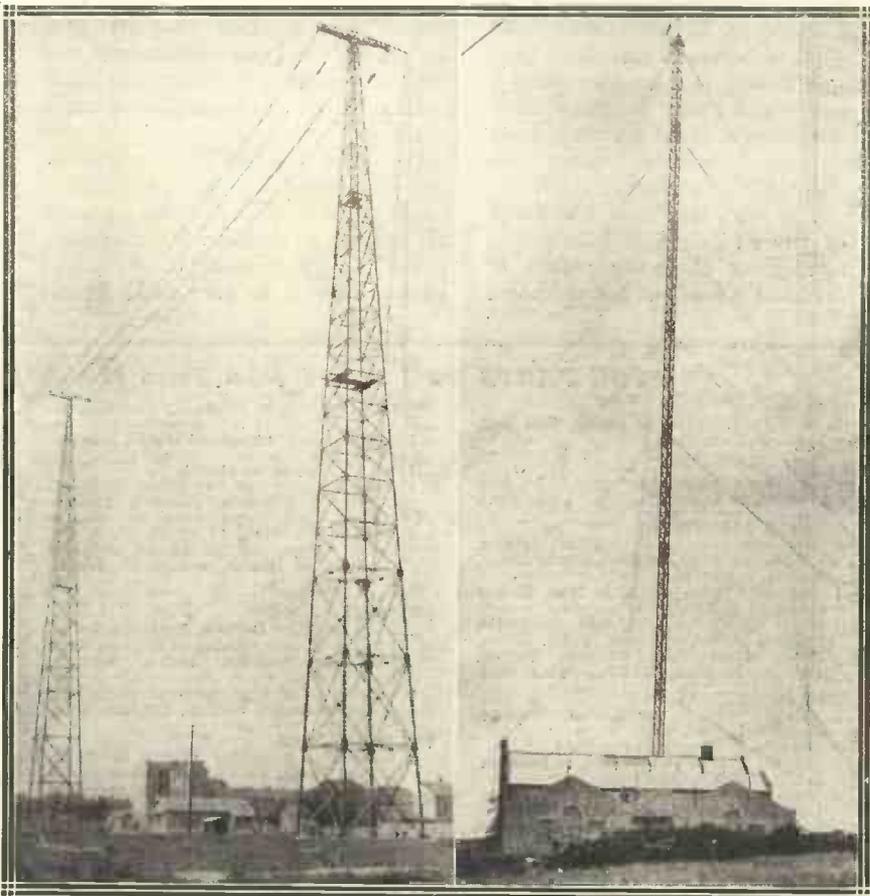
My next step was to make up a large absorption wave-trap. This comprised a frame aerial roughly of the average dimensions of the portables. In the case of one definite make it could, of course, be exactly the overall dimensions of the set.

That is, if you have a portable measuring, over its largest side, 18 in. by 18 in., get a piece of wood of this size and wind on it fourteen turns of wire in the form of a spiral, the turns being separated by about an eighth of an inch. The outside turn should be close to the edge of the wood.

You can hold the turns of wire in position with pins. The ends of the windings should be connected to a small compression condenser of .0005 maximum capacity. The whole thing

(Continued on page 102.)

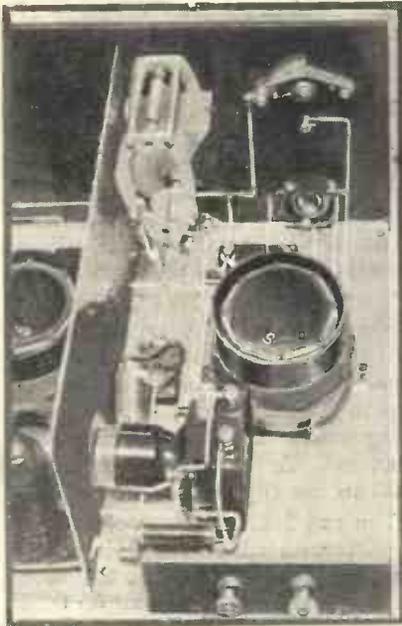
## Two Overlapping Long-Wavers



Here are Radio-Paris (left) and Daventry 5 X X, two long-wavers that tend to interfere with each other on inselective sets.

# "The M.W."

*An extremely powerful set using 2 S.G.'s, with panel wave-changing, very keen selectivity and first-class quality.*



The first H.F. stage gives extremely great amplification.

WHEN the writer of this article was acting as "technical expert in attendance" on the "M.W." stand at the last Olympia Exhibition, he was asked a question which really staggered him. It came quite without warning, from a perfectly harmless-looking individual, in these words: "What's the matter with this new dual-range coil of yours?"

The inquirer obviously wasn't of the fortunately rare but not unknown

type which regards an exhibition as an opportunity for cheap humour, but on the contrary really seemed to have something on his mind.

He was accordingly told that we believed there was extraordinarily little the matter with our coil, very much less, in fact, than any other we knew. And, further, wouldn't he please explain why he asked his amazing question?

### Ample Power

Then it came out. He had seen on the stand a five-valve set with two screened-grid H.F. stages using the new coil, and it appeared that he thought this must surely mean that our coil was a pretty poor effort! His belief was that if two S.G. stages were working properly they should not need the assistance of two L.F. stages to give adequate loud-speaking from any transmission worth hearing.

Of course, the flaw in his argument was the assumption that a reasonably good outdoor aerial would be used. He seemed to realise when reminded, that the existence of countless readers limited to very small aerials

justified us in producing five-valve designs, and we saw no more of him.

The writer was left with a lurking suspicion that he had not been without hopes of scoring off us, but his question was taken seriously for all that, because it was in such striking agreement with a conclusion at which we ourselves had already arrived.

That is, simply, the five-valve combination is tending to become obsolete. Improvements in valves and wireless technique generally have undoubtedly reached a point at which it can be argued that the "five" is growing unnecessarily powerful for use on an average outdoor aerial.

For small aerials, frames, and the indoor type, no doubt it will remain for some time to come the best de luxe outfit, but its position as the ideal general-purpose high-power receiver is now seriously challenged.

### Many Stations

Anyone familiar with the results which can be obtained from two modern screened-grid valves in one of the latest circuits must agree that

## THE PARTS YOU WANT FOR THIS MAGNIFICENT SET

### PANEL

21 x 7 in. (Goltone, or Lissen, Red Seal, Becol, Paxolin, etc.).

### CABINET

Panel space as above, baseboard 10 in. deep (Pickett, or Camco, Osborn, Lock, etc.).

### VARIABLE CONDENSERS

3 .0005-mfd. (Lissen, or Dubilier, Igranic, J.B., Lotus, Polar, Ormond, Ready Radio, Burton, Formo, etc.).

1 .0005-mfd. solid dielectric type (Ready Radio, or Burton, etc.).

1 .0001-.00013-, or .00015-mfd. differential reaction (Lotus, or Igranic, Polar, Formo, Ready Radio, J.B., Lissen, Burton, Dubilier, Magnum, Wearite, Parex, etc.).

### FIXED CONDENSERS

2 .01-mfd. (T.C.C., or Lissen, Dubilier, Mullard, Igranic, etc.).

3 .002-mfd. (Lissen, or Telsen, etc.).

2 .001-mfd. (Lissen and Mullard, or Ediswan, Ready Radio, Telsen, etc.).

1 .0003-mfd. (Dubilier, or Ferranti, Telsen, Lissen, T.C.C., Ready Radio, Ediswan, Igranic, Formo, Watmel, Mullard, Goltone, Atlas, etc.).

2 1-mfd. (T.C.C., or Dubilier, Igranic, Lissen, Formo, Hydra, Mullard, etc.).

### RESISTANCES

2 of 600 or 500 ohms, with holders if required

(Ready Radio, or Bulgin, Parex, Magnum, Wearite, etc.).

1 of 25,000 ohms (Spaghetti type) (Magnum, or Bulgin).

1 of 15,000 ohms (as above).

1 2-megohm grid leak and holder (Dubilier, or Lissen, Ferranti, Ediswan, Igranic, Mullard, etc.).

1 filament rheostat, 12 or 15 ohms, for 2-volt valves, 30 or 50 for 6-volters (Wearite, or Igranic, Gecophone, Lissen, etc.).

### SWITCHES

1 L.T. (Bulgin, or Goltone, Benjamin, Lotus, Igranic, Ready Radio, Keystone, Red Diamond, Magnum, Lissen, Wearite, Burton, etc.).

3 3-spring on-off type wave-change (Bulgin, or Ready Radio, Wearite, Magnum, etc.).

### VALVE HOLDERS

2 horizontal mounting (Junit, or W.B., Bulgin, Parex, etc.) (Note: These decide the height of the holes in the screens for the S.G. valves).

2 ordinary sprung type (W.B., or Lotus, Telsen, Igranic, Lissen, Benjamin, Clix, Bulgin, Dario, Formo, Magnum, Wearite, etc.).

### H.F. CHOKES

2 (Lewcos and Keystone, or other good

makes, e.g. Telsen, Varley, Dubilier, Lotus, R.I., Ready Radio, Lissen, Magnum, Igranic, Wearite, Parex, Watmel, etc.).

### L.F. TRANSFORMER

Low ratio (Lissen, or Telsen, Ferranti, Igranic, Varley, Lotus, R.I., Mullard, Lewcos, Brown, etc.).

### COILS

3 "M.W." dual range (Ready Radio, or R.I., Wearite, Parex, Goltone, Magnum, Keystone, etc.).

### DIALS

3 vernier type, if condensers are not slow motion (Igranic, or J.B., Lissen, Ormond, Formo, Ready Radio, Brownie, Lotus, etc.).

### MISCELLANEOUS

2 "M.W." standard screens, 10 x 6 in. (Parex, or Ready Radio, Magnum, Wearite, Keystone, etc.).

10 terminals (Eelox, or Igranic, Belling & Lee, Clix, etc.).

2 terminal strips, one 7 x 2 in. and one 5 x 2 in., or one strip 21 x 2 in.

Sheet of copper foil, 21 x 10 in. (Parex, etc.).

2 G.B. plugs (Belling & Lee, or Clix, Eelox, etc.).

Wire, screws, flex, etc.

# Four

## AN UP-TO-THE-MINUTE LONG-DISTANCE LOUD-SPEAKER SET

Designed and Described by  
The "M.W." Research and Construction Department.

two low-frequency stages are no longer needed for general work. So long as a "fair to moderate" aerial is available a single L.F. stage should suffice to ensure adequate volume on the loud speaker from any station worth hearing.

More exactly expressed, any station whose signal is sufficiently above the general noise level to be of any practical value can be brought up to satisfactory speaker strength with a four-valve combination consisting of two screened-grid H.F. stages, detector (with reaction for the benefit of the weaker transmissions), and one low-frequency.

### Efficient L.F. Side

It is assumed in this statement that an outdoor aerial of not too low efficiency is used, and that the L.F. stage gives its full share of magnification. This last, of course, just means that a really good L.F. transformer of one of the leading makes should be used.

When a "five" is used under these conditions it is generally found that

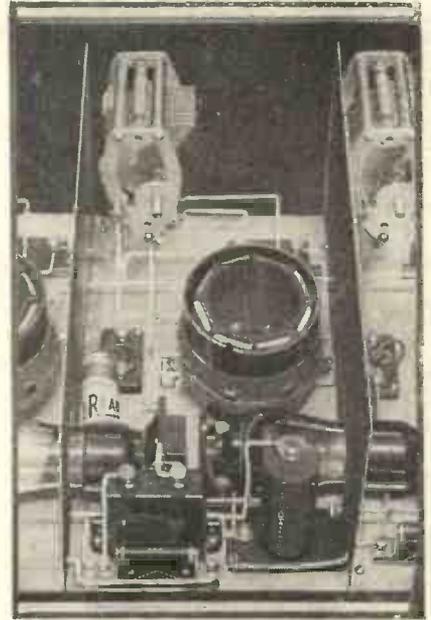
the volume control is in almost continuous use to avoid overloading the output valve. The operator is apt to feel in consequence that the receiver is wastefully over-powered. The "background," too, is not so quiet as in the case of the "four."

### Many Advantages

In short, the 2 H.F., detector, and L.F. circuit in its modern form bids fair to become the normal general-purpose receiver in the high-performance class for outdoor aerial use. It will naturally take some time to displace the five-valver from the position it has held so long, but there can be little doubt of its ultimate victory.

The four-valver of this type has several quite noteworthy advantages over the five, besides the two we have already noted (quieter background and a degree of power better matched to the work it has to do).

There is the obvious one of reduced cost, both initial and running, and such points as easier construction, smaller size, and so on, of a practical



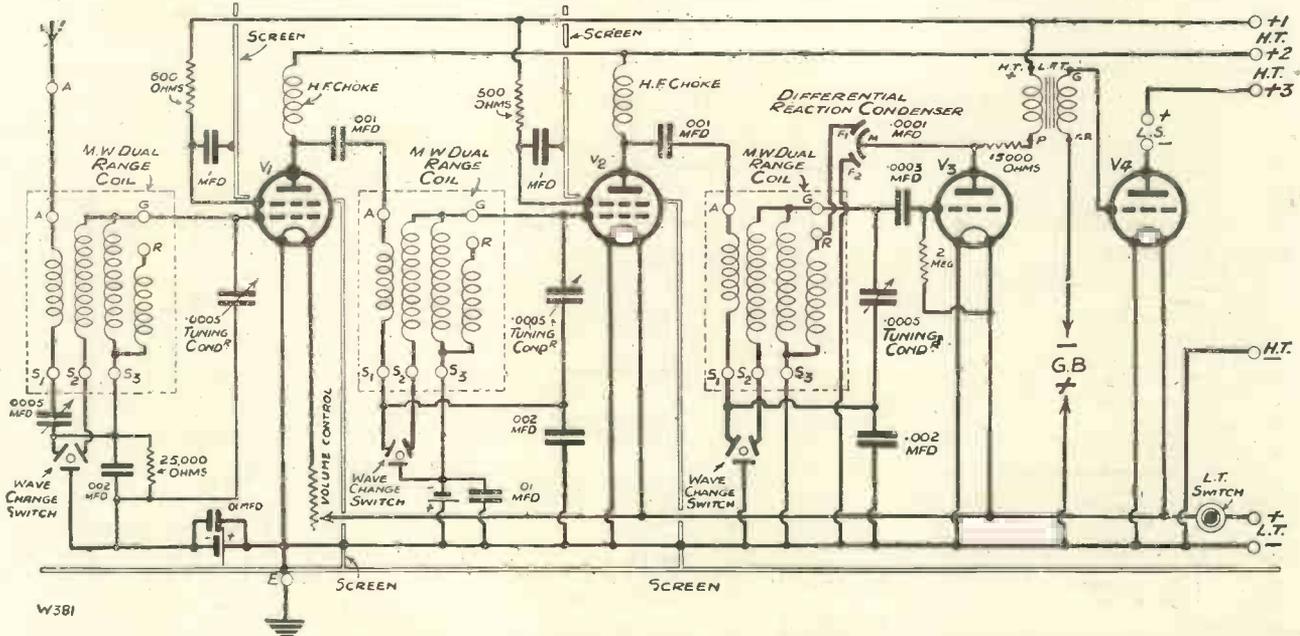
The second H.F. stage multiplies the amplification many times.

nature, before we come to its electrical characteristics at all.

### Fascinating to Handle

Probably these latter are the more important, for they have a greater bearing upon the impression the set makes on the operator. First and foremost is unquestionably the interesting peculiarity of the circuit whereby it brings in a very large

### A "HOT" COMBINATION OF FOUR FINE FEATURES



In this "100 per cent" four-valver you have a scientific ensemble of the "M.W." dual-range coils, the "M.W." "Star-Turn" and "Interwave" principles, and differential reaction, together with several other novel and most modern features.



## Inexpensive to Build and Easy to Operate

As a natural consequence, it is very much easier to operate receivers of this type from mains units, even when the units are not too well de-coupled. Sets are much less liable to suffer from hum under these conditions, too, and in every way they are less critical in their requirements.

Just the few considerations we have mentioned will suffice to show that the "2 H.F., detector and L.F." circuit is one deserving a great deal of attention.

resembles the equivalent section of the five-valve instrument to which reference was made at the beginning of this article. Its remarkably high standard of performance here is based upon two special "M.W." features.

### Two Valuable Factors

The first is naturally the use of our new high-efficiency dual-range coil unit. This alone is sufficient to ensure a level of sensitivity and selectivity of

These various points in the arrangement of the H.F. side of the receiver you will be able to follow out quite easily from the circuit diagram, and we do not think we need go over it in any detail. There is one thing we should like to explain a little, however, and that is the volume-control system.

Although this is of less importance than in a set with two L.F. stages, it is yet necessary that the control should be correctly arranged if satisfactory quality is to be obtained from the local, without overloading at any point in the circuit. Considerable changes are taking place in our ideas on the whole question of late.

### Controlling Volume

The development of higher magnification H.F. amplifying circuits has compelled much greater attention to be directed to the problem. Up to a point it is satisfactory to provide control which will drop the amplification of the H.F. stages, or of one of them, but we appear to be reaching the limits of this method.

Increases both in the strength of local transmissions and the amplification of our H.F. stages are combining to render the scheme inadequate. The point is that it now has often to be carried so far in the case of a really powerful receiver that undesirable effects are produced in the H.F. stage.

### Input Adjustments

It seems that a further control of actual input from the aerial is becoming desirable in such sets. If a means is provided whereby the input can be cut right down at the point of entry to the set, definitely better results are obtained.



PLEASE DON'T JUMP TO CONCLUSIONS!

The set is NOT a difficult one to handle, and you will have no difficulty in tuning in as many stations as you want on the three dials. There is a very simple scheme for tuning as is mentioned in the article.

That attention it will receive in "M.W.'s" set design programme, and we are presenting this month our first example of the type in a fully modernised form.

As becomes the first of a series, the design you see illustrated on these pages is for a rather simple receiver. The tuning system is on perfectly straightforward lines, with separate tuning condensers for each circuit, without any attempt at ganged controls, in the interests of economy, simplicity, and ease of construction.

### Cost Kept Down

No "cheese-paring" methods have been employed in designing the instrument, but a very close watch indeed has been kept upon the cost factor. All the really valuable refinements have been included, but a strict embargo has been laid upon all mere "frills."

As a result the instrument is a very fine example of real simplicity, with all its obvious practical advantages, combined with faultless performance and just those refinements which really assist the operator to get the best out of it and make it truly pleasing to handle.

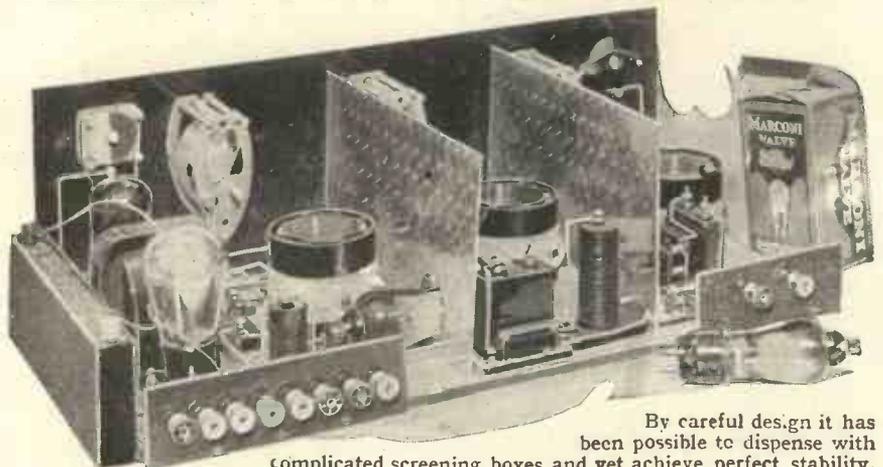
The H.F. side of the receiver closely

an exceptionally high order, with marked simplicity of assembly and wiring.

The second factor is the employment of that other important "M.W." production, the "Interwave" system of aerial and intervalve coupling on long waves.

Not merely does this device ensure an excellent level of general efficiency on long waves, but it also wipes out completely that old nuisance of interference on the long-wave band due to the local "breaking through."

### A SCREENING PROBLEM SUCCESSFULLY TACKLED



By careful design it has been possible to dispense with complicated screening boxes and yet achieve perfect stability.

The older type of control acting on the "mag." of the H.F. side can then be used for the smaller variations to suit the requirements of different items. So long as it is used for this purpose alone and not carried to extremes it is satisfactory and leads to none of the distortion and "cross-talk" troubles which are otherwise prone to result.

In our present four-valver, therefore, we have provided a dual system of volume control. There is first an input control in the form of a variable condenser of the inexpensive "solid dielectric" type in series in the aerial circuit.

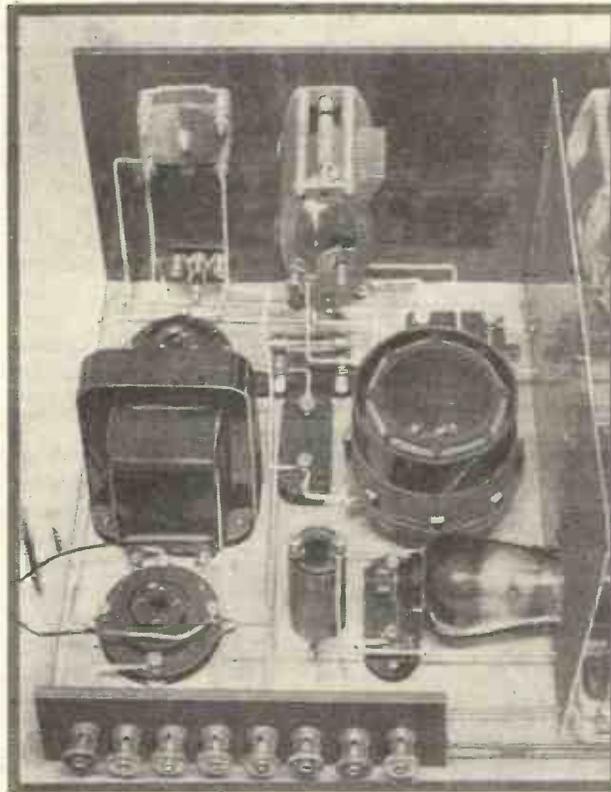
**Input Control**

This is conveniently placed on the panel, and is normally used to adjust the selectivity of the set to the needs of the particular circumstances in which it is used. A suitable setting for it is found from this point of view, and at this it is kept, except when receiving the local.

For this latter work it can be pressed into service as our desired control of aerial input. The energy admitted to the set can be cut down by reducing the series con-

and you will understand how it is intended to be used if you have followed the explanations we have just given.

**THERE IS PLENTY OF POWER HERE!**



The single E.F. stage gives all the L.F. magnification needed for first-rate loud-speaker results from dozens of stations.

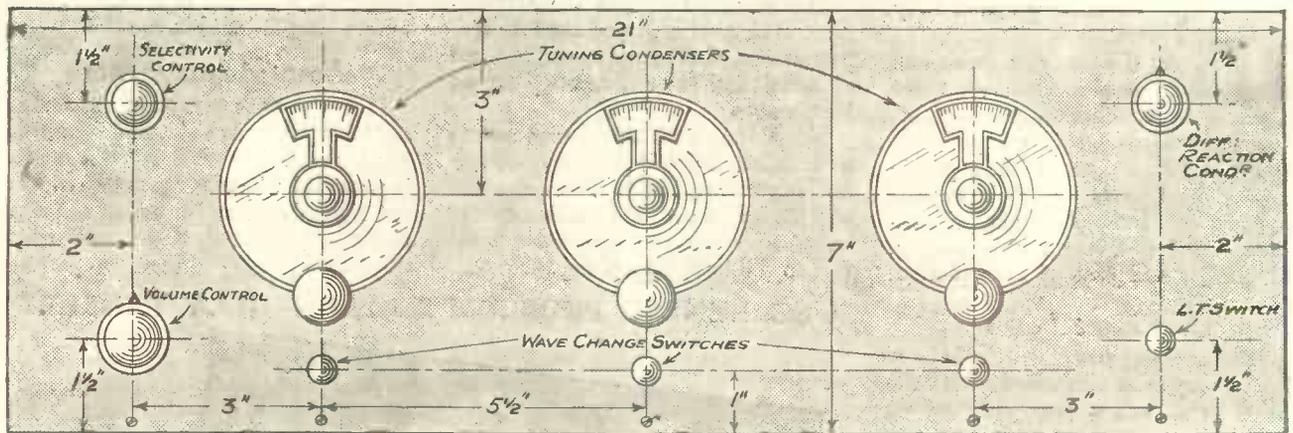
screws along its edges, and is later secured more firmly by the mounting of the various components. The fixing screws of these latter pass through the copper and down into the wooden baseboard beneath.

There are two points to note in connection with this sheet of copper foil. First, be careful to see that all the various components mounted upon it have no projecting "live" points underneath which might touch the metal and cause a short. If any of them look dangerous play for safety and mount them on little pieces of plywood.

**The Upright Screens**

Secondly, note that the vertical metal partition screens which complete the separation of the various circuits must make proper contact with the foil. If, therefore, the latter has a lacquered finish rub it over with glasspaper along the part where the lower edges of the vertical screens will rest upon it.

When you come to mounting the three coils, note that they are raised up on little blocks of wood. These



**PANEL LAYOUT**

The panel layout is particularly attractive, the dials and knobs being symmetrically disposed. The pre-detector volume control eliminates cross-modulation.

denser to a very low capacity. For example, in many cases it will suffice to put the condenser back to its nominal "zero" position, and trust to its minimum capacity to let through a sufficient amount of the energy of the local transmission.

The volume control proper takes the form of a filament rheostat controlling the first screened-grid valve,

Now let us take a look at the set as a constructional job. First, we will draw your attention to the way the necessary screening is carried out.

**Concerning the Baseboard**

There is a large sheet of copper foil covering the whole of the upper surface of the baseboard. This is at first held in place with a few small

should be 3/4 or 1 in. thick, and must not be omitted in this design.

The only other constructional point we need mention concerns the wiring of the wave-change switches. It is advisable to leave the fitting of the variable condensers to the panel until the switches have been wired up, to make the process as easy as possible. All the rest of the work

## The Construction Has Been Scientifically Simplified

is quite straightforward. Now to give you brief operating data for the finished instrument and then we can leave you to get on with the work. The handling of the volume and selectivity controls we have already covered, the reaction control functions just as usual (turn to the right to increase), and so do the wave-change switches—push them inwards for long waves, pull outwards for medium.

### The Valves to Use

Operating the three dials to the best advantage does not call for much skill, and the knack is soon acquired. Once you have got them in step on any one station it is not difficult to run them together while searching. A little practice will teach you the trick of it.

In the way of valves you want two S.G.'s, one of the H.F. or "special detector" type for  $V_3$ , and a power or preferably super-power for  $V_4$ . Working voltages will be somewhat as follows: 70 to 80 volts on H.T. + 1, 120 volts on H.T. + 2, and 120 to 150 volts on H.T. + 3, according to

the rating of your output valve and the amount of "juice" available.

### Grid-Bias Values

Grid bias on the output valve will depend on the type used and the H.T. voltage, and on the S.G.'s it should be derived from separate single dry cells, one for each valve. The  $1\frac{1}{2}$ -volt type will serve if you have the full 120 volts H.T., but the special .9-volt type is somewhat to be preferred.

A final hint: The main G.B. battery is intended to be fitted to the inside of the cabinet.

### INTERESTING ITEMS

Mounting condensers—Labelling acid bottles—Using old files—etc., etc.

WHEN making a hole to mount the spindle of a condenser of the one-hole mounting type, do not make it so small that the condenser can be screwed in, for this often results in a strained condenser.

If you have trouble in labelling bottles containing accumulator acid because the label is attacked by the acid, melt ordinary wax from a candle in a spoon and paint this over the label.

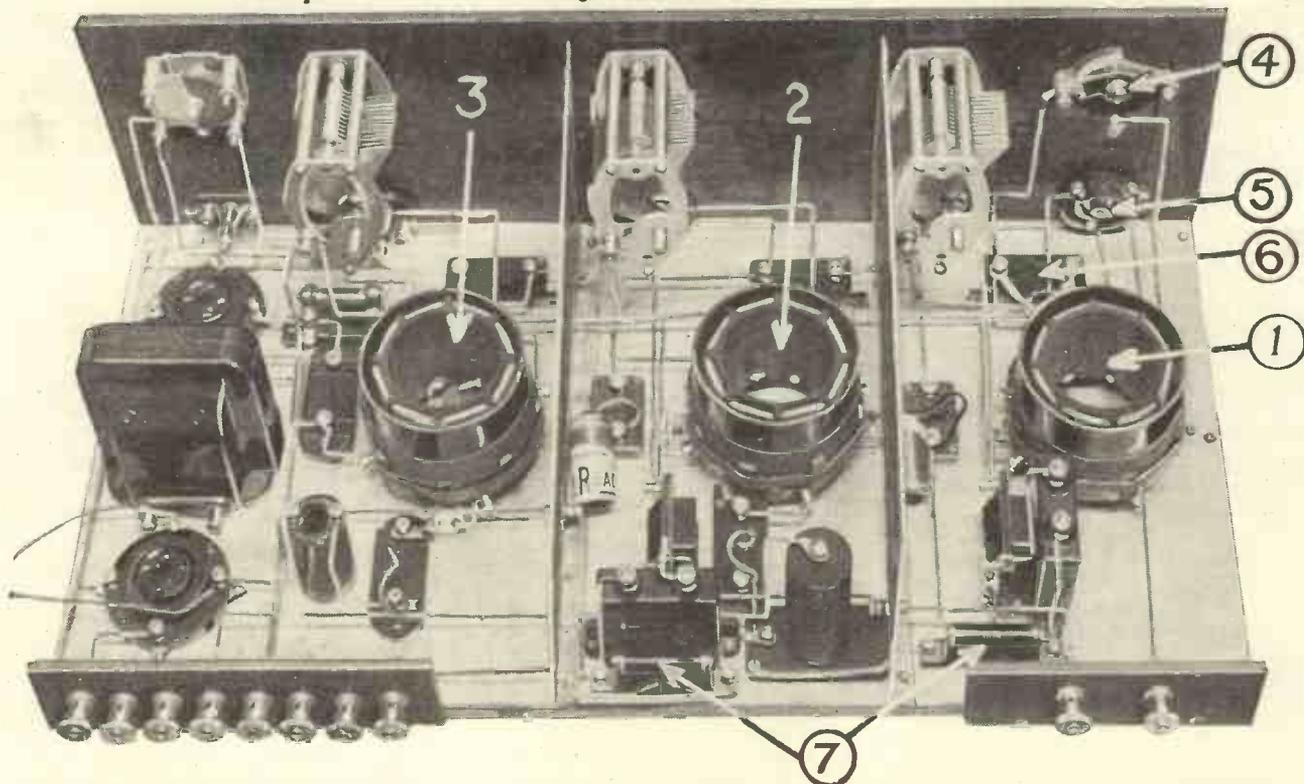
Do not throw away an old file, as the tang of this can often be sharpened with a carborundum stone to a very keen edge, and will come in very handy as a reamer.

Do not put up with a badly fitting ebonite panel, as it is very easy to remove some of the surplus with a file or rasp.

Both the acid itself and the lead of an accumulator are poisonous, and either may cause trouble to a cut finger unless properly protected.

If when you are talking your neighbours can hear it on their set, and you can hear them talking when their set is on, the trouble is that your aerials are too close together.

### Compare it with any other Four-Valve Receiver



A little more compactness might have been possible, but only at the expense of sensitivity and stability, or both. We confidently claim that this receiver achieves a higher all-round performance than any other similar set; it has none of those snags so commonly met in mere haphazard hook-ups. (1), (2), and (3) are "M.W." dual-range coils; (4) selectivity control; (5) volume control; (6) the "Interwave" coupling condenser, and (7) and (8) de-coupling resistances for the screening grids.

# ARE MAINS SETS ECONOMICAL?

By R. SUMNERS

*How to work out the cost of taking your H.T. and L.T. from the mains.*

**T**HERE is a widely accepted belief that all mains sets are economical to run. This is not quite true. There are occasions when it is cheaper to use batteries, especially for the L.T. This is especially the case when listeners have to take their supply at the lighting rate, for this is always much more expensive than the power rating.

It is not difficult to calculate the cost of running a mains set. You pay so much per unit for your electricity. One Board of Trade unit comprises a thousand watt-hours; that is to say, when you have used a thousand watts for one hour you have consumed one unit.

## How Many Hours?

To simplify the reckoning, I would advise you to reduce the figure to a current basis. To aim at this, divide the voltage of your mains into one thousand.

Supposing the voltage happens to be 250, dividing this into 1,000 you get 4. Having resolved that figure, you can then proceed to forget about the mains voltage and the 1,000 watts.

You now know that you can take four amperes from your mains for one hour for each unit. Alternatively, you can take one ampere for four hours or two amperes for two hours, or eight amps. for half an hour.

To eat up one unit, the sum of the current in amperes and the hours for which you drain that current from the mains must work out at four. I have fixed that figure only as an example, and you must remember that with mains of different voltages it would work out differently. For instance, with 200-volt mains the current figure would be  $5, \frac{1,000}{200} = 5$ .

## D.C. Mains Sets

D.C. mains sets can be very expensive to operate, and it is easy to see why. The filaments of the valves demand a certain current and you have got to take that current at the full voltage of the D.C. mains.

With A.C. you step-down the mains voltage to operate filaments, and in

stepping-down the voltage you step-up the current. Frequently D.C. mains sets have the filaments of their valves wired in series in order to keep the current consumption down, but this seriously hampers the choice of valves.

## Much Cheaper to Run

However, it must be admitted that the series filament scheme makes for considerable economy. On these lines the L.T. for a seven-valver is no more expensive than that for a one-valver. At first sight that may seem strange, but when you think it over you will see that with the one-valver series resistances are necessary to break

## YOU SAVE MONEY



The running costs of a set that derives its power from A.C. mains are generally extremely low, and compare very favourably with those of an equivalent battery-driven receiver. Here is a section of the "Mains-Power" Three, described in the December, 1930, issue of "M.W."

down the current for the valve filaments to, say, 1 amp. For a five-, six- or seven-valve set the additional valve filaments replace a part of the current-reducing resistance.

1 amp. is not a particularly heavy consumption where the mains are

concerned, and with ordinary types of valves to be found in the 1 rating, 25 milliamps of H.T. is an outside sort of figure. This gives a total of 125 of an ampere consumption from the mains.

Dividing this into 4, you will see that you can run such an outfit from 250-volt D.C. mains for over 30 hours before you have consumed a unit, and even at 10d. per unit that is but three hours or so a penny. Not a very heavy financial drain.

## Parallel Filaments Expensive

But it is when you have parallel filaments that the cost of running a set from D.C. mains mounts up. A moderately powerful outfit using a super-power valve might need as much as 8 of an ampere filament current.

In comparison with this, even a hefty H.T. becomes almost negligible. With such a filament consumption on 250-volt D.C. mains, only five hours of service would be provided for each unit. At, say, 7½d. per unit, the cost of running such a set would be 1½d. per hour. In the hands of a fairly enthusiastic listener this might amount to some two shillings per week. This is not a very big sum, but money would be saved by the use of an accumulator for the L.T.

## Advantage of A.C.

A.C. sets are definitely cheaper than battery-driven outfits. It is even generally cheaper to trickle charge your own L.T. battery, if you have an accumulator, with A.C. mains than to have it charged at a service station. With D.C. home-charging rarely saves you money.

Anyway, it would cost just as much to charge a small accumulator from D.C. as to take the L.T. direct from the mains. You have to put more into an accumulator than you take out, and you have to break down the current for charging an accumulator from D.C. mains, just as you have to break down the current for valve filaments when such a supply is used.

## Well Worth Consideration

But any type of set working from any kind of power mains would have to be much more expensive than it actually is to run before it became a proposition not worth consideration. Unvarying constancy in operation and freedom from the snags of battery supply are great advantages, particularly in a household receiver, but the experimenter generally stops short at high tension, preferring the more flexible accumulator for supplying the L.T.

# AT YOUR SERVICE

## by OUR TRADE COMMISSIONER



### Radio on Trains

**I** WONDER if any of my readers has listened to radio while travelling on a long journey? If so, he will fully realise the value of this form of entertainment—how it helps to relieve the tedium of continual travelling.

The L.N.E.R. is to be congratulated on the fitting of its 10.10 a.m. Leeds express with radio. 'Phones are provided at a shilling per pair, per journey, and though the possibility of an English programme is not a great one till midday, the return journey, commencing at 5.30 p.m., can be accompanied by British music during the whole of its course.

The set is a three-valver and is situated in one of the guard's vans in a special felt-lined case.

### Vigorous Varley

At the time of writing, Varleys are in the midst of an intensive advertising campaign in which their all-electric receivers and radio-gramophones are the chief features.

Special leaflets for the trade have been prepared for public distribution, and advertisements in a large number of leading newspapers have been arranged.

Messrs. Varley, Ltd., have always had plenty of push, and I hope this campaign will have the success that this vigorous firm deserves.

### Ediswan's Success

I understand that the special campaign just ended, in which Ediswan and Mazda products were brought before the notice of twenty-five million people, has been a great success, and that the Christmas sales of products of this old-established firm have been greatly increased, due to the special advertising displays.

*Here is some varied news of the trade that should interest all readers, whether or not they are connected with the radio industry. Manufacturers, dealers, home constructors and general readers are invited to send items of interest to be included under this heading.*

### Marconiphone Price Cuts

A reduction in price and the appearance of something new are always welcome, and we have recently had both among the Marconiphone products. The price reductions concern the famous Model 56 receivers. The A.C. mains model is down to £26 from £35, the D.C. model

### "LITTLE TOMMY TUCKER"



The Mullard Orgola radio-gramophone with the "H" speaker used for reproduction of records in the foyer at the Daly's Theatre, where "Little Tommy Tucker" is being played.

(H.T. only) has dropped to £23, and the all-battery set is now £21 instead of £30 7s.

The new arrivals are valves—a complete new range, as you probably saw by the advertisement on page 539 of MODERN WIRELESS last month. And "some" valves they are, too, as I have found on test. But you will be getting a full test report in other pages of this journal within the next month or so.

Anyhow, the "2/b and 2/c" series are worth your attention, especially L2/c and the P2/b.

But you must turn to the ads. to see why. This is not a test, or even technical, section of the paper, but I could not help referring to this latest step forward in the production of high-efficiency 2-volt valves.

### New Ferranti Mains Unit

I have received from Ferranti, Ltd., details of their new A.C. H.T. supply unit, which is a home-constructor's job. It is suitable for use with any receiver of good design employing up to five valves.

The maximum output is 80 milliamps. at 200 volts. It is adequate for the largest receivers required for domestic use, and the design is such that there is no "motor-boating" and no mains hum audible on a good moving-coil speaker with an audio-frequency amplification up to 5,000 times; and even at greater amplifications than this the mains hum is very small.

Also, Ferranti's have now available a push-pull transformer with separate grid-bias tapings on the secondary, so that, if required, different bias can be given to the output valves.

### Progress in Ireland

With a view to making available to Irish listeners a service comparable to that which obtains in Great

## Radio Plans for the New Year

Britain, the Marconiphone Co., Ltd., have opened a new branch at 13, St. Andrew's Street, Dublin. This branch will not only undertake the distribution of Marconiphone products direct, instead of through Marconi (Ireland), Ltd., but it will also provide service facilities to assist Marconiphone dealers in the Free State on all questions of service.

Mr. F. Jones is the company's Free State representative, and will be in charge of the new branch, assisted by Mr. Farmer, who is already well-known to the trade in Ireland.

### Sign, Please!

Upon entering an exhibition held recently in New York visitors were somewhat surprised to hear a voice, coming apparently from nowhere, invite them to sign their names in the book.

This is only another example of

### RETAILERS RALLY AT MANCHESTER



A group of members of the National Federation of Retailers photographed during a recent visit to the Ferranti works at Hollinwood.

what can be done by the latest marvel of electrical science—the photo-electric cell.

When the visitor entered the exhibition he interrupted a beam of light directed on to the cell, and thus automatically set a gramophone in motion which was amplified by a loud speaker. Simple, isn't it?

### Radio Play Novelty

Radio actors appear to be in for a very easy time. In a play recently transmitted from Lille, two of the principal parts were broadcast by the actors from their own sitting-rooms.

By following the play with head-

phones every member of the cast was able to take his "cues" just as promptly as if they had all been together in the studio, and the experiment was declared a success.

### Useful Mains Converter

There are many wireless sets and similar apparatus now working on D.C. electric-light mains. The owner of such apparatus may move into a district where the supply is alternating current, or the direct current may be changed to alternating current at any time. Such conversions are going on all over the country.

In order that existing sets can be worked from a new current supply without alterations, Philips Lamps, Ltd., have designed a very useful unit. It is a complete instrument in itself, and the 2-pin plug should be fitted into a lamp-holder or power socket (A.C. supply).

### Heyberd Transformers

Slight misunderstanding may have arisen owing to the wording of the advertisement on page 667 of last month's "M.W." where the Heyberd L.T. Power Transformer was described. It should, of course, be realised that the filament current can be taken direct from the transformer if indirectly-heated valves are used.

Finally, I should like to remind manufacturers, retailers and readers that next "M.W." will be a specially enlarged number. On sale January 31, price 1/6.

### AERIALS FOR SHORT-WAVERS

A few words by W.L.S., our Short-Wave Expert, on this important matter.

I AM very annoyed sometimes when I change over from my big transmitting aerial on to a dirty little length of wire in the loft and find that signal strength all round is exactly the same. One thing does seem certain and that is great height and great length are no advantage at all.

Particularly does that apply to the former. Although I cannot see why, a high aerial seems to bring in all the "mush" that is going without improving signal strength at all.

### Reducing "Mush"

In fact, if you are a martyr to "mush," my advice to you is to string an aerial along the top of the garden fence and to receive on that. You will find all the signals are still there with a much decreased background.

For some time now, owing to this self-same "mush," I have forgotten all that I ever knew about note-mags. and have been using a plain screened-grid stage and detector only. One certainly seems to get used to the lack of "punch" after a while, and then it becomes a pleasure to hear clean-cut signals coming through with a really quiet background.

There is not the slightest doubt that they are far more easy to read than the terrific signals one hears on some sets, surrounded by sparky noises and crackles, together with that terrific hiss that seems to be purely a property of the L.F. side.

# MY BROADCASTING DIARY



*Our own Broadcasting Correspondent records the progress of the British Broadcasting Corporation, and frankly comments on the policies in force at B.B.C. headquarters.*

## *Baird Television*

**T**HE inside history of the events which led up to the prolongation of the broadcasting of Baird Television has not yet been told. I do not profess to know all of it; but this I do know, that for about two months it seemed most improbable that the transmissions would survive the end of 1930.

Most people at Savoy Hill are extremely sceptical about television of any kind at any time; they are frankly unimpressed by the Baird system of television. So it was presumed with good reason that the broadcasting would terminate as soon as reasonably possible.

But in the end other counsels prevailed. I gather there was a feeling that the trial period had not been quite long enough, especially as, at the moment, there was no worthy television rival in the field. And the decision is definitely better than "Suspended Sentence." For the first time, the B.B.C. engineers are taking a hand in television research. This may have far-reaching results.

## *Dr. Boulton's Future*

The unqualified success of Dr. Adrian Boulton as conductor of the new B.B.C. Orchestra has presented the Savoy Hill administration with a difficult problem. Dr. Boulton was appointed Music Director, it being presumed that the duties of that post would permit him to conduct at rare intervals, but not regularly. As things have turned out it has become a moot point whether Dr. Boulton is not of greater value to the B.B.C. as a permanent senior conductor than as a Music Director hampered with masses of administrative tasks. If a change is made in this sense, there will be another job going—and a very good one, too, for eminent musicians. Of the candidates so far mentioned as having strong followings, Mr. Percy Scholes and Mr. Geoffrey Toye are well in the lead; the forces being led by Mrs. Philip Snowden and Mr. R. H. Eckersley respectively.

## *Sir Walford's Successor*

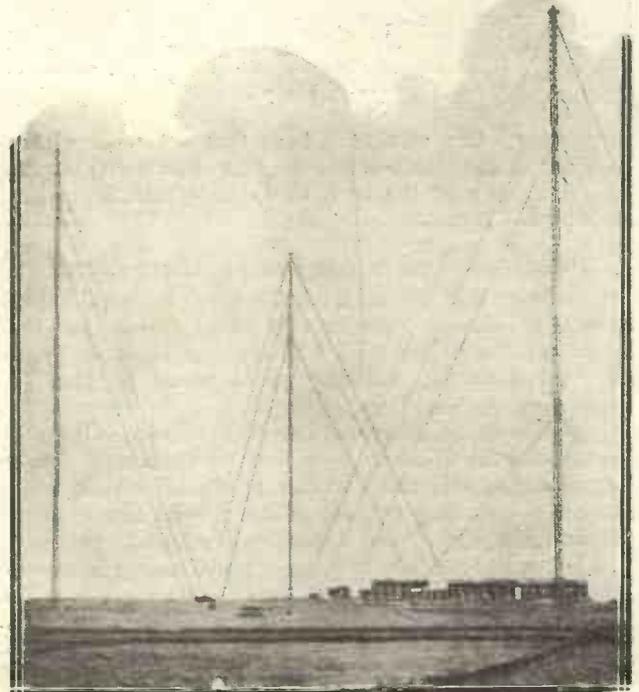
Among Savoy Hill personalities the most interesting development in the last quarter of 1930 was the rapid rise of Mr. Victor Hely-Hutchinson. His artistic and executive reputation had already been established, but his microphone personality had not been recognised.

Then through the illness of Sir Walford Davies came the young man's chance. His broadcasts in the "Ordinary Listener" series, substituting for Sir Walford Davies, were not regarded as better in quality than those of the master teacher, but they were different in a wonderfully fresh and attractive way. Music lovers and listeners generally will hope that the B.B.C. will insist on Mr. Hely-Hutchinson developing his newly discovered microphone personality.

## *One Up for Modern Music*

The cohorts of modern music enthusiasts, led by Mr. Clark, of the music staff of the B.B.C., have been having a "thin" time lately, but the run of bad luck seems to have been broken by a striking success in connection with the Sunday programmes.

## THE MASTS AT MOORSIDE



A fine view of the 500-ft. masts at Moorside Edge, where the North Regional station is situated.

## Latest News Items for the Listener

It is believed by the B.B.C. that the Sunday night concerts have a bigger audience than any other programme of the week. Formerly the idea was to meet this by keeping the concerts as "popular" and "orthodox" as possible.

But more recently, with the knowledge of the tremendous audience, has come the desire on the part of those whose mission in life is "Modern Music" to impose it on the public on Sunday evenings. And they have been so far successful as to obtain sanction for the occasional broadcasting in Sunday's main programme of work of which Hindemith's is typical.

### *Harpichord Difficulties*

The B.B.C. is having trouble acquiring a harpichord strong enough for continuous work in Queen's Hall, and it has been decided to send Mr. Victor Hely-Hutchinson to Germany to seek the right instrument there.

At present it is usual, when broadcasting the harpichord, to place a microphone actually inside the

### A SCENE OF DRAMA!



The studio at Manchester that is used for the production of radio plays.

instrument. The result has been that a listener with a good set in the North of Scotland has had better results than a listener at the back of Queen's Hall, dependent only on his ears.

### *Public Concerts for the Military Band*

It is likely that the B.B.C. will arrange a special public concert at Queen's Hall once or twice a year for the benefit of Mr. O'Donnell's military band and its great army of admirers, some of whom would be glad of the chance of seeing it in the flesh.

Most competent critics are now agreed that Mr. O'Donnell has created the finest military band in the world. Their work, handled with skill and flair, is of a remarkably wide character, including original military band music, symphonic descriptions, and appropriate musical synthesis. This is bound to be a very popular move among listeners.

### *Q.H. Alterations*

Friends at Savoy Hill tell me that the B.B.C. is far from satisfied with the present internal structure of the platform at Queen's Hall. It is awkwardly shaped and too small. Important changes are to be made before the beginning of next summer's Promenade season. A considerably enlarged and "beautified" platform will be one of the chief reforms.

### *Setting of the Orchestra: Two Methods*

Since the beginning of this symphony season there have emerged two distinctive settings for the new orchestra. The first, that thought out by Dr. Adrian Boult, is excellent for microphone balance, but is defective for musical ensemble.

Sir Henry Wood, the creator of the rival setting of the same orchestra, gets a much better musical ensemble, but is definitely inferior in microphone balance. So it has been decided to combine the merits of the two and evolve a new standard B.B.C. setting, based on a combination of Sir Henry's arrangement of strings with Dr. Boult's arrangement of the wood-wind.

### *Another "Talks War"*

Feeling among the "entertainers" at Savoy Hill has been rising again on the vexed subject of Talks. The finances of programmes are kept very secret; hardly anyone in "music" knows what "Dramatic Productions" are allowed to spend, and so on.

But it has leaked out somehow that Talks spend £2,000 a week, or over a £100,000 a year. This may or may not be too large a share of the resources of broadcasting; but the condemnation outside the Talks department is pretty general and enthusiastic.

Miss Matheson has survived so many attacks from so many quarters that another campaign will hardly find her unprepared. But the suggestion that £100,000 is at least a generous allowance for what is mostly "uplift" will be hard to refute. I would not be surprised to see an armistice arranged on terms admitting a reduction in talks time in favour of music and news.

### *The B.B.C. and Prohibition*

Temperance organisations are making capital out of the refusal by the B.B.C. to accept advertisements of alcoholic liquor for its papers, or to allow anything to be said on the microphone which might encourage "drinking."

The B.B.C. itself has very little to say on the subject, but will not deny the truth of the statements made by the temperance interests. It is now rumoured also that the B.B.C. is about to link itself definitely with a big "nation-wide" campaign against the "drink-traffic" to bring about prohibition.

If this is so, most listeners will conclude that such action is entirely contrary to both the spirit and the letter of the B.B.C. Charter. The practical folly of such a move speaks for itself.





# The "M.W." "STAR-TUNE"

A very easy-to-make, simple-to-operate little unit that can be fixed to any set in a matter of moments. By its use even those old "plain aerial" outfits can be given all the selectivity necessary for modern conditions.

Designed and Described by the  
"M.W." RESEARCH AND CONSTRUCTION  
DEPARTMENT.

As readers of MODERN WIRELESS will be aware, a great amount of attention has been devoted by members of the "M.W." Research Department to the problem of securing adequate selectivity for present-day requirements without unduly complicating receiver designs.

A successful solution to this urgent problem has been achieved, and sets incorporating a simple but highly selective tuning scheme have been described in MODERN WIRELESS recently under the name of "Star-Turn" receivers.

### Many Appreciations

That these receivers have fully justified the claims made for the tuning system employed has been amply evidenced by the large number of appreciative letters received from readers who have constructed them.

### ALL YOU WANT

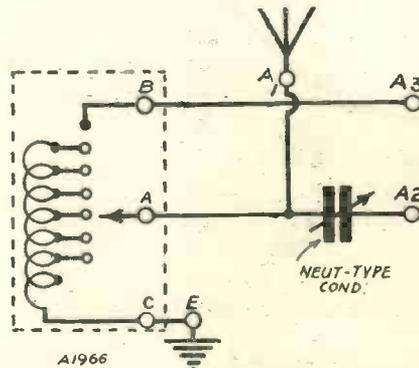
- 1 Panel, 7 x 4 in. (Goltone, or Lissen, Red Seal, Becol, etc.).
- 1 Baseboard, 7 x 6 in.
- 1 "Star-Turn" Selector coil (Ready Radio, or Wearite, Parex, Magnum, Keystone, Goltone, etc.).
- 1 Neutralising condenser (Magnum, or Bulgin, etc.).
- 4 Terminals (Belling & Lee, or Eclax, Igranic, Clix, etc.).
- Wire, screws, etc.

It is not, however, reasonable to suppose that everyone is in a position to make an entirely new receiver in order to cope with new broadcasting conditions.

The endeavours of the Research Department have, therefore, recently been directed towards realising a means of adding the "Star-Turn" method of attaining high selectivity to existing simple receivers. The unit about to be described is the outcome of much experimenting along these lines.

A receiver to which this unit is added will be endowed with much the same high degree of selectivity

### SUITS ANY SET



The "Star-Tune" is designed for attachment to any kind of receiver.

as is possessed by all the receivers in the "Star-Turn" range, and at the same time its sensitivity will be improved quite perceptibly.

### Simple

The principles involved in the "Star-Turn" tuning system are basically those governing the operation of the loosely-coupled tuner of the pre-broadcast era. It could not, however, be justly claimed that simplicity of manipulation was a feature of the loosely-coupled two-circuit

tuner, although it was undoubtedly a great aid to selectivity. The "Star-Turn" system aims at retaining the highly selective qualities of the loose-coupler with greatly simplified operation, and this is done by tuning one circuit—the aerial—partially by stepped variation of inductance instead of complete tuning with a variable condenser.

### Well-Tried Principle

In the "Star-Turn" scheme, too, the coupling between the circuits is not dependent on the coils of the two circuits being coupled magnetically.

A separate coupling coil can be used, or—as with the present unit—capacity coupling. It will be seen, therefore, that the "Star-Turn"



Having adjusted the coupling condenser to suit your set, there is only the one knob that needs slight adjustment when you have found your station.

## Make Your Set a "Star Turn"

tuning system is based on well-tried principles.

The actual construction of the unit will present few difficulties, either of a financial or of a mechanical nature. Very few components are required, as will be revealed by inspection of the list of components. Many owners of a home-constructed receiver will have all the components, with the exception of the "Star-Turn" Selector coil, already in their possession.

### Neat Little Unit

A small baseboard about 6 in. long and 4 in. wide, and a panel 7 in. by 4 in. are assembled in the usual way by screwing the panel to the edge of the baseboard. Panel brackets may, of course, be used if desired.

Connection to the set is quite simple, and the circuit of the unit has been

disconnect the unit from the set.

In connecting the unit to the set, the aerial is removed from the aerial terminal on the receiver and connected instead to the  $A_1$  terminal on the unit.

The E terminal of the unit is joined to the earth terminal of the receiver, to which also the actual earth connection is joined. To the set's aerial terminal, the unit terminal  $A_2$  is joined. These are the connects for medium-wave reception.

For the long waves the unit is cut out by adjusting the arm of the Selector switch to the point B, which is fully round to the right. If the set is then adjusted for long-wave reception, the neutralising condenser will be in series with the aerial lead to the set's coil unless an extra connection is made.

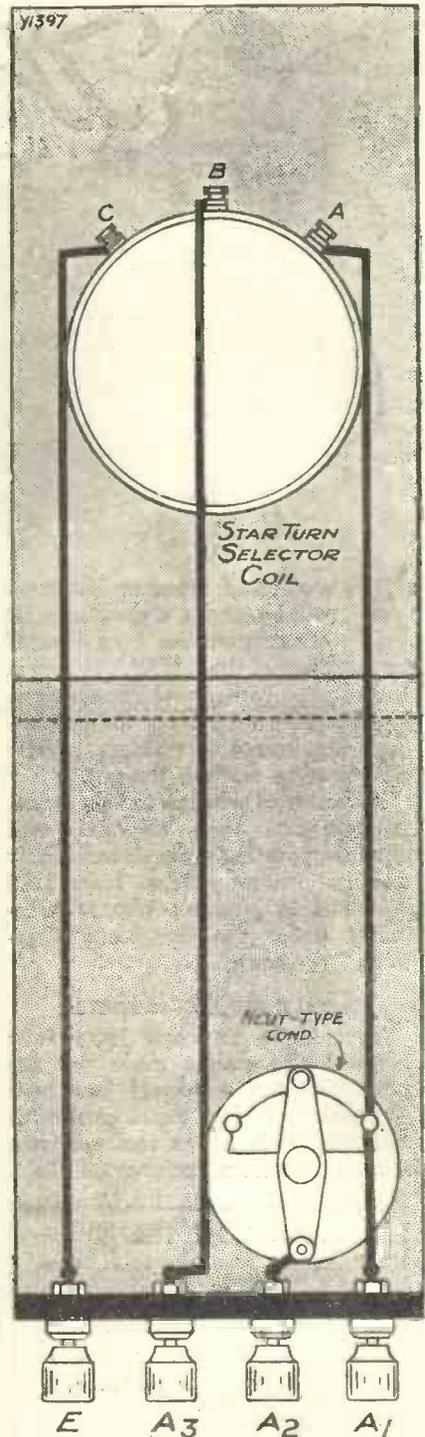
To cut the neutralising condenser out of circuit, as should normally be done, it is only necessary to connect together the  $A_2$  and the  $A_3$  terminals on the unit permanently, keeping, of course, the arm of the selector coil switch fully over to the right. The set should then be operated without regard to the unit being connected to the set. This is the normal procedure.

### "Rough" Searching

In some cases it may be found more convenient to connect  $A_3$  across direct to the aerial point on the long-wave tuning coil in the set. Terminals  $A_2$  and  $A_3$  would not then be connected together, but this point is only mentioned in passing.

For rough searching on the medium waves, with the unit in use, the Selector coil switch can be turned fully to the right as for long waves, but, of course, the set is adjusted for reception on the medium wave-band.

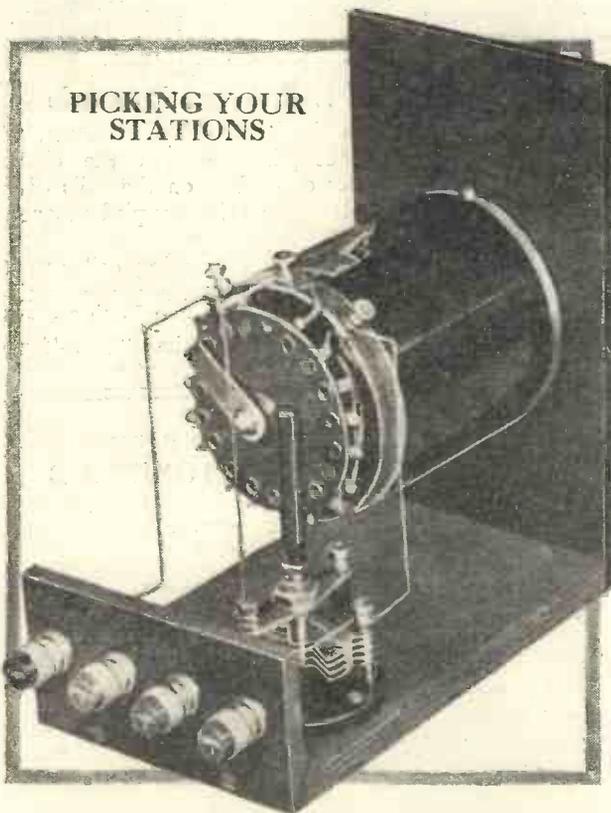
Tuning is done with the set's



You can complete the wiring of this remarkable device with only four wires!

tuning condenser only, and, having found one's station, adjustment of the Selector coil stud-switch is made until the best stud is found, when it will be discovered that the desired station is greatly increased in strength and will be very sharply tuned.

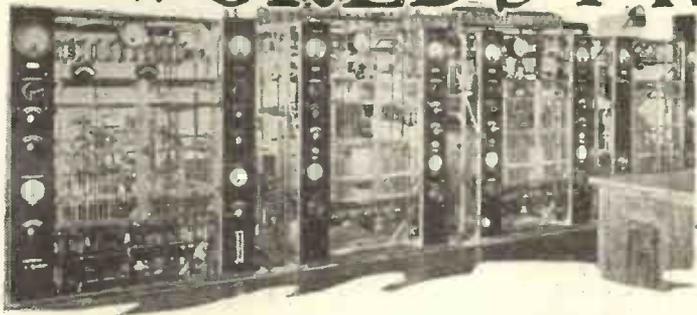
Variation of coupling can be effected by adjustment of the neutralising condenser. The tighter the coupling is made, the more sensitive will the receiver become, but, of course, somewhat less selective.



This photo affords an excellent view of the "Star-Turn" coil—the key unit in this most efficient station-separating device.

so arranged that the connection may be permanent. The unit is, of course, only effective on the medium band of wave-lengths (extra-high selectivity is not usually required on the long waves), but when receiving on the long wave-band there is no need to

# The WORLD'S PROGRAMMES



## WHEN, WHERE AND HOW TO HEAR THOSE FOREIGNERS CONDUCTED BY "D.X."

### A SIMPLE SHARPENER

DOES your local station "spread" over too many degrees on the dial? Or, worse still, have you a *twin* local station giving two programmes that your set won't separate?

#### Easily Built

If so, don't despair. Use a sharpener-circuit of some kind.

\*The best of all is the "Star-Tune" described in the preceding pages. The following is a less effective method employing capacity-coupling and using other components you may have on hand.

\* \* \*  
For the capacity-coupled aerial circuit you need an aerial coil of 40, 50 or 60 turns, and a variable condenser (or a semi-variable) with a maximum capacity of about .0005.

\* \* \*  
In addition to these you need a *small* neutralising condenser and three terminals, the whole lot being made up into a little unit that goes in your aerial lead.

#### Connecting Up

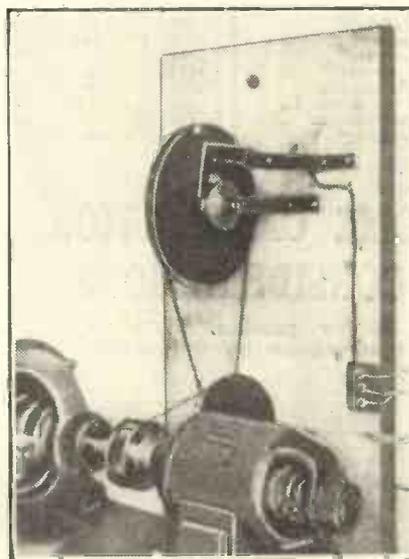
One of the terminals is marked "Earth," and you join it to one side of the coil, to one side of the .0005 condenser, and (by a short flexible lead) to "Earth" on your set.

\* \* \*  
The other sides of this condenser and coil are joined together and to one of the remaining terminals (marked "Aerial") and also to one side of the neutralising condenser.

Finally, you join the remaining side of the neutralising condenser to the third terminal, which should be marked A, and connected to the aerial terminal on your set in place of the lead-in wire. This now goes to the aerial terminal of the unit.

This is the way to use it. Have your ordinary tuning adjusted to receive the interfering programme at full strength, turn the new neutral-

### LJUBLJANA'S CUCKOO



It doesn't look much like a cuckoo, but this is the queer apparatus used by Ljubljana (on 575 metres) for its distinctive cuckoo call.

ising-type condenser about half-way in, and *slowly* tune your new circuit with the .0005 condenser. You will find that in just one clearly defined position the interference goes right down to zero, or thereabouts. Very surprising!

If tuning becomes too sharp, put the neut.-type condenser a little more "in."

### NOT WHAT THEY SEEM

ONLY a few years ago, if you sat up till 1 a.m., and tuned in a strong carrier-wave, and nursed it into speech and then heard an unmistakably American voice say, "This is K D K A, the Pioneer Broadcastin' Station of the World"—well, you knew you really had "picked up America." But nowadays not so.

#### Local "DX"

You can do all the above, and yet be receiving from the Continent of Europe. For some of the Europeans pick up short-wave American broadcasting and relay it to their listeners. And, naturally, if you pick up this rehash on your receiver it sounds like the real thing—U.S.A. brand. Actually, you are getting it from Germany, perhaps, or Norway. Not directly from the U.S.A.

In the same way you can sometimes catch a European station which is apparently right out of position. Recently London National was announcing itself on a wavelength just below 400 metres, but it was really Toulouse or one of his neighbours relaying the London programme as a stunt.

#### Simultaneous Broadcasting

Another modern trick of the broadcasters which is very puzzling is this linking of two or more transmissions for simultaneous broadcasting.

You get a station's name and its interval signal and everything to identify it, but the whole thing is really coming from somewhere else. Very puzzling sometimes.





# THE BROADCASTERS OF EUROPE

A list of all the principal stations, showing wave-lengths

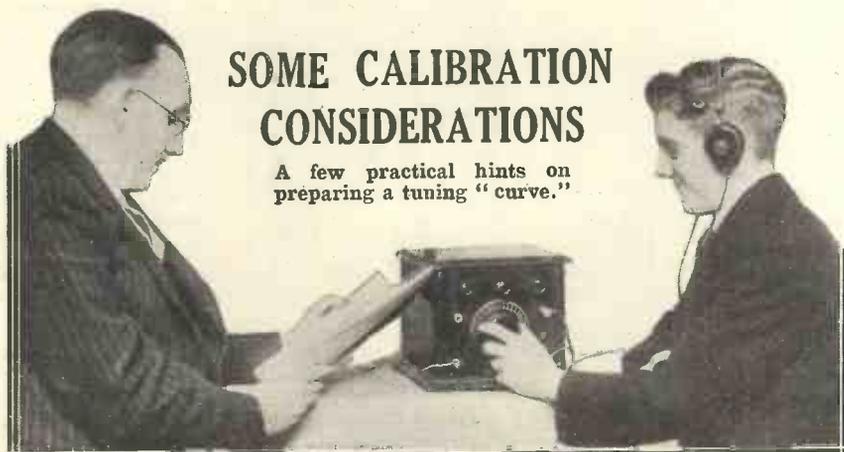


Wave-length in metres.	Name of Station
227	Aachen (Germany)
453	Aalesund (Norway)
301	Aberdeen
363.4	Algiers (Algeria)
252	Almeria (Spain)
1961	Ankara (Turkey)
511	Archangel (Russia)
560	Augsburg (Germany)
268	Barcelona, Radio Catalana (Spain)
349	Barcelona (Spain) (Radio Barcelona)
242	Belfast
432.3	Belgrade (Yugoslavia)
364	Bergen (Norway)
283	Berlin Relay
418	Berlin (Witzleben)
403	Berne (Switzerland)
218	Björneborg (Finland)
1200	Boden (Sweden)
453	Bolzano (Italy)
231	Boras (Sweden)
304	Bordeaux (Lafayette), PTT
288.5	Bournemouth
288.5	Bradford
279	Bratislava (Czechoslovakia)
316	Bremen (Germany)
325	Breslau (Germany)
342	Brno (Czechoslovakia)
509	Brussels (No.1)
338.2	Brussels (No.2)
394	Bucharest (Rumania)
550	Budapest (Hungary)
335	Cadiz (Spain)
310	Cardiff
246	Cartagena (Spain)
246	Cassel (Germany)
227	Cologne (Germany)
281	Copenhagen (Denmark)
224.4	Cork (I.F.S.), 6 C K
453	Danzig (Free City)
1554	Davenport, National
479	Daventry, Midland Regional
319	Dresden (Germany)
413	Dublin (2 R N)
288.5	Dundee
288.5	Edinburgh
246	Eskilstuna (Sweden)
298.8	Falun (Sweden)
222.9	Fecamp
218	Flensburg (Germany)
390	Frankfurt-on-Main (Germany)
368	Frederiksstad (Norway)
570	Freiburg-im-Breisgau (Germany)
204	Gävle (Sweden)
760	Geneva (Radio-Genève)
381	Genoa (Italy)

Wave-length in metres.	Name of Station
399	Glasgow
259	Gleiwitz (Germany)
322	Göteborg (Sweden)
352	Graz (Austria)
328.2	Grenoble (France), PTT
216	Halmstad (Sweden)
231	Hälsingborg (Sweden)
587	Hamar (Norway)
372	Hamburg (Germany)
566	Hanover (Germany)
276	Heilsberg
221	Helsinki (Finland)
298.8	Hilversum (Holland)
257	Hörby (Sweden)
270	Hudiksvall (Sweden)
1875	Huizen (Holland)
288.5	Hull
283	Innsbruck (Austria)
1200	Istanbul (Turkey)
202	Jönköping (Sweden)
270	Kaiserslautern (Bavaria)
247.7	Kalmar (Sweden)
1153	Kalundborg (Denmark)
186	Karlskrona (Sweden)
218	Karlstadt (Sweden)
1350	Kasbah (Tunis)
408	Katowice (Poland)
1935	Kaunas (Lithuania)
406	Kharkov (Russia)
1200	Kharkov (Russia)
232.2	Kiel (Germany)
800	Kiev (Russia)
246	Kiruna (Sweden)
453	Klagenfurt (Austria)
278	Königsberg (Germany)
1635	Königswusterhausen (Zeese, Germany)

Wave-length in metres.	Name of Station
293	Kosice (Czechoslovakia)
203	Kristinehamn (Sweden)
1796	Lahti (Finland)
473	Langenberg (Germany)
680	Lausanne (Switzerland), H B 2
200	Leeds
253	Leipzig (Germany)
1000	Leningrad (Russia)
351	Leningrad (Russia)
280	Liège (Belgium)
265.4	Lille (PTT)
293	Limoges (France)
246	Linz (Austria)
288.5	Liverpool
574.7	Ljubljana (Yugoslavia)
356.3	London Regional
261.3	London National
234	Lodz (Poland)
381	Lwow (Poland)
466	Lyons, La Doua (France)
287.2	Lyons (Radio Lyons)
424	Madrid (Union Radio), E.A.J.
283	Magdeburg (Germany)
436	Malmberget (Sweden)
231	Malmö (Sweden)
376.4	Manchester
316	Marseilles (PTT)
501	Milan (Italy)
700	Minsk (Russia)
286	Montpellier (France)
263	Moravska-Ostrava
1481	Moscow (Old Komintern)
1304	Moscow (Trades Unions)
1103	Moscow (Popoff)
497	Moscow (Russia)
720	Moscow (Experimental)
450	Moscow (R A 2)

Wave-length in metres.	Name of Station
1348	Motala (Sweden)
360	Muhlacker (Germany)
533	Munich (Germany)
227	Münster (Germany)
332	Naples (Italy)
288.5	Newcastle
249	Nice (Juan-les-Pins) (France)
453	Nidaros (Norway)
840	Nijni Novgorod (Russia)
239	Nürnberg (Germany)
1060	Oslo (Norway)
314	Oviedo (Spain)
447	Paris (Ecole Supérieure), PTT
1445.7	Paris (Eiffel Tower)
328.2	Paris (Poste Parisien)
370.4	Paris (Radio L L)
1725	Paris (Radio-Paris)
288.5	Plymouth
335	Poznan (Poland)
487	Prague (Czechoslovakia)
416	Rabat (Morocco)
216	Radio Chateaufort (Belgium)
272	Rennes (France)
525	Riga (Latvia)
445	Rjukan (Norway)
441	Rome (I R O)
453	Salamanca (Spain)
459	San Sebastian (Spain)
246.2	Schaerbeek (Brussels)
368	Seville (Spain)
288.5	Sheffield
175	St. Quentin
283	Stettin (Germany)
436	Stockholm (Sweden)
288.5	Stoke
345	Strasbourg-Brumath (France)
360	Suttgart (Germany)
288.5	Swansea
401	Tallin (Revel) (Estonia)
255	Toulouse (France), PTT
385	Toulouse (Radio du Midi)
291.1	Turin (Italy)
246	Turku (Åbo) (Finland)
283	Uddevalla (Sweden)
231	Umeå (Sweden)
453	Uppsala (Sweden)
517	Vienna (Rosenhügel)
291	Vüperi (Viborg) (Finland)
1411	Warsaw, No. 1 (Poland)
142.2	Warsaw, No. 2 (Poland)
312	Wilno (Poland)
307	Zagreb (Yugoslavia)
459	Zürich (Switzerland)



## SOME CALIBRATION CONSIDERATIONS

A few practical hints on preparing a tuning "curve."

Most long-distance listeners realize that one of the best aids to the quick placing of stations received is a calibration chart or tuning curve. Quite easy to make (as described in "M.W." last November) and very easy to use, such a "curve" is simply invaluable to the radio roamer.

But not everyone gets the full value from his "curve," because its very simplicity sometimes proves misleading. There is more in this tuning business than one might think!

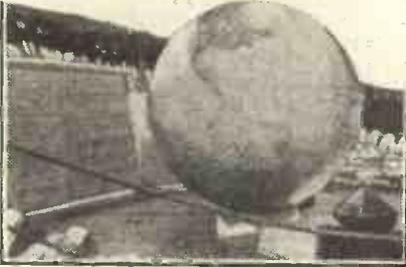
In a set with two tuning dials (aerial and H.F.) it is better to plot a curve for the H.F. than for the aerial dial; because the aerial readings (only) are apt to be a little upset by altered aerial tapplings, etc.

When drawing in your "curve," a great deal depends on the first few stations you place on the chart. And to get a good guiding line you ought to pay special attention to the tuning positions near the top and near the bottom of the dial. That's where the chief tendency to curve unexpectedly crops up.

If you get the readings of half a dozen stations which are fairly evenly spaced over the dial numbers, you get greater accuracy than more stations piled all in a heap would give. And those stations you select should be reliable, steady fellows.

Some of the European broadcasters "wobble" badly from time to time, but you can always trust the B.B.C. wave-lengths. And the Germans are a meticulous crowd, too, sticking to their allotted places very conscientiously.

# WHAT THE STATIONS ARE DOING



News items in brief about recent developments in the ever-changing panorama of the ether.

**CAEN**, the French station that broadcasts on 329 metres, will be glad of reports from English listeners. Address: 38, Rue St. Manvieux, Caen, France. (Programme from noon to 1.30 p.m., and evening concert, etc., commencing at 7.15 p.m.)

**ROME** has been trying to hit on a suitable interval signal, but so far none of the suggestions from listeners have been good enough.

**OTTAWA** has recently been broadcasting appeals for jobs for the unemployed.

**TRIESTE'S** new station should be in operation this month (January) with a power of 8.7 kw.

**BERLIN** is to have an ultra-short-wave transmitter, for wave-lengths below 10 metres.

**OSLO** is getting over on 1,071 metres very satisfactorily, according to reports from Norwegian readers.

**PRAGUE'S** announcements are made in Czech, English, French and German.

**KONIGSBERG** (who surrendered its wave-length to Heilsberg) is now working on 217 metres.

**ALGIERS** had 30 applicants for the job of announcer, so the best three were given the chance of acting as announcers, and then listeners voted for their favourite.

**MUHLACKER** has wooden masts, made by the same firm that constructed those at Munich which broke during a November gale.

**HEILSBERG**, Germany's second new Regional station, uses crystal control of wave-length.

if an agitation for a second long wave-length for Britain is successful.

**MUNICH** is not the only station to suffer from winter gales, for recently Radio Paris had its aerial blown down, at 8 o'clock at night. It was up again for the noon transmission next day.

**HUNGARY** is to have two new 10-kw. stations this year.

**BUDA-PEST** is to be gingered up to a power of 100 kw.

**LILLE** has completed the construction of its new masts.

**RADIO VITUS** (Paris) has been officially forbidden to continue its experimental broadcasts from Romainville.

**SUBOTICA** and **SKOPLJE** are the proposed sites for Jugoslavica's new relay stations to be erected this year.

**BELGRADE** is proposing to come on the air with a considerable increase in power during 1931.

**EAST PITTSBURG (KDKA)** recently celebrated its tenth anniversary of the commencement of regular broadcasting.

## NEXT MONTH

### SPECIAL DOUBLE NUMBER AND

### 50 MORE GUARANTEED CIRCUITS

Out Jan. 31st.      1s. 6d.      Order NOW.

**STUTTGART-MUHLACKER'S** interval signal consists of the notes C, D, G (produced by oscillating valve circuits).

**MELBOURNE** recently inaugurated a wireless picture service with a portrait of the King.

**SOFIA** is to have broadcasts on the air very shortly, Bulgaria being the last European country to have a broadcasting station of its own.

**DAVENTRY 5XX** may have a brother long-wave station

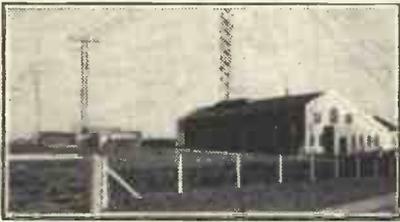
Breslau ... <sup>Kw.</sup> 1.7	<b>THE POWER THEY USE</b>				Oslo. .... <sup>Kw.</sup> 75
Brussels, No.1 <sup>Kw.</sup> 1.2	Hamburg .. <sup>Kw.</sup> 1.7	Muhlacker . <sup>Kw.</sup> 75	Naples .... <sup>Kw.</sup> 1.7	Paris . . . . . <sup>Kw.</sup> 1.2 <small>(Poste Parisien)</small>	
Cassel .... <sup>Kw.</sup> 0.3					Posen. .... <sup>Kw.</sup> 1.9
Copenhagen <sup>Kw.</sup> 1.0					Stockholm . <sup>Kw.</sup> 75
Cork ..... <sup>Kw.</sup> 1.5					Vupuri .... <sup>Kw.</sup> 15
Cracow ... <sup>Kw.</sup> 1.5					Wilno. .... <sup>Kw.</sup> 0.5
Frankfurt .. <sup>Kw.</sup> 1.7					Warsaw ... <sup>Kw.</sup> 120
Geneva. .... <sup>Kw.</sup> 1.5					Zeesen. .... <sup>Kw.</sup> 35 <small>(Konigswusterhausen)</small>

**TAP! TAP! TAP!**

Some Useful Tips.

Not water-taps. Nor taps at the window. But coil taps. Got a tapped coil on your set?

Many listeners would get better long-distance reception if they used that little fix lead to the coil more often. It is so easy to leave it in one position all the time, because best results from the local are obtained on that particular coil tapping. But it's often a great mistake.



A view at the Dorchester Beam station, which is in touch with the U.S.A. and S. America.

Here's a good tip about taps. The best one for the "local" is usually not the best for foreigners. So try all the different taps when you are searching.

The idea of having different taps on a coil is to provide some control over selectivity. An "aerial" coil, for instance, may have 50 turns in all, with taps at the 15th, 20th, and 25th turns. And much of that aerial's "sharpness" will depend on which tap you connect up.

Usually you must tap high for strength, and tap low for selectivity. So in this case you get most strength at the "25."

**TRY THE NEXT**

But probably that brings in the "local" at his loudest, so try the next tap ("20"). This ought to give good strength and much sharper tuning.

If not quite clear of the local, tap still lower, and go to the 15th turn. It's all a matter of balancing strength and sharpness.

Once you've got the knack you won't be tempted to neglect the tappings. You'll find them all invaluable. You'll say they're good! Tip-top taps!

**THE NEIGHBOUR QUESTION**

A European Problem.

Interference from neighbours is bad enough when your neighbour is just another listener. But what must

it be when two really powerful stations put out rival programmes in close proximity?

That is the situation in the Rhineland to-day, where both France and Germany are catering for the broadcast requirements of the population. On the French side of the frontier there is the new Strasbourg-Brumath transmitter, working on 345 metres with a power of 15 kw.

**BELOW THE REGIONAL**

This is the station a few degrees below the London Regional wave-length which announces in both French and German. And the power with which it penetrates over southern England leaves one in no doubt that Alsace-Lorraine listeners are able to hear it clearly!

Across the frontier, not more than about 50 miles as the crow flies, is the great new German Regional station at Muhlacker, which is now taking

over the Stuttgart programmes.

A mere fifty miles separation would be bad enough if the wave-lengths were widely

different, but Muhlacker is working on the Stuttgart wave-length of 360 metres, so that the ether separation is relatively as small as the geographical separation.

Muhlacker, moreover, has 77 kw. up its sleeve. For following on the idea of the British Regional scheme the Germans intend to serve their whole country with only three stations, if Muhlacker is as successful as is expected.

The other two German Regionals are Langenberg and Heilsberg.



The remotest village is now kept in constant touch with town by the radio programmes.

mission is by the fact that it nearly always concludes with that hymn-tune which we know as Hadyn's "Austria." (The Germans use it as a sort of National Anthem.)

The most interesting German station at the moment is "Mudlacker." That's what people are calling it, but the real name is Muhlacker. And it's taking over the Stuttgart programmes.

**OVER THE BORDER**

Muhlacker is one of Germany's new Regional stations. It is just over the Rhine, opposite Alsace, and it covers the Rhineland and the Black Forest.

Heilsberg, the other new German regional, is taking over Konigsberg's old wave-length (276.5 metres) and also that station's programmes. Both Heilsberg and Muhlacker are super-stations—power 75 kilowatts, and more if necessary. (London uses—Regional 45 kw., National 68 kw.)

**ACHTUNG!**

**ACHTUNG!**

Germany Calling.

"Achtung" is German for Attention. It means: Say.—Hullo!—Hi, There.—You.—Listen to this!

All the German stations say "Achtung" instead of "Hullo." And another way you can tell a German trans-

**COUNTRIES YOU HAVE HEARD: GERMANY**



Germany has twenty-nine broadcasting stations, the principal ones being shown above.

The new Heilsberg Regional station, which should be heard by the time these lines are in print, is situated in East Prussia, and will work in conjunction with the Konigsberg station.

In addition to those shown Germany has stations at: Aachen (Relays Cologne).

Freiburg-im-Bresgau (Relays Stuttgart). Kaiserslautern (Relays Munich).

Konigsberg. Langenberg. Mugdeburg (Relays Berlin). Stettin (Relays Berlin). Stuttgart (or Muhlacker). Representative distances (from London) are: Berlin 570 miles, Breslau 743 miles, Munich 570 miles, and Hamburg 449 miles.

**SHORT-WAVE TUNING**

You need a slow-motion dial. But a slow-motion dial isn't everything.

At first you need patience as well. This short-wave tuning is an art that has to be acquired. It's worth acquiring.

The man that can handle a short-wave set properly can make an ordinary set fairly tingle. And apart from that, handling a short-waver is its own reward.

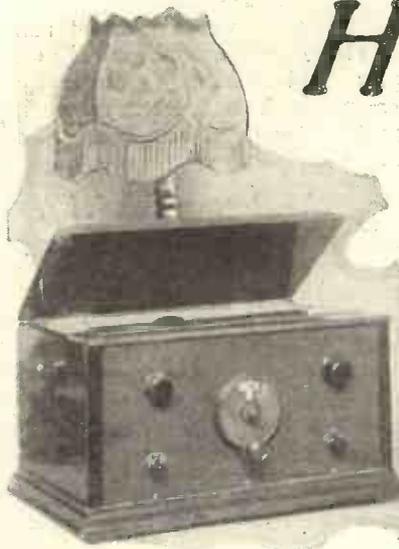
**FIVE CONTINENTS**

You hear Europe. You hear Asia. Africa is picked up easily.

You hear America as well. Scores of American stations seem "just round the corner" on a good short-waver.

And you hear Australasia (not often, perhaps—but it can be done).

That's five continents you hear. And if there were any other continents you would hear them as well! You can't travel like that on ordinary wave-lengths.



# How to Build The "TRIPLE" TWO

**W**E are presenting this month an important and far-reaching departure in set designs for the home-constructor, and the reader may like to hear something of its inner history before we go any farther.

It came about in this way. We came to the conclusion that the time has come to treat the problem of mains versus battery sets in an entirely new way.

## For Modern Conditions

In the past it has been customary to arrange the majority of designs for battery working, and to intersperse among them examples of mains sets. These latter were of varied types, some small and some large, some for alternating current and some for direct, and so on, but they bore no particular relation to the battery designs.

We have found that this arrangement does not meet modern conditions. For one thing, interest in "all-mains" sets is growing, as well it may, and our readers are beginning to wish for a larger proportion of such designs.

## Batteries or Mains ?

Again, receiver types are necessarily becoming more highly developed, and there is therefore all the more reason why the all-mains designs should resemble closely the battery versions.

It is our experience that the publication of a design for a particularly attractive battery set is always followed by a crop of requests for A.C. and D.C. all-mains versions of the same circuit.

These requests we have compiled

*We are presenting in the following pages a description of one of the most successful receivers we have ever designed. It makes use of three of "M.W.'s" latest and best schemes, namely, the "Star-Turn" selectivity coil, the "Interwave" coupling system, and the Dual-Range wave-change coil.*

*In addition, so that the "Triple" Two shall have as wide an application as possible, it is being presented in three forms. These are suitable for battery operation, D.C. mains working, or for use with A.C. electric-light supply. Hence the name "Triple" Two.*

*Whether you want to build the set or not, you will find the description extremely interesting, and it is especially fascinating to see how one fundamental circuit is adapted for use in the various conditions of power supply.*

*Those looking out for an ideal household "two," which yet has plenty of virility for DX work, will find one or other of the three sets exactly what they require.*

with whenever the original design was one lending itself conveniently to such treatment, but at the beginning of this season we decided that a decidedly different method of treatment for the whole problem would be called for in the future.

## Real Development

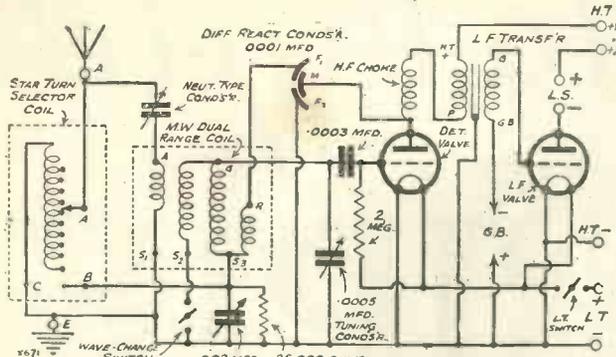
The growing importance of the all-mains receiver warrants it being given the same systematic and logical development as the battery type, and so at the beginning of the season we planned out a complete all-mains programme of a comprehensive nature. This programme is based on a great deal of experimental work carried out in the last six months, and we shall have many interesting disclosures to make regarding the permissible simplification and cost-reduction of mains apparatus.

This doesn't mean just a series of all-mains receivers of an improved and simplified modern type. The real development lies in our decision to make these mains designs an integral part of our main programme, correlated with the battery types.

## A Fine Scheme

We are not forgetting that the battery set must remain the most popular type for some time to come, of course. We cannot, therefore, indulge in too elaborate a mains programme just yet awhile, but we have been able to work out a scheme which will provide the all-mains enthusiast with a very fine range of designs, and at the same time satisfy the needs of the greater number who want battery sets

A FINE FOUNDATION



The simple but amazingly efficient circuit upon which all the models of the "Triple" Two are based. Note that it uses a dual range coil, "Star Turn" aerial tuning and that other wonderful "M.W." device, the "Interwave" system.

We could not put this scheme into operation at the actual beginning of the season, because we had so many important new types of battery sets to present. We accordingly disclosed just a few isolated examples of our mains devices in our earlier issues, as an indication of what was to come.

Outstanding Performance

Last month, for example, we gave a design for a really simple D.C. mains H.T. unit of exceptionally low cost and good performance, and a very fine general-purpose three-valver of the "H.F.-Det.-L.F." type for A.C. mains.

This last was a remarkably simple and inexpensive instrument of outstanding performance, and it was

intended to give our readers a preliminary idea of what can be done by rational simplification on modern lines.

It was based on much thorough and painstaking experimental work undertaken to determine just how much smoothing, decoupling, and so on, is needed under really practical conditions. We fancy

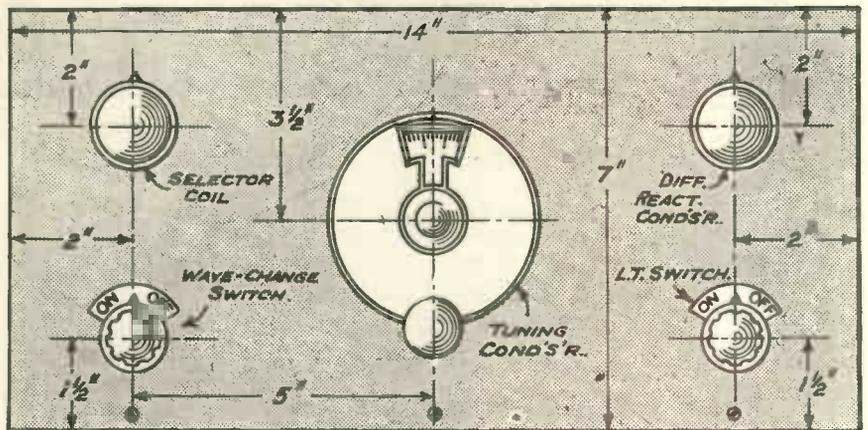
it must have been something of a surprise to those whose ideas of mains sets have been derived from the complex and elaborate contraptions emanating from quarters where the problem has never been tackled from first principles.

The Battery Model

There are still bigger surprises yet to come, as witness the three sets we are disclosing this month. Others yet to come are still in the "hush, hush" state.

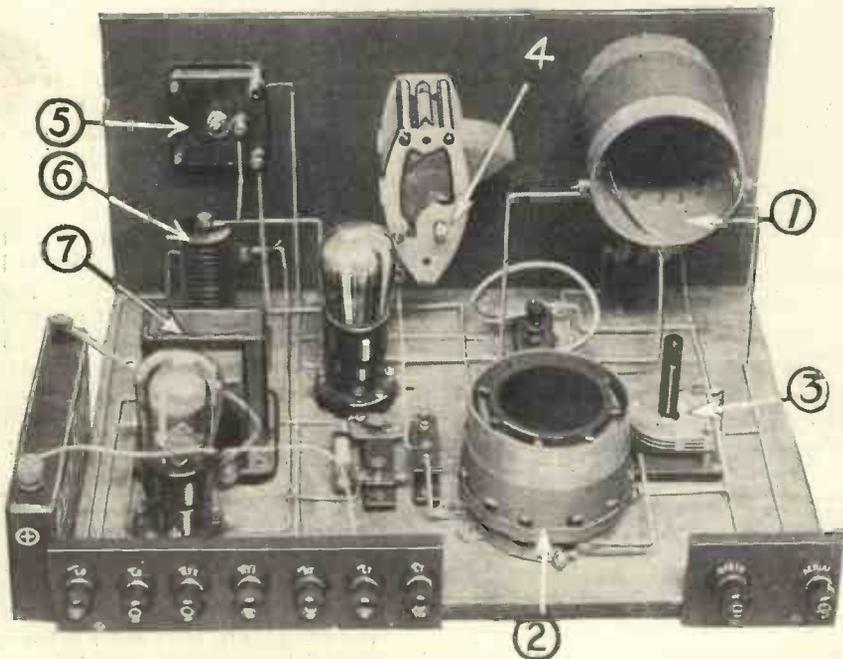
With this issue we commence our systematic and logically worked-out all-mains programme. Let us just explain how it is being worked out to

EASY CONTROL ENSURES SUCCESS



Ease of control is essential. Successful reception over long distances is to be achieved. The "Triple" Two has its controls arranged in just the right places.

THE FIRST OF THE TRIO



Here you see the battery model of the "Triple" Two ready to go on test and give you a new conception of what can be done with only two valves. The numbers denote some of its more important parts, thus: (1) is the "Star Turn" Selector coil; (2) the dual-range coil; (3) the little coupling condenser; (4) the tuning condenser; (5) the reaction condenser; (6) H.F. choke; (7) L.F. transformer.

achieve the objects we have enumerated.

We are tackling the problem by taking certain popular types of receivers, preparing a fundamental design based on the best and most up-to-date practice, and then presenting each in the form of a related group of three versions.

Each group will consist of essentially the same receiver, but the first version will be for battery operation, and the others for all-mains "drive," one for direct and one for alternating current.

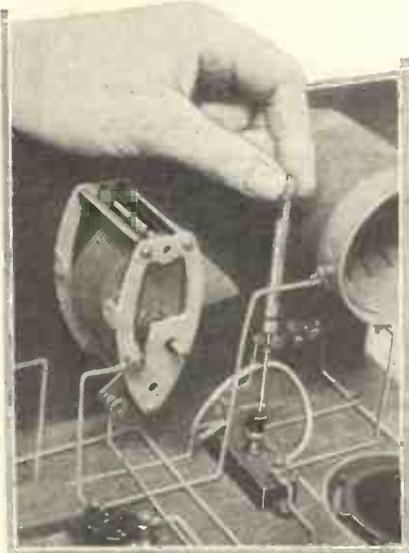
We begin by taking that valuable little circuit, the detector and one low-frequency two-valver, and on these pages you will find the complete data for building it in its battery, D.C. and A.C. versions.

Exclusive "M.W." Features

In future issues you will find the same method applied to larger receivers. These will maintain the same striking characteristics of an absolutely new standard of simplicity and low cost, combined with an excellence of performance possible only with certain exclusive "M.W."

## Another "Star Turn" Receiver

### ON THE LONG WAVES



Adjusting the aerial coupling on long waves. Just a little testing with various settings of the Interwave device will enable you to get extraordinarily fine results, with sensitivity and selectivity of an order never before achieved in so small a set.

features. For example, a really high-efficiency dual-range coil, and such circuit developments as "Star Turn" aerial tuning, "Interwave" coupling, and so on.

Why do we start with so small a type? Well, we have observed that the user of modest sets has been much neglected in the matter of mains designs. This is probably because small receivers become quite disproportionately expensive with the older hit-or-miss elaborate methods of all-mains equipment.

### Loud-Speaker Results

That objection disappears with our simplified and more efficient methods. Besides, we wanted to emphasise the fact that with our latest circuits it is not necessary to use a large number of valves to get good performance.

Consider the fundamental circuit of this trio of two-valvers and its capabilities. It employs "Star Turn" aerial tuning in its latest and most highly developed form, and that means a standard of selectivity fully adequate even to the regional conditions, *without* the complication of an extra tuning dial.

Not merely that, but it gives also a definite increase in signal strength. These two characteristics alone ensure results far above the level of any

ordinary two-valver of the older type. In addition you have the higher efficiency given by the "M.W." dual-range coil, the complete freedom from interference by the local on long waves conferred by "Interwave" coupling, differential reaction, and all the other good points of a thoroughly up-to-date design.

### THE PARTS REQUIRED FOR THE BATTERY MODEL

#### PANEL

14 x 7 in. (Lissen, or Goltone, Red Seal, Becol, Paxolin, etc.).

#### CABINET

Panel space as above, baseboard 10 in. deep (Camco, or Pickett, Keystone, etc.).

#### COILS

1 "Star Turn" Selector (Wearite, or Ready Radio, Magnum, Parex, etc.).  
1 "M.W." dual-range (Wearite, or R.I. Magnum, Ready Radio, Goltone, Parex, Keystone, etc.).

#### VARIABLE CONDENSERS

1 .0005 mfd. (Lissen, or Lotus, Polar, Dubilier, Ready Radio, Ormond, Formo, Igranic, J.B., Burton, etc.).  
1 .0001-, .00013-, or .00015-mfd. differential reaction (J.B., or Dubilier, Lissen, Lotus, Formo, Burton, Igranic, Parex, Wearite, Magnum, Ready Radio, Polar, etc.).  
1 baseboard-mounting "neutralising" type, about .00005 mfd. (Bulgin, or similar type).

#### ADJUSTABLE CONDENSER

.002 mfd. (maximum) (Formo, or Polar, Lewcos, Lissen, etc.).

#### SWITCHES

2 ordinary on-off type (Benjamin, or Lotus, Igranic, Lissen, Goltone, Ready Radio, Bulgin, Burton, Ormond, Magnum, Wearite, Keystone, Red Diamond, Junit, etc.).

#### FIXED CONDENSER

.0003 mfd. (Ready Radio, or Lissen, Dubilier, Telsen, T.C.C., Igranic, Mullard, Ediswan, Ferranti, Watmel, Formo, etc.).

#### GRID LEAK

2-meg. with holder (Ediswan, or Ferranti, Lissen, Igranic, Dubilier, Ready Radio, Mullard, etc.).

#### VALVE HOLDERS

2 ordinary 4-pin type (Lotus, or Igranic, Benjamin, W.B., Lissen, Telsen, Bulgin, Clix, Burton, Junit, Dario, etc.).

#### H.F. CHOKE

(Lewcos, or Varley, Telsen, Ready Radio, Dubilier, Lotus, Keystone, Wearite, Watmel, Polar, Magnum, Parex, R.I., Igranic, etc.).

#### L.F. TRANSFORMER

Low or medium ratio (Telsen, or Lissen, Igranic, Ferranti, Mullard, Varley, Lotus, Brown, Lewcos, R.I., etc.).

#### MISCELLANEOUS

Vernier dial, if tuning condenser of plain type (Igranic, or Lissen, Ready Radio, Lotus, J.B., Formo, Ormond, etc.).  
2 terminal strips, 7 x 2 in. and 2 1/2 x 2 in.  
9 terminals (Igranic, or Belling & Lee, Clix, Belex, etc.).  
1 25,000-ohm Spaghetti resistance (Magnum, or Bulgin, etc.).  
Wire, flex, screws, G.B. plugs, etc.

A circuit combining these things is necessarily in a very different class from a "two" of the older kind. To be sure, you cannot expect it to give you much on an indoor aerial, but on an average outdoor one it will give a most excellent account of itself.

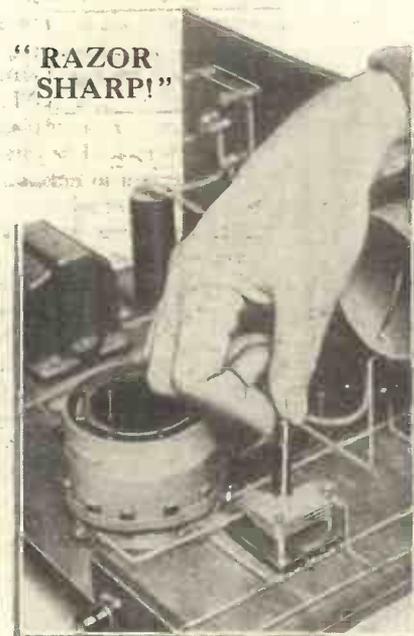
The local programmes will be obtained at real loud-speaker volume, and so will 5 G B (Midland Regional) over a considerable part of the Midlands and South of England. Long-wave Daventry (5 X X) will be obtained at moderate speaker strength over a much wider range still.

### Foreigners, Too!

After dark it will usually be possible to put several of the foreigners on the speaker, but this will naturally depend greatly upon local conditions, for here we are reaching the limits of the two-valver, however efficient. When conditions are good a "two" of this type will bring in quite a string of stations on the speaker, but it is safest to expect them to be at very good 'phone strength.

This you will always get, and you will log a list of foreigners of imposing length in a very few evenings. (It's perfectly safe to use 'phones with each of these sets.) Given a good aerial many of them will work the speaker, but this we are not going to claim as a certainty in all circumstances; we believe in under-stating rather than over-estimating the powers of our sets.

This performance we consider fully justifies the treatment of the circuit in mains form, for we believe it will satisfy the needs of very many listeners.



Even with the coupling condenser at maximum you get truly remarkable selectivity, and if you reduce the setting a trifle tuning becomes absolutely razor-edged.



## Run Your Set Completely From the Mains

The standard we have explained is to be expected from the battery and D.C. mains models, which are alike in performance. (The A.C. mains model behaves rather differently, by virtue of the greatly superior characteristics of the modern indirectly-heated A.C. mains valves.)

Photos, diagrams and a detailed list of components render the battery model's construction a very simple and straightforward business.

### Some Practical Points

There are perhaps just one or two practical points we might explain to

different makes. So wire up by their markings rather than positions.

The detector valve should be the usual H.F. or "special detector" type, and an ordinary power valve is suggested for the second socket. The H.T. voltages will be much as usual—i.e. 60 to 80 on H.T. +1, and 120 or so on H.T.+2.

Turning the knob to the right increases reaction. For maximum volume on a weak station bring it up until the set is just short of the oscillation point, but keep it well back on strong ones so as to obtain good quality.

waves it will be set for best volume.)

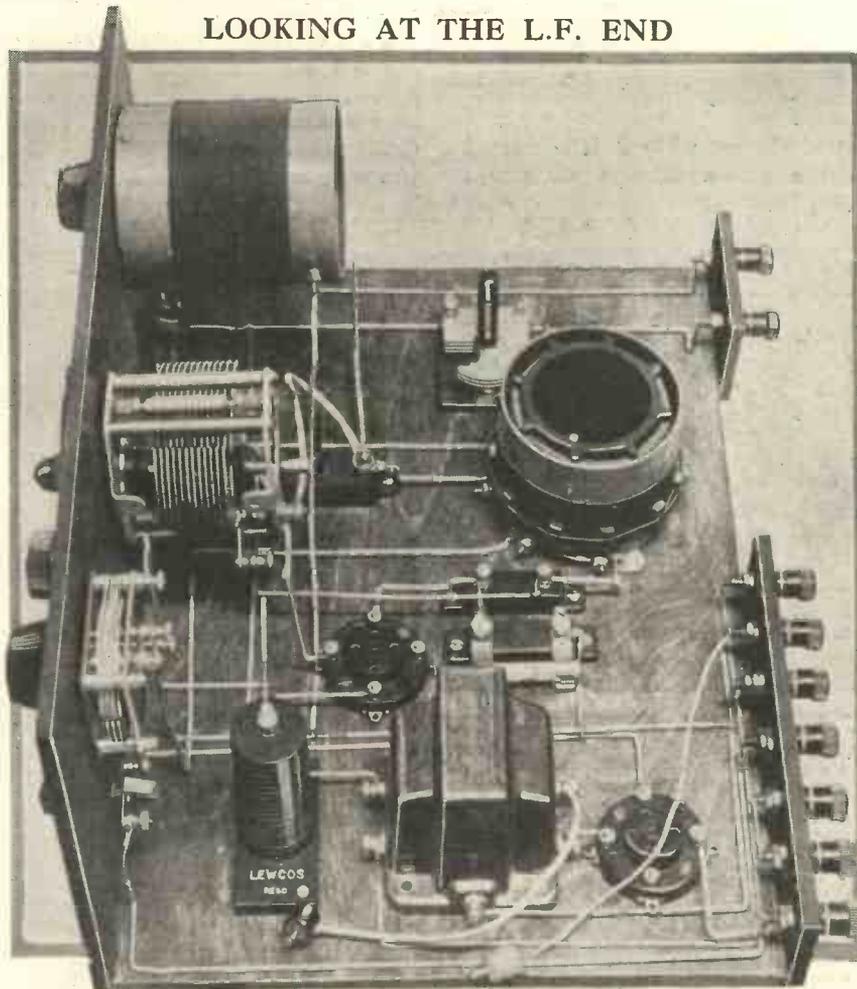
There are two selectivity controls in the receiver, and of these the neutralising condenser functions on the medium wave-band. This will normally be kept set at its maximum capacity (moving plates fully engaged with fixed). If very exceptional high selectivity is needed it can be obtained by reducing the capacity here a little, but if you go too far the strength goes down.

### Long-Wave Coupling

On long waves the compression-type condenser of .002 mfd. gives a control of aerial coupling, and so of selectivity. Fully screwed-down coupling is reduced, and so selectivity is increased. A mid-way setting is usually correct for an average aerial.

Now a final hint about tuning. It is this: You can search with the tuning dial alone for the most part, using reaction as required if the desired station is weak. Having got your station, turn to the Selector knob and seek for the setting which brings volume and selectivity up to the remarkably high level characteristic of all "Star Turn" sets, and you will probably be able to slack back the reaction and still get good strength.

### LOOKING AT THE L.F. END



Another view of the "Triple" Two battery model, which shows the powerful L.F. end very clearly. Observe that there is room for the usual 9-volt G.B. unit to stand on end between the grid leak and the terminal strip.

help you, although there is nothing critical about the layout as a whole. Arrange the coils as they were placed in the original, for stray couplings here can be harmful. Note, too, that the positions of the terminals of the Selector coil may vary a little in

The wave-change switch functions thus: For long waves put it at the "off" or "open" position, and place it at "on" for the medium waves. For long waves, also, turn the Selector coil switch knob round to the right as far as it will go. (On medium

### THE "TRIPLE" TWO D.C. MODEL

*Every ounce of power is provided by the mains in the D.C. set. No batteries, not even for grid bias, are required. And the set is not expensive to build or to run.*

HERE we come to the mains model of the "Triple" Two, which approximates most closely to the battery version. It gives precisely the same results, and it only differs in being arranged for running from direct current mains of any voltage from 200 to 240.

It is "all-mains" in the fullest sense of the term, for every volt and every milliamp. of "juice" it requires it gets from its own wonderfully simple and efficient mains-drive circuits.

Simple as the mains-drive circuits are, they do their job, and there isn't a trace of hum to annoy you in the intervals of the programme on even quite bad mains. Only just sufficient smoothing is provided, with none of

the lavish squandering of chokes and condensers so often seen in mains sets, but it is sufficient, and naturally its simplicity means exceptionally low cost.

A great deal of solid research work has been done of late on the problems

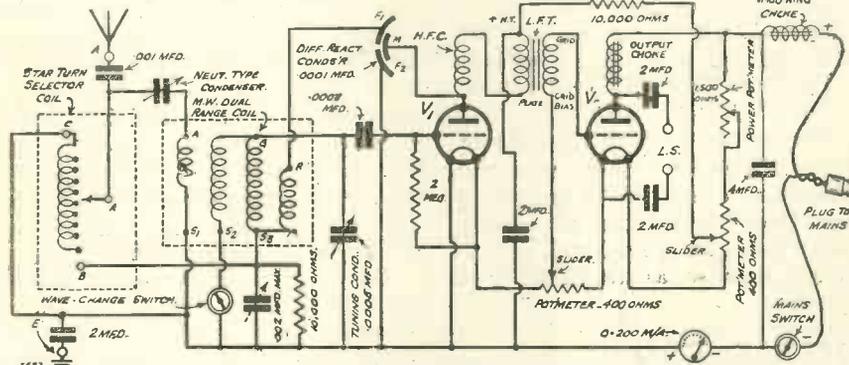
soundest lines, moreover, and it is quite impossible for anything to blow up if the set is properly constructed with good materials.

While we are talking of safety, though, we ought to add the usual warning about keeping your fingers

completely at the mains point feeding the receiver before doing anything inside it. It's as well, too, to fit a lock to the lid of the cabinet, or secure it with a couple of screws (you will hardly ever want to open it).

That's just by the way. We shall have more to say about ensuring freedom from risks of shocks later, but now let us get back to more general matters.

ONE HUNDRED PER CENT EFFICIENT



The D.C. model of the "Triple" circuit is pretty simple for an all-mains set, isn't it? There has been no cheseparing either, for it really is smoothed, amply de-coupled, and fully equipped with safety devices.

of D.C. mains working, and we are now in a position to produce designs of a simplicity, economy and perfection of operation hitherto impossible. The little D.C. mains H.T. unit we described last month will have given you an idea of the extent to which we have been able to reduce costs, and now comes an even more striking example in the D.C. "Triple" Two.

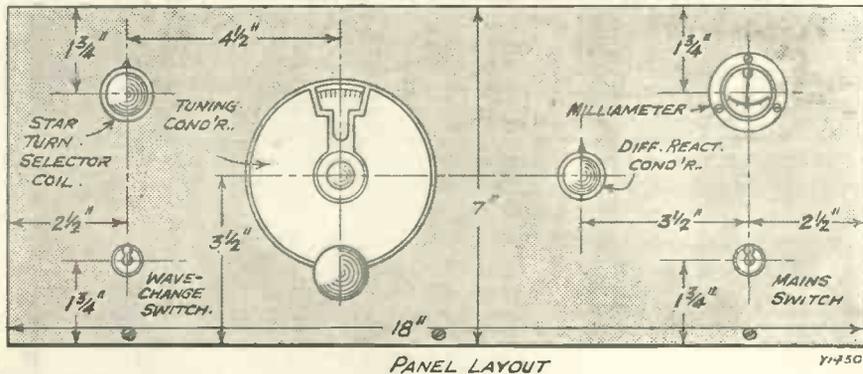
out of the set while it is connected to the mains. Always disconnect

The Power Supply Circuits

First, let us remind you that the same basic circuit has been used for the actual receiver portion of each of this remarkable trio of sets. Therefore, for a brief general account of its arrangement we would refer you to the description of the battery model on earlier pages.

There you will find, also, an account of the standard of performance to be expected from the set, and instructions for the handling of its controls. These details are exactly the same for the two sets, and we would suggest you

ALL CONTROLS AT YOUR FINGER-TIPS



PANEL LAYOUT  
The milliammeter on the right of the panel is to indicate the filament current passing through the valves

Safety First

The set is safe, too, for you cannot get a mains shock from the loud-speaker terminals (you can use 'phones with perfect confidence) or the aerial, and there is no risk of shorting the mains through the earth lead. The design itself is on the safest and

THE COMPONENTS YOU WILL NEED FOR THE D.C. MODEL.

- PANEL**  
18 x 7 in. (Goitone, or Red Seal, Lissen, Paxolin, etc.).
- CABINET**  
Panel space as above, baseboard 10 in. deep (Camco, or Pickett, Osborn, Keystone, etc.).
- COILS**  
1 "Star Turn" Selector (Ready Radio, or Parex, Magnum, Wearite, etc.).  
1 "M.W." Dual Range (Ready Radio, or Wearite, R.I. Goltone, Magnum, Parex, Keystone, etc.).
- VARIABLE CONDENSERS**  
1 .0005-mfd. (J.B., or Lissen, Dubilier, Polar, Ready Radio, Lotus, Igranic, Formo, Ormond, etc.).  
1 .0001-, .00013-, or .00015-mfd. differential reaction (Lotus, or Formo, Polar, Igranic, Lissen, Dubilier, Wearite, Ready Radio, Magnum, J.B., Parex, etc.).  
1 baseboard-mounting "neutralising" type, about .0005 mfd. (Bulgin, or Magnum, etc.).
- ADJUSTABLE CONDENSER**  
.002 mfd. (maximum) (Formo, or Lissen, Polar, Lewcos, etc.).

- SWITCHES**  
1 ordinary on-off for wave-change (Igranic, or other good insulated make. See text about this.)  
1 small panel-mounting mains type (Igranic, or Bulgin, etc.).
- FIXED CONDENSERS**  
1 4-mfd., minimum working voltage 200, preferably 250 (T.C.C., or Dubilier, Igranic, Lissen, Hydra, Formo, Mullard, etc.).  
1 2-mfd., working voltage 150, except for one in earth lead (beside neut. condenser), which must be 250 volts or over (Igranic, T.C.C. and Dubilier in set. (See above).  
1 .001-mfd. and 1 .0008-mfd. (T.C.C. and Mullard in set. Some alternative good makes are given in battery set list).
- GRID LEAK**  
2-meg., with holder (Dubilier, or other good make. See battery set).
- VALVE HOLDERS**  
2 ordinary 4-pin type (Telsen, or other good make, as in battery set list of alternatives).
- CHOKES**  
1 H.F. (Ready Radio, or other good make. See battery set).  
1 smoothing type, nominal inductance about

- 20 henries, D.C. resistance not to exceed 300 ohms, and to carry up to 140 m/a (Varley 20 H., or R.I. 28/14 H., etc.).
- 1 output type (Lissen, or Varley, Igranic, Ferranti, Wearite, R.I., Atlas, etc.).
- L.F. TRANSFORMER**  
Low or medium ratio (Ferranti, or other good make. See battery set list for alternatives).
- RESISTANCES**  
1 "power potentiometer" (used as variable resistance—i.e. only two terminals are wired up) of 1,500 ohms (Varley).  
2 400-ohm baseboard-mounting potentiometers, capable of carrying 100 m/a (Igranic).  
2 10,000-ohm Spaghettis (Bulgin or Magnum, etc.).
- MISCELLANEOUS**  
1 0-150, or 0-200 milliammeter (Bulgin, or Ferranti, Weston, etc.).  
Vernier dial if condenser of plain type (Igranic, or Ready Radio, Ormond, Lissen, J.B., Formo, Lotus, etc.).  
2 terminal strips, 4 x 2 in. (or one strip right across back of set if desired).  
4 terminals (Belling & Lee, or Eelex, Clix, Igranic, etc.).  
Wire, screws, flex, mains plug or adaptor, etc.

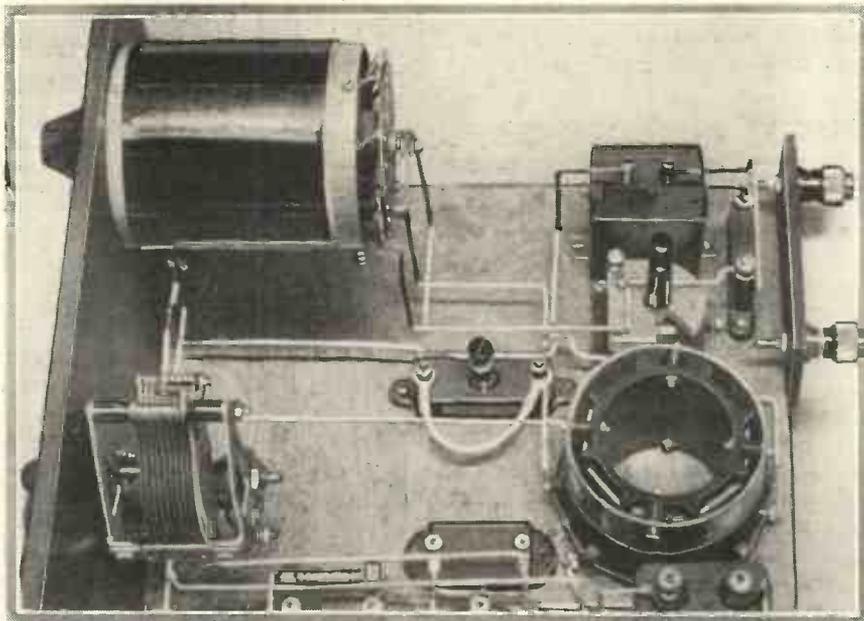
## The Ideal Set for Use with D.C. Mains

should read the whole of the article in question; it contains a good deal of interesting general explanatory matter which applies to each of the models.

the latter with its H.T. Proceeding down the main path the current next encounters a variable resistance, this being the control which adjusts the filament current to the correct figure.

To identify this resistance note that it is the Varley "Power Potentiometer," placed on the baseboard between the panel and the 4-mfd. condenser. By the way, this is used as a plain variable resistance, not as a potentiometer—i.e. connections are made to only two of its terminals; note carefully which one is left blank when you are wiring-up.

### SAFETY, SELECTIVITY AND SENSITIVITY



Here you see two of the devices which make the "Triple" Two an absolutely safe as well as ultra-efficient receiver. The large condenser near the terminals is in series in the earth lead and the smaller fixed one is in the aerial lead. Note also the "Star Turn" and dual wave coils.

By making the first article serve as an introduction to the two mains versions we shall be able to save much space which we can devote instead to the mains details proper.

Let us make a start by seeing how the main power supply circuits of the D.C. version are arranged. Here we must refer you to the circuit diagram, in which you will see that it is indicated that the mains current is led to the set through a twin-flex lead from a plug or lamp-adaptor.

### Adequate Smoothing

The positive lead first encounters a heavy-duty L.F. choke, which performs the main smoothing operation. All the current consumed by the set passes through this choke—i.e. both the filament and anode currents.

On emerging from the choke the current finds, first, a 4-mfd. condenser shunted across to the negative side of the circuit, and this disposes of any trace of hum which may have got through thus far.

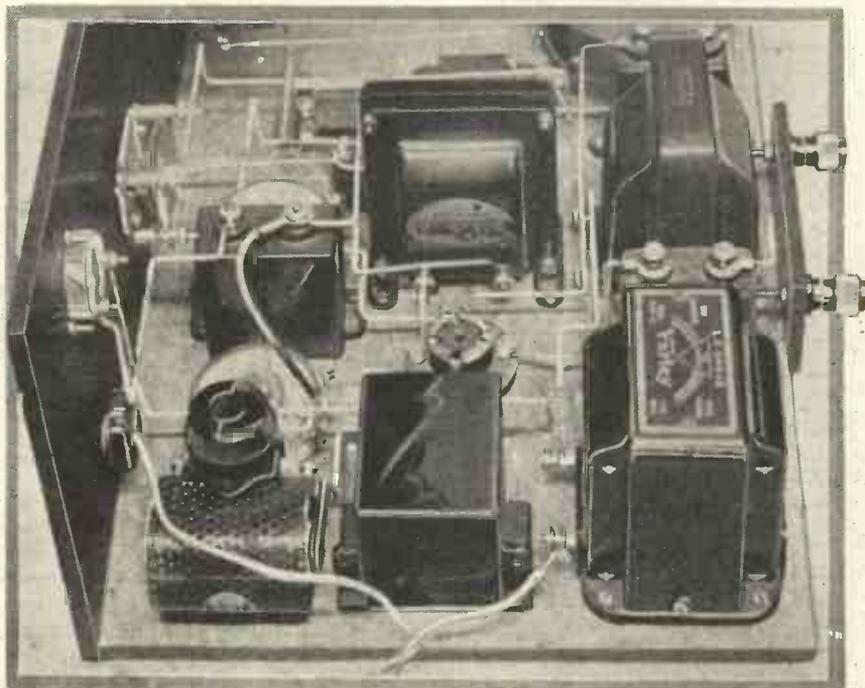
An alternative path goes off from this point, also, to the anode circuit of the second valve, and this supplies

### Getting Grid Bias

Below this resistance comes a potentiometer through which the current next passes. The voltage drop across this serves to provide the necessary variation of anode voltage on the detector valve. The H.T. for this valve is drawn off from the slider of the potentiometer, and following this lead round you will find a de-coupling filter composed of a 10,000-ohm resistance and 2-mfd. condenser. A little extra smoothing is introduced by this filter, so it serves a double purpose.

Following the main current on its way you will see that it arrives at the filament of the second valve, and after passing through this it comes to another 400-ohm potentiometer. The voltage drop set up across this by the passage of the current is utilised to provide the grid bias for the second valve.

### POWER, PUNCH AND PURITY



This illustrates the power department. Simple as it is, it wipes out hum thoroughly and delivers a constant unvarying supply of pure current to the valves at just the right voltages.



## It is an Ideal Household Receiver

Further, the filament current *must* be .1 amp., i.e. 100 milliamps. This is not such a severe limitation of choice as you might imagine, remembering that you can pick from any filament voltage range.

you want about the parts to be used, but there remain a couple of points we must cover here.

First there is the milliammeter, which enables you to set the filament current control correctly. A very

Any component spindle, dial-fixing grub-screw, etc., which is in metallic contact with the interior wiring of any D.C. mains receiver can administer shocks if it happens that the positive main of your system is earthed, and certain precautions must be taken to remove the risk.

The points concerned on the present receiver are the grub-screws of the tuning dial, reaction knob and Selector knob, and the spindle and fixing nut of the wave-change switch.

As regards the latter, an easy way out is to use for wave-changing a switch of the miniature mains type, such as those in the Bulgin and Igranic ranges. In these the knob, its spindle, and indeed all those parts on the front of the panel, are completely insulated and there is no risk of shock whatever.

### Stopping "Shocking"

Electrically any ordinary on-off type will serve the purpose, but with many of these the projecting spindle and the fixing nut are "alive." With such switches the operator has to be

On no account should the condensers in the earth lead and in the aerial circuit be omitted, and these should be of good quality, especially that one in series with the earth. This condenser, if the positive electric main is earthed, will have to withstand a large voltage across it, and should therefore be of the type designed for a high working voltage.

Here are a few examples of suitable detectors: Osram and Marconi H.L.210, H.L.410, and H.L.610; Mullard P.M.1 H.F., P.M.4D.X., and P.M.6D.; Mazda H.L.210, and H.L.610; Cossor 210 H.F., 210 Det., 410 H.F., 610 H.F.; Six-Sixty S.S.210H.F., S.S.410D., and S.S.610D.

### Plenty to Choose From

There is almost as wide a range of power valves with .1-amp. filaments, but it is suggested that here a 4- or 6-volt valve should be chosen. The 2-volt .1-amp. power valves are capable of only a rather modest output without overloading.

So much for the valves themselves. Now as to the conditions under which they work. The filament current is set to the correct value by adjusting the appropriate resistance until the meter on the panel reads 100 milliamps. This is done when the set is first put into commission, in a manner which we will explain later.

The H.T. voltage on the detector is adjustable between about 40 volts and some 75 volts. The second valve gets a fixed H.T. of about 150 volts, on mains of 240 volts (the highest voltage normally encountered), 130 on 220-volt mains, and so on in proportion.

### Constructional Simplicity

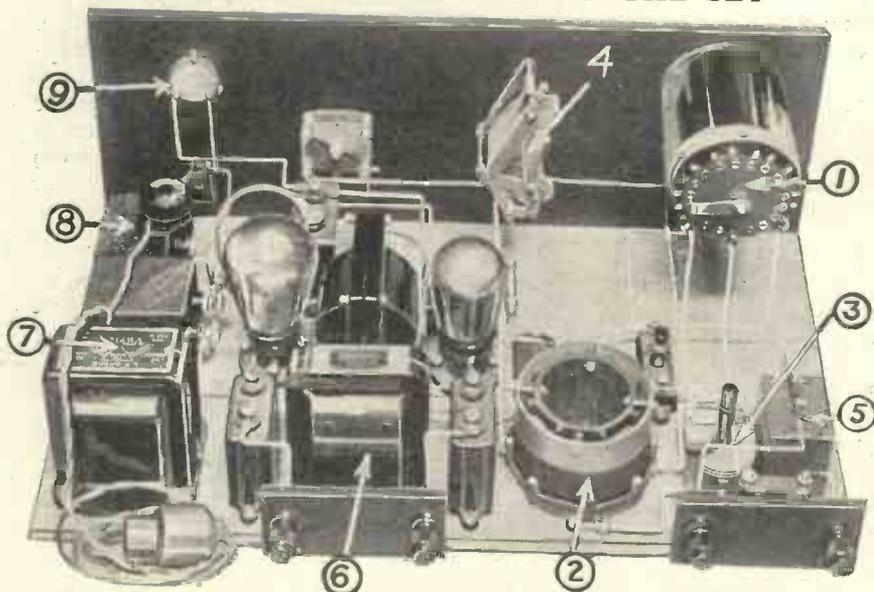
There is little we need tell you about the construction of the receiver, for it is such a very simple and straightforward job. Close attention to sound wiring, with good joints and proper insulation of the wires, is important, however, and we would emphasise this point. Remember that a wire coming adrift, or a short-circuit anywhere, may cause considerable damage in a mains receiver.

The list of components gives you most of the practical information

high standard of accuracy is not necessary here, so quite a moderate-priced instrument will serve if desired. The point is that errors of even as much as 5 per cent in adjusting the filament current represent much smaller variations than those which occur in battery working as a result of the difference between the "freshly charged" and "discharged" voltages of the accumulator.

Of course, a good meter is probably a better investment than a cheap one, but the latter will serve our present purpose. So large an error as the

### OUTSTANDING FEATURES OF THE SET



The famous Star-Turn Selector Coil is shown at (1), while on the baseboard is the "M.W." Dual-Range Coil Unit (2). The selective coupling control is indicated at (3), (4) is the tuning condenser, and (5) the earth-lead condenser. The output choke, the mains smoothing choke, the power potentiometer and the milliammeter are indicated respectively by (6), (7), (8) and (9).

5 per cent we have mentioned is highly improbable with the cheapest type. The one actually used, for example, although very moderate in price, conforms to a much higher standard.

The other point concerns possible shocks from certain panel controls.

careful to touch the knob only, and so we advise the insulated type. In addition to the actual mains specimens mentioned, certain of the ordinary on-off types have insulated spindles, and these, too, are suitable.

Now about those grub-screws. The cure here is simple: after fitting the

knobs and the dial and tightening down the grub-screws, cover the head of each screw with sealing wax or with two coats of enamel. The receiver portion proper is exactly the same as the battery model as regards initial adjustments, so refer to the battery set article on all these points.

First, however, you must make the proper current and voltage adjustments in the power circuits, as follows.

Don't forget to switch off the set before making any internal adjustment.—With the exception of the potentiometer variation described on this page, nothing inside the set should be touched unless the mains plug has been removed from its socket.

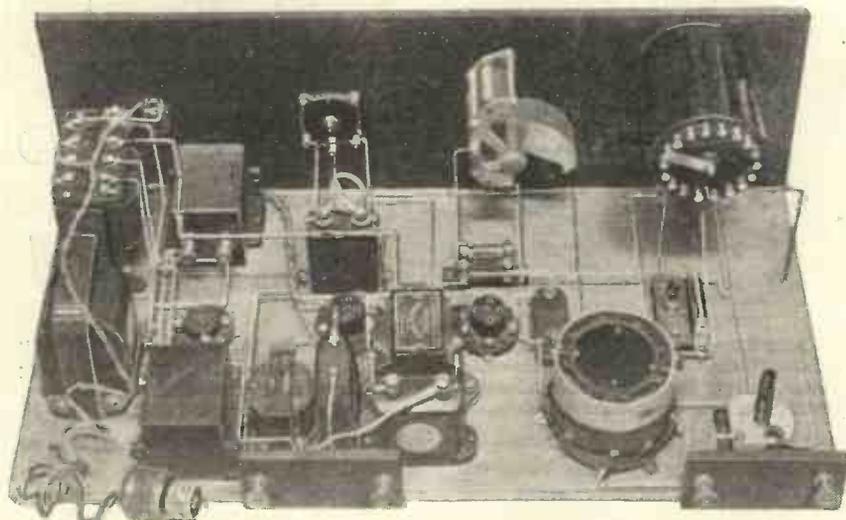
Connect up aerial and earth and loud speaker, and insert the valves, but don't put the plug or adaptor into a mains point yet.

### Switching On

First set the two potentiometers and the power resistance (the one between the 4-mfd. and the panel) thus: Turn the sliders of the potentiometers fully to the right, using a screwdriver placed in the slots you will see provided in the centre of each for the purpose.

Set the power resistance by turning its knob fully to the right, i.e. clockwise, also. This brings its slider along to the end of the resistance element nearest to the panel. Note: For these instructions to work out correctly it is *essential* that the potentiometers and resistance be placed and wired as shown.

### AS GOOD AS A "THREE"!

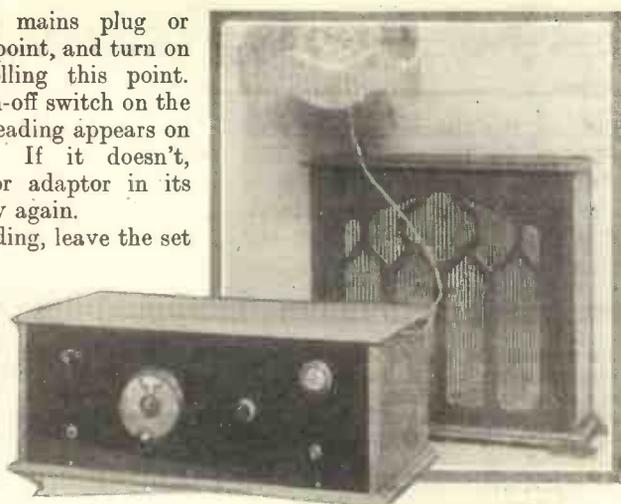


This is the A.C. model of the "Triple Two", the third valve holder (on left of photo) being that for the rectifying valve. It will be seen that this holder is of the four-pin variety. The A.C. model is undoubtedly the best of the three, due to the tremendous advantages one obtains by the use of the modern high-efficiency indirectly-heated-cathode valves.

Now insert the mains plug or adaptor in a mains point, and turn on any switch controlling this point. Next turn on the on-off switch on the set and see if any reading appears on the milliammeter. If it doesn't, reverse the plug or adaptor in its mains point and try again.

Having got a reading, leave the set

**PLUG IT IN—** to the electric light socket, and there you are! You have a perfectly efficient all-power loud-speaker set that will never give you any trouble. No batteries to bother with.



switched on and turn the power resistance knob back very carefully in the opposite, i.e. anti-clockwise, direction until the meter reads 95 milliamps as near as you can get it.

Now take a screwdriver with a wooden or insulated handle and turn your attention to the potentiometer nearest the H.F. choke. Turn the slider back in an anti-clockwise direction until the milliammeter reading goes up to about 105.

### Setting the Sliders

Be careful not to let your fingers stray on to the blade of the screwdriver while you are doing this. Also, don't let the blade touch anything else in the set.

The increase in the milliammeter reading represents the anode current of the power valve which now passes through the milliammeter along with the filament current.

Hence, when the set has been adjusted the detector filament current is 105 milliamps and that of the power valve is 95 milliamps.

### The Final Touches

Now tune in a station and proceed to adjust the detector H.T. voltage for the best volume and smoothest reaction. This is done by adjusting the slider of the potentiometer, which is placed between the second valve holder and the panel. (Same method as before.)

Now tune in the local, and see if you can bring the slider of the grid-bias potentiometer any farther round in a clockwise direction without spoiling the quality. Take it round until reproduction begins to suffer, then go back very carefully until the quality just clears up once more.

That is the correct point, and the milliammeter may now be reading only perhaps 102 or 103, depending upon the particular power valve in use.

**THE "TRIPLE" TWO  
A.C. MODEL**

*An unusually efficient version for  
A.C. mains of the two-valve  
described in the previous pages.*

**H**ERE we reach what is perhaps the most interesting version of our "Triple Two", the model for A.C. mains operation. Its chief interest lies in its quite remarkable simplicity in comparison with the ordinary all-mains set, and the very exceptional performance obtainable by virtue of the excellent characteristics of the A.C. valves.

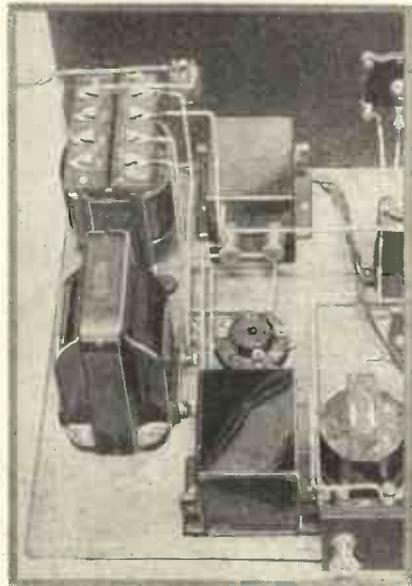
We should like to emphasise the fact that it gives results quite out of proportion to its modest size, because many people unfamiliar with A.C.

## Smooth Control and Powerful Reproduction

valves do not allow for the very great increase in magnification which is obtained when they are used.

It cannot be too clearly understood that the indirectly-heated A.C. valves

### PROVIDING THE POWER



The mains rectifying and transforming section of the set, where the power from the electric light supply is converted into a form suitable for use by the valves in the receiver.

are very greatly superior to their battery equivalents. It follows, therefore, that an entirely different estimate must be made of the probable performance of any set employing them.

The A.C. "Triple" Two is a case in point, for here is a set which gives a performance far above the normal level of a two-valver. It actually gives results approximating quite closely to those of a battery valve "three" of the detector and two L.F. type.

### "Excellent Volume"

In consequence it provides a really effective general-purpose outfit capable of giving excellent volume and quality on the local programmes, and well able to bring in a goodly number of foreign stations on the loud speaker. Its sensitivity is of a high order, and it will deliver a really satisfying volume; the output valve will give an undistorted output comparable with quite a large super-power valve in the battery class.

Now, the receiver circuit proper of the A.C. model is exactly the same in its main outlines as that of the battery

version. We shall need all our available space to tell you about the mains

### THE COMPONENTS YOU WILL NEED FOR THE A.C. MODEL

#### PANEL

21 x 7 in. (Lissen, or Goltone, Paxolin, Red Seal, Becol, etc.)

#### CABINET

Panel space as above, baseboard 10 in. deep (Pickett, or Keystone, Camco, Osborn, etc.).

#### COILS

1 "Star Turn" Selector (Magnum, or Wearite, Ready Radio, Parex, etc.).  
1 "M.W." dual range (Magnum, or R.I., Goltone, Keystone, Ready Radio, Wearite, Parex, etc.).

#### VARIABLE CONDENSERS

1 .0005-mfd. (Lotus, or Dubilier, Formo, Lissen, J.B., Ready Radio, Igranic, Ormond, Polar, etc.).  
1 .0001-, .00013-, or .00015-mfd. differential reaction (Ready Radio, or Lissen, Igranic, Dubilier, Polar, Formo, Magnum, Parex, J.B., Wearite, etc.).  
1 baseboard-mounting "neutralising" type, about .00005 mfd. (Bulgin, or similar type).

#### ADJUSTABLE CONDENSER

.002-mfd. (maximum) (Formo, or similar type).

#### SWITCHES

1 ordinary on-off type (Lissen, or other good make. See battery set list for alternatives).  
1 small panel-mounting mains type (Igranic, or Bulgin, etc.).

#### FIXED CONDENSERS

2 4-mfd. working voltage 200 (T.C.C., or Lissen, Dubilier, Igranic, Ferranti, Mulard, Hydra, Formo, etc.).  
3 2-mfd., two preferably of 200-volt rating, one ordinary "receiving" type (this is the one between middle valve holder and panel) (Lissen, Hydra, and Dubilier in set. See above for other makes).  
1 .0003-mfd. (Dubilier, or other good make. See battery set for alternatives).

#### GRID LEAK

2 meg., with holder (Dubilier, or other good make. See battery set).

#### VALVE HOLDERS

2 5-pin and 1 4-pin (Wearite and W.B., or alternatives as in battery set list).

#### CHOKES

1 H.F. (Telsen, or other good make, as in battery set list).  
2 smoothing, or filter type, inductance about 20 henries. Need not be heavy-duty type (Lissen and Igranic in set. Other suitable chokes are available in Varley, Wearite, Ferranti and R.I. ranges).

#### L.F. TRANSFORMER

Low or medium ratio (Varley, etc. See battery set for alternative good makes).

#### MAINS TRANSFORMER

To give following outputs: 4 volts 1 amp. (rectifier filament), 4 volts and up to 4 amps. (only 2 amps. used in present set), 140 or 150 volts and up to 30 milliamperes (H.T. winding). Specify your mains voltage and frequency when ordering. (Wearite, or Atlas, R.I., etc.)

#### RESISTANCES

1 25,000- and 1 1,000-ohm Spaghetti type (Magnum, or Bulgin, etc.).  
1 10,000-ohm and holder (Ready Radio) (or another Spaghetti if desired).

#### MISCELLANEOUS

Vernier dial if condenser of plain type (Ready Radio, or other good make).  
2 terminal strips, 4 x 2 in.  
4 terminals (Ealex, or Clix, Igranic, Belling & Lee, etc.).  
Wire, screws, flex, mains plug, or adaptor, etc.

circuits, so we shall not be able to repeat here the description of the receiver part.

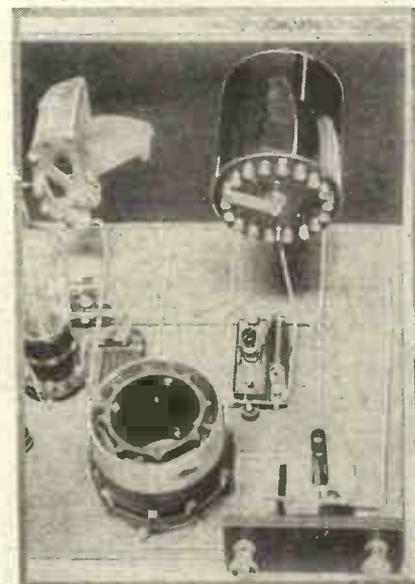
Instead we suggest you read through the article on the battery set, and so get an idea of how the receiver is designed and how it is operated. You will find it is all set out quite fully in the description of the battery model, with some interesting general explanations of our ideas in producing this group of designs.

### Really Simple Circuit

With the ground thus cleared we can get down to the mains details of our "Triple" Two model for alternating current. Let us start with the circuit diagram and see what auxiliary gear was needed to convert our basic battery model into the A.C. version now to be described.

The first thing we shall note is that there is extraordinarily little of this auxiliary gear, for the mains-drive circuits have been simplified down to the real essentials. There is none of the lavish and wasteful squandering of chokes and condensers so often seen in less carefully worked-out designs.

### PICKING OUT THE STATIONS



Like the D.C. and battery models, the A.C. "Triple" Two uses the wonderful "Star Turn" selectivity scheme and the new "M.W." dual-range coil.

Everything has been reduced to really practical limits, sufficient to ensure satisfactory operation with correct design. The result is a high-efficiency humless receiver of quite





## Start the New Year with the New Valves

undesirable effects. The device is entirely automatic and requires no adjustment.

All the rest of the circuit is exactly as in the battery model, and calls for no further explanation, so now we can proceed to give you a few constructional hints.

### The Heater Circuits

Nothing very detailed is required, because the set is really so simple that the diagrams tell you practically the whole story. We should just like to impress upon you, however, that pains should be taken to make a good sound job of the wiring, because if anything comes adrift and causes a short in a mains set it is apt to damage your gear.

Two special points to note in wiring are these: Join one lead from the on-off switch to the "O" or "common" point among the mains or input terminals of the mains transformer, as shown in the wiring diagram. One mains lead goes to the remaining side of the switch, while the other must be taken to the input terminal on the transformer marked with the voltage of your mains.

### Use Twisted Flex

The second point concerns the wiring of the heater circuits. This must be done with twisted flex of the type used for lighting circuits, and pains must be taken to keep it well away from the grid wires of the valves.

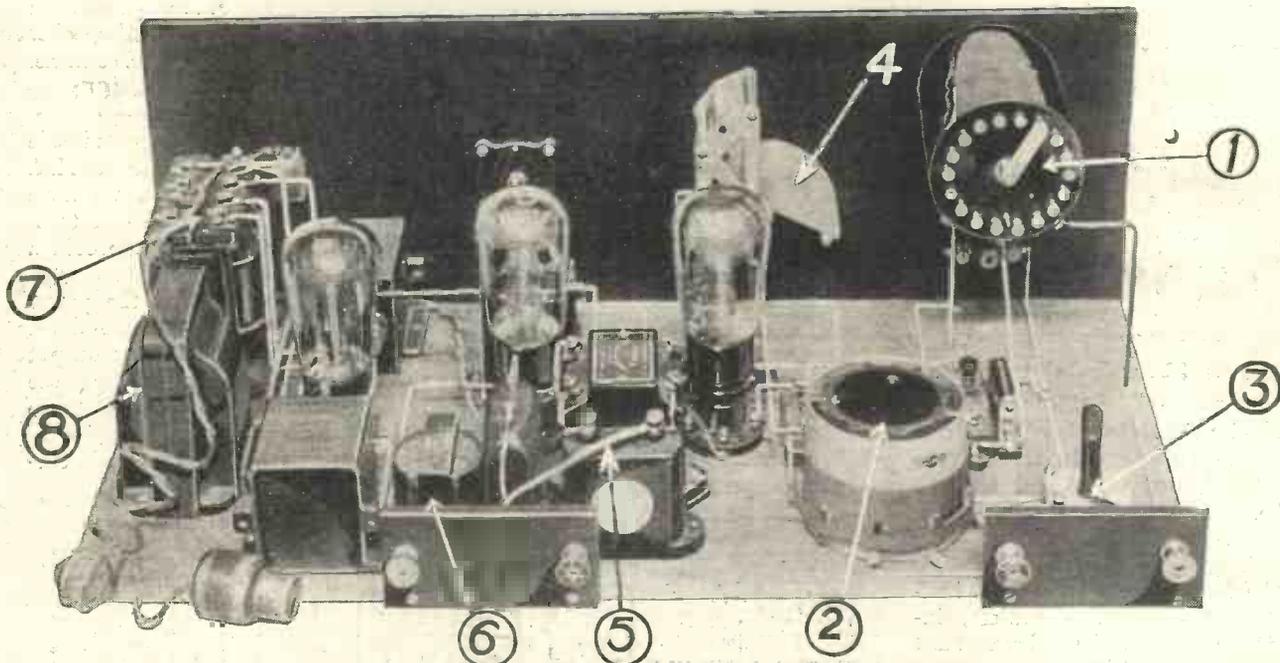
With these hints we can leave you

to proceed with the construction of the set, and all that remains to us is to indicate the types of valves to use.

You do not require any operating instructions, for a very simple reason: there are no preliminary adjustments to make, and the ordinary operating notes for the receiver proper were given in the article on the battery model which you will already have read.

Here, then, are the valve types. Rectifier: Mazda U.30/250 (used in original), or Mullard D.U.10. Detector ( $V_1$ ): Mullard, 354V., Marconi or Osram M.H.4, Cossor 41M.H.L., or Mazda A.C./H.L. Output valve ( $V_2$ ): Marconi or Osram M.L.4, or its equivalent in other makes, e.g. Mullard 104V., etc.

### ALL-MAINS, ALL-POWER, ALL-PROGRAMMES



Here is a useful general guide to the layout of the A.C. model: (1) is the Selector coil (aerial tuning); (2) the dual-range coil; (3) aerial coupling condenser; and (4) is the tuning condenser; (5) is the detector de-coupling and voltage-adjusting resistance; (6) the output filter choke; (7) the power transformer, and (8) the smoothing choke.

You can trace whether humming interference is coming from a mains unit or is being picked up in the set by borrowing a H.T. battery to replace the unit for a few minutes.

If your "X" coil appears to give insufficient selectivity, make sure that the holder is wired the right way round. (Usually the pin of the holder goes to earth, L.T., etc.)

The high-tension voltage which is

### HINTS FOR THE HANDYMAN

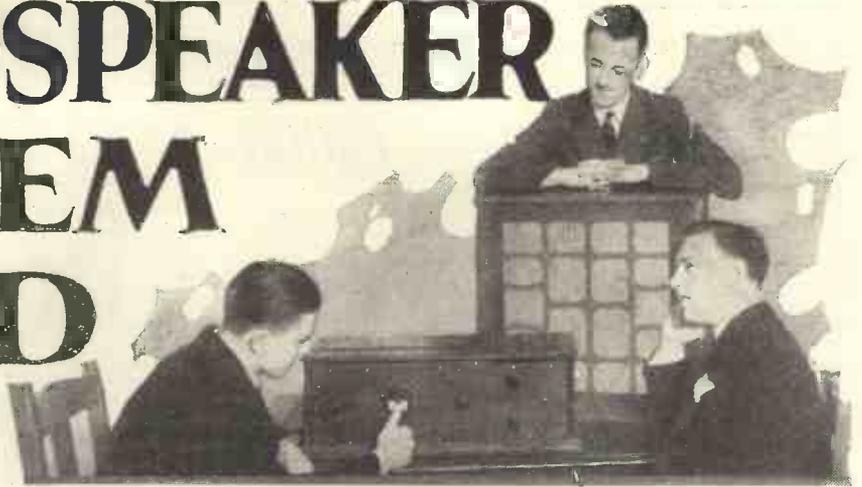
actually on the plate of the valve is always less than the figure at the corresponding H.T. plug on the battery, because there is invariably a voltage drop through any resistance, primary winding, or other device in the circuit.

When working on an ebonite panel be careful to keep the bench clean and clear, otherwise screws and wires may scratch the new panel and spoil its appearance.

When your short-wave set fails to give you the last ounce of sensitivity, try connecting a high variable resistance in series with the grid leak, as this often has the effect of increasing sensitivity.

# A LOUDSPEAKER PROBLEM SOLVED

*The first details of a notable achievement in radio engineering.*



ONE of the greatest problems in connection with loud-speaker design has at last been solved. For years it has been realised that the ideal diaphragm arrangement for any type of instrument would be one having a perfect free edge.

## *For Your Benefit*

Many attempts had been made to evolve a satisfactory compromise between a completely rigid anchoring and the ideal of complete freedom, and some success had attended these efforts. But only limited success, for it is widely realised that the best "semi-free" edge is, at most, nothing more than a mere compromise.

Don't run away with the idea that our solution is nothing but the removal of the cone surround and the rigid fixing of a cone to the movement's driving member. The attainment of a free-edge without those other very necessary factors—rigidity and lightness and adequate baffling—would constitute a very empty victory.

As a matter of fact, the "M.W." Research Dept. has been at work for months on the task of evolving a one hundred per cent cone, and some hundreds of different ideas have been scientifically experimented with.

In addition to the above requirements we also had in mind that our duty lies primarily with the home

constructor. A design suitable only for factory production would have failed to thrill us. What we have been aiming at is a system of free-edge construction so simple that anyone with no other workshop than the proverbial kitchen table could duplicate it.

And we are able to report that we have reached our goal. It has been a long struggle, though not a bitter one, for every member of the Research Dept. who took part in it thoroughly enjoyed himself. Even if we had not achieved success in our main aim, the time spent on the research would not

prove of inestimable value in the future.)

At this very moment of triumph we feel a trifle guilty. Our concentration on loud-speaker design was quite a time overdue. But we trust that readers will forgive us because we have maintained such a very high standard in our set designs.

## *A Gentle Reminder*

Our regular supporters must also forgive us for these gentle wanderings from the path of perfect modesty, because it is essential that we chronicle our efforts thus-wise for the benefit of the thousands of new readers that we are monthly gathering around us. It would be false modesty indeed to "lie low and say nuffin'," for there are few independent observers who can widely circulate our doings!

And we must remind those who may be pleased to be sceptical that our good friends in the trade would not continue to lend us such stout support were we not prepared to substantiate to the full all the claims we make. It may not be possible to receive every one of our readers, and explain and demonstrate scientifically the virtues of our products, but we can and do receive accredited representatives of any trade or scientific organisation.

## *The Acid Test*

The doors of our Research Dept. are wide open for that purpose, and not one day passes but that the truth of this fact has to stand the test. Secrecy is neither necessary nor advisable in our work.

The production of three or four sets every month is a most arduous task, albeit it is both interesting and pleasant. We say it is an arduous task—it would be a mighty easy one if we were

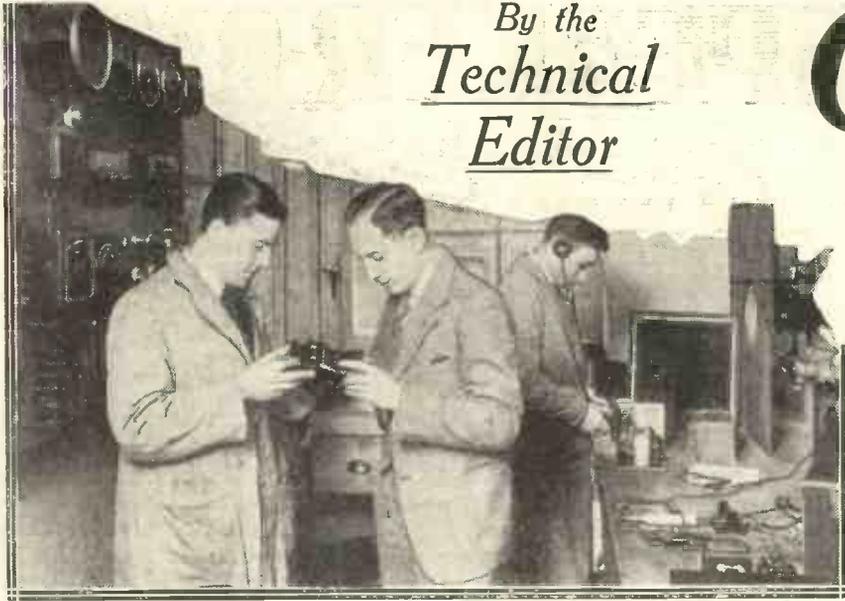
*(Continued on page 104.)*



have been wasted, for we gathered an enormous amount of data concerning loud speakers in general. (The response curves of some two hundred commercial and other models that have been taken in themselves constitute a unique reference that will

By the  
*Technical*  
*Editor*

# On the



find them up to their specifications. It is obvious that they are dependable and we can certainly recommend their use as grid leaks, anode resistances and so on.

## A New Valve Holder

It is interesting to note how deeply the A.C. valve has made its impression on the design of modern valve holders. Thus the new "Clix" valve holder, due to Lectro Linx, Ltd., is made available with five pins in addition to the usual four-pin form.

It is a very interesting production this Clix valve holder, for it constitutes a complete breakaway from the conventional. Many of you no doubt saw it at the recent radio show. It has special resilient sockets air-spaced, top and bottom insulating

## A Fine Mains Set

THE STANDARD BATTERY COMPANY has adopted an excellent plan in the construction of its Wates four-valve A.C. set. Either the receiver itself, or the loud speaker that goes with it, can be purchased separately, and apart they are both entirely complete in themselves and capable of competing in either appearance or efficiency with any other makes.

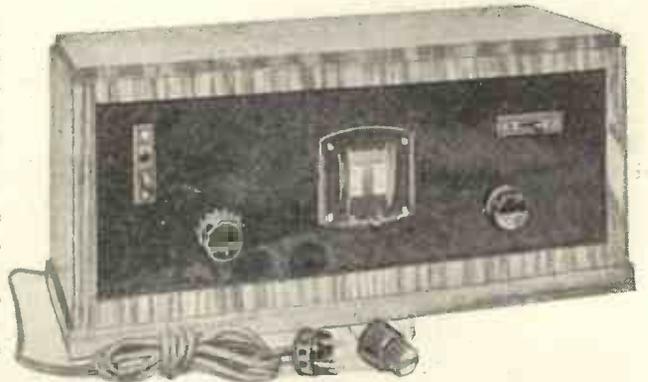
But the set can be stood on top of the loud speaker to form the one unit, and the *ensemble* does not look at all like a mere combination of units. It constitutes a fine outfit of distinctive lines, the two parts merging together as though modelled as one article.

In operation the Wates A.C. outfit gives a fine performance. The smoothing is completely adequate, and the con-

trols are flexible and responsive. Distant stations come in with real punch, and the quality of reproduction is of a good standard.

Provision is made for the plugging-in of a pick-up if desired, and the record reproduction is as good as that of the radio.

It will be noticed that lever-type switches and thumb-drive tuning controls are fitted—modern innovations that decidedly facilitate the handling of a receiver. The circuit of this Wates A.C.4 set incorporates an S.G. valve of the indirectly-heated type.



The Wates A.C. Four-Valver can be placed on the top of the "Star" loud speaker to form an attractive ensemble.

## "Gas-Ohms"

These are new types of gas-filled resistances due to Rotor Electric, Ltd. Layers of a special resistance mixture are sprayed on an insulating base contained in a small blue glass tube. The tube is first evacuated and then filled with a special dried gas.

By this means it is claimed that a particularly constant resistance is achieved and one that is quite unaffected by atmospheric and other influences.

The standard size of Gas-ohm is available in values from 1,000 ohms to 10 megohms, and will take a quarter of a watt, while the power type (1,000 ohms to 1 megohm) can be loaded up to one and a half watts.

We have carefully tested the two samples sent us for this purpose and

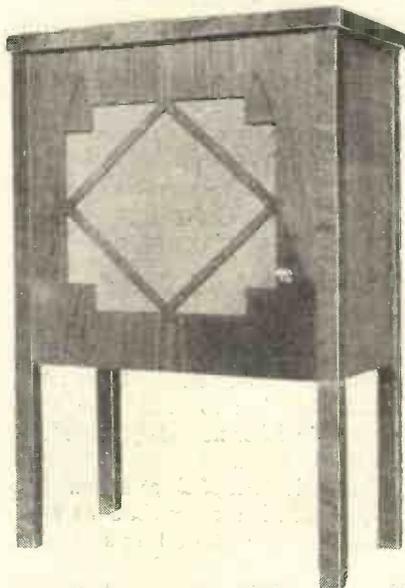
discs and terminals completing the structure.

It has all the good points that one looks for in these critical days, such as a short-circuit preventing disposition of contacts, compactness, and a snug and easy adaptation to the not-always-too-precisely-disposed valve pins, and so on.

And, of course, its inter-socket capacities are negligible and its insulation resistance infinity—for all practical purposes.

## "Magnet" H.T. Battery

There are two ways in which a manufacturer can go about the construction of H.T. batteries. The first, and one time very popular method, was to join together a string of



This is the "Wates" Star loud speaker that matches the Wates A.C.4 set.

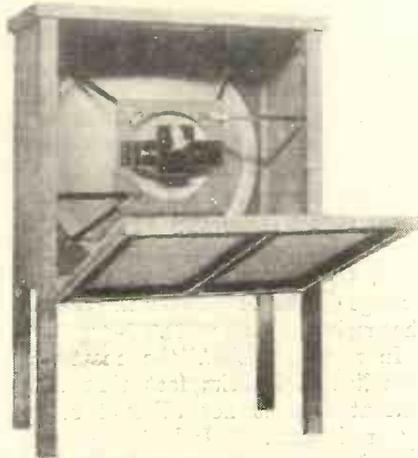
# Test Bench

This month Standard Battery, Rotor Electric, Lectro Linx, General Electric, Celestion, and Wingrove and Rogers, etc.

crudely constructed little cells, wrap pieces of paper around them, put them in a box, and bury them for ever in a tar material.

Obviously, that system operates on the principle that "what the eye does not see the heart does not grieve at!"

Nowadays, however, reputable manufacturers pay as much attention to each cell of an H.T. battery as they do to the handsomely designed wrapper enveloping the case!



A rear view of the "Wates" loud speaker referred to on the previous page.

An excellent example of this is to be found in the new G.E.C. "Magnet" triple-capacity type. Here you have large cells robustly constructed, that are hidden from sight only as a matter of convenience.

We have had one of these triple-capacity H.T. batteries on test and find it completely satisfactory. When renewing their batteries, amateurs would do well to remember the General Electric Company and their triple "Magnets," which cost 13s. 6d. each for units of 60 volts. They certainly have three times the capacity of the ordinary small types.

A point well worth noticing is that the article is fitted with special super-grip sockets which take any wander plugs, even those of not-too-good design, snugly and efficiently. One does not have to resort to match-sticks or pieces of paper to preserve permanent contact!

## New Celestion Product

There is now a Celestion chassis model available for constructors. It is known as the D.20 chassis, and it retails at £3 3s. This is, of course, the first Celestion available in chassis form, and although we are convinced that its arrival has been long delayed, we are certain that its success will be none the less for that.

We find in the D.20 the special Celestion diaphragm construction, together with a specially reinforced anti-resonant metal frame.

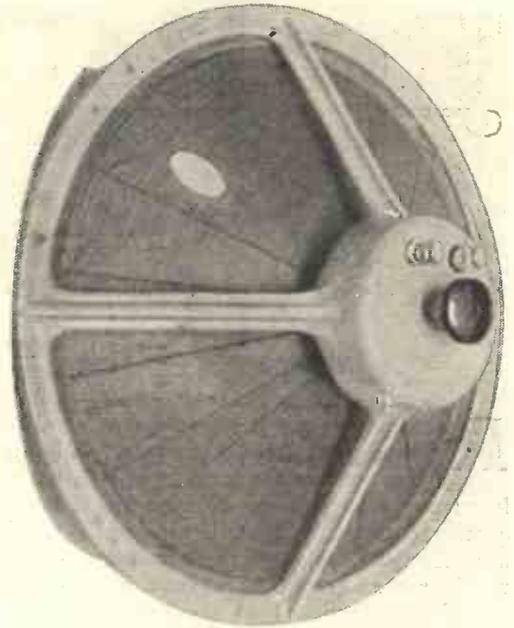
In a not-too-cramped cabinet or attached to a baffle of substantial dimensions the D.20 gives impressive results. There is that cleanness of definition common to all Celestions, and a freedom from those undesired resonances that mar so many otherwise moderately good speakers. There is also rather more bass than one generally gets with an electro-magnetic movement.

## Useful Ganged Condenser

Messrs. Wingrove & Rogers recently sent us one of their Polar Two-Gang "Ideal" condensers. This is a perfectly straightforward construction and comprises two .0005 sections linked together, but divided by a single screen.

An adjustable supporting leg is provided and this considerably facilitates the mounting of the component. The very excellent slow-motion device of the ordinary Polar "Ideal" condenser is found in the two-gang version, which is, indeed, the normal "Ideal" with a further section added.

The price is 18s. 6d. There is little need for us to refer either to the



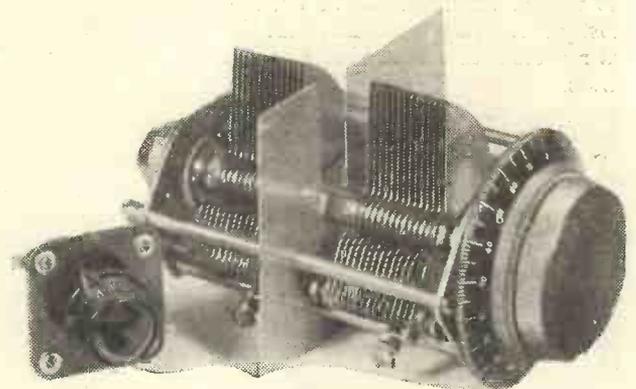
The new Celestion chassis loud speaker.

workmanship or to the general design and working of this component, for "M.W." readers will be well aware of the high standard the "Ideal" class reaches.

We have also received one of the Polar differential slow-motion condensers in its improved form. The improvement is to be found in the fitting of solid brass end-plates. This Polar differential is one of the prettiest little propositions we have ever seen. The slow-motion control is perfect—no other word could do it justice.

## "M.W." Dual-Range Coils

Just before going to press with these pages we received our first samples of the new "M.W." Dual-Range coils made by Messrs. Radio Instruments. They are exactly in accordance with our specification and retail at 12s. 6d. each. As proof of their careful manufacture it may be mentioned that each one made is individually tested for wave-length and inductance.



Here is the Polar "Ideal" Two-Gang condenser and a Polar "Trimming" condenser that can be used with it.

# RADIO REVERSES



*Some curious sidelights on the opposite effects met in radio, and a useful reminder relative to Ohm's Law.*

By D. GLOVER.

**R**ADIO waves are frequently confused with "radio currents." But perhaps the term "radio-frequency energy" (or "high-frequency energy") is in itself misleading. Anyway, although radio waves, which exist all around us all the time, may be the subject of much controversy, it is at least safe to say that they are not currents of electricity.

## Reflective Effects

Some scientists hold that they are waves, in an all-pervading medium, the ether. Others contend that they comprise great clouds of particles shooting about in space. But this much is certain: A radio wave, in many ways, acts in quite an opposite fashion to an electrical current.

For instance, radio waves find such things as stone, glass and dry wood, which are non-conductors of electricity, easy going. On the other hand, they are reflected by masses of metal and other conductors of electricity.

That is why, generally speaking, reception is better after rain, when the ground is wet, for the radio waves do not then easily penetrate into the ground.

This fact also explains the abnormal ranges covered by ships' sets. To some extent these performances are due to the absence of obstruction in the way of buildings and so on, but mostly it is owing to the fact that the sea reflects rather than absorbs radio waves.

## A.C. Anomalies

Currents of electricity of a very high frequency tend to travel on the outsides of conductors, and the higher the frequency the less they penetrate. That is why a wide, bored tube of very thin metal may have a much less resistance to high-frequency currents than a solid bar of smaller over-all diameter.

Another curious opposite effect is to be found in capacity and induc-

tance. An alternating current can pass through either an inductance or a condenser.

Supposing an alternating current has to pass through an inductance and a condenser in series. If you increase the frequency of the current, the "resistance" offered by the inductance increases and that of the condenser decreases.

Reduce the frequency of the current and the "resistance" of the condenser rises and that of the inductance falls.

Talking about condensers, these ubiquitous components operate oppositely to both inductances and resistances in calculations. Thus if you connect resistances or inductances in series the result is merely the sum of the individual values, but connect

## STENODE IN THE STATES



Dr. Robinson (left) and Mr. Percy Harris (right) with the all-A.C. Stenode Radiostat they are demonstrating in America.

condensers in series and you get a capacity smaller than the capacity of the smallest individual condenser. To get a greater capacity you have got to connect the condensers in parallel.

But one of the most consistent and unchanging laws of electricity is Ohm's law. This stands good in all circumstances, and for all kinds of current, from the little trickle of

direct current that lights a pea bulb in a flash lamp to the H.F. currents in the Brookmans Park aerials.

## "Child's Play"

It is undoubtedly one of the most perfect and most useful laws that has yet been evolved. If you have a fair grasp of Ohm's law a hundred-and-one otherwise very tricky problems become "child's play." As a reminder it runs:

Volts = current times resistance.

If you know any two of those factors you can find the third. But, remember, there is no such thing as a voltage "at one point." We mean by "voltage" a potential difference, a difference of pressure between two points.

Supposing we had a filament resistance of 10 ohms and a current of half an ampere passing through it. Well, Ohm's law tells you that the voltage difference between the ends of that resistance is 5 volts.

In regard to A.C. the matter is complicated by the fact that A.C. current flow is not affected solely by resistance. Inductance and capacity play their parts. The resistance, capacity and inductance in the circuit all combine to form impedance, i.e. resistance to alternating current.

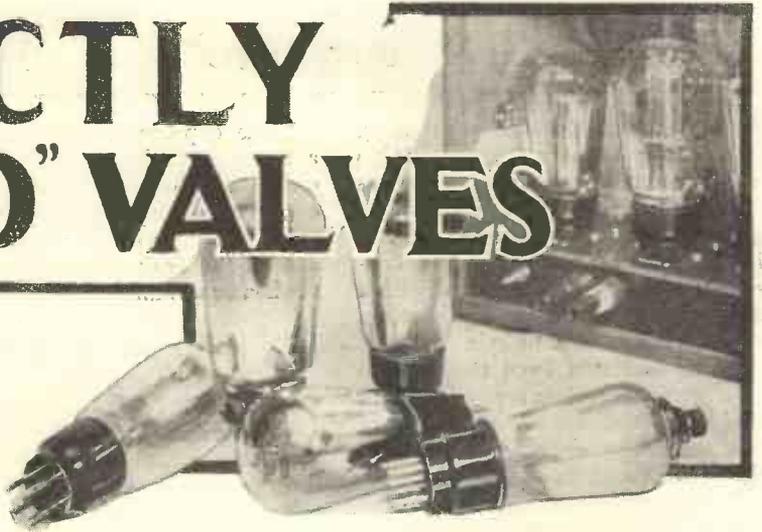
## A Useful Tip

But Ohm's law does not fail. If you have not got an absolutely sound grasp of Ohm's law here is an excellent way of memorising it. On a piece of paper inscribe a large V. Underline this V and then write "C X R" under the line.

Now, whichever letter you cover with your finger the disposition of the remaining two will give you the method of calculating the hidden factor. Cover the V and you leave C X R (current multiplied by resistance). Cover the C and you have  $\frac{V}{R}$  (voltage divided by resistance)

Cover the R and you have  $\frac{V}{C}$  (voltage divided by current) which, of course, gives you the resistance.

# "INDIRECTLY HEATED" VALVES

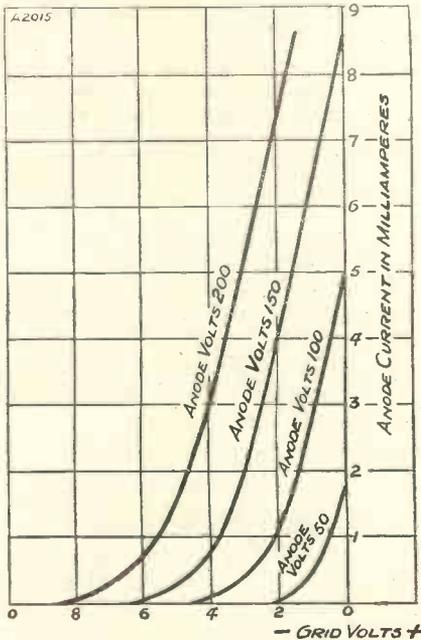


There is nothing tricky about the use of A.C. valves, for it is all pretty plain sailing as long as a few simple precautions are taken. Some of the main points to look out for are dealt with below.

By KEITH D. ROGERS.

THE indirectly-heated A.C. valve has to a great extent revolutionised radio reception. In many cases it has brought radio from the status of a somewhat scientific instrument to a position previously enjoyed only by the gramophone, that of an article of furniture capable of turning out music when and where required.

## HIGH MAGNIFICATION



The characteristic curves of the Cossor 41 M.H.F., an A.C. valve with an impedance of 14,000 ohms. and a mag. factor of 32.

In the old days, before the indirectly-heated valve was brought out, the owner of a radio receiver had one main thing to worry about. Whether he built his set himself or whether he bought it ready-made made no difference, he had always to worry about the batteries; to see

that the L.T. was up to scratch, and (before the advent of the mains H.T. unit) to keep an eye on the H.T., too.

With the advent of the indirectly-heated valve, those fortunate enough to have A.C. mains automatically found their troubles solved. They could run the whole set from the mains without worrying about batteries of any type whatever.

Unfortunately, so far comparatively few listeners in this country have A.C. mains, but the new electricity scheme will gradually make itself felt throughout the country, until most homes which have electricity installed will have A.C.

## "Half as Good Again"

By that time, if A.C. valves go on increasing in efficiency as they are doing at present, the radio set will have become a tiny little box that can be tucked away in any odd corner, simply plugged into the electric supply system, but yet capable of bringing in all Europe to one's own fireside.

The A.C. valve is undoubtedly a remarkable piece of work. It has done away with the need for providing a D.C. L.T. supply, i.e. in most cases the use of L.T. batteries. This in itself is a great boon, but it has in addition enabled a most amazing degree of efficiency to be obtained, a degree which with the exception of one or two super-power valves has never been approached in the battery class.

The A.C. valve in most cases can be said to be half as good again as any battery valve of the same class, but before I go any farther let me assure those of my readers who are still afraid of the bugbear of hum that an A.C. need not hum if it is properly designed.

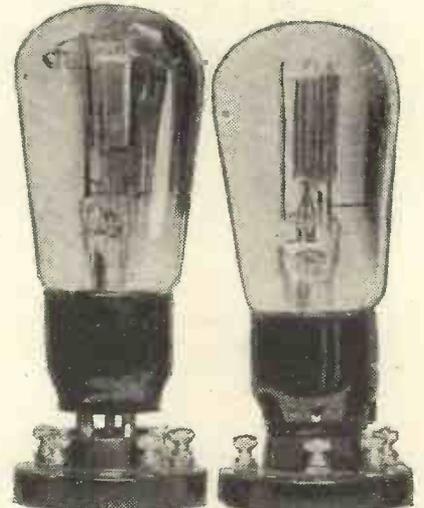
Many people have toyed with the idea of going over to A.C. They have got A.C. in their home, but they are still clinging to the battery valve (although they may use an H.T. eliminator), because they are firmly convinced that the indirectly-heated A.C. valve must cause hum.

## Very Low Running Costs

In some cases they have heard commercial sets run from A.C. in which there was a faint background the whole time the set was working. They will admit that it did not interfere with the music, and might be termed "negligible," but it was there, and that was enough for them.

It takes at the most only 30 or 40 watts to run a four- or five-valve A.C. set, so that for one unit of electricity you can run the set for something like 25 or more hours, and this, at the price of the average unit, works out very

## DET. AND FIRST L.F.



Two Marconi and Osram valves, suitable for Det. and L.F. work. On the left is the M.H.4, and on the right the M.H.L.4.

## Get Your Grid Bias From the Mains

much cheaper than 25 hours running of a battery receiver when one takes into account the price that one has to pay for accumulator charging.

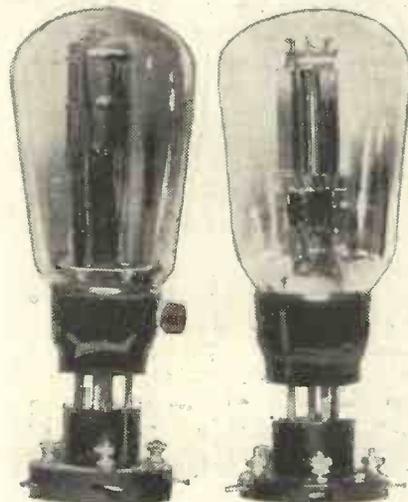
The average A.C. valve has a 4-volt 1-amp. cathode heater system consisting of a nickel tube coated with a mixture of barium and strontium oxide. Inside is a hairpin tungsten filament insulated from the cathode by a special porcelain separator. This enables the cathode to be placed very near the heater, so that loss of heat is extremely small.

In some cases the earth circuit (and that is the cathode) of the A.C. valve is taken to a centre point on the heater wiring, or to the slider of a potentiometer placed across the heater circuit. This latter is in order to find an equi-potential point on the L.T. side, but is not always necessary. In many cases it is sufficient to take the earth or cathode to one side or other (which side is the better is found by experiment) of the heater circuit.

### Cathode Connections

There is no hard and fast rule that can be laid down about these connections, and the various methods of connecting the cathode to the heater should be tried. As a matter of fact, from an electrical point of view there is no need for the cathode to be connected to the heater at all, but as a rule it is an advantage for the heater circuit to be earthed. This, in most cases, where automatic bias is not used, means that it must be taken to some point common to the cathodes.

### LOUD-SPEAKER VALVES



Two Mazda output valves. The A.C. Pen (left) and the A.C.P.I.

Some experimenters prefer to use a capacity bridge across the heater circuit and to take the earth to the centre of this capacity bridge. Others seem in favour of the potentiometer, and still others use the centre tap of the heater winding on the transformer.

### A Simple Method

The simplest method you will find used in the "Triple" Two (A.C. version) described in this issue of MODERN WIRELESS, where the heater is taken direct to earth without any centre tap or bridge arrangement being employed.

One of the advantages of running a radio set direct from the mains is that automatic grid bias can be employed, providing one has enough H.T. to allow of a certain amount of the voltage being "side tracked," as it were, for grid bias.

It must not be forgotten that in automatic or "free" grid bias, where we derive grid bias from the mains and use no special rectifier, the amount of bias voltage we use has to be subtracted from the H.T. voltage available.

Thus in a three-valve A.C. set one may require something like ten or fifteen volts grid bias on the last valve. This can very easily be taken from the H.T. without any apparent loss, though actually, of course, the H.T. voltage available on the last valve will be 15 or 10 volts less than it appears to be.

### The Filter Circuit

The circuit in its simplest form is shown in the diagram, and as you will see it consists merely of placing a resistance in series between the cathode (which for simplicity's sake we can again think of as the filament) and the H.T. negative.

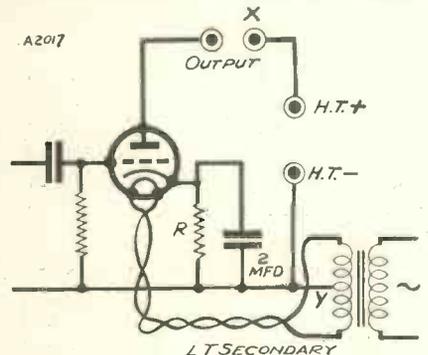
The external anode circuit of the valve is from anode through the output to H.T.+, through the H.T. mains unit, through the biasing resistance, and thence to the cathode. Thus it is obvious that whatever current is flowing in the anode circuit will cause a voltage difference across that resistance R, and this difference of potential is used to make the grid negative in respect of the cathode, or, in other words, the cathode positive in respect of the grid.

That is all very simple, but there are one or two little things to be watched, and one is that it is not

advisable to use the same resistance, however much you by-pass it, for more than one valve, owing to back coupling effects, and in any case it is necessary to by-pass the resistance with as large a condenser as possible.

Where the valve is used with a filter output circuit, and the loud speaker is taken between the anode (in series with a condenser) and the cathode or H.T.—, it should be made absolutely certain that the loud speaker does go direct to the cathode itself and not to the H.T.—, which, as you will see in the diagram, is

### AUTOMATIC GRID BIAS



"Free" or, better, automatic grid bias is easily obtained as shown above. If a filter output system is employed the loud speaker is connected between the cathode and the filter condenser and not to H.T. negative. (The connection of the earth lead to point Y is not always necessary.)

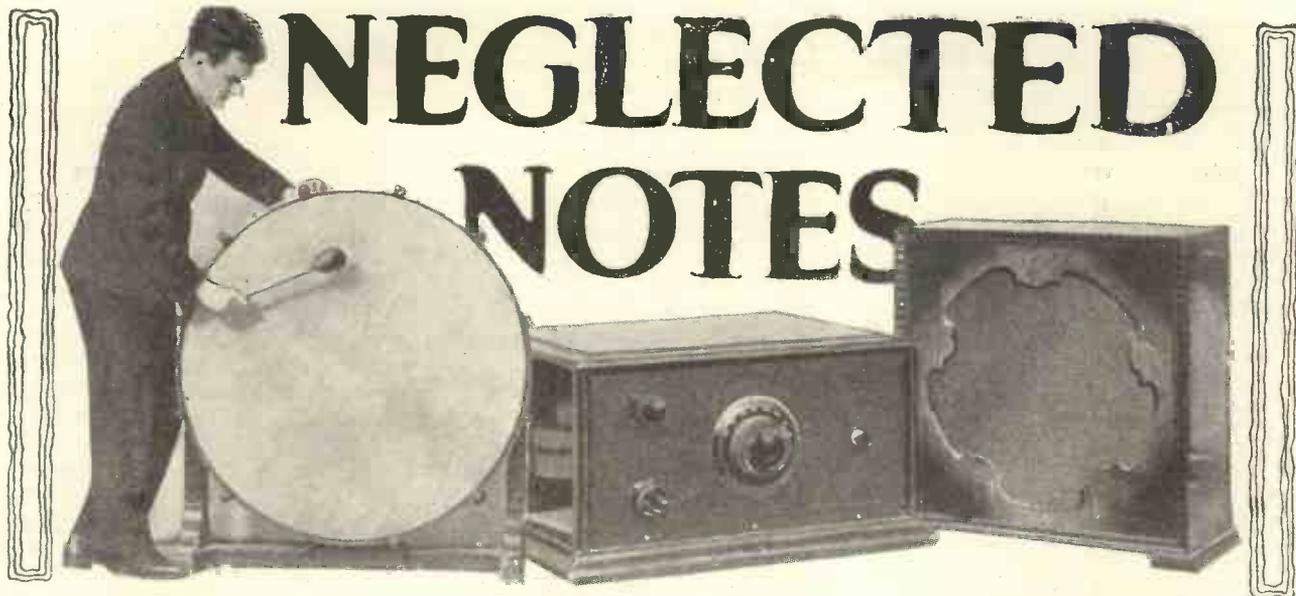
on the side of the resistance opposite to the cathode.

If the loud speaker is connected to H.T.— the return L.F. circuit to the cathode must be completed through the resistance R, and that means that the loud-speaker current variations have to be passed through R, causing, of course, L.F. fluctuations in voltage.

### Dodging L.F. Trouble

These fluctuations of voltage, in spite of the condenser, may be transferred in sufficient strength to the grid of the valve to cause a kind of L.F. reaction.

Now as regards some of the A.C. valves themselves. Marconi and Osram A.C. valves have recently been re-issued with somewhat different characteristics; the M.S.4 remains with an impedance of about 500,000 ohms and an amplification factor of about 550, while the M.H.4 now has an impedance of something like 16,000 ohms and retains its amplification factor of 35.



A FEW days ago I was passing a fairly large gramophone shop, and having a few moments to spare I thought I would drop inside and have a look at one or two of the latest lists, and possibly get a couple of records or so.

### What Was Wrong?

While I was there a customer came in and tried over several records which I happened to know quite well, and as they were being run on one of the latest radio-gramophone outfits I pricked up my ears and paid more attention than I should normally have done.

One was an organ solo, which came over exceedingly well; the tone was deep and full, and on the whole there was nothing to grumble at all; but the second record that was placed on the turntable was a Jack Hylton recording of "Memories of Sullivan," a new H.M.V. record that had only recently come out; and though, from the casual listener's point of view, the reproduction might have been quite satisfactory, when one began to criticise one realised that something was lacking.

### Too Much Control

Now, as I had heard that record at home, I realised what was happening. The instrument in the shop was provided with a scratch filter, or what was called in this instance, I think, a "brilliance control." At any rate, it was a high-note losser device which enabled the operator to cut down the scratch until very little of it was audible, giving, of course, a most pleasing result on certain records.

But when one came to an item in which a large amount of brass was

*Comparisons are odious, they say; but comparisons are very necessary when one is dealing with radio and radio-gram receivers. In fact, if one is to get anywhere near perfection it is necessary to compare very frequently the radio or "canned" reproduction with the original. In this article by Mr. Frederick Lewis some valuable hints are given for the radio-gram user, with details of some of the most useful records for test purposes.*

recorded, that scratch filter had the most undesirable effect. The record

was a particularly good one for test purposes, in that it contained quite a lot of echo, but the effect of that filter was to discount to a great extent the value of that echo, because the brass instruments were robbed of their higher frequencies to such an extent that they sounded dull.

### A Brass By-Pass

So instead of standing out as a brilliant piece of recording the whole record at once became commonplace, and though perhaps "pleasant," was not particularly realistic.

### HOW DOES YOUR SET DEAL WITH THIS?



In the foreground of this photo of a broadcast orchestra are the percussion instruments—drums, tympani, xylophone, cymbals and piano. The reproduction of these is very often badly mutilated when received on a radio set.

## Records That Will Test Your Set

The consonants in the vocal solo portion—where extracts from some of the Gilbert and Sullivan operas were being sung—were smudgy, and the "TH" and "F" sounds were badly confused.

I completed my purchases in the shop and went home, and immediately put on that same record on my own outfit. This has a tone corrector as well as a scratch filter, and I found, as I expected, that when the scratch was reduced beyond a certain point consonants became woolly and the record lost its brilliance to such an extent that it became very dull and uninteresting.

### "Moving-Coil Quality"

There are far too many radio-gramophone outfits (home-made and commercial) which, in order to secure what they think is a "mellow" tone, and in order to pander to the public taste and fancy that electrical reproduction must always be completely free of scratch, cut down the high register so much that in a large number of records the reproduction is really hardly any better than that obtained with an ordinary good gramophone.

As a matter of fact, I have heard many moving-coil outfits which have been distinctly worse than a good gramophone, simply because the brilliance of the record has been destroyed in an endeavour to get what is commonly known as "moving-coil quality."

### Slaughtering High Notes

This slaughtering of the high notes is due apparently to a general impression that a moving coil must "bring out" the bass and plenty of it, if it does nothing else. But a moving-coil speaker, on the average, is only too ready to shove out the bass; it will give you bass, more bass, and still more bass if you feed only bass into it. But what's the good of that? It becomes merely boomy.

A moving-coil speaker need not be boomy. If it is fed by a proper outfit, designed by someone who realises that the moving-coil speaker would sooner give bass than treble, then really remarkably realistic reproductions can be obtained; and with pick-up work, where we have to deal with a "transmission," as it were, which has a falling characteristic at either end (both treble and bass falling off rather rapidly), we

have to be doubly careful that we do not lose all the advantages of electrical reproduction.

The ear can get used to practically anything. Consequently, if you have too much bass, strange as it may seem, you yourself will be getting used to it and will think you are getting really good reproduction.

### The Accommodating Ear

Similarly, a great number of people put up with receivers which give nothing much below 200 cycles, and this rather high-pitched reproduction is looked upon as being really "natural." "Listen to the violins," they say, as a thin travesty of a symphony orchestra wails through the speaker.

### USEFUL TEST RECORDS

- "Largo" (Handel). Organ. C1458. H.M.V.
- Hall Johnson Negro Choir. Choral. C2081. H.M.V.
- "The Blue Danube." B.B.C. Choir. Choral. DB.301. Col.
- "Valse Oubliée." Piano. DA.1140. H.M.V.
- "Sarabande and Tambourin." Violin. DB.1295. H.M.V.
- "Pizzicato Pierrette." Flute. DB.261. Col.
- "Midnight Review." Vocal and Drums. C1988. H.M.V.
- "Memories of Sullivan." Brilliance in band recording, vocal and general excellence. C2073. H.M.V.
- "King of Jazz" Selection. Brilliance and Trumpets. 5714. Zono.

Now if the ear can be made to put up with almost anything, why not let that anything be good, even though it has a little bit of scratch with it?

### That Needle Scratch

Needle scratch is not pleasant, but with an electrical reproducer there is no need to have more needle scratch than one gets with many an ordinary gramophone; and the development of electrical reproduction and recording at the present moment is such that it is essential to have a certain amount if one is to get brilliance in the reproduction. This cannot be obtained if the scratch is eliminated, and without brilliance away go all your high harmonics, and the transients that are so valuable in the reproduction of brass and percussion instruments.

We are all too familiar with the cymbal that sounds as if it were made of some base metal with no ring in it—harmonics gone again. Or with the piano whose high notes sound dead and wooden—the same old trouble.

We have to guard those high notes very carefully if we mean to obtain the true brilliance of violin, flute, brass instruments, piano, cymbals, and so on. And to do this we cannot do better than keep among our records special "test" items that provide good examples of instrumental—and vocal, for the human voice must also be taken into account—recording.

### Testing Speech

The consonants and the "esses" of speech are very easily lost, as you will find if you run over such records as "Sam," by Stanley Holloway (Columbia), on a poor radio-gram and then on a good one. Another good record for speech is "The Murder on the Portsmouth Road" (H.M.V. C2044), where Sexton Blake's voice is very well recorded, and his diction is excellent.

There are many records, besides the special constant-frequency type, that are useful for test purposes. Such items as the trombone duet of the Miserere scene, on Columbia DX124, and the flute duet on another recent Columbia (DB261) record, are excellent for testing those high notes.

Lower frequencies can be examined by playing over one or two Flotsam and Jetsam records, or an item or two of Layton and Johnstone.

### Checking Crispness

Crispness in attack is essential for really successful loud-speaker reproduction, and this can be tested by using such records as Columbia DB276, a banjo "Swanee River Medley," or one or two of Jack Hylton's excellent recordings on H.M.V. A very good one, especially as it has vocal solos in it, is the "Memories of Sullivan," recently released.

In the centre column of this page you will find a brief selection of test records, with the type of instrument they illustrate best listed at the side.

And if you try them, or some of them, over, you will soon get a good idea of the type of reproduction your set is giving you, where its strong points are, and where it fails.

# POWER PECULIARITIES

By H. A. R. BAXTER.

*Have you a mains set? Does it emit funny noises? If this is the case, read the following article, which explains away some curious mains occurrences.*



**A**LL-MAINS sets, and even those sets using H.T. mains units in place of dry batteries, are sometimes subjected to curious forms of interference. You might think that proper smoothing arrangements should prevent any irregularities occurring, but the smoothing in any ordinary mains H.T., for instance, is only of an L.F. character, and not always of too efficient a nature at that.

## Side-tracking H.F.

But there is always a certain amount of H.F. wandering about the power mains. This may be generated by such things as sparking motor contacts, collector sparking on tramways, X-ray machines, and so on.

It is not often that trouble is caused by either earth currents or atmospherics, for all power mains are enclosed within metal tubes that are very efficiently earthed. These act as screens against many kinds of H.F. strays.

You usually get more H.F. on D.C. mains than on A.C. It is these vagrant currents that are frequently the cause of odd cracklings.

On the other hand, it is quite possible for the H.F. to be modulated at L.F. The L.F. smoothing in the H.T. mains units will offer no barrier against this energy, and so it gets through to the set, and in due course may evince itself in the form of a hum. The best cure is to supplement an existing smoothing arrangement with an H.F. filter. For this you require two H.F. chokes, each able to carry, without distress, all the current taken from the mains by the unit, and one 1-mfd. fixed condenser tested at a voltage double that of your mains.

## Those Clicks

One high-frequency choke should be joined in series with each of the mains input leads, and the fixed condenser should be joined across the chokes at the unit side.

Another distressing kind of interference frequently met with is caused by the operation of switches in adjoining houses. You get a click every time a switch is operated. In a large block of flats this can sometimes be most annoyingly frequent. The clicks may occur during the whole of an evening.

There is not much that can be done in such a case. However, in the usual course of events this clicking

does not assume very great proportions.

Faulty switches in one's own house can cause very a loud crackle in a set. It is generally due to a switch not making good contact. There is a small arcing or sparking going on the whole while it is in an "off" position.

## Locating the Switch

Such a source of interference is, however, easily dealt with. You should note whether the crackles persist when any certain one of the switches in the house is turned on.

By a simple process of elimination you can soon isolate the switch that is faulty. But unless you have the knowledge of an electrical engineer do not attempt to put it right yourself. You might get a very nasty shock.

When the plugs fitted to irons, kettles and such other electrical appliances do not make proper contact in their sockets you are almost certain to hear crackles in your set.

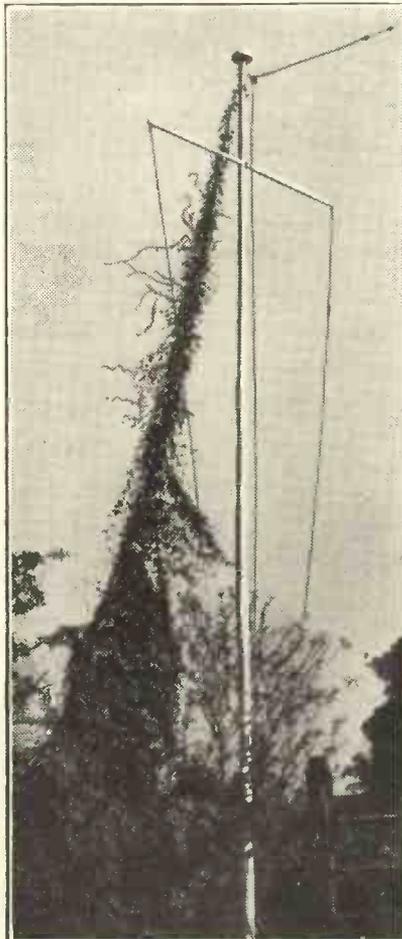
A vacuum cleaner with sparking brushes will sometimes cause a roar on a radio outfit, and may be heard in receivers in adjoining houses.

The power supply mains are frequently regarded as being absolutely unvarying in quality, but it is not safe to assume that this is the case. Although the Board of Trade lays it down as one of its regulations that public electricity concerns should keep their voltages to within very narrow margins of their specified voltages, there are times when quite large fluctuations occur.

## Voltage Variations

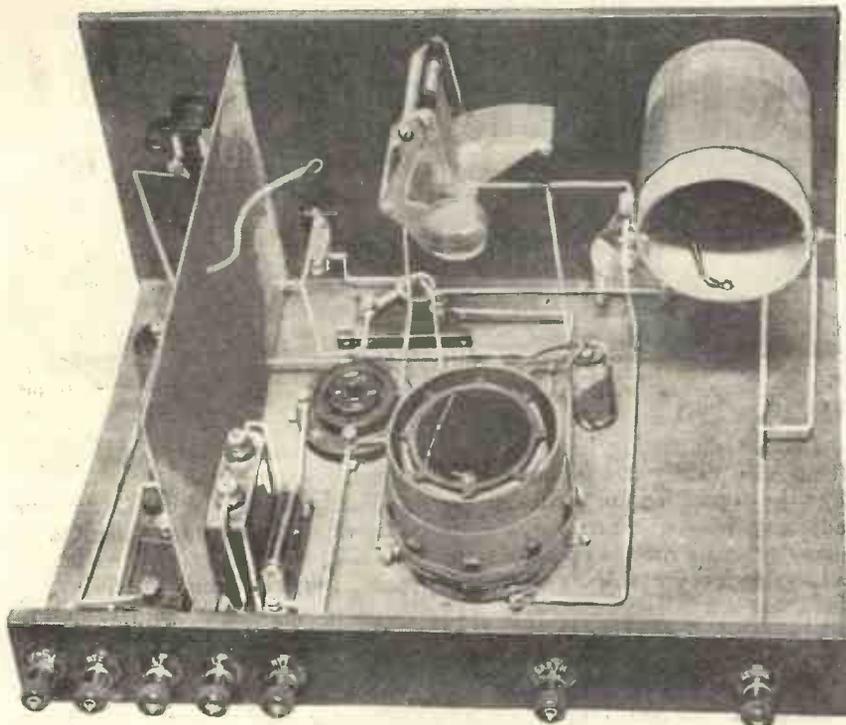
Sometimes variations of as much as fifteen volts occur. The possibility of errors of such a character should be borne in mind. It is generally necessary for the supply to fluctuate so much that the lights dim or brighten very noticeably before a mains-driven radio set is seriously upset.

## AERIAL ACTIVITY



An "M.W." reader went abroad and when he came back this is how he found his aerial. It had attracted a creeper with lofty ideas!

# The



It looks very simple, but the experienced constructor will not fail to note the "M.W." dual-range coil, with its promise of compact efficiency. On the panel is the Selector coil that gives the final touch to the tuning of a far-off foreigner. Note, too, the simple but effective screening.

IT may seem a bit of a paradox, but it is often easier to invent something than to decide how best to develop that invention when it is made! The problem is one with which the "M.W." Research Department is familiar, because after all it is our business to invent new things. Whether the invention is simply a method of doing in a better fashion something which could be done before, or whether it is a scheme for

doing something entirely new, the same old conundrum always crops up—how best can it be exploited, so that our readers may derive the fullest possible benefit?

### Difficult Decisions

We have first to decide the ultimate value of the invention. If we consider that it is of minor importance, it is usually sufficient to release it in a single receiver design and leave

interested readers to embody the new feature in other designs if they are so inclined. If it is obviously of far-reaching significance it may be considered necessary to make it the basis of a whole series of designs, showing exactly how it may be applied to all sorts of different receivers.

If it should be decided that an invention is worthy of this elaborate treatment, we have next to work out the particular types of receivers to which it is really suited, and plan our line of designs accordingly.

These are but a few of the decisions that have to be taken, and we only mention them in this article because we shall be dealing with two recent inventions whose mode of presentation we should like the reader to understand.

### And Easy Ones

The two inventions we have in mind are the "Interwave" aerial coupling system and the "Star Turn" tuned aerial circuit, the exploitation of both of which are concerned in the H.F. unit we are going to describe.

When these two devices were first developed in the "M.W." Research Laboratory there was no difficulty in deciding upon the exact degree of their importance, for it was immediately obvious that they were both of the greatest value. The "Interwave"

## THESE ARE THE PARTS THAT YOU WILL REQUIRE

**PANEL**  
14 x 7 (Red Seal, or Lissen, Goltone, Paxolin, etc.).

Parex, Keystone, Magnum, etc.).

Radio, Lissen, R.I., Lotus, Wearite, Keystone, Parex, Magnum, Watmel, etc.).

**CABINET**  
Panel space as above, base-board 10 in. deep (Pickett, or Osborn, Lock, Camco, etc.).

**H.F. CHOKE**  
(Lewcos, or Varley, Telsen, Dubilier, Ready

### COILS

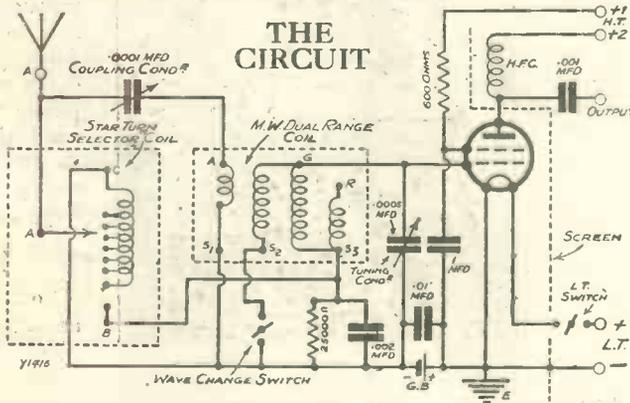
1 "Star Turn" Selector (Wearite, or Magnum, Keystone, Parex, Ready Radio, Goltone, etc.).

1 "M.W." dual-range (Ready Radio, or R.I., Goltone, Magnum, Keystone, Parex, Wearite, etc.).

**VARIABLE CONDENSERS**  
1 .0005-mfd. (J.B., or Lissen, Lotus, Igranic, Dubilier, Ready Radio, Polar, Formo, etc.).  
1 .001-mfd. (reaction type) (Lotus, etc.).

**FIXED CONDENSERS**  
1 1-mfd. (T.C.C., or Lissen, Hydra, Dubilier, Formo, Mullard, etc.).  
1 .001-mfd. (Dubilier, or Telsen, Lissen, Mullard, T.C.C., Ferranti, Ready Radio, Ediswan, Formo, Watmel, etc.).  
1 .002-mfd. (Lissen, or Telsen, etc.).  
1 .01-mfd. (T.C.C., etc.).

**RESISTANCES**  
1 25,000-ohm "Spaghetti" (Magnum, or Bulgin, etc.).  
1 600-ohm for 500-ohm (Ready Radio, or Wearite, Bulgin,



No plug-in coils are required, the two units containing all the necessary inductances. Note that Interwave coupling comes into play on the long waves when the Selector contact is at B.

### SWITCHES.

1 L.T. (Igranic, or Goltone, Lotus, Lissen, Benjamin, Bulgin, Red Diamond, etc.).  
1 plain on-off type wave-change (Bulgin, or Keystone, Ormond, Wearite, Ready Radio, Lissen, Magnum, Red Diamond, etc.).

### VALVE HOLDER

1 ordinary sprung type (W.B., or Telsen, Igranic, Lotus, Benjamin, Lissen, Dario, Clix, etc.).

### MISCELLANEOUS

Terminal strip, 14 x 2 in.  
7 terminals (Igranic, or Clix, Belling & Lea, Belex, etc.).  
1 screen, 10 x 6 in., etc.

# "Dual-Range" H.F. Unit

## YOU CAN ADD IT TO YOUR PRESENT RECEIVER

device provides the long-desired improved method of aerial coupling for long waves, giving added selec-

tion and readers may not feel inclined to build an entirely new set while still desiring to try out these new ideas.

and we are free to turn to the needs of the reader who would rather try to add the advantages of the new inventions to an existing receiver.

If your set needs extra range and selectivity, add this unique unit! It confers in full the advantages of the "M.W." DUAL-RANGE COIL—"INTER-WAVE" COUPLING ON LONG WAVES—AND "STAR TURN" SELECTIVITY.



So far as "Interwave" coupling is concerned, the matter is very simple and scarcely calls for any special article. To modify an existing set on these lines, all that you do is just to

**ANOTHER TRIUMPH  
FOR THE "M.W."  
RESEARCH DEPT.**

tivity and sensitivity and completely removing the long-standing nuisance of interference from the local station on this wave-range.

The "Star Turn" system of aerial tuning and coupling, for its part, has solved the problem of getting sufficient selectivity for modern conditions without the complications involved in multiple-tuned circuits, and has at the same time produced a definite increase in the sensitivity of all receivers in which it was incorporated. There was thus not the slightest doubt as to the full merits of these two devices, and the only problem involved was concerned in how to develop them to the full advantage.

### Our Season's Programme

We should like the reader to understand what we decided to do in this connection, in order that he may realise what parts of our programme for the season may be expected to meet his particular needs.

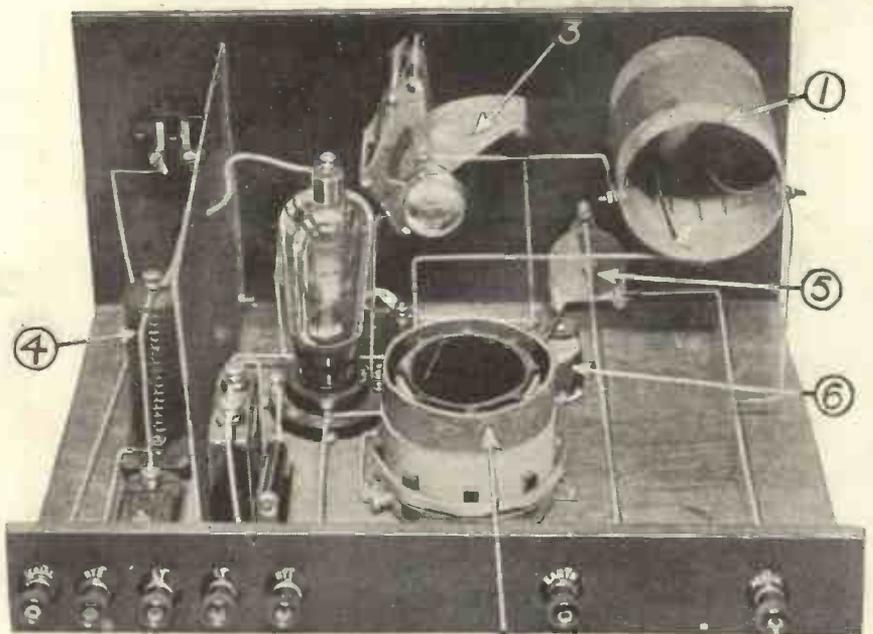
The number of designs which we can produce in any given season and present in MODERN WIRELESS is, of course, limited by practical considerations of space, and so these things have to be worked out very carefully. "Star Turn" aerial tuning and "Interwave" coupling quite obviously called for treatment at full length in a complete series of receiver designs, but at the same time we have not forgotten that many of our

We concluded that the reader who was wishful to build an entirely new set would probably be considering the matter rather early in the season, and so we have devoted the space available in our preceding issues to the first specimens of our series of complete receiver designs incorporating the new methods. We feel that we have now cleared the ground to a considerable extent in this direction,

locate the lead connecting one side of your long-wave secondary coil to earth, break it, and insert in series at this point a compression-type adjustable condenser with a maximum capacity of .002 mfd. with a 25,000-ohm resistance connected across its two terminals.

Then, on going over to long waves, connect your aerial lead to the junction point between this .002 condenser and the long-wave secondary

### SOME SECRETS OF ITS SUCCESS



Here is the unit ready for test, with some of its salient features numbered for reference. (1) and (2) are the coils; (3) the tuning condenser; (4) the H.F. choke; and (5) the coupling condenser.

Note the little dry cell marked (6). This supplies the necessary grid bias for the S.G. valve.

winding, instead of to its usual point either on a tapping on the long-wave coil or on a separate primary winding. We give this little hint in passing.

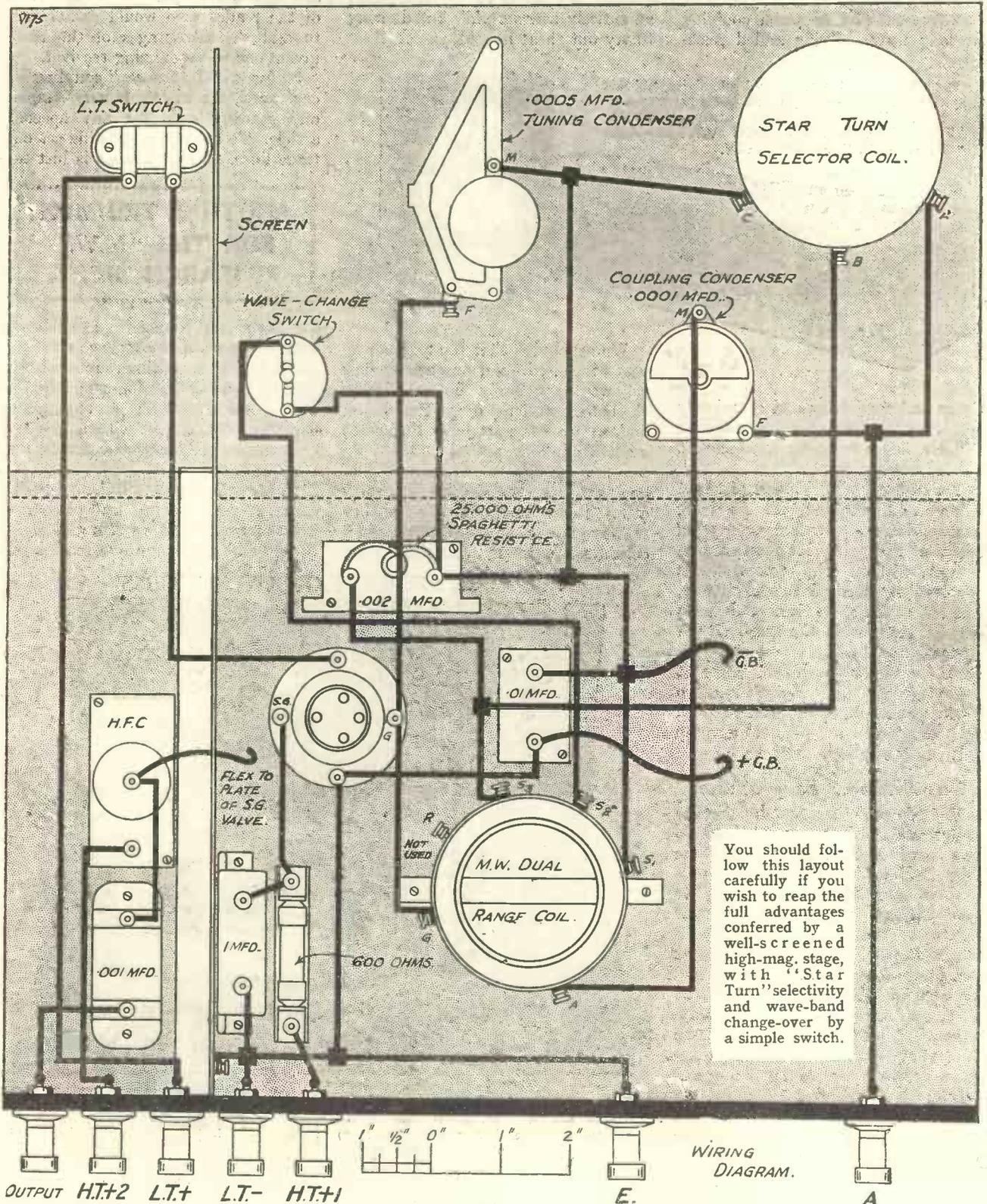
"Star Turn" aerial tuning, on the other hand, calls for rather more elaborate treatment, and it is to this

that we have been devoting more time from the point of view of the man who wants to add its benefits to an existing receiver. We have designed a little extra tuner unit for connection to any existing receiver, which will convert its present semi-periodic aerial circuit to one of the

"Star Turn" type, and this you will probably find is dealt with elsewhere in the present issue. (Should space considerations make it impossible to include it in this number, you will certainly find it in our next.)

The "Star Turn" unit we have just mentioned adds not merely the super-

**A REALLY WELL-ARRANGED S.G. STAGE**



OUTPUT H.T.+2 L.T.+ L.T.- H.T.+1

# PURE LISSEN CURRENT FROM YOUR MAINS!

You cannot get purer current for radio than the pure D.C. current of a Lissen Battery—BUT IF YOU WANT TO USE AN ELIMINATOR USE A LISSEN ELIMINATOR.

Because no current from any eliminator is smoother or more silent than the current from a Lissen eliminator. No eliminator output is more constant, none is so free from hum.

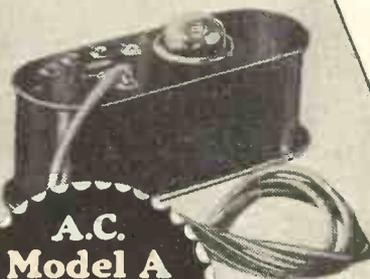
Lissen have made eliminators safe—notice that the neat moulded cases of these Lissen Eliminators are made entirely of insulating material—see also the thickly insulated "cab-tyre flex" that Lissen have used.

Lissen too have made it easy for you to choose the right eliminator—there are only four models and they satisfy the requirements of 90% of listeners. In producing these eliminators, Lissen have compared their current with the purest form of current known, namely the Lissen Battery, and have got as near to that standard as it is humanly possible to do.

If you are buying an eliminator, be sure to see a Lissen Eliminator. Your Dealer will be pleased to show you one that will suit you.



D.C.  
Model A  
**27/6**



A.C.  
Model A  
**60/6**

**TYPES AND PRICES.**

**D.C. MODEL "A"**  
(100-150 volts and 200-250 volts).

Employs 3 H.T.+ tapings: H.T.+1 giving 80 volts for S.G. valves; H.T.+2 giving 60 volts at approx. 2 mA. for detector valves; H.T.+3 giving \*120/150 volts at 20 mA.

Price 27/6

**D.C. MODEL "B"**  
(100-150 volts and 200-250 volts).

Employs 3 H.T.+ tapings: H.T.+1 and H.T.+2 are continuously variable (by means of two control knobs) and capable of giving any desired voltage up to \*120/150 volts at approx. 2 mA.; H.T.+3 giving \*120/150 volts at 20 mA. for power valves.

Price 39/6

\*(The output voltages given from D.C. models operating from 100/150 volt mains are approximately 75 per cent. of those quoted.)

**A.C. MODEL "A"**

Tapings as in D.C. Model "A" (100-125 volts and 200-250 volts). Price £3:0:0

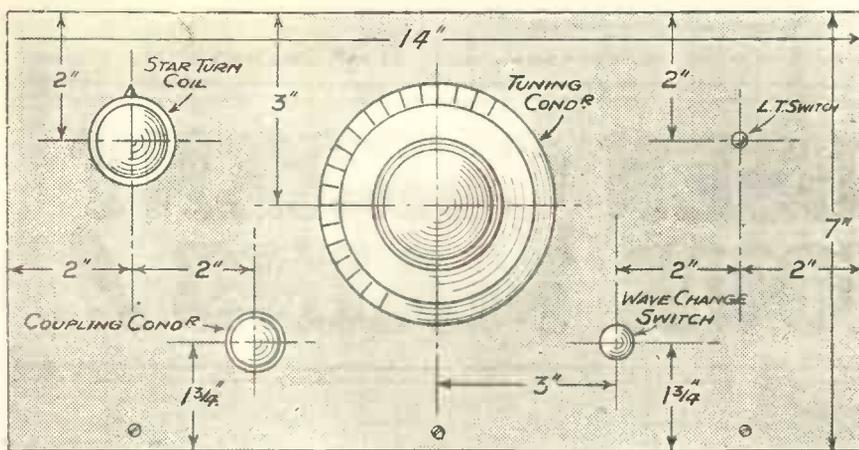
**A.C. MODEL "B"**

Tapings as in D.C. Model "B" (100-125 volts and 200-250 volts). Price £3:15:0

# LISSEN

## ELIMINATORS

**LISSEN LTD.,** Worplesdon Rd., Isleworth, Middlesex.



The main tuning is done on the central condenser, and a touch on the "Star Turn" control gives just that extra power that "makes all the difference." You can vary your selectivity to the required sharpness in a moment by means of the coupling condenser.

selectivity characteristic of the scheme, but it would also in practically every case produce a quite definite improvement in sensitivity as well, with a notable increase in the volume of distant stations. This, however, will not be enough to satisfy some people, and so in the present article we are giving a design for a unit which will produce a still greater improvement.

**When to Use It**

We have noticed that during the later part of the winter season many constructors begin to think of adding to the range and power of their outfits without going to the trouble of building the new set which they now begin to think might well be postponed until the beginning of the following season.

For their benefit we have worked out the design for this most attractive unit, which adds not merely a stage of screened-grid H.F. amplification in front of your receiver, but also a "Star Turn" aerial system, giving thereby not merely a great increase in range and power, but also a quite phenomenal degree of selectivity.

**What It Will Do**

The unit is intended for employment with any receiver of the detector and L.F. types, and when so used will provide a complete outfit capable of dealing with the most arduous regional conditions with the greatest of ease. It will enable you to tune the local transmissions in and out over only a few degrees of your dials, and at the same time give you a tremendously enhanced performance on the more distant stations, with real volume and quality, without the need of working reaction up to its limit.

At this point we would refer the reader to the circuit diagram on

these pages, in which you will be able to follow out the main details of the unit. Despite its remarkable power it is very simply arranged, and the first point to note is the tuned aerial circuit provided by the Selector coil.

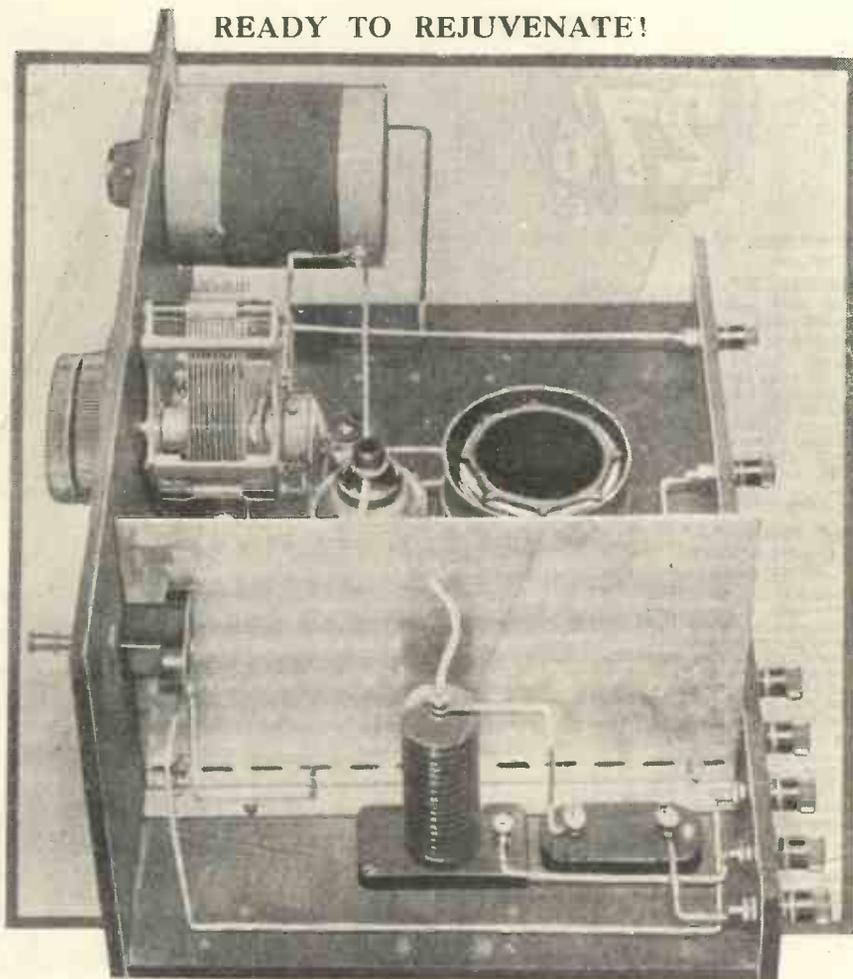
From the high-potential end of this tuned aerial circuit a capacity "feed" is taken off to the A terminal on the "M.W." dual-range coil, which provides the main secondary tuning circuit. This feed lead is passed through an adjustable coupling condenser with a maximum capacity of .0001 mfd., so that the correct adjustment may be found for different conditions. We shall have more to say about the exact use of this condenser at a later point.

**Wave-Change Switching**

The "Star Turn" system of aerial tuning is employed only on the medium wave-band, as usual, and "Interwave" coupling is arranged for long waves. This is brought into action by turning the Selector coil switch fully round to the right-hand end of its travel, so switching the aerial terminal through to terminal B on the Selector, from which a lead goes off to the "Interwave" coupling device.

(Continued on page 108.)

**READY TO REJUVENATE!**



Added in front of an ordinary set the unit confers a very high degree of selectivity and a wonderful extra range of reception. It brings in scores of programmes that would not be worth listening to without it.

# BROADCASTING and the NEW YEAR

By *THE EDITOR*

*A review of the position and prospects of British Broadcasting.*

ONE of the big broadcasting events for 1931 will be the opening of the North of England Regional transmitter at Slaithwaite, near Huddersfield, another link in the great Regional Scheme chain designed by Captain Eckersley.

## *The Scottish Station*

The New Year will also see a start made on the new transmitter for Scotland, and preparations completed for the construction of the West Regional broadcaster.

Thus 1931 will see the Regional Scheme well over half-way to completion—a gigantic, costly, but thoroughly first-rate undertaking. The policy of “alternative” broadcasters met with much early opposition, much hindrance from red-tape sources, and multitudes of delays.

But with the opening of the year 1931 we can look back and realise that good work has been well and soundly done, and that, looking forward, we can confidently count that good work continuing until the Regional plan has been put into full and successful effect. No small task and no small triumph for all concerned.

## *More Listeners*

The pessimists who saw in broadcasting a new and ephemeral toy are no longer with us; or, if they are, then in such small numbers that their voices are seldom if ever heard, save in the wilderness which will always be at the disposal of pessimists. Broadcasting, in all its varied phases, grows, and grows steadily.

Just as the surest indication of the popularity of general success of a publication can be gauged by its circulation, so can the success and popularity of broadcasting be gauged by the licence figures.

During the past year they have steadily increased. Even during the summer season, when normally one would not expect broadcasting interest to be very high, the average number of new licences taken out each month—apart from renewals—was over and above 20,000. Saturation point still seems a very long way off—indeed, the B.B.C. is probably right in the assumption that saturation point will only be reached when it is a case of “wireless in every home.”

By September 30th, 1930, there were 3,195,553 licences in force; representing, according to a B.B.C. estimate, 12,000,000 listeners—or approximately every second home in the

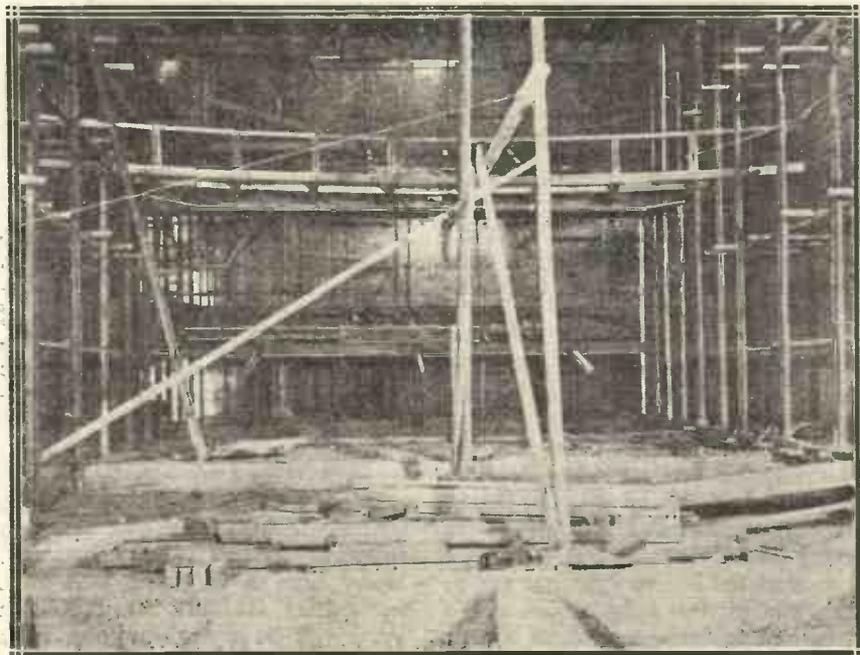
country. Before 1931 draws to a close it would not be very startling if the licence figures rose to very nearly 4,000,000.

## *Good Sets for All*

But it must be remembered that the credit for this steady growth in the popularity of broadcasting is not entirely a monopoly of the B.B.C. Savoy Hill has kept its end up admirably, but so has the wireless industry. British wireless manufacturers have set a pace which wants a lot of beating.

As a matter of fact everything necessary for good listening, has improved tremendously; prices, too, have

## BUILDING BRITAIN'S BIGGEST STUDIO



The main studio at the B.B.C. new Portland Place headquarters under construction. It will have a seating capacity of 1,000 and will incorporate an organ and a concert platform.

**“There is One Small Cloud on the Horizon . . . . .”**

reached more satisfactory levels, and to-day it may be safely said that a good radio set is available for everybody at a sound and reasonable figure.

Gone are the days—we hope for ever—when a three-valve set could not be had under £20. Prices have tumbled because efficiency has climbed up! And that is as it should be.

**A Big Accomplishment**

One of the really big accomplishments of the past year has been the formation of the B.B.C. Symphony Orchestra. The aim and ideal is to make it the finest orchestra in the world. Its cost will be high—

on the horizon—perhaps so distant that it should not now be given much attention—but which may, as the year progresses, assume displeasing proportions. Despite the very large income received by the B.B.C., there are the drawbacks of the Corporation having to forgo a portion of the gross receipts for the benefit of the Treasury and the Post Office; and the recent unexpected decision, to the effect that the Corporation is liable to Income Tax on the excess of income over revenue expenditure, makes the financial prospects of the B.B.C. not exactly bright.

The Income Tax decision, for example, affects the Corporation seriously, for this so-called excess of

debarred from benefitting proportionately or immediately by an increase in licences. The amounts received by the B.B.C. represent approximately as follows:

In 1927, 67.2 per cent of the gross licence revenue, or, roughly, 6s. 8½d. per 10s. licence; in 1928, 66.7 per cent., or 6s. 8d. per 10s. licence; while in 1929 the B.B.C. only received 64.2 per cent., or 6s. 5d. per 10s. licence.

**Costs Increasing**

The B.B.C. points out that while the amount of its increase in expenditure is not, of course, a criterion of the extent of development, it is inevitable at the present stage of broadcasting that development should be reflected more or less directly on increasing costs.

As a result of the development of the Regional Scheme, the increase in the cost of maintenance and plant, etc., shows an increase over 1929; and the temporary overlapping of the old and the new systems of broadcasting is still making itself felt, from a financial point of view, under the heading of rent, rates, taxes, etc.

The B.B.C. found the new burden of Income Tax particularly heavy in 1929, as the bulk of the liability from the Corporation's inception had to be provided for in that year. This was due to the uncertainty existing until then as to whether the B.B.C. was liable at all, and, if so, on what basis. At the end of 1929 a total sum of £100,000 had to be withdrawn for this purpose from projected use and financial capital development.

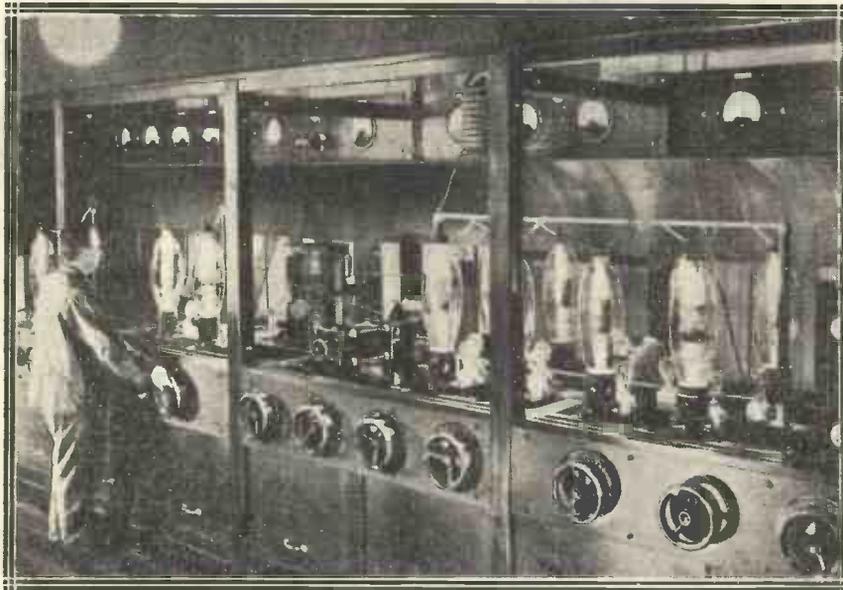
**Capital Expenditure**

The capital expenditure on the Regional Scheme is not obvious in the B.B.C.'s Balance Sheet and Accounts. The position is that during 1927 and 1928 a reserve of £200,000 was built up for this purpose; at the end of 1928, £30,854 15s. 8d. of this sum had been spent; during 1929 expenditure increased rapidly, and in 1930 the amount spent was £114,747 2s. 2d.

Without going into details, it becomes apparent that the cost of the Regional Scheme will fall much more heavily on the B.B.C. during the next few years' finances, and it will be impossible to meet it out of income. To quote the B.B.C. Handbook for 1931:

(Continued on page 104.)

**A NEW TRANSMITTER AT LEIPZIG**



This new transmitting apparatus has recently been installed at the Leipzig station.

£100,000 per annum at least—but the day is not far distant when this orchestra will well and truly be “world famous.”

\* \* \*

In general, then, the stage is set for another successful year of endeavour and achievement by the B.B.C. and for the radio industry; for it is undeniable that interest in broadcasting grows and grows, and with the B.B.C. supporting the ideal of “wireless in every home,” it takes but a cursory glance at the licence figures to realise that the wireless industry has still a vast and potential market to occupy its labours, and its interests during 1931.

There is, however, one small cloud

income is, in reality, the Corporation's only source for meeting Capital Expenditure, and taxation is therefore simply depriving the B.B.C. of money essential for Capital developments, and consequently for the better development of British broadcasting.

**Expensive Undertaking**

It must not be forgotten that the Regional Scheme, for example, is a tremendously expensive undertaking. Every time a Regional twin-wave transmitter is built the B.B.C. is faced with an expenditure of at least £150,000.

Despite the steady growth of licence figures, the Corporation is

# TROUBLE-FREE SET BUILDING

## Guaranteed Kits

### THE "TRIPLE" TWO

#### A.C. MAINS MODEL

**KIT A**, less valves and cabinet, £9 2 0, or 12 equal monthly payments of **16/9**  
**KIT B**, with valves less cabinet, £11 10 0, or 12 equal monthly payments of **21/1**  
**KIT C**, with valves and cabinet, £13 2 0, or 12 equal monthly payments of **24/1**

#### D.C. MAINS MODEL

**KIT A**, less valves and cabinet, £8 11 0, or 12 equal monthly payments of **15/8**  
**KIT B**, with valves less cabinet, £9 10 0, or 12 equal monthly payments of **17/5**  
**KIT C**, with valves and cabinet, £10 0 0, or 12 equal monthly payments of **20/2**

#### BATTERY MODEL

**KIT A**, less valves and cabinet, £4 8 0, or 12 equal monthly payments of **8/-**  
**KIT B**, with valves less cabinet, £5 7 0, or 12 equal monthly payments of **9/10**  
**KIT C**, with valves and cabinet, £6 10 0, or 12 equal monthly payments of **11/11**

Send for complete list of parts for any of above kits.

### COMPLETE KIT OF PARTS FOR THE "SUPER-SIMPLE" A.C. H.T. UNIT AS SPECIFIED

Ready for immediate dispatch. Price £5 10 0, or 12 equal monthly payments of **10/-**

Send for complete list of parts. Post Free.

### DUAL-RANGE H.F. UNIT

**KIT A**, less valves and cabinet, £3 17 0, or 12 equal monthly payments of **7/-**  
**KIT B**, with valves less cabinet, £4 17 0, or 12 equal monthly payments of **8/9**  
**KIT C**, with valves and cabinet, £6 0 0, or 12 equal monthly payments of **11/-**

Send for complete lists of parts. Post Free.

### "PLUS-X" FOUR

**KIT A**, less valves and cabinet, £7 13 0, or 12 equal monthly payments of **14/-**  
**KIT B**, with valves less cabinet, £10 1 0, or 12 equal monthly payments of **18/6**  
**KIT C**, with valves and cabinet, £11 11 0, or 12 equal monthly payments of **21/3**

Send for complete lists of parts. Post Free.

### SEND NOW FOR THESE CATALOGUES

1931 **RADIO OUT OF INCOME**  
 Free Catalogue of Sets, Speakers, Equipment and Components selected by our experts as representing the finest value obtainable.

A complete Encyclopedia of all modern Sets, Speakers, Equipment, Components and Accessories, including particulars of everything needed by the set builder. Price 1/- Post Free.

### THE "L.S." THREE

£ s. d.		£ s. d.	
1	ReadiRad -0005-mfd. Brookmans condenser	3	6
1	ReadiRad -00015-mfd. differential reaction condenser	5	0
1	ReadiRad filament switch	10	1
1	ReadiRad 3-point wave-change switch	1	6
1	ReadiRad "M.W." dual-range coil	15	0
1	Formodenser, type G, 001 max.	1	6
1	Dubilier -002-mfd. fixed condenser, type 620	2	0
3	Telsen 4-pin sprung valve holders	3	0
1	Dubilier -0003-mfd. fixed condenser, type 620	1	8
1	Dubilier 2-meg. grid leak and vertical holder	2	9
1	Lissen R.C.C. unit	4	0
1	ReadiRad "Hilo" choke	4	6
1	Igranic Midget L.F. transformer	10	6
1	Blue Spot 51R loud speaker	4	4
3	Valves to specification (det., L.F., power)	1	7
1	Packet Jifilinx	2	6
2	Clix plugs and sockets, flex, wire, screws, spades, etc.	2	3
<b>TOTAL (including valves, loud speaker, etc.)</b>		<b>£8</b>	<b>12 0</b>

or 12 equal monthly payments of **16/6**

### THE "M.W." FOUR

£ s. d.		£ s. d.	
1	Ebonite panel, 21 x 7 x 7/8 in., drilled to specification	7	0
1	Hand-polished cabinet, with baseboard 10-in. deep	1	12
3	ReadiRad -0005-mfd. variable condensers	13	8
3	ReadiRad Duograph slow motion dials	19	8
1	ReadiRad -0005-mfd. Brookmans condenser	3	6
1	ReadiRad -00015-mfd. differential condenser	5	0
2	Dubilier -01 type 620 fixed condensers	6	0
3	Dubilier -002 type 620 fixed condensers	6	0
2	Telsen -001 fixed condensers	2	0
1	ReadiRad -0003-mfd. fixed condenser	10	1
2	Dubilier 1-mfd. fixed condensers	5	0
2	ReadiRad 600-ohm resistances	5	0
1	Link resistance, 25,000 ohms	1	6
1	Link resistance, 15,000 ohms	1	3
1	ReadiRad 2-meg. grid leak and holder	1	4
1	ReadiRad rheostat, 15 ohms, panel mounting	2	0
1	ReadiRad filament switch	10	1
3	ReadiRad wave-change switches (3-contact type)	4	6
2	Junit H.V. valve holders	3	6
2	Telsen 4-pin valve holders	2	0
3	ReadiRad "M.W." dual-range coils	2	5
1	ReadiRad "Hilo" H.F. choke	4	6
1	Telsen H.F. choke	2	6
1	Telsen "Radiogrand" L.F. transformer, ratio 3-1	12	6
2	ReadiRad standard screens 10 x 6 in., with holes for S.G. valves	5	0
1	Piece copper foil, 21 x 10 in.	4	0
1	Drilled terminal strip, 21 x 2 x 1/2 in.	2	3
10	Belling-Lee "B" terminals	5	0
2	Belling-Lee wander plugs	7	0
2	Stemens S.G. cells	2	0
1	Packet of Jifilinx for wiring	2	6
4	Screws, flex, etc.	1	5
4	Mullard valves to specification: 2 S.G., detector and power	2	19
<b>TOTAL (including valves and cabinet)</b>		<b>£13</b>	<b>9 0</b>

or 12 equal monthly payments of **16/6**

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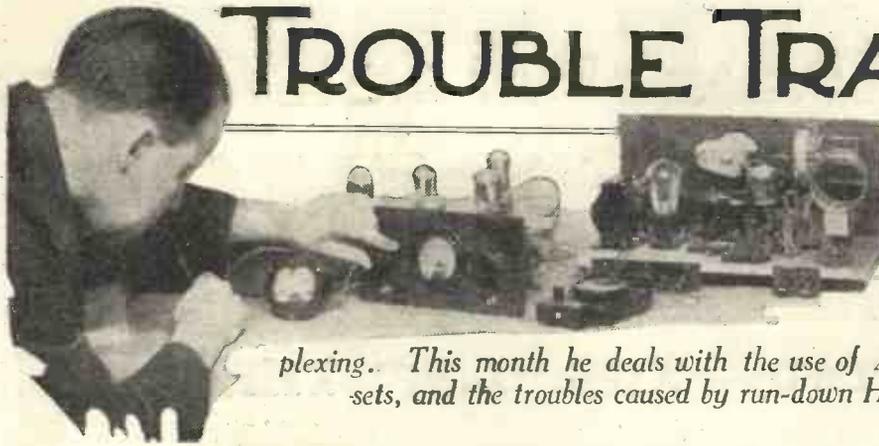
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# TROUBLE TRACKING



*On this page the Chief of the "M.W." Query Dept. discusses, month by month, some of those common difficulties and troubles which can be so perplexing. This month he deals with the use of A.C. valves in battery-operated sets, and the troubles caused by run-down H.T. and G.B. batteries.*

**I** NOTICE from my correspondence that a number of readers are keen on all-mains designs, and in their enthusiasm several of them have taken such sets as the "Olympia" Five and modified the wiring to suit A.C. valves.

In these cases it is practically a foregone conclusion that the results will be unsatisfactory, because there is a big difference between battery-operated sets and all-mains designs. It is not just a question of putting A.C. valves into the set in place of the existing battery-operated ones.

## Increased Amplification

Mains valves are very efficient, and in consequence the magnification per stage on the H.F. side may be much higher than in an equivalent stage incorporating an ordinary S.G. valve. This high magnification is a very fine feature of the A.C. valve, but it must be realised that an H.F. circuit requires considerable screening when its amplification is high, and for this reason if mains valves are inserted into an ordinary set there is frequently some danger of instability.

This danger is very marked in the case of a 2 H.F. receiver such as the "Olympia" Five, and the only way to arrange the H.F. stages is by screening them very thoroughly, the degree of screening amounting to a metal box round each stage.

Those of you who prefer mains sets should build one of our designs specially intended for mains operation, and should not try to adapt battery sets.

## Run-Down Batteries

I have come to the conclusion that a great many of the present-day faults are caused by batteries which have been allowed to run down, their owners not realising the fact, and having no voltmeter to test them.

So often do we have cases where a

set has been working satisfactorily for, say, three months, and then suddenly starts to howl or to distort. Perhaps the signal strength weakens, possibly the reaction control becomes poor.

## Don't Do It!

There is a whole host of troubles which can be caused by a partly run-down H.T. or grid-bias battery. I know I have dealt with this trouble before, but it is so common that I

## CONNECTING "X" COILS



This point is important! In joining up baseboard "X" coil holders the pin should be connected to that part of the wiring that goes to earth. This is because the tappings on the coil are nearer the end of the winding which is joined to the socket on the coil mount.

think there is some justification in going over the ground again.

The life of the ordinary small H.T.

battery, say, the standard size which retails at about 14s. 6d. per 100 volts, is quite adequate if it is used with a small set, such as a two-valver. But when you start employing super-power valves, S.G. valves, and pentodes, you must not expect one of these little batteries to supply you with something like 15-20 milliamps. They will not do it, and it is unfair to expect them to.

## Triple Capacity, or Mains

The economic discharge of this type of battery is somewhere about 5 milliamps. Therefore, if yours is a set with an S.G. valve, and a super-power valve, in addition to perhaps two other valves, you should choose a triple-capacity H.T. battery if you haven't the mains available, or if you are unable to make use of accumulator H.T.

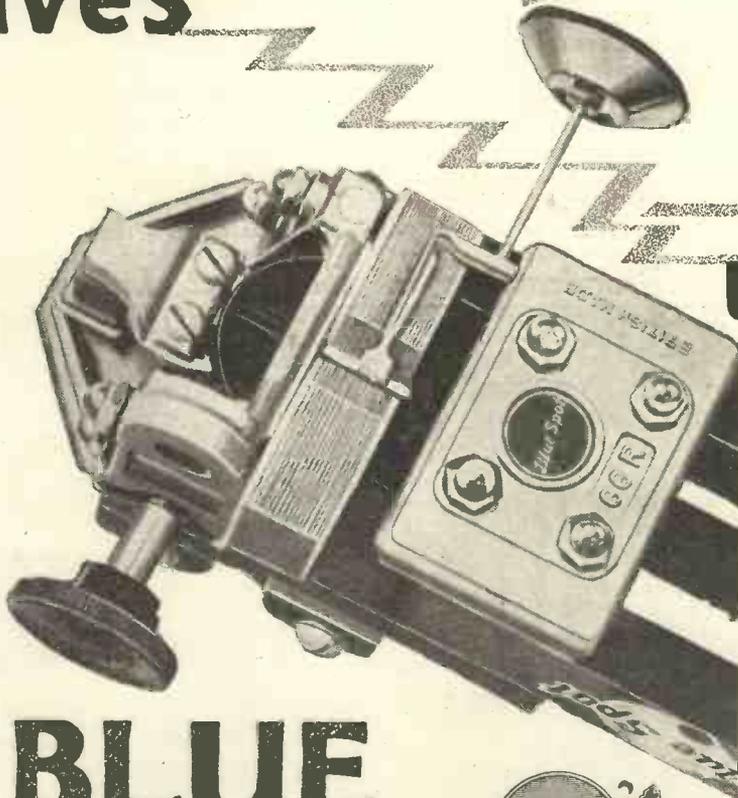
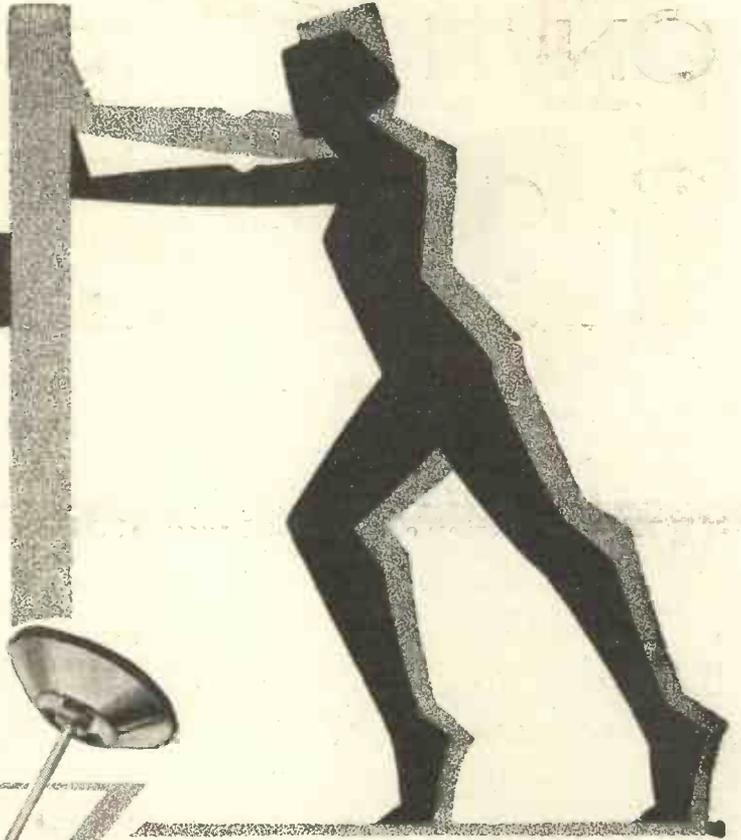
Then there is the question of grid bias. How often does the average man replace his G.B. battery? Not very often. It is usually put into the set, and then forgotten. Although the grid-bias battery is not called upon to supply current, it deteriorates in time, and should be replaced at intervals of about six months or so to be on the safe side.

## Remember the Bias

These small grid-bias strips are quite cheap, and when the voltage begins to drop off it is not worth while retaining the battery, because, first, it is not possible to operate the valves correctly, and, secondly, the total anode current taken by the set increases considerably. This in turn makes the H.T. battery run down more quickly, and so failure to replace the grid-bias battery in good time only means that more money will have to be spent in the end in the purchase of a new H.T. battery.

It also must be remembered that incorrect G.B. may have a bad effect upon the emission of the valves.

Release  
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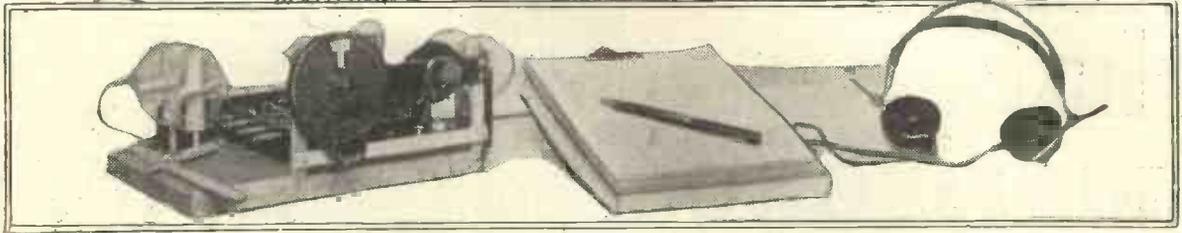
Blue Spot Power Unit Type 66P	-	-	-	27/6
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# ON THE SHORT WAVES



*An unusual article by our popular contributor in which he describes a peculiar experience.*

*By W. L. S.*

WITH the atmosphere of Christmas not yet quite left us, we are (or should be) just comfortably surrounded by that pleasant feeling that all's well for the present, and that the past hasn't been so bad after all.

## *One Sunday Afternoon . . .*

And this spirit is identical with that less noble spirit that moves a man to write his memoirs. (No, reader, don't switch off just yet; I am not intending to do anything so base as that!)

What I am getting at in my round-about fashion is that at Christmas-time we all reach, somehow, that frame of mind conducive to pleasant reminiscences of the past. And who has more thrilling radio experiences to recount than the confirmed short-wave fan who has heard everything worth listening to, and been first in the field time after time with new stations logged, new countries "bagged" and "freaks" galore?

Towards the end of last year, on a cold and clammy Sunday afternoon, I had a peculiar experience. I was sitting in the comfortable chair that I reserve for myself when listening, for I find that a certain degree of comfort is essential for a "long-period" fan.

## *. . . I Heard a Faint Piping*

It was about three in the afternoon, and I heard the faint piping of a real long-distance station, much too faint to identify even one letter of the call-sign. As I listened the "mush" grew less and less troublesome, the signal came up in strength, and lo and behold, it was not a Morse signal at all, but loud, clear telephony.

I recognised the voice as that of a British amateur that I used to know very well, and as I listened to his conversation I had the uncanny feeling that I had heard it all before. ". . . Yes, old man, I am afraid we shan't hear much of each other now. If we are all going to push off down to these beastly short waves of 150 metres and have to re-make all our gear we might as well give up and hand in our licences right away. What do you make of it? D'you

replying. Well, old man, you surprise me. Didn't you hear that old Ack Emma had heard a Frenchman on 150 metres last night?

## *Old-Fashioned Apparatus*

"And he has wired him for a two-way schedule to-night at 11.30. If he gets over that will be first contact with France on the new wave. I'm going round to be on the spot and also find out what he uses as a receiver down there. I'll bet he has got

## *Broadcasting in the West Indies*



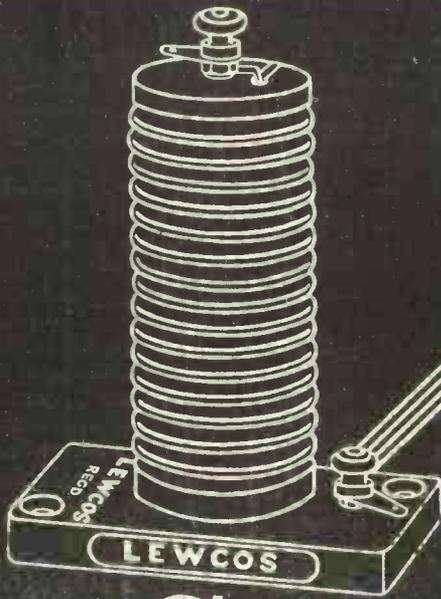
A corner of one of the studios at the Havana broadcasting station. The vocalist is standing near the "mike," the accompanist being situated some distance away.

know anyone that's done anything down there yet? Over!"

Adjusting the tuning condenser slightly I found the other station just starting up. In came the microphone circuit with a characteristic hiss, and "Hullo, 2—, this is 5—

ebonite extension handles about two feet long, or else he's got those new vernier condensers with a single plate on the back . . ."

As his voice faded slightly I looked round the room, and, without any surprise at all, I found that it was



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**LEWCOS RADIO PRODUCTS FOR BETTER RECEPTION**

THE LONDON ELECTRIC WIRE COMPANY AND SMITHS LIMITED, CHURCH ROAD, LEYTON, LONDON, E.10

## The Result of That Sunday Dinner!

not my present den, but my old love of 1922 or thereabouts. Then, when I looked back at the receiver, I found what I had been secretly expecting.

### Bright Emitters

Gone was the neat aluminium cabinet with the three slow-motion dials, and in its place was a lengthy affair with a sloping panel. Three ivory scales above three plain knobs were crowned by three bright-emitter valves of identical type, and two coils with another knob controlling the coupling stood out at the side.

it wasn't so good last night. Only heard about ten of them in all, but my brother in Nottingham logged over thirty last week-end. Who's going to be the lucky man to get across first of all? I don't think it will be long now before someone breaks through. Old Reinartz must have got a high-power outfit to put out that signal . . ."

Then I realised what this conversation was about; the first two-way communication with the United States, on 150 metres; probably the biggest thrill amateur radio has yet handed to anyone. And I found myself sitting in the dark save for

consuming three amperes in filament current, and goodness knows how much H.T. Milliammeters were expensive things then.

### Right Round the World

Next I was tuning my own receiver again, and picked out quite a strong signal sending "Z 4 A G Z 4 A G . . ." Could it possibly be the "Z" himself? New Zealand was about as far as one could get on *this* earth, anyhow, and it sounded as strong as many Frenchmen. No, there was no doubt about it—it *was*. There was thrill number two; the first sound from New Zealand that I had ever heard, and, as I thought then, the last.

Another change came over the surroundings, and I found myself sitting between a little transmitter and a much smaller receiver than I ever thought practicable. And round the wall were gaudy-looking cards, with call-signs of stations from all over the world.

As I looked at them I found them becoming less unfamiliar, and eventually recognised them as old friends. All my "scalps" from 45-metre days, thought I. I wonder whether I shall ever bag such a collection on this wretched 20-metre business. But it's got to be done—there's too much interference on 40 to do anything now.

And then I heard a voice talking to me. "It's great stuff this morning, old man, and it's a real thrill to talk to the Old Country like this on 'phone. Who said '20' wouldn't be any good . . .?"

It didn't take me long to place that scrap of conversation as my first "phone" contact with Australia, on the much maligned 20-metre wavelength.

### And Then I Woke Up

Pulling myself together with an effort I sat up, finding in front of me (as I had expected to do) the familiar little aluminium box and the 'phones on the bench. Putting the 'phones on I heard yet again the old familiar voice to which I seemed to have been listening all the afternoon, saying "I believe he's gone to sleep.

"I've been calling him solid for the last ten minutes and there's not a sound of him. You know what a bounder he always was for dinner. I'll give him another shout now and pull his leg."

## The World's Most Powerful Radio Station



Marchese and Marchesa Marconi in the Power house at the Rugby transoceanic telegraphy and telephony station.

Of course, I knew all along that I was dreaming—probably the effect of the Sunday dinner—but I had the uncanny feeling that this fearsome receiver in front of me was the real one, and that the neat little aluminium box that I remembered having seen was part of a dream.

Then there was a blank, until I heard a faint voice again. Swinging round the condensers, I heard another amateur station. ". . . No,

a neat panel lamp, feverishly hanging on to the dial listening to the faintest of Morse signals sending "CQ CQ CQ C ——— Q CQ CQ . . . ." Who was it? Had I got my first "Yank," or would it turn out to be some European using low power? Still "CQing." Ah, here he is! ". . . CQ de de U I R W U I R W." That's done it! And that was the first transatlantic signal ever heard on my old veteran, the three-valver



## Introducing 1931 to the Radio Enthusiast

WITH the coming of a new year it falls to me, as the Official Commentator upon Nothing in Particular, to rise and make a few remarks by way of introducing it to our esteemed public. So, in the words of the costermonger introducing his "donah" to his "pal," "This is 'er!"

### SOMEWHAT SKITTISH



"Pleasedtermeetcher, Miss 1931! Hope you will bean improvement on your predecessor."

Pleasedtermeetcher, Miss 1931! Hope you will be an improvement on your predecessor, who was somewhat skittish and unmanageable at times.

### Yuan Mei

What hopes? This new year will in all probability be similar to the other years—full of months and things, besides rain and taxes, pain and taxes, spring and winter, droughts and floods and—well, a year is only a year, anyway.

Yet I would not have you ignorant of the fact that the Chinese essayist, Yuan Mei, writing of the art of dining (though doubtless allegorically), alleged, "A ham is a ham." That is precisely my point. A year is a year.

Nevertheless our Oriental sage continued, "But in point of goodness two hams will be as widely separated as sea and sky." If we only knew the height above sea-level of the bottom of the sky this ham-fancying business would be placed on a scientific basis. As matters are, however, we must stick to poetic fancy.

### Hams and Mackerel

This fellow Yuan Mei—between Yuan Mei he was a bit of a guzzler—proceeded to state that "a mackerel is a mackerel" and compared two given mackerel to ice and live coals. I am not going to pretend that I can argue with him about mackerel; I give him best. All I know is that all the soused mackerel which have come into my life have seemed to me to be identical—even to the very vinegar.

I dragged in this Chinese scribe merely to demonstrate how deeply I research into literature for your delectation and information. Nevertheless, like Yuan Mei's hams, two years may in point of goodness be as widely separated as three mackerel. If you see what I mean! (If you do, kindly drop me a postcard.) Perhaps I was one mackerel too many—in which case we will deduct it, leaving two, which was the number I first thought of. So *that's* clear.

### All About Ahab

Very good, then. Two mackerel per year—dash it! What *are* you talking about? These—er—years—and so forth—what is the use of mentioning years to radio men? Radio deals with small fractions of seconds.

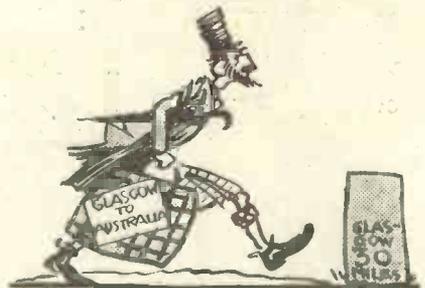
Radio abolishes space—and time, too, except for odd bits of seconds. Still—a year's a year! And we've got to live through it—unless we drive a car—when there's no compulsion whatever about living for twelve months through considerable difficulty.

Of course, you have all heard about Ahab Bings! No? Well, Ahab went to Australia from Scotland in 1899 because Scotland didn't seem just exactly the place where gold is found lying around loose.

### Quite Right, Too!

By 1920 Ahab had built up a fortune large enough to keep a film star for several months. Then Ahab remembered the days of his youth, recalled the stern exhortations of the dour Scots minister at Auchterroy, **AHAB BINGS!**

### AHAB BINGS!



Scotland didn't seem just exactly the place where gold is found lying around loose.

and realised that his days fled faster than his bank balance grew. And he got the "wind up."

Moreover, Ahab had taken unto himself, at long last, a young wife—this young party being vastly sporty, and dear unto him. So that he simply

## Nowadays Beardless Boys Build Transmitters

hated the idea of the mathematicians, that time is a concept endowed with the quality of fluxion. In other words, Ahab (Heavens! what a monicker!) didn't like the notion of being an old husband of a young wife. (And quite right, too!)

### Beating Old Man Time

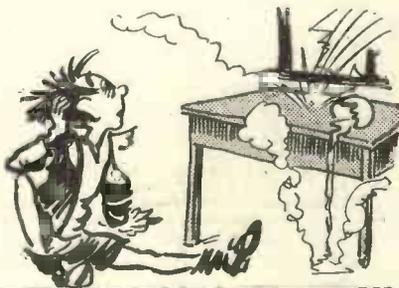
So he appealed to whatever gods he knew at the time—and Bert Allcutt appeared, clothed as a man of Sydney, yet with majesty in his counsel. Bert explained to Ahab that to-day in Sydney is as good as yesterday in England. Ahab went home afire with inspiration. If (so he reasoned) he could live by G.M.T. he could save nearly half a day every day, and thus almost double his expectation of life. After all, time is an arbitrary thing—witness the manner in which we juggle with it in the summer. If we like to call this year 1851, some of us would be pretty youthful!

Ahab began by commissioning Bert to supply him with a radio receiver guaranteed to give Big Ben's chimes. He nearly swooned when he got the bill. However, Big Ben boomed heartily and revived him. First of all he set all the household clocks and watches to G.M.T.

### Speeding Up!

That made him feel a lot younger, and he shaved off his beard, thereby giving Mrs. Ahab a nasty shock; he looked so raw! And he had the proper Scotch upper lip, too, which, added to the expanse of his chin, and reminded her of Jenny, the big chimpanzee at the Zoo.

### SMITTEN WITH CHEMISTRY



When the bang occurs he inquires of me what has taken place!

On his fifty-ninth birthday Ahab announced that he was fifty-eight years old. Believing this, he began to cogitate a means of improving upon

his time-saving notion. Eventually he decided to assume, for purpose of argument, that in order to reach Australia he had really gone right round the globe.

Clearly this gained him another half day per diem, and he was growing younger! He repeated the process once a year, and when he had actually reached the age of sixty-five he was stating his age as twenty-five! And except for his rheumatics, asthma and lumbago, he might have passed for forty-five.

### Ahab's Eclipse

Ahab then proposed to speed the process up, by duplicating his receiver; so that for every day which passed he grew some six or seven weeks younger. At last came the day when, according to his reckoning, he ought to be born in a week's time. To his Scotch soul the possession of a wife seven days' before one's birth seemed a bit thick.

So he locked Mrs. Ahab in the coal-cellar and telephoned for the doctor

Have you ever considered that to Shakespeare a gramophone would be a miraculous "engine," and that he would probably flee from a loud speaker in action as from Satan?

and the nurse. They came, and saw—and Ahab's removal to a large red brick institution took place shortly afterwards. That was ten years ago. Ahab now considers that he has reached the reign of Richard Cœur de Lion!

I just mention Ahab in passing, as a reminder that we cannot cause Ole Man Time to retrace his footsteps. Of course, this age really makes us live faster than ever. We advance centuries in a year, and in a month we can travel farther than most of our fore-runners did in a lifetime.

### So Much Whoopee!

Hurry, bustle, noise and speed—where is the solitude and the time which went to the making of the Bayeaux Tapestry, Rheims Cathedral, Chaucer's poems, the Thirty Years' War, Westminster Abbey, Da Vinci's "Last Supper," "The Compleat Angler" and "The Decline and Fall"? We are so snappy! We make so much whoopee! Life is a matter of so many miles per hour and miles per

gallon. In fact, we cannot live fully because life offers so much at one sitting.

Have you ever considered that to Shakespeare a gramophone would be a miraculous "engine," and that he would probably flee from a loud speaker in action as from Satan, and never stop till he could pound on the doors of Westminster Abbey, crying, "Sanctuary!"? Yet nowadays beardless boys build transmitters and thereby talk to mariners heaving uneasily on Polar seas forlorn.

### THE BEST NEW YEAR



I shall deal out my treasure on every new wonder.

We, the children of this restless age, cannot look back, unless we happen to be historians or archæologists, and so the only thing to do is to look forward with as much zest as we can summon to the surprising achievements of our sons and nephews who are already twenty years wiser than ourselves.

### Facing the Future

They, too, look forward, possibly with glances which overleap the immediate future. As, for instance, my own son—twelve and a bit—who is unaccountably smitten with chemistry. That he knows nothing of chemistry daunts him not a whit, and he sits in his den like a wizard, mixing, baking, boiling, and distilling unlovely substances with a world of faith in his eyes. When something happens, when the bang occurs, when the mess fizzes and emits odours, he inquires of me what has taken place!

To what is the radio enthusiast, listener or constructor, to look forward? For myself, though I have furnished up my equipment against the heavy demands of the New Year "parties," even to the extreme of abandoning an aerial which has served me for seven years—and the neighbours also!—even though a young man has put my entire "earth" and aerial system into an accord with the

(Continued on page 102.)

# WORKING VOLTAGES OR TEST VOLTAGES?

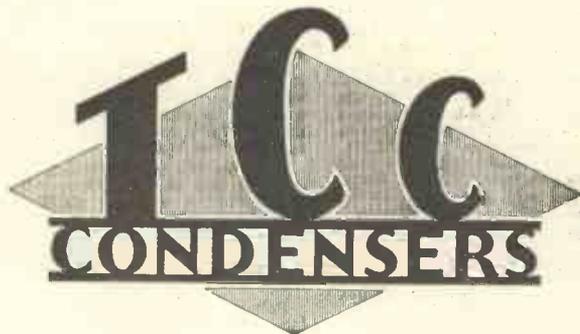
AN  
IMPORTANT  
STATEMENT  
BY THE  
TELEGRAPH  
CONDENSER  
CO., LTD.

At the present time there is some confusion regarding the most suitable method of indicating Condenser voltages. Some manufacturers, including ourselves, mark their Condensers with their actual *working* voltages. Others adopt the more spectacular method of indicating *test* voltages.

Because test voltages are obviously much higher than actual working voltages, the Condenser buyer may be led to believe that the higher voltage indicates a more efficient and better insulated condenser. This is not necessarily the case.

In the past it has been fairly safe to assume that the continuous working voltage of a Condenser was half of its stated test voltage. Unfortunately, this method of grading Condensers can no longer be universally relied upon since it has been found that Condensers of similar capacity and size have been sold stamped with varying test voltages, but with no indication as to the working voltage. (This formed the subject of a statement issued by us earlier this year in reference to condensers of foreign manufacture).

We, therefore, recommend all users in their own interests to see that the Condensers they purchase are definitely marked with their maximum working voltage. This will always be found on "T.C.C." CONDENSERS.



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**BROADCAST RECORDS**

ONE of the best-known "spots of bother" which has been broadcast by Clapham and Dwyer is now available in record form on the Broadcast Ten, No. 645. This "spot" will be very familiar to many, but whether you have heard it or not you will probably like to have it among your records of favourite broadcast stars.

The Waikiki Serenaders provide *With My Guitar and You*, from the film "Swing High," and *The Kiss Waltz*, from "Dancing Sweeties," on 643; while those popular duettists, Mellow and Rich, on 642, entertain with *Swinging in a Hammock* and *I Remember You From Somewhere*.

*Let's All Have a Sing-Song*, by Bobby Comber, with Slippery Sam the Stoker, on 626, is an interesting record, and so is that by the two duettists just mentioned, featuring *Say a Little Prayer for Me and Down the Lane to Home Sweet Home*, on 627.

A different type of record is *Smilin' Thro' and Love's Old Sweet Song*, sung by Scout Teddy James, the boy soprano, with the organ at the City Temple (629); while we have the usual wealth of dance numbers, the best of which in our opinion is the disc containing *Great Day and Without a Song*, played by Hal Swain and his band, on 632.

**COLUMBIA**

Columbia have turned out a tremendous number of records during the last month, many of which are of the Christmas variety; but though that festival is now past, some of our readers will very likely want to get a few of the records we mention here.

One of the most popular is sure to be the descriptive sketch (broadcast during Christmas) by the Roosters Concert Party, entitled *Tommy's Christmas*, and recorded on DX137. This is in true Rooster style, and makes an interesting companion to their recent reunion record which we reviewed a short time ago. Layton and Johnstone, the American duettists, have made another of their delightful records, *Dancing With Tears in My Eyes*, and *Watching My Dreams Go By*, on DB283; while the former composition, coupled with *The Kiss Waltz*, is recorded by Albert Sandler and his Orchestra on DB320. Both of these are excellent discs.

Monologues are not always a success on the gramophone, but we do not think that there is anything wrong with two of the recent Columbia issues. We refer to that by Will Fyfe, the Scottish comedian, giving his description of *MacPherson's Wedding Breakfast* and *The Railway Guard*, on DX138, and more particularly to Stanley Holloway's humorous monologue concerning that well-known broadcast character, "Old Sam." On this record we have the delightful episode at Waterloo which was recently broadcast (*Pick Up Tha' Musket*), and on the reverse side *Halt! Who Goes There?* a further adventure of Sam, who finds himself on guard outside Buckingham Palace. This is DX168.

Among the more serious items we find a recording of a broadcast Epilogue by The Wireless Singers; the Scripture readings being undertaken by the Hon. David Tennant. This is recorded in the Central Hall, Westminster, on DB211. Muriel Brunskill, the well-known operatic contralto, sings *There is a Green Hill Far Away*, and the recitative and aria from "St. Paul," *The Lord is Mindful of His Own*, on DX150.

Tales of Hofmann Selections, by the Regal Cinema Orchestra, on DX164, and *The Blue Danube*, a vocal waltz, sung by the B.B.C. Wireless Chorus with Orchestra, on DB301, are well worth note. Concerning this latter record we should like to congratulate Messrs. Columbia for providing with each disc a printed slip giving the words of the waltz. This enables one to follow the singers with ease.

**DECCA RECORDS**

While Gracie Fields is busy recording for one of the large gramophone companies, and, in fact, we

have one of her records for review later on, her sister, Betty Fields, is busy with the Decca Company, and this month one of her records is released on F2024, *Dancing With the Devil and 'Fonso, My Hot Spanish Knight*. Betty seems to be trying to follow in her sister's footsteps, but somehow she just seems to miss it in this record: *Singing a Song to the Stars and I'm Learning a Lot from You*, played by Roy Fox and his band, on F2028, is a pleasing record, while the Three Ginx, singing *Liza Lee and My Baby Just Cares for Me*, on F2011, are worth hearing.

Carl Brisson gives us *Little White Lies and On the Sunny Side of the Street*, on F2006; while *Once in a While and Loving You*, on F1971, should be very popular. *Hunting Tigers Out in India* is a comedy number which has been made famous by Jack Payne, and Harry Tilsley, on Decca record F2005, gives it with great effect. The reverse side provides *Sophie on the Sola*, another humorous number.

**GOODSON RECORDS**

Another batch of these unique white flexible records have reached us, and of these we have picked out the following for inclusion in our monthly review: *Dreamy Carolina* and *The Water Mill*, by the Black Dominos, on No. 260.

*A brief selection from some of the records released during the month. They have been chosen because of their special value to the pick-up user.*

*Nobody Cares If I'm Blue and When You're Smiling*, on 249, by the Golden Gate Syncopators. *Cheer Up and Looking at You*, on 250; *My Future Just Passed and Waiting Through the Night*, on 251; and *You Brought a New Kind of Love to Me and Living in the Sunlight*, on 252. These are all extremely good and there is no doubt that the Goodson record is rapidly improving both in the bands which it is recording and in the actual quality of the recording itself.

**H.M.V.**

At the commencement of this section we should like to draw attention to a slight error which occurred last month regarding the record called *The Murder on the Portsmouth Road*. The number of this record should be C2044, instead of as stated last month.

Now for the records which have reached us since we last went to press. Of these the one which we like most of all from the point of view of excellence of recording is that of the Royal Opera Orchestra at Covent Garden, playing the *Overture from "Maritana"*, on C1927. This is an exceedingly good recording, and should be heard by all orchestra lovers.

Following this from the point of view of recording excellence, though it may not appeal to so many people, is the *Noel Fantasy*, from "A Carol Symphony," played by the same orchestra and conducted by the composer, Mr. Victor Hely Hutchinson. This is recorded on C1968, and from the point of view of the reproduction which can be got out of it it is a really remarkable record. The brass is wonderfully clear, and the whole recording is exceptionally clean.

Jack Hylton's *Memories of Sullivan* is an exceedingly fine record, and is a wonderfully good number. It has vocal refrains and, of course, Jack Hylton's Band is one of the best from a recording point of view. This is on C2073. It is crisp, and has a fair amount of brass, which is always a good test for a radio-gram outfit.

The excerpts from *The Maid of the Mountains*, on C2063, by the Light Opera Company, will appeal to a great number of people who remember that wonderful show, while the same company's recording of *Follow a Star*, also in "vocal-gem" form on C2057, is a very fine bit of work. It is one of the few records that we have heard recently in which the choral parts can be brought out at full strength without any blasting due to faults in the recording becoming evident. There is not the slightest suspicion of hardness or false timbre even when the chorus is "going all-out."

All these are 12-in. records: now for the tens. We must not forget Vladimir Horowitz, who provides us with pianoforte solos, *The Forgotten Waltz*, by Liszt, and *Capriccio in F minor*. This is on DA1140.

Another "DA" record (red label) is *Love Everlasting and Serenade*, from "The Student Prince," sung by Richard Crook, tenor. This is DA1142. Richard Crook seems to have rather a peculiar voice, and we are not sure whether we like quite like it in this particular type of number. We think he would probably be better in some operatic number, as his enunciation and production are both rather unsuited to this type of song.

Now we come to our old friend Gracie Fields giving us, as she so often does, one serious and one comedy number. The former, *I'll Be Good Because of You*, is rather unlike Gracie in parts, but it is always most artistically done, while the second one, *Over the Garden Wall*, is Gracie at her best—once more.

**PHONYCORD RECORDS**

These are flexible transparent records, of ranging hues of blue, red, green, etc. On test they give quite good results as long as played with the special angle needles. Ordinary needles scratch the surface badly. Items we tested include "King of Jazz" Selection, *Siciliana* ("Cavalleria Rusticana"), saxophone solos, and a vocal quartette, *Round the Corner*. But more of these records in the near future.

**PICCADILLY**

There are several interesting Piccadilly releases this month, not the least being the Viennese Orchestra recording of the *Pique Dame Overture*, on No. 623. Emile Charlier, playing the accordion, gives us *Return of Johnny March*, and the *Mirella Waltz* on 625. Lighter numbers include: *My Baby Just Cares for Me* (681), on the other side of which is *Don't Tell Her What's Happened to Me*; *I'm Swinging in a Hammock* and *The Girl Friend of a Boy Friend of Mine*, on No. 670. These numbers are both by the same band (Jock McDermott and his New Carlton Players), a combination which also provides us with *Let's Have a Sing-Song* and *Syncopated Melody*, the latter being a novelty waltz on No. 678.

**ZONOPHONE**

The Zonophone list is a very bright one and includes some excellent numbers. For instance, "The King of Jazz," selection by the London Orchestra, is a particularly lively recording. It includes six of the most delightful "hits." There are two Vocal Refrains, "Bench in the Park" and "Ragamuffin Romeo"—the last-mentioned, though rather less well-known, having a sweet lilting tune (5714).

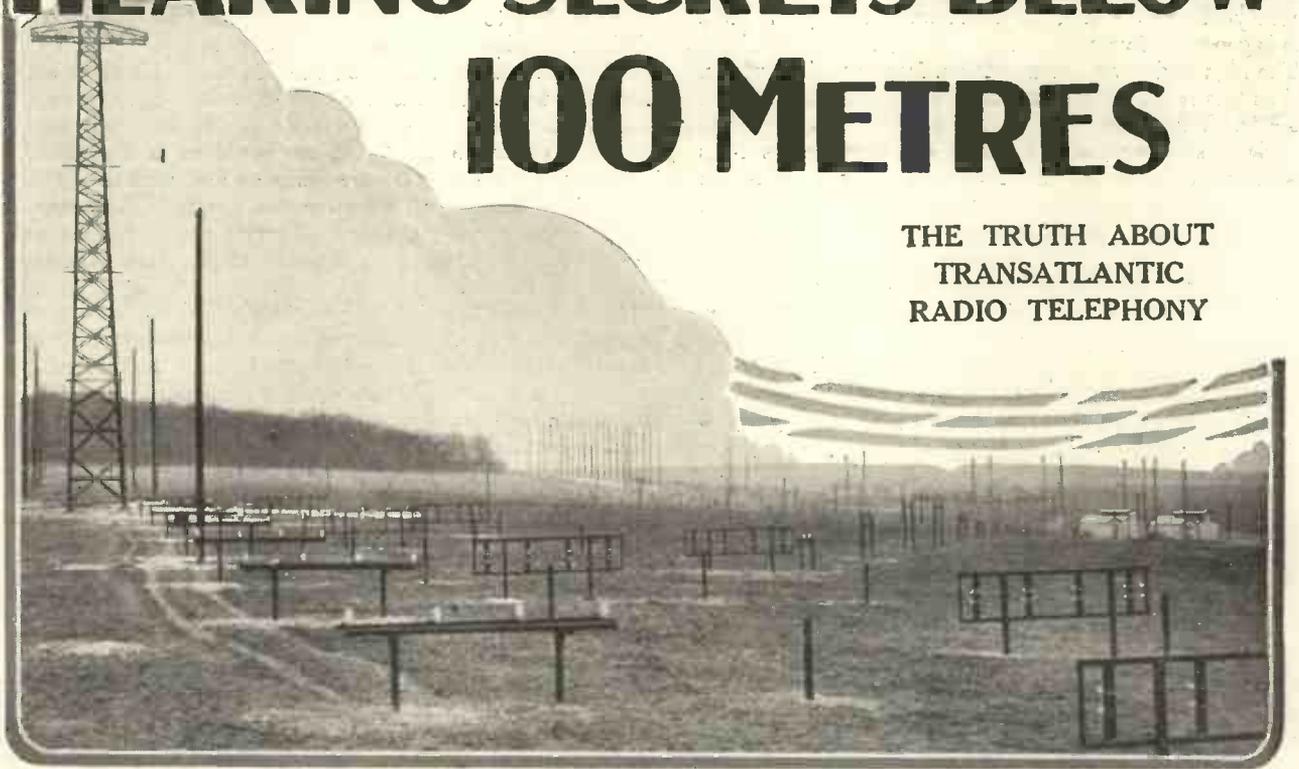
Miss Megan Thomas (soprano), on 5718, sings *She Wandered Down the Mountain Side* and *The Pipes of Pan*. Miss Thomas has a fine voice and sings these two favourites with a clarity which is remarkable. Both songs have been broadcast several times by this artiste from the London studio, where she is very well-known.

Maurice Elwin, the Zonophone Crooning Troubadour, as he is called, has recorded six titles recently. We have received a copy of the most outstanding of these three records; No. 5719, which has the "hit of the moment," *Dancing With Tears in My Eyes*, on one side, and *Like a Breath of Springtime*, from the film, "Hearts in Exile," on the other. The first number is in great demand, and this record by Zonophone should prove a best-seller.

Finally, we must mention *The White Blackbirds*, in four parts (5783 and 5784). This is a special series which Zonophone have found to be very popular, and which have been the cause of much gratifying comment. Two excellent records these, by the famous Blackpool "White Blackbirds," which you should not fail to buy for light entertainment!

# HEARING SECRETS BELOW 100 METRES

THE TRUTH ABOUT  
TRANSATLANTIC  
RADIO TELEPHONY



*A great deal has been said about the lack of secrecy of the wireless telephone to America, and here a Special Correspondent explains the system in a description of his visit to Baldock, the G.P.O. receiving station.*

I WONDER how many motorists on the Great North Road near Baldock, in Hertfordshire, have been puzzled by the masts of the "broadcasting station" there, and how many have known what they really are?

Baldock is not by any means a broadcasting station. It is the official receiving station of the G.P.O., and it is one more proof that the Post Office is not so Victorian in its habits as some would have us suppose.

As a matter of fact, the receiving gear here is very up to date, comprising some excellent short-wave apparatus, and on the short-wave side hangs a tale.

## Very Active on Sundays

If you tune-in to 16 or, sometimes, 32 metres, you will hear the automatic ripple of Rugby's code messages to America. Sometimes the American reply (and what short-wave enthusiasts dub the "Rocky Point stuff") is stronger than Rugby's signal, but that is only one of the vagaries of short-wave working.

All the time there is the monotonous ripple, which you can change from a "canary" to a low-pitched burble by a slight twist of the reaction knob.

And then there is a pause, a click, and the ripple changes to a carrier-wave. Resolve this, and with a little careful tuning you may hear voices—the voices of people talking on the wireless telephone across the Atlantic just as easily as they would from "Museum" to "Gerrard."

There isn't much secrecy about that, I'm afraid; but then, on the other hand, there are many difficulties in the way of receiving these short-wave transmissions.

That is where Baldock comes in. This receiving post,

corresponding to the B.B.C.'s Tatsfield, has to keep in constant touch with the American transmitters, and the engineers there have to be able to receive the telephony signals at sufficient strength to pass them on to the London telephone lines.

I was up at Baldock recently on a Sunday, for it is on Sundays that most of the transatlantic work is done between the big commercial houses on both sides of the "Herring-pond."

The aerials at Baldock are unique. A sort of Beverage arrangement is employed, and there must be miles of wires supported a few feet from the ground on T-pieces, looking like young telegraph poles just springing from the ground.

The aerials and the counterpoises are arranged directionally, and there are complicated arrangements in the receiving sets for balancing up the tuning circuits with the aerials. I daresay part of Baldock's success is due to its position, for it is on high ground in typical Hertfordshire open country.

## Plenty of Metal Screening

The receivers used resemble nothing more than the amplifiers used in talkie films, for all the valves not at the back of the panels are shielded by oval metal shields. Each section of the receivers—high frequency, intermediate, detector, and low frequency—is on a separate panel, and these panels can quickly be slipped into place in the metal frames in case of breakdown.

Back-of-panel appearance is very similar to any good receiver, and there is plenty of metal screening. Ordinary slow-motion dials are used for tuning, which show the

## Sending Pictures By Radio Across the Atlantic

stability of the circuits, for short-wave tuning on most sets is generally fairly tricky.

The high and low tension is taken from a mains supply, and as this is constant there are not many meters used in the sets. When the operators are at work, tuning-in the American stations and switching on the various lines (Baldock is connected by ordinary land-line to the London Trunk Telephone Exchange), they might for all the world be at the B.B.C. dramatic-control board.

### A Choice of Wave-Lengths

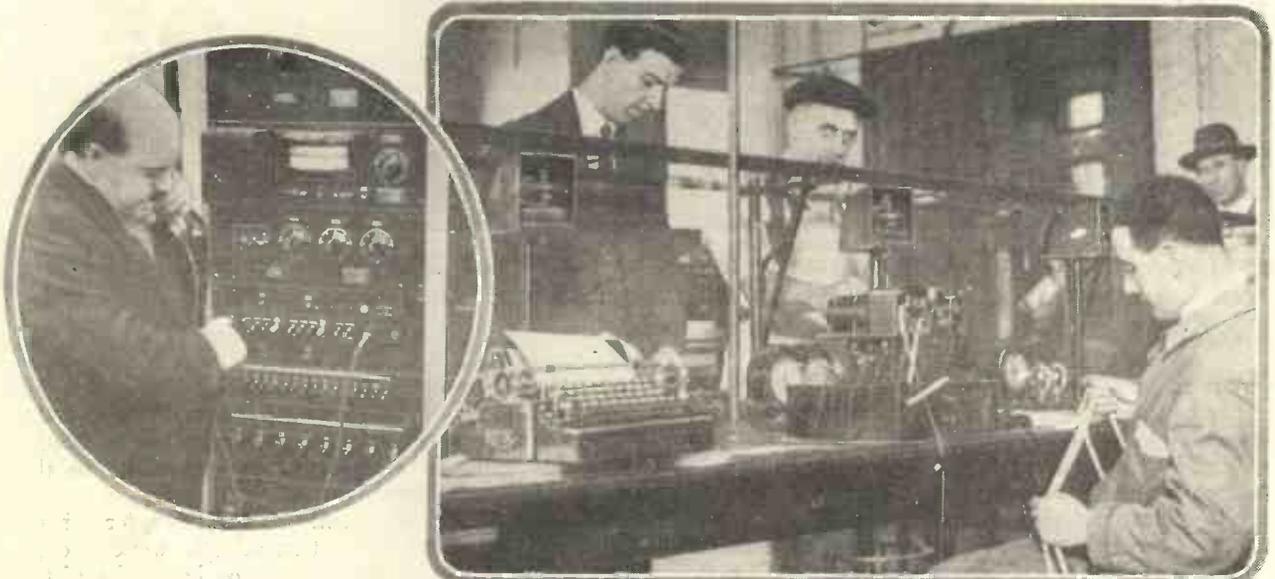
What happens when you lift the receiver in, say, London, ready to listen to an American correspondent (having first booked the call), is that the Trunk Exchange switches your 'phone receiver line on to Baldock, and your transmitter ('phone mouthpiece) to Rugby by a long, direct land-line.

According to the time of day and the reception conditions, Rugby puts your speech out on either the long or short waves. Similarly, on the American side there are separate transmitters and receivers, switched, as a rule, on to the New York Trunk lines. If Baldock were situated closer to Rugby there would be a danger of "jamming" between the transmission and reception.

Naturally, different wave-lengths are used for transmitting and receiving, and Baldock is not tied down to short-wave working, though most of its work is done below 100 metres.

I hear that the G.P.O. picture system, by means of which you can now send a picture by telegram to France and Germany (by land-line, of course, under the Channel), is shortly to be tested for radio working across the Atlantic, in which case Baldock will then become the receiving station for the pictures.

*"Hallo, London; Here is an American Call for You!"*



When a New York subscriber is "put through" to a British subscriber the two great telephone systems are directly coupled by the radio link.

**T**HE modern accumulator is a sturdy piece of apparatus, and it will stand quite a lot of misuse without complaining. But consistent maltreatment will have its effect in the end, in the shortening of the battery's life, and in gradually decreasing its reliability.

One of the most general forms of assault on its life is the over-discharging of the accumulator. Running it down too far is easily done, and at first seems to do no harm. But the harm is being done nevertheless, and in time such treatment will make itself felt.

How far should we discharge it, then? Till the set starts to give distortion of signals, or should we re-

### ASSAULTING THE BATTERY

How not to treat your accumulator.

charge it as soon as the voltage begins to drop off? The latter is the better method, for if we discharge too far, then, again, we shall shorten its life.

#### Checking the Volts

Also, we must not forget that a voltmeter applied either to a wet or to a dry battery is not a reliable test unless that battery has been in operation for about half an hour and is still working. I have seen an accumu-

lator which has been sulphated "up to the eyebrows" and not used for several weeks give a full 2 volts per cell for a fraction of a minute, but, of course, when put on load that voltage dropped almost immediately to zero.

Then what about the accumulator terminals? In what sort of condition are these? Are they covered with verdigris or are they nicely smeared with grease and kept thoroughly clean? I mention this point because I myself have recently been rather careless with an accumulator, and I have had a merry time cleaning up the terminals and cleaning the spade-ends of the wires from their green coating.

G. W. E.

# Not a moving coil, *but* — **the Dynamic 8**

*The Unit which triumphs in every test*

The Undy 8 pole *Dynamic* Loudspeaker Unit gives a volume and clarity of reproduction far beyond any other, yet working on a minimum of power is amazingly economical to run.

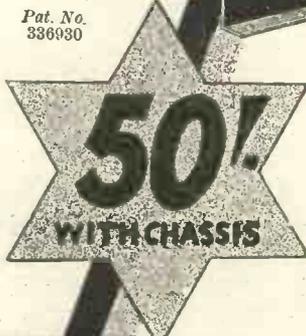
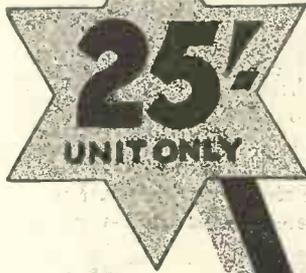
This extreme sensitiveness ensures the maximum result from every receiver, however small, and removes the necessity of high-power final-stage valves, with the consequent saving on power whether from batteries or mains.

Within the few months of its introduction the "Undy" has literally swept the country—pronounced popularity which proves its amazing efficiency.

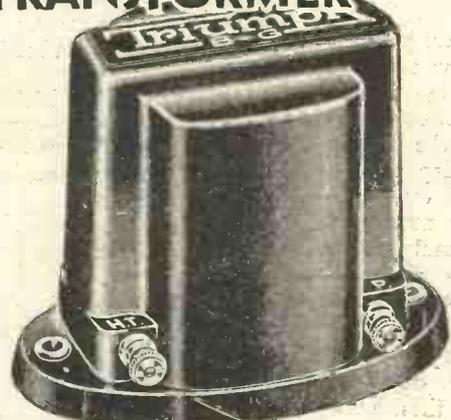
Hear the "Undy" at any radio store and realise its pronounced superiority.

Pat. No. 336930.

Pat. No. 336930



## THE SET DEPENDS UPON THE TRANSFORMER-



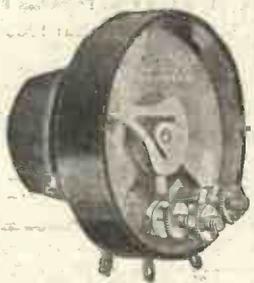
A marvel of production in L.F. Transformer design. The quality of material and workmanship guarantees results which might be envied by transformers costing three times as much.

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# NEW SHORT-WAVE CIRCUITS



By J. ENGLISH.

Here are some really novel ideas for short-wave receivers. No more need you worry about threshold howl, background noises and hand-capacity, those deadly enemies of successful reception on the ultra-high frequencies. The circuits are the result of a great deal of experiment, and have been thoroughly tested.

If you were asked to make a list of the essentials of an ideal short-wave receiver I have no doubt that you would start off with such things as high sensitivity with very smooth reaction control, easy tuning without hand-capacity, and a complete absence of threshold howl and background noise.

## Approaching the Ideal

We are getting much nearer to this ideal in modern designs, but many present-day short-wave outfits are lacking in one or other of these desirable features. In the majority of cases such deficiencies can be traced to the detector valve.

This needs to be a good deal more efficient, especially as regards reaction control, than in a normal receiver for broadcast reception. If you can make sure of a well-behaved detector, then much of your troubles in short-wave reception disappear entirely.

as the above requirements are concerned, it is decidedly more satisfactory than the conventional three-electrode detector.

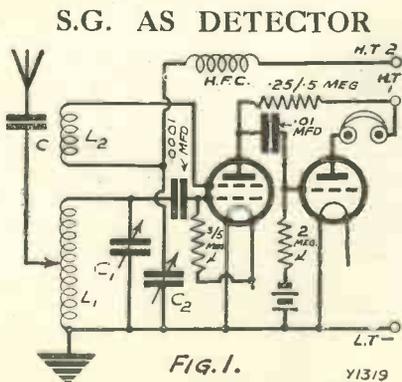
A prominent feature of the screen-grid detector is its sensitivity to weak signals, due to its high amplification factor. The corresponding high im-

"Even on wave-lengths round about 15 metres . . . reaction control was still delightfully smooth. Adjustment was by no means of hair-splitting delicacy."

pedance gives us no alternative but to use a resistance-capacity coupling if we are to obtain anything like a respectable proportion of this theoretical amplification with satisfactory quality.

As normally used, the mere presence of the R.C. coupling after the S.G. detector makes it well-nigh impossible to obtain proper reaction effects upon which so much of the success of a short-wave receiver depends.

However, we can get over this difficulty quite easily by making a radical change in the normal circuit, whereby we can secure adequate regeneration and an appreciable addition to the over-all sensitivity of the detector. The circuit of Fig. 1 is that of one of the special S.G. detectors which I have developed on these lines.



The use of S.G. valves enables a high degree of sensitivity to be obtained.

Recently I have been investigating the behaviour of the screen-grid valve as a detector for short-wave work, and some very interesting features have come to light. During the course of this work a special detector scheme has been evolved, and, as far

## Screen-Grid Reaction

From the diagram you will at once notice that reaction is obtained from the screen electrode. If any of the conventional reaction schemes is connected into this circuit and the proper voltage applied to the screen, smooth and ample reaction is obtained, more or less independent of anode voltage and coupling resistance.

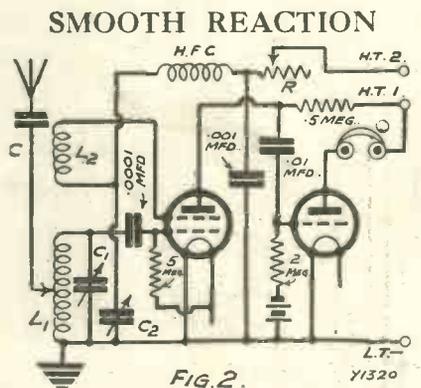
The adjustment of screen potential is somewhat critical within certain

limits, as will be described farther on. Of the two methods of rectification the grid method is naturally the more sensitive, and the best results are obtained with a rather higher value of leak resistance than normal; values between 3 and 5 megohms are recommended here.

Perhaps the outstanding feature of this circuit is the perfect control of reaction. You will at once appreciate that this is the chief recommendation of the S.G. detector for short-wave reception.

## Oscillates Freely

Moreover, in my first tests, no difficulty was experienced in getting the receiver to oscillate freely on very short wave-lengths; actually it proved to be a better oscillator than the ordinary valve. Starting somewhere about 100 metres, the wave-length range was gradually reduced



The resistance R in the H.T.2 lead provides perfect H.T. control—a strong point in short-wave reception.

by substituting smaller coil units; the detector, when required, oscillating merrily down to just below 14 metres.

This was the lower limit of a recent series of experiments, but with extra care in design and layout there is no doubt that the S.G. detector would regenerate satisfactorily on even

## Perfect Reaction Provides Perfect Reception

shorter wave-lengths. Herein lies an interesting field of experiment for short-wave enthusiasts.

Even on wave-lengths round about 15 metres, where H.F. currents have the incredible frequency of 20 million per second, reaction control was still delightfully smooth. Adjustment was by no means of hair-splitting delicacy provided small-capacity tuning condensers were used.

### No Threshold Howl

On all wave-lengths the receiver was entirely free from that bugbear of short-wave reception—threshold howl, while background noise was almost imperceptible. At times it was difficult to tell whether the receiver was oscillating or not other than by tuning in a carrier-wave.

The combination of these two features makes all the difference to the reception of weak stations, as you well know if you have tried to resolve some faint, far-away whistle with a persistent hissing in the background and an unstable howl just on the threshold of oscillation.

Although this S.G. detector provides smooth reaction control independent of the usual critical adjustments of anode voltage and grid bias, the screen is somewhat particular about

intensity as this screen voltage is raised. On the ultra-short wave-bands it is often necessary to increase screen volts slightly in order to obtain sufficient regeneration.

The easiest and most satisfactory way of arriving at this adjustment is to insert a variable resistance, with a maximum of 100,000 ohms or more, in the screen lead, as in Fig. 2. The

### POINTS TO REMEMBER

It is false economy to join a new H.T. battery in series with an old one.

More than one-third of the complaints of oscillation received by the B.B.C. are proved to be due to faults within the complainant's own receiver.

If you allow your set to

oscillate you are running the risk of having your licence cancelled by the Postmaster-General.

\* \* \*

If you want really good loud-speaker reception you cannot "get away" with less than 100 or 120 volts H.T. on the last valve.

The minimum anode voltage at H.T.1 was also found to be about 90, while potentials higher than 120 volts do not produce a proportionate increase in volume to justify the cost of the extra volts. If you use a dry battery for H.T. supply, a block-unit of 108 volts is ample for general use.

### Very Economical

Incidentally, the S.G. detector is remarkably economical, the total anode and screen currents with most

potential of H.T.2 is then roughly set at, say, 30 volts, and with the reaction control at zero the resistance R is gradually decreased from maximum.

As soon as you hear a sharp thud in the 'phones, stop rotating the knob of the resistance. The extra-sensitive condition is just before this "thud" is heard. Accordingly, the resistance of R is slightly increased, causing another "plop" to be heard.

You will then find that reaction control is again perfectly smooth with a marked increase in sensitivity. When you have tuned in a rather weak station it is possible to increase signal strength by cautiously decreasing the resistance of R, thus getting as near as possible to the "pre-thud" condition.

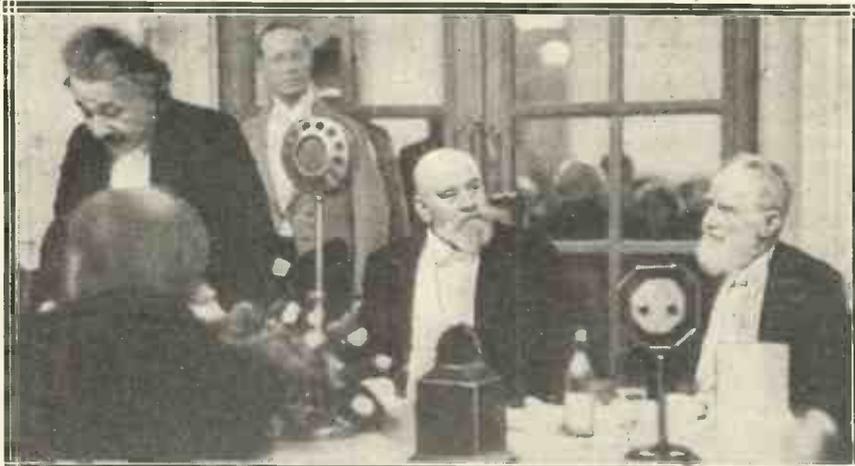
### Easy Control of H.T.

You may be thinking that this adjustment of screen voltage is complicated, but in practice it is a very easy one to carry out, and quite permanent when once made. In the course of investigating this effect it was noticed that the best results were obtained with an anode resistance of .5 megohm.

With a resistance of .25 megohm the effect was less marked, but you may find it necessary to use this value on wave-lengths below 20 metres in order to obtain maximum regeneration. Poor results were obtained with values of anode resistance greater than .5 megohm unless excessive anode voltages were used.

If a variable resistance for the adjustment of screen volts is not available, then you have to adopt the less easy "hit and miss" method.

## BROADCAST THROUGHOUT THE WORLD



Prof. Einstein, the great physicist, speaking at a dinner given in his honour. The speeches were relayed by 5 S W on short waves to all corners of the globe.

its potential. This must lie within a certain range of voltages for proper reaction control and for maximum rectification efficiency.

For example, with the Cossor S.G.220, the minimum screen voltage is approximately 15 volts for 108 volts at H.T.1, reaction increasing in

types being less than 1 milliamp, under the conditions of Fig. 1.

When investigating the relationship between anode and screen volts, I found that it was possible to obtain a particularly sensitive and stable condition by a little juggling with the screen potential.

# INTERFERENCE



*This is the first of an unusual series of narratives that we feel sure will arouse considerable interest. They deal with the experiences of a radio consulting engineer, and, of course, all the characters are entirely fictitious. Nevertheless, the stories are founded on fact to a large extent, and none of the situations lies outside the bounds of strict possibility.*

**T**HERE are not many fully qualified consulting radio engineers. Of course, there are hordes of so-called wireless experts who, for comparatively small fees, are prepared to do their best with faulty receivers. But John Dare is in an entirely different category. It is no good trying to engage his services to counter the ordinary trials and troubles that crop up in radio reception. In any case, the smallest fee that would be likely to interest him would buy the best new set on the market.

John Dare has an office, and a palatial office at that, in the very best part of Regent Street, and most of his work is concerned with the transmitting side of radio. Foreign Governments employ him to give impartial criticisms of the plans of super-power broadcasting stations. Our own Admiralty and Army authorities frequently refer to him before embarking on new radio projects. He is also in great demand by leaders of industry when complicated patent situations arise.

### Dare Has a Visitor

And as can well be imagined, his experiences are at times of the most interesting character, although, unfortunately, many will never be permanently recorded owing to the strict bonds of secrecy under which he generally works.

But it is possible to chronicle at least a few of his queerest "cases." For instance, there is no reason at all why you should not hear about the affair of the "Death Clicks." John Dare will have no objection, while Slewson is not the real name of the fussy little man that presented

himself at Dare's office one autumn afternoon.

You might have passed a hundred Slewsons in Regent Street without taking any notice of them. It would be difficult to find a more ordinary-looking little fellow, with his loose-fitting grey overcoat, grey trilby hat, rather youthful face, and still more youthful moustache. And yet Slewson is the general manager of one of the biggest stockbroking concerns in the City of London. If he hadn't been a financial notability he wouldn't have reached Dare's private office quite so readily. As it was, the Radio Consultant received him somewhat coldly, for Dare is able to choose his own clientele.

### A Doubtful Undertaking

"So you financed Scientific Radio Productions?" said Dare, looking with some distaste at the back of Slewson's visiting card.

"Yes—er, at least, my firm arranged the underwriting," assented Slewson.

"And very near the edge it was, too. The company is about to be wound up, isn't it? Afraid I won't care to have anything to do with that."

"I don't want you to, Mister Dare. I have come here to consult you in a purely private capacity. I only put that on my card so that you should know that I have had some slight, if not quite successful, contact with the radio industry."

### Haunted by Radio

"Well," said Dare carefully, "I am pretty busy just now."

"I'll pay you any fee—"

"Mister Slewson; my fees are based on the work I have to do. If your commission interests me, then I will undertake it."

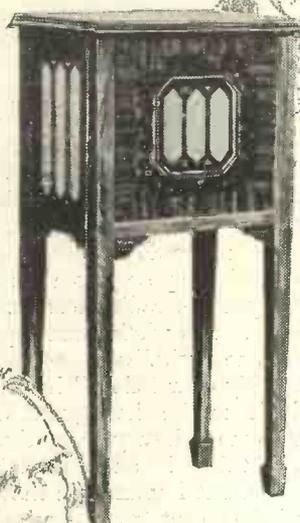
Dare arose from his swivel chair, threaded his way around his large mahogany desk and placed a chair for his prospective client, who sank into this with an audible sigh of relief. Truth to tell, Dare was getting interested in the little man, whom he

### SUDDENLY THE MUSIC STOPPED !



Every night for about a week he heard those midnight clicks on the Slewson radio . . .

# REPRODUCTION THAT IS ALMOST RE- CREATION



Beethoven's majestic overtures, Wagner's mighty operas, the delightful melodies of Schubert, or the swinging waltzes of Strauss—all are interpreted by the Ferranti speaker with a realism that re-creates the work of the master mind. The rendering of speech is crisp and agreeably life-like in clarity.

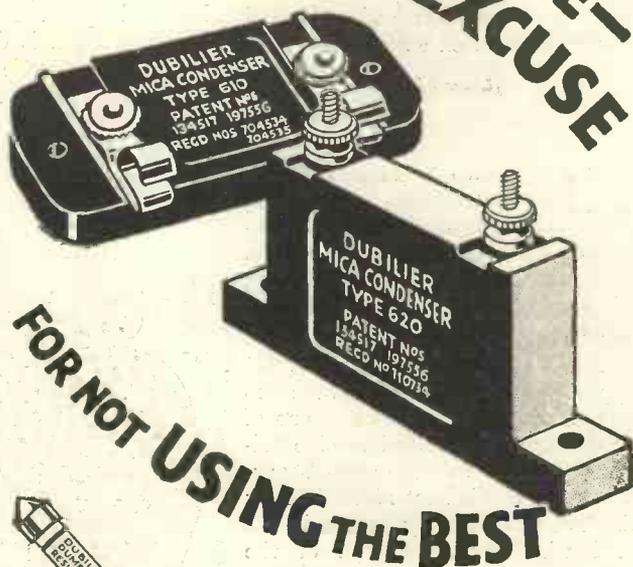
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MOVING COIL MAGNO DYNAMIC SPEAKER

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# NOW THAT DUBILIER CONDENSERS HAVE BEEN REDUCED IN PRICE— THERE'S NO EXCUSE



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FROM  
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Increased demand has made it possible to reduce the cost of producing the world-famed Dubilier Condensers and Grid Leaks, an advantage which we are handing on to you.

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'00005 to '0009	- - -	each	1/8
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'006	- - -	"	2/6
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# DUBILIER

## MICA CONDENSERS

Dubilier Condenser Co. (1925) Ltd.  
Ducon Works, Victoria Road, North Acton, London, W.3

.....  
**“After That There is Nothing but Silence . . . . .”**  
 .....

could see was in a deplorably nervous condition. He offered him a cigar, which was refused, and himself took a less dignified seat on a corner of the desk.

“There may be nothing at all in it,” commenced Slewson, “and it is in the hope that you can reassure me on that point that I have come along to consult you. Nevertheless, I am almost convinced that I am being haunted by radio—” He paused to judge the effect of this announcement. Dare smiled sympathetically. He had heard of many such cases in the past.

**“He Shot Himself”**

“It is quite a common hallucination, Mister Slewson,” he suggested.

“Yes, I know,” responded the stockbroker impatiently, “the form of neurosis you have in mind probably is, but there is much more in my case than mere neurosis—I have checked up the effects with independent observers.

“But I will tell you exactly what happens—and what happened to start it all. Some few months ago one of our directors committed suicide following the failure of the great Trans-Silesian loan. He shot himself. Now this man was the only person in the world who had knowledge of the whereabouts of certain papers relative to that unhappy business.

“Evidently realising it at the moment of death, he tried to get through on the telephone to give me that important information—information upon which depended, and still depends, the fortunes of many investors who would undoubtedly get back much of their money if we could only locate those documents.

**A Spirit Message?**

“I can only tell you that the papers are provisional banking contracts drawn up by certain independent financiers who will benefit considerably by this loss. But poor Rowley only managed to get his connection through to my house before he died. When I reached the ‘phone and placed the earpiece to my ear, all I heard was a series of three clicks—made by Rowley as he impatiently chattered the ‘phone hook in an endeavour to hasten my attention.

“After that there was nothing but silence! The time was exactly twelve midnight—the hall clock had just struck. Ever since”—Slewson paused dramatically, and Dare proved his

interest by signifying him to proceed. “Ever since,” continued Slewson, his face nervously twitching, “I regularly hear those three clicks on my wireless set at twelve midnight. It happens every night. The dance music from the London station ceases, Big Ben strikes twelve, and then, as clearly as I heard them on the original occasion, and with the certainty of the time signal itself, those three clicks arrive.

“You might say, why do I listen? I can’t help it! I am drawn to that radio as a pin is drawn to a strong magnet. My wife has heard these clicks, and so have others, although

sorts of things of quite a physical character. It is not difficult to imagine those ‘strays’ taking definite form; wireless operators often read ‘Morse’ from nothing but atmospheric disturbances.”

Mr. Slewson negated this with a tired wave of the hand, and shrank the deeper into his chair. He adopted the appearance of a man whose last chance of avoiding some great catastrophe had eluded him. Dare, at heart a very sympathetic man, despite his rather aggressive cast of features, walked over and laid a hand on the stockbroker’s shoulder.

**Late That Night**

“Don’t let your nerves get you down,” he advised kindly. “I’ll come along and listen to those clicks myself this evening—if you care to invite me to do so.”

Slewson sprang from his chair and gripped the radio consultant by the hand. His whole frame appeared to become revitalised.

“My dear fellow,” he cried, “you don’t realise how great a relief it is to me to hear you say that. Maybe you think it an absolutely absurd affair, but I assure you that following all the recent tragic depression in the City it has worried me until I have at times thought that I would go mad. To think of poor Rowley trying—”

“Forget it,” interposed Dare decisively. “Two hundred and ten Marlboro’ Square, isn’t it? Right, I’ll be there at half-past eleven! No, can’t dine with you, thanks. I have another appointment earlier on.”

\* \* \*

“In about one minute’s time London will shut down and then there will be silence—except for those three clicks,” said Slewson, wiping his forehead nervously and picking up his glass of whisky and soda. “Have another—”

**Three Mysterious Clicks**

“No, thanks,” said Dare shortly. The radio engineer was perched on the edge of a chair right in front of Slewson’s four-valve all-mains receiver. He was listening very critically to the reception, and his thoughts were not particularly complimentary to the makers of the set. He thought there was far too much hum, and that the quality of reproduction was of a miserably low standard.

(Continued on page 106.)

**AT MIDNIGHT!**



“Both were intently gazing up at the moon-lit exterior of the building.”

I haven’t told them that it is poor Rowley trying to use the radio ether as a means of communication from the other world.”

“You don’t know that it is,” interrupted Dare sharply. “There is always a certain amount of noise on a radio set. You don’t hear it when the broadcasting is in progress, for this drowns it. But when the station ‘goes off air,’ as we say, there are always odd little clicks and chirps to be heard, and these may be due to all

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Get this coil at your usual radio dealer. If you have any difficulty please write to us direct, giving, if possible, your dealer's name and address.

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**12/6**

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No more trouble with wavelengths! These coils, perfectly manufactured and laboratory tested on the wavemeter and inductance bridge, ensure best results and save the trouble of winding and assembly. Remember, the maker's name on this coil is your surest guarantee of highest efficiency.

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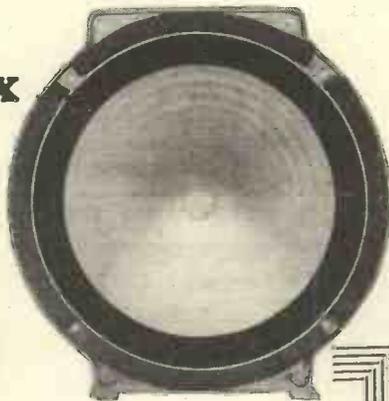


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**A Moving  
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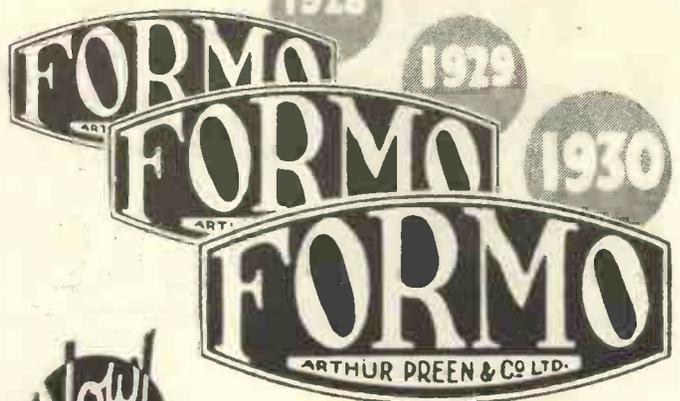
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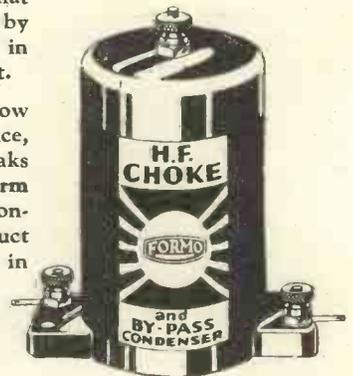
**Now! REPEAT SENSATIONAL  
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SUPER PERFORMANCE**

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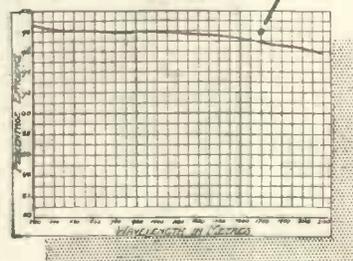
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High inductance value, low self capacity, low resistance, free from resonance, peaks and blind spots. Uniform efficiency and in fact, a wonderful dual purpose product that will improve any set in which it is installed.



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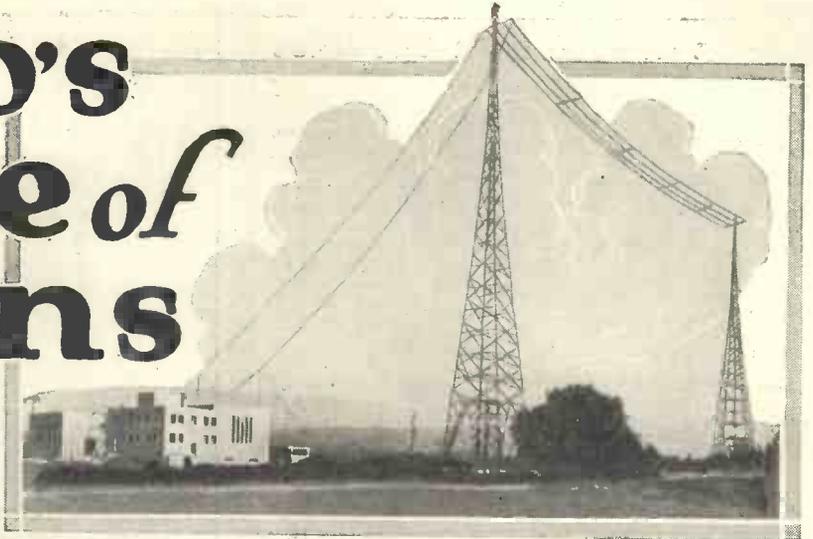
**SEE THESE  
FORMO  
Displays**



*The Sign of the Best Dealers Everywhere*

# Radio's League of Nations

*Our special representative records his impressions of the 1930 meeting of the International Broadcasters Union at Budapest.*



**P**OTTERING round the ether, as all listeners do, some years ago I was taken with the idea of going and visiting those places whence came the sounds in my loud speaker. During the past six years I have visited many broadcasting stations, and the more important ones over and over again.

But I only knew all these broadcasters in their own homes, behind rows of doors, and always with a very large desk between myself and the man I was seeing. The atmosphere was wrong somehow. Each man represented a broadcasting organisation, and was conscious of the fact that not he, but a company, was being interviewed, with the result that only fragments of his personality got across the desk into my notebook.

I at last decided to try and get to know broadcasters from a different angle. To have a look at them when not at home. The Union Internationale de Radiodiffusion periodically has re-unions, once a year at Lausanne, and usually once a year somewhere else.

## *Off to Budapest*

Now, at Lausanne I surmised that they would probably take on a special internationally official air, but when visiting one of Europe's capitals at the second yearly meeting there surely would be the completely unfamiliar surroundings, and these would let me get a look at the human side of many of those who give us our daily programmes.

As it turned out, Budapest was the ideal place to get an impression of the atmosphere in which the Broadcasting Union's meetings take place. So I packed my bags and went off to Radio's League of Nations.

Incidentally, the only similarity

between the League of Nations and the U.I.R., at least to my mind, is the fact that both have their permanent offices at Geneva, and that both are international organisations. The U.I.R. in all other respects widely differs from the League.

## *That Fellow Feeling*

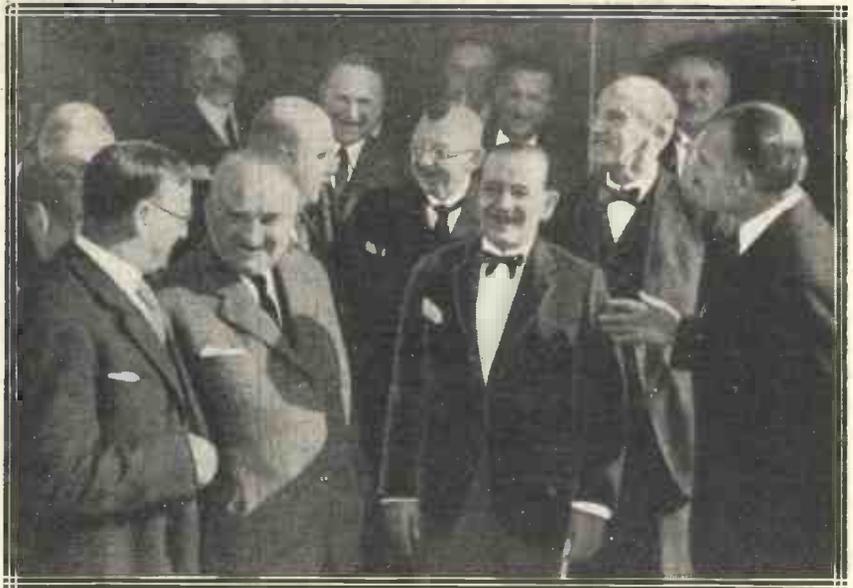
At the League diplomats meet and talk to each other, each word probably hiding another—as is the way in diplomacy. At the Union we have a lot of men bound together by one common aim; and last, but not least, bound together by a common understanding of a technical problem. And we all know that if there is anything that will keep people together, then it is the joint pursuit of a technical hobby.

Broadcasting is rather more than a hobby to broadcasters now, but it seems to me that all the broadcasting engineers I have met have made their hobby their work, or the other way about. They all have common difficulties, common troubles, common hopes, and they all speak more or less the same language, as Mr. Braillard laughingly pointed out when we were standing up on the Fischerbastei one evening looking down at the sparkling lights of Budapest.

## *On Common Ground*

And as for the others (not engineers)—well, I think that one listener is much the same as another as far as fundamentals go, and so their problems are much the same, too. And it must be largely owing to this

## ARRANGING EUROPE'S ETHER



Some of the delegates to the convention. On the left, Dr. Geogewitsch (Belgrade) is talking to Dr. Czeija (Vienna). A. R. Burrows, Ministeriabratt Giesecke (Berlin); Generaldi Szöts (Hungary), Admiral Carpendale (Britain) and Dr. Sourek (Prague) are all in the picture.

**“Spotting Old Friends was Quite an Amusing Job”**

common ground that the Union is what it is to-day.

**Jolly Family Spirit**

I remarked on the jolly family spirit which seemed to crop up at every moment all of them were together. Mr. Burrows was still the jolly Uncle Arthur, and always seems to have one broad smile for all and sundry, and I quite believe it when he says: “We all may have been at loggerheads over some point or other before the meeting, but the moment we are all together, and the moment we see each other and talk it over, general understanding of the other man’s point of view seems to come automatically, and some solution is found

gradually and was hardly noticeable to themselves.

Spotting old friends was quite an amusing job for me. And in nearly all the cases I was struck with the difference that the air of Budapest seemed to have wrought. A man I remember visiting once or twice in his office in his own country, who to me had always seemed terribly pre-occupied with weighty matters and who had given me some of the heaviest sentences and thoughts to digest that I have ever come upon, seemed completely transformed.

He was smiling, enjoying the air, and talking to some body who by all political rights ought to have been his bitterest enemy across the frontier. Here and

were always there, always seeing that everybody was getting the most out of his visit to Budapest, Hungary, and seeing that work was evenly balanced with play.

On the first night of the conference the Hungarian broadcasting company gave a welcome dinner at one of the beautiful hotels on the Danube. I mention this one function because it happened to be here that I learnt something of real Hungarian hospitality, of the family re-union spirit of the Union Internationale de Radio-diffusion and of the oldest members.

**P.P.E’s. Busman’s Holiday!**

Under the influence of wonderful gipsy music I saw Capt. Eckersley, still a member of the Union’s technical committee, forget Prague plans and such-like and interest himself in the mathematical foundation of that famous Hungarian dance the Czardas.

Later I discovered that P.P. had all mapped out in his head the exact formula as to the frequency of the Primas’s violin strings. I think the broadcasters really never get quite away from the day’s work, but they certainly are human, and personally—oh, terrible thought!—I am sure that they would all grumble at the programmes the same as we do if they were just mere listeners.

**SOME WELL-EARNED RELAXATION**



Mr. A. R. Burrows (one-time “Uncle Arthur” of 2 L O) and his staff examine the stall of a native vendor of sweetmeats.

which before meeting seemed to be out of the question.”

I do not think that any member of the Union regularly coming to the meetings is himself aware of the great resemblance these meetings bear to the meetings of a scattered and very large family after a long parting. I asked several members myself, and they told me that it certainly might strike me, but that it all just grew up

there I heard wave-lengths discussed, radio drama, international programmes. Seemingly what hadn’t been discussed at meetings was taken up outside, over the dinner table, at lunch or at some famous sight of Budapest.

And let us not forget the hosts. The Director-General of the Hungarian broadcasting company, Szöts, and his administrative director, Dr. Havel,

**PICK-UP POINTERS**

RADIO-GRAM enthusiasts who value their records should on no account use rusty needles for these.

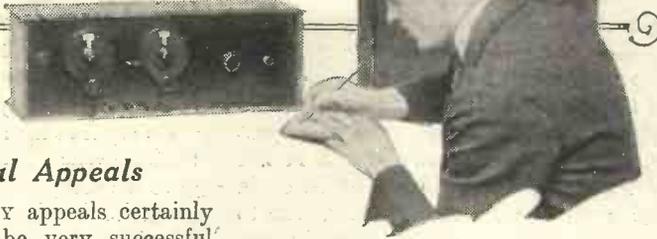
Do not use extra-loud-tone needles with your pick-up if the medium tone give adequate volume, as the “extra loud” needle tends to damage the record on heavy passages.

If you get distortion or harshness when using a gramophone pick-up, but not on radio, the probability is that the latter is overloading your set.

At one time gramophone pick-ups were usually provided with an adjustment, but nowadays they are mostly preadjusted, and should not be tampered with.



# RADIO NOTES and NEWS of the MONTH



## Successful Appeals

**B**.B.C. CHARITY appeals certainly seem to be very successful judging by the following results:

July 13.—St. Martin's Summer Holiday Fund, by the Rev. Pat McCormick, £3,600.

July 20.—St. Francis Leper Guild, by Major Raphael Jackson, £1,357.

July 27.—Y.M.C.A., by Col. Sir A. Henry McMahon, £569 1s. 4d.

Aug. 3.—Central Council for the care of Cripples, by Sir Robert Jones, £531.

Aug. 17.—Lady Minto's Indian Nursing Association, by Mary Countess of Minto, £790.

Under a scheme of lump contributions the B.B.C. has raised more than £1,000, so that it is able to distribute a sum of £20 to the main appeal of the week.

## Tell-Tale Tick-Tocks

By the time this issue is on sale listeners will probably have had an opportunity of forming an opinion about the B.B.C.'s tick-tock signal during the unannounced intervals in the programmes.

This is a Continental idea which the B.B.C. has decided to adopt, as it is a clearly recognisable automatic signal which fills up the blank spaces in the programmes and, at the same time, lets listeners know that an interval is in progress.

## Opera Scheme Criticism

According to an interview which was published in a newspaper a few days ago about the Grand Opera

scheme, Mrs. Philip Snowden, the wife of the Chancellor of the Exchequer, and a Governor of the B.B.C., expresses the view that the matter has been badly handled, and that it should have been fully explained to the press before an announcement was made in Parliament.

Many readers will no doubt agree that this would have been the best course, for the Opera scheme has been sadly misrepresented in many sections of the press, and even now there are thousands of listeners who are under the impression that the taxpayers are going to pay for the proposed Opera scheme; whereas, as a matter of fact, the money will come entirely from the Treasury "rake off" fund from wireless licences.

## "Badly Handled"

"I see now," said Mrs. Snowden, "that the whole matter was badly handled. As it was, the B.B.C. was driven to issue a statement which did not adequately explain the whole matter. I can assure you that the whole matter is entirely above board."

## What Listeners Wish

Incidentally, it was pointed out in the press the other day, that if the

(Continued on page 96.)



**H.F. CHKOE**

Specified for "Triple Two" Each **7/6**



600 ohms, 1,000 ohms, 10,000 ohms, 15,000 ohms, 25,000 ohms, and up to 50,000 ohms each 1/6; 80,000 to 100,000 ohms, each 2/-; 150,000 ohms 2/6

## SPAGHETTI WIRE-WOUND RESISTANCES

Specified for "M.W." Four, "Triple Two," Dual-Range H.F. Unit, and many other circuits.

# Build the "M.W." FOUR

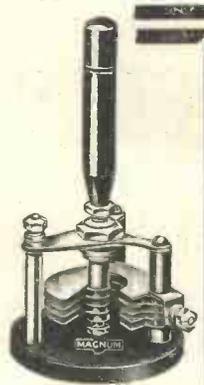
	£	s.	d.		£	s.	d.
1 Oak Cabinet, 21 x 7 in., with baseboard	1	8	0	1 Magnum L.T. Switch	1	3	
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2 Magnum '01 Fixed Condensers	5	0		1 Varley Nicore II L.F. Transformer	15	0	
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2 Magnum '001 Fixed Condensers	3	0		3 Lissen Vernier Dials	10	6	
1 Magnum '0003 Fixed Condenser	1	6		2 Magnum Standard Screens, 10 x 6 in.	4	0	
2 Dubilier 1-mfd. Condensers	5	0		10 Belling-Lee Terminals as specified	3	9	
2 Magnum 600-ohm Resistances	3	0		1 Terminal Strip 7 x 2 in., ready drilled	10		
1 Magnum 25,000-ohm Spaghetti Resistance	1	6		1 Terminal Strip 5 x 2 in., ready drilled	8		
1 Magnum 15,000-ohm Spaghetti Resistance	1	6		1 Sheet Copper, 21 x 10 in.	2	6	
1 Lissen 2-meg. Leak and Holder	1	6		2 G.B. Plugs	1	4	
1 Lissen Filament Rheostat (state voltage of valves)	2	6		Wire, Screws, Flex, etc.	1	3	
				<b>Total</b>	<b>£9</b>	<b>16</b>	<b>0</b>

Any of the above parts supplied separately if required. £2 19 0  
1 Set of 4 Valves as specified

The "M.W." Four as above, ready wired and tested, including Coils, Valves and Cabinet, Royalty paid **£14 15 0**

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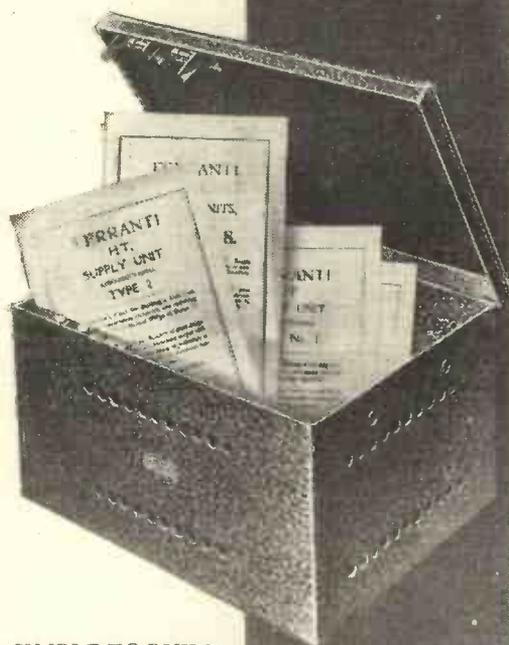
"MAGNUM" HOUSE,

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No set can work well unless it is supplied with adequate power. This means not only sufficient H.T. to provide for the necessary grid swing, but an ample supply of current. No circuit has a fair chance if the voltage falls and the current fails. Give your set adequate power and you will be astounded at the difference, not only in its "punch," but in its reproduction. If you have electricity in your home the problem has a ready solution. FERRANTI have available charts showing the construction of H.T. Supply units, from 20 milliamps, 120 volts to 100 milliamps, 200 volts output; there is also a unit for D.C. Mains, output 100 milliamps, 200 volts.

*Ask your dealer, or write to us giving particulars of your requirements.*



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## DON'T MISS THE FEBRUARY 'M.W.'

GREATLY ENLARGED

THREE SPECIAL SUPPLEMENTS!

ANOTHER BOOK FREE!

ON SALE JANUARY 31st.

PRICE, ONE SHILLING AND SIXPENCE

**RADIO NOTES AND NEWS OF THE MONTH**  
—continued from page 94

Government, instead of subsidising Grand Opera with part of the money filched from B.B.C. licence funds, would use it to reduce licences, the reduction would only amount to 1½d. per listener per year.

In the House of Commons the other day it was stated that listeners would rather have the opportunity of hearing Grand Opera than have their licences reduced by 1½d. a year. This is true, but it is also true that listeners would rather have *all* the Treasury money sent back to the B.B.C. for expenditure on better programmes.

**Who is A. J. Alan?**

Listeners have, no doubt, often wondered who A. J. Alan is. Of course, this is not his real name; it is a nom-de-plume adopted by the gentleman who is such a successful and thrilling broadcaster.

Mr. Alan is in actual life a very highly placed Civil Servant. We are under a pledge not to reveal his real

name, but if you walk along Whitehall any night between 6 and 7 o'clock, it's on the cards that you will pass A. J. Alan.

**Gigantic German Listeners' List**

Broadcasting in Germany seems to be growing and growing, as it is over here. It was calculated that on October 10th there were 3,242,000 subscribers in Germany. The revenue of the G.B.C. amounted to 88 million marks, i.e. £4,400,000.

**NEXT MONTH**

The February issue of "M.W." will be a **SPECIAL ENLARGED NUMBER.**

There is sure to be a run on it, so **ORDER YOUR COPY NOW.**

Out Jan. 31st. Price 1/6

German listeners pay a higher licence fee than we do. It comes to about 24 marks annually.

**Mr. Ford Again**

Mr. Robert Moffatt Ford, who achieved some publicity in 1924 when he challenged the Postmaster-General

to proceed against him for refusing to take out a licence, appeared in Court the other day for an interim injunction to restrain the Postmaster-General from handing over to the B.B.C. the sum of £17,500 annually, and, in particular, £5,000 on account forthwith to maintain performances of Grand Opera.

The Judge asked Mr. Ford if he had any evidence that the Postmaster-General intended to hand over £5,000 forthwith, and Mr. Ford quoted from the Parliamentary Hansard report. He said the money was taxation money paid into the Exchequer.

**A "Pirate" Judge?**

During the course of the evidence, Mr. Justice Bennett said:

"I have listened, but I have not got a licence. Am I liable to be sent to prison?"

"I do not know what would happen to you," was the reply.

Mr. Justice Bennett: "If you are right, I should think a great many people will be spending Christmas in prison."

Mr. Ford: "You are liable to that if you listen to a loud speaker in the street."

(Continued on page 98.)

**REALISTIC REPRODUCTION!**

Listen to the sparkling tone and wonderful power of a Telsen-equipped set! Reproduction is REAL—absolutely true-to-life!

Get the last ounce of power and purity from your radio by fitting Telsen Components to your receiver—they have been designed by master craftsmen with master minds in radio component construction!



**TELSEN H.F. CHOKE.** Designed to cover the whole wave-band range, from 18 to 4,000 metres. Extremely low self-capacity. Impregnated in Genuine Bakelite. Inductance 150,000 microhenries, resistance 400 ohms. Price 2/6 each.



**TELSEN FOUR-PIN VALVE HOLDER.** Price 1/- each.



**TELSEN FIXED (MICA) CONDENSERS.** Shrouded in Genuine Bakelite, made in capacities up to .002 mfd. Pro. Pat. No. 20287/30. .0003 supplied complete with patent Grid Leak Clips to facilitate series or parallel connection. Can be mounted upright or flat. Tested on 500 volts. Price 1/- each.

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



**TELSEN FIVE-PIN VALVE HOLDER.** Price 1/3 each.



Adv. of Telsen Electric Co., Ltd., Birmingham.

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### Six-Sixty Valves

(A.C. or D.C.) are standard replacements in any set and unsurpassed for all-round efficiency.

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*Coltone "P.W." & "M.W." Dual Range Coil*  
1930/1931

Recommended and Specified by "POPULAR WIRELESS" and "MODERN WIRELESS"



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Specially designed and approved for 1930/31 "Popular Wireless" and "Modern Wireless" circuits.

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WHEN you put your Set in this striking Radio-Gram Cabinet it becomes a handsome piece of furniture. Beautifully finished and soundly constructed, the Camco "Waverley" is remarkable value for money at £5 : 10 : 0 in Oak and £6 : 15 : 0 in Mahogany. Complete with 15" baseboard. Used for the "Orgola" and other well-known Circuits. Thousands already in use. Don't delay! See it to-day at our Showrooms. Also send coupon for free 74 pp. Catalogue now.

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Advertisement of Jackson Bros., 72, St. Thomas' Street, London, S.E.1. Telephone: Hop 1837.

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### Advertisement Rates

SINGLE Insertion - - -	£45 0 0
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ONE INCH single col. (2½ in. wide)	1 15 0
Minimum Space, half-an-inch	17 6

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All communications respecting advertising must be made to JOHN H. LILE, Ltd., 4, Ludgate Circus, London, E.C.4 and NOT to Editorial or Publishing Offices.

**RADIO NOTES AND NEWS OF THE MONTH**  
—continued from page 96

**Have You Got China?**

By this time the new Chinese government broadcasting station at Chenju, near Shanghai, will be on the air. It is stated that the station can get into direct touch with San Francisco, Paris and Berlin.

We wonder whether any of our readers have heard it yet?

**Four Million Licences**

At the Annual Dinner of the Radio Manufacturers Association, over which Sir William Bull, M.P., presided, it was stated that there was good reason to suppose that within the next year the total licence figure might easily pass the four-million mark. The Radio Manufacturers Association represents a total invested capital of nearly £80,000,000, and it is interesting to know that every penny of the invested capital is British.

**Broadcast Honour for Centenarians**

If you know anybody who has reached his or her 100th birthday,

or will shortly do so, let the B.B.C. know. The B.B.C. is willing to send out free birthday greetings through the microphone to centenarians; but you've got to be sure of your figures—no 99½ will do. It is only those who have really reached the century who are entitled to this privilege.

**THAT FREE BOOK**

—which is given away with this month's "M.W."—will next month be backed up by

**50 More Guaranteed Circuits**

All Different—all Tested—and all Guaranteed.

ORDER YOUR COPY NOW.

Out Jan. 31st. Price 1/6

**Beecham Objects**

Sir Thomas Beecham doesn't seem too pleased about the Government opera subsidy problem. He said the other day: "There's not a chance in a million that the proposal will go through. Every cinema, barrel

organ, and pierrot troupe will want protection by a subsidy."

"There has never been brought forward such a piece of gross stupidity in connection with music," he added.

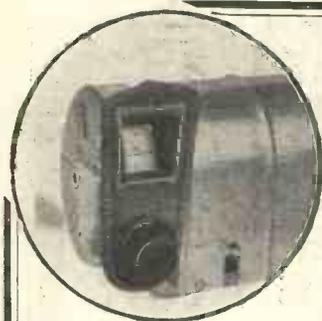
**The Muhlacker Station**

The row about the Muhlacker station was a nice tit-bit for the Press. It certainly caused a bit of trouble on 360 metres; but, as it was pointed out in Berlin, this is more or less a tit-for-tat for the inconvenience Daventry caused the Germans. The Director of the Muhlacker station has pointed out that they have strictly observed the international agreement, and that Muhlacker saw no real reason to change its wavelength.

**ITEMS OF INTEREST**

Owing to its very high magnification factor, the A.C. screened-grid type of valve requires particularly good screening.

If you get ploppy or fierce reaction control on your condenser, do not forget that a readjustment of the high-tension voltage to the detector will often make a great improvement.



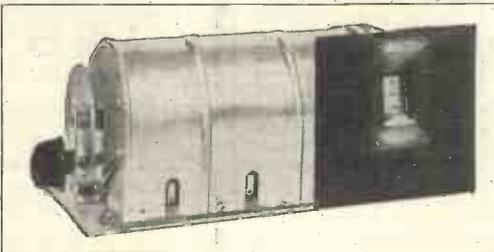
Above illustration shows the "Tub" fitted with the Polar Drum Drive, a slow-motion drive with knob control. Easily read scale in recessed aperture, with window for illumination. Metal escutcheon, bronze finish. Drum Drive - 8/6

**The new Polar "TUB" CONDENSER**

A triple-ganged, fully screened condenser expressly designed to meet the needs of modern multi-stage single-control sets.



Above illustration shows the "Tub" fitted with the Polar Disc Drive, a knob control slow motion with scale behind panel. Very smooth action: easily read scale 0-180. Metal escutcheon, bronze finish. Disc Drive - 5/-



The "Tub" shown fitted with Drum Dial reading but controlled by end drive.

**Price - 30/-**

Disc Drive and Drum (as illustrated) - 37/6  
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Three separate condensers are mounted on a common spindle and mounted in a die-cast frame. These are accurately matched, being guaranteed within 1 mmf. up to .0001 and over that within 1%.

Trimmers are provided for any necessary adjustment.

Each section is separately screened and totally enclosed, and each rotor independently earthed.

FURTHER DETAILS ARE IN THE 24-PAGE POLAR CATALOGUE. SENT FREE ON REQUEST.

**WINGROVE & ROGERS, LTD., 188-9, STRAND, W.C.2. Polar Works, Old Swan, Liverpool.**



**A NEW RECORDER**  
By Dr. ALFRED GRADENWITZ.

A NEW process for the recording and reproduction of sound vibrations has been devised by a German inventor. It is in many respects reminiscent of the telegraphone, in which recording was carried out by imparting varying degrees of magnetism to a steel wire as it passed between the poles of a magnetic system.

**Converted by Light**

Whereas in the telegraphone the variable magnetism of the steel wire is used to record and reproduce, the sound in this new method is first converted into fluctuations of light.

Photographic emulsions containing metals such as silver, chromium, platinum, etc., are used exclusively, the carrier being a band of celluloid film, metal, paper, or fabric, in the form of tape, strings, or wires. The amount of metal left at the various places on this carrier will be larger where the light has been more intense.

If such a carrier is made to pass through (or close to) a coil situated in the magnetic field of another coil, fluctuations will be set up in this second coil corresponding to the amount of metal at the various points of the carrier-band or string.

**DON'T MISS THEM!**

Three Special Supplements will appear in the February "M.W."

**THE "M.W." KIT SET REVIEW**

**BUILDING YOUR OWN LOUD SPEAKERS**

**Modern Radio Components and Accessories**

ALL IN THE FEBRUARY "MODERN WIRELESS"

Out Jan. 31st. - - 1/6

These current fluctuations will affect any suitable instrument inserted into the circuit of the second coil. In a telephone receiver a reproduction of the original speech or music would be heard. Any amplifier of the type used in radio practice could be used to increase the power of the fluctuations.

This process of reproduction can be used either in connection with a moving picture or as a substitute for gramophones.

If the new process be used in connection with "talkies," the picture and sound may not be recorded on the same band. The sound is, to begin with, recorded on a separate band—in synchronism with the picture—and either printed on a suitably prepared back of the picture film, or else allowed to run off separately; though, of course, in synchronism with the latter.

**For Record Reproduction**

If the picture and sound are recorded on the same film, an emulsion containing little or no metal is used for the former; on the other hand, the sound film should not become too dark after developing.

In the case of records destined to be frequently reproduced, as in connection with gramophones, the exposed film should be printed on metal tapes and possibly etched as in the making of printing blocks, thus producing in the metal cavities and elevations an agreement with the acoustic record. Light metals are preferably used in this connection.



**TUNGSRAM A.C. VALVES**

Tungram A.C. Valves for mains operated sets. They are the best A.C. Valves you can buy. Their first cost is less. They cost less to run and they have a long life. And their performance: long range, selectivity, volume, and perfect tone. For better, more economical radio use Tungram A.C. Valves. For full particulars of the TUNGSRAM range write to Department V.108

INDIRECTLY HEATED VALVES, 9/6. 4 v. A.C. POWER VALVES, 3/.

Tungram Photo Electric Cells. Nava B, £2.17.6; and Nava R, £3.3.0.

TUNGSRAM ELECTRIC LAMP WORKS (Great Britain) Ltd., Radio Dept., Commerce House, 72, OXFORD ST., W.1  
 FACTORIES IN AUSTRIA, CZECHO-SLOVAKIA, HUNGARY, ITALY, POLAND. BRANCHES IN BELFAST, BIRMINGHAM, BRISTOL, CARDIFF, GLASGOW, LEEDS, MANCHESTER, NEWCASTLE, NOTTINGHAM, SOUTHAMPTON.



# START RIGHT with a PILOT RADIO KIT



Here are the PILOT Kits for this month's "M.W." sets:

"M.W." **FOUR.**  
 Kit A. Cash £7 15 3 } or 12 monthly { 14/3  
 Kit B. " £10 17 3 } payments of { 19/11  
 Kit C. " £12 14 9 } payments of { 23/4

"**TRIPLE**" **TWO (Battery Model).**  
 Kit A. Cash £3 17 9 } or 12 monthly { 7/1  
 Kit B. " £4 18 9 } payments of { 8/10  
 Kit C. " £5 13 3 } payments of { 10/5

Prices and terms for A.C. or D.C. models on application.

**DUAL-RANGE H.F. UNIT.**  
 Kit A. Cash £3 5 0 } or 12 monthly { 6/-  
 Kit B. " £4 5 0 } payments of { 7/10  
 Kit C. " £5 1 8 } payments of { 9/4

**Important Note:**  
 KIT "A" is less valves and cabinet. KIT "B" with valves less cabinet. KIT "C" with valves and cabinet. Any parts supplied separately.

**SEND NOW FOR THE PILOT CHART.**

Contains detailed Price Lists of all the latest and best Kits, and over 30 valuable Hints and Tips for the Amateur Constructor.

See our Full Page Announcement in Handbook.

Success guaranteed. Every part down to the last screw, in an attractive carton, including The Famous Pilot Test Meter, without which no set is complete. No delay—immediate dispatch service. Immediate delivery to all approved orders. Carriage paid.

"P.W."

## DOUBLE TRAPPER

(See "P.W." 13/12/1930)

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Post Free.

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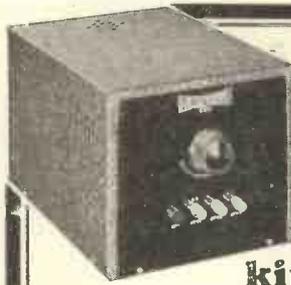
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M.W. 1/31.



Have you  
seen the new  
**HEYBERD**  
eliminator

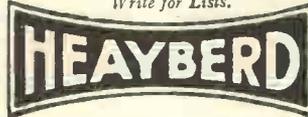
kits at your dealers?

The new A.C. eliminator kits that are absolutely complete. Containing only the finest components and including a Westinghouse Metal Rectifier. These eliminators, when constructed, are far cheaper to run than accumulators and supply steady hum-free power far more consistent than that obtained from batteries. Prices of kits from 69/6 according to power required. When ordering state mains voltage. Below is an illustration of the Heyberd H.T. Transformer,

an exceedingly reliable component for mains eliminators. Endorsed by the leading Radio papers, who comment on its remarkable efficiency and careful construction. Designed for use with Westinghouse Metal Rectifiers, these transformers range in price from 14/- according to output required. Write for lists.

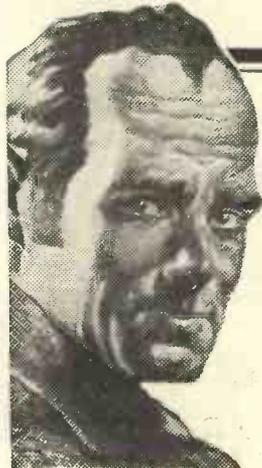
The **HEYBERD**  
H.T. Transformer

Write for Lists.



F. C. HEYBERD & CO.  
10, Finsbury St., E.C.

Phone: Met. 7516.



# Inspector EGO

*The New Detective*

An entirely fresh figure in crime fiction, created by G. R. MALLOCH. Detective Ego appears in the first of a series of complete stories in the January CASSELL'S MAGAZINE. His exciting adventures and original personality will grip your imagination as few other fiction Detectives have done. Read his first adventure

TO-DAY in

**CASSELL'S Magazine 1/-**

For JANUARY. Now on Sale at all Newsagents

**MAKING PORTABLES SELECTIVE**

—continued from page 25

will only cost you two or three shillings.

This type of wave-trap is placed flat against the side of the portable, and you may find it much more effective on the one side than the other.

You tune the station you want to cut out to its maximum on the portable, and then very carefully adjust the small compression condenser of your absorption wave-trap until you reduce the interfering programme to a minimum. You then tune-in to the station you want and hope for the best!

**Seven Sets!**

Such an absorption trap is undoubtedly effective on the medium wave-band, although I am afraid it does not do much on the long waves, even if you wind the necessary number of turns. It is certainly able to cut out an interfering long-wave station, but when its wave-length is very close to that of the station you want, as it generally is, you find that it robs you of much of that desired energy.

My experiences of absorption wave-traps of this kind are that it is sometimes better to separate the wave-trap aerial and the set by two or three inches, or even more.

Altogether I had seven different makes of portables to assist me in these researches, none of which was more than eighteen months old. At least five of them should never have been made at all! But there you are, they were, and many people are in the unfortunate possession of their exact duplicates.

**The Alternatives**

Summarising, this is what I would advise you to do if you have a portable that suffers badly with overlapping programmes. At first try the position and fine-tuning experiment. If this does not succeed, you have two alternatives.

If the frame-aerial leads are accessible, insert an "M.W." Standard Wave-trap in one or other of them. It should be a lead which goes to an end of the frame-aerial winding, but not to that end which may, in cases, be used for reaction purposes.

Almost as successful is the absorption wave-trap idea, and this involves

no interference whatever with the portable set itself.

The completely successful elimination of interference on the long waves is a very sticky problem indeed. On the other hand, there is no reason why portable set owners should put up with such jamming as may exist between the two Brookmans transmitters. There very definitely is relief for this, as I trust I have indicated.

**IN PASSING**

—continued from page 80

latest theories, each of which he explained to me and for which attention I was much obliged (and bored), I am keeping a sharp eye upon the gramophone record lists, such is my faith in the B.B.C.

Sometimes I wish that Sir John Reith would get a peerage and go to the House of Lords. He is an excellent man of business and has the gift of organisation in rich abun-

**NEXT MONTH  
SPECIAL ENLARGED  
NUMBER  
WITH  
Three Special Supplements  
AND  
ANOTHER GIFT BOOK.**

dance. But he is Scottish enough to believe himself to be a man with a mission and that the mission is to "improve the masses."

That, at least, can be inferred from his speeches and writings and from the programmes. The pure joy in those programmes is merely so much lollipop to induce the children to be good and to "mind their books," and I always feel that somewhere behind a humorous "turn" or a selection from a musical comedy sits a dour Sir John, smiling grimly but indulgently as he thinks of the unsophisticated minds of his masses.

So that for the listener I counsel patience, understanding and a set which will get him Paris, Langenberg, and Rome. He must look forward to further skinning and dissection of beautiful music, and to an everlasting cantata, in fourpenny bits, written by J. S. Bach, a good fellow who never knew when to stop.

He will in all probability continue for another year to have blank afternoons, the music beginning when he has to go to his tea; and his radio Sundays will continue to be mighty

deserts of blank time blobbed with patches of uplift and Causes so good that they ought to be subsidised rather than left to the charity of the uncultured masses. (Tut, tut! "In charity to all men," etc.) All right, listener, I'll let you go.

The radio constructor and experimenter is likely to have the best of the new year, because although the Covenanted mind hardly moves at all, the scientific mind nowadays has acquired a vigorous wiggle which is communicating its energy to radio researchers. A timid man, I feel positively scared at what may be done by wireless before the world goes clean mad; and yet I know quite well that I shall be "in on it" and shall deal out my treasure on every new wonder. For I am a veritable Sam Pepsy for curiosity, and I shall die wondering—if I have time—whether pegging out is as uninteresting as coming "out of the Every-where into Here."

**Use and Misuse**

For a time the uses of broadcasting, even its misuses, blinded us to the glory of the means of broadcasting. The fact that we could sit at home and hear a contralto booming, or a tenor gargling, in a room at Savoy Hill or in Berlin, so tickled our sense of the grotesque that we forgot the thrills we were wont to derive from getting a signal, any signal, from anywhere, and even an "atmospheric," by means of the queer contraptions which we huddled together and dreamed of o' nights.

Our feet left the Way! We strayed and were caught up in the glamour of Harry Lauder, Melba, Flotsam and Jetsam, and Sir Walford Davies, not to mention the seductions of vaudeville and dance music as twanged out by a Mr. John Payne and his troupe of performers.

**New Year Resolutions**

Let us shake ourselves as men awaking from a ghastly dream, and seizing a blue-print, place our right hands upon the H.F. circuit and swear to keep to the true path, not skimping the insulation, not being led aside by meretricious gadgets or vain and idle knobs.

And, above all, not to log any station unless it says something more intelligible than "Bloop yop google boom whee-ee woo." That's the acid test, to resist the urge to log, "Bloop yop," even though it is uttered in good Italian on Rome's wave-length. Fare ye well. Be strong and quit ye like angels.

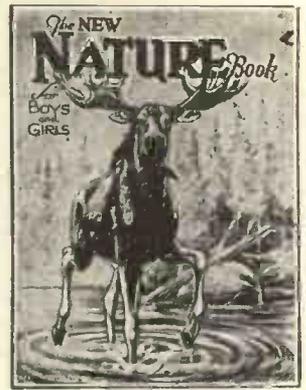
# JOLLY GIFT BOOKS FOR BOYS AND GIRLS

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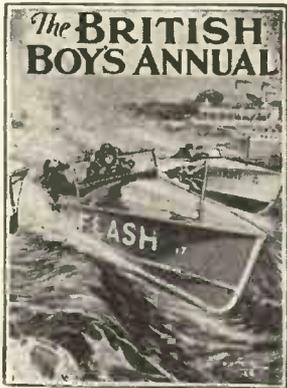
**I**F you want a present that cannot fail to please any boy or girl, you cannot do better than to choose one of these splendid gift books. They are packed with the jolliest stories and pictures, and, in addition to beautiful coloured plates, most of them contain many pages printed in colour. These books are strongly bound in brightly-coloured covers, and are cheaper than the average toy and more durable. Books are the best gifts—easy to pack—cheap to post—and certain to please. Ask your newsagent or bookseller to show you these famous "All-British" Annuals.



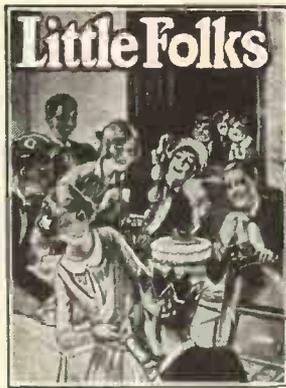
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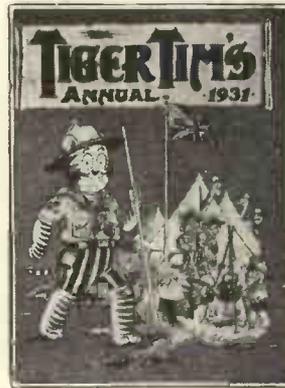
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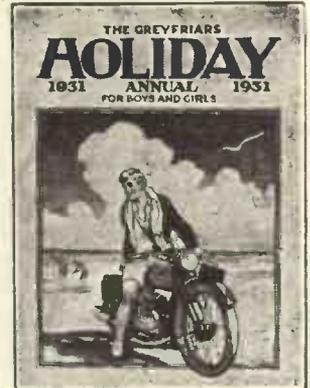
The ideal book for boys. Contains a host of thrilling stories of school, sport, mystery and adventure. Also useful articles. **5/-** Net.



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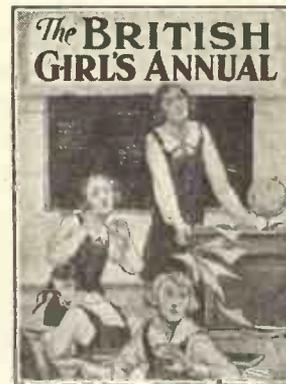
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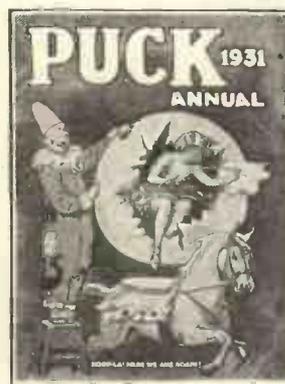
A book for the manly boy between 10 and 15 years. Thrilling adventure stories, articles and eight beautiful plates. **6/-** Net.



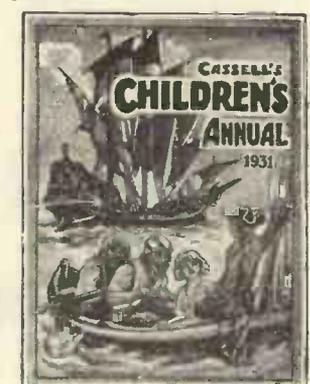
A big favourite with boys and girls from six to twelve years old. Full of amusing pictures, stories and puzzles. **6/-** Net.



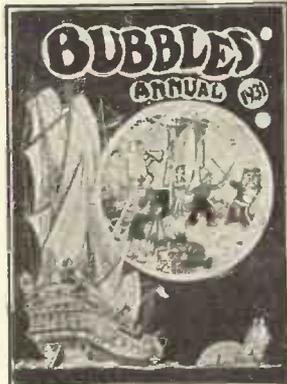
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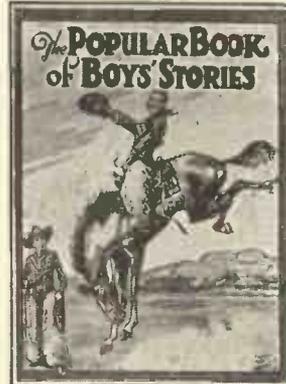
An ideal gift for boys and girls from seven to fourteen. Coloured plates, splendid tales, and scores of amusing pictures. **6/-** Net.



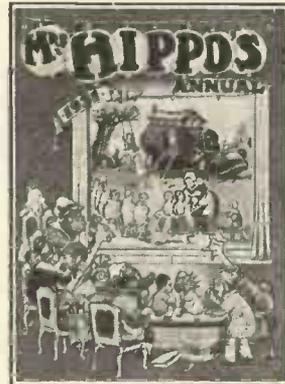
Charming adventure, fairy, animal and humorous stories, and dainty verse. Delightful colour plates and black and white illustrations. **5/-** Net.



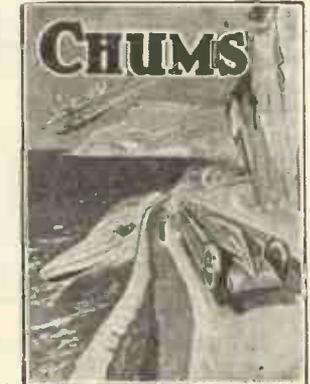
A delightful book for children of all ages. One hundred large pages of entertaining features. Many illustrations in colour. **3/6** Net.



For adventure-loving boys between nine and twelve years. Contains 128 pages of healthy, gripping adventure tales. **2/6** Net.



Hosts of fine stories—pages of pictures of the funny Bumpy Boys, the Jolly Hippo Girls and other favourite characters. **3/6** Net.



832 pages of reading. Stories of school, footer, mystery and adventure. Splendid articles. Many pages of photographs and 12 colour plates. **12/6** Net.

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**THE "TRIPLE" TWO**  
**THE "L.S." THREE**  
**THE "DUAL-RANGE" H.F. UNIT**

All described in this issue.



**"M.W." DUAL COIL**  
**12/6**  
 (approved by "M.W.")  
 A beautifully finished  
 and very efficient coil.  
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STANDARD SCREENS, 10" x 6"	Copper 4/-; Alum 2/-
COPPER FOIL, 21 x 10"	3/6
H.F. CHOKES	each 3/6
600-ohm RESISTANCE with holder	each 2/6
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\*\*\*\*\*  
**BROADCASTING AND**  
**THE NEW YEAR**  
—continued from page 72  
\*\*\*\*\*

"It will be seen . . . that the Corporation is entering on a phase of its development in which its needs in the way of revenue and capital expenditure are bound to exceed greatly its present financial resources, and it is obvious that some of the existing limitations of its resources will have to be overcome very shortly if its progress is not to be unduly impeded."

**Very Plain Hint**

Now that is a very plain hint to those responsible for the Charter and the whole of the financial arrangements in connection with broadcasting that the Treasury deduction from the gross income has got to be stopped; and that the amount allocated to the Post Office is probably in excess of the sum necessary for the maintenance of the licensing organisation, etc.

No satisfactory explanation has yet been given as to the reason for this Treasury deduction, and the ever-growing fund thus accumulated. We have no knowledge how this money is spent, if it is being spent at all, beyond the statement made by the Chancellor of the Exchequer a few weeks ago that a certain small proportion of it would be handed back to the B.B.C. for the benefit of Grand Opera.

Much misinterpretation resulted from this announcement, partly due to political prejudice and partly due to sheer ignorance of the facts. Many people and many public organs of opinion assumed that this sum of money to be handed back from the Treasury was money from the pockets of taxpayers, and consequently there was a very great outcry against the expenditure of any money on Grand Opera during the present period of industrial depression and unemployment.

**Good Investment**

But the fact of the case is, of course, that this proposed Opera Subsidy is just a fraction of the large fund accumulated by the Treasury from part of the licence money paid by listeners; and in subsidising opera with it the listener does get quite a good entertainment investment return on the money.

If the scheme goes through—and, incidentally, it is doubtful whether it will, owing to political opposition—listeners should benefit to the extent

of sixty first-class operas a year for a period of five and a quarter years. The person who does not possess a wireless licence is therefore not contributing one penny. The ordinary taxpayer, as such, has no legitimate grumble.

We hope that 1931 will see not only the successful backing of Grand Opera—which makes a very admirable form of entertainment for the broadcast listener—but that steps will be taken to force the Treasury to disgorge not fractions of the fund it has formed from its "share" of licence money, but every penny of the money which was originally subscribed by listeners for the one specific purpose of supporting the British Broadcasting Corporation.

If the B.B.C. could receive its legitimate dues back again from the Treasury, its financial qualms would be set at rest, and the situation rendered much more satisfactory in every conceivable way.

That this matter of licence money "shares" has been tolerated far too long is common knowledge; but it is pleasing to note that the recent controversy concerning the Opera Subsidy has ventilated the true facts in a way which can hardly fail to be productive of a more satisfactory and equitable adjustment of the B.B.C.'s finances.

\*\*\*\*\*  
**A LOUD-SPEAKER**  
**PROBLEM SOLVED**  
—continued from page 57  
\*\*\*\*\*

satisfied with the building of sets around circuits culled from standard text-books and foreign publications. But such hook-ups, even if they were given cunning twists and novel variations in mere form, would not advance us in the estimation of the discriminating constructor. We might be able to get away with it for a few years, but such a procedure would fail to lay down that solid foundation that is essential to a lasting success.

And there must be no standing still. We certainly believe that a good idea deserves a fairly long pursuit, but smug satisfaction leads to staleness. So it is research, experimentation, research and yet more head-scratching for new lines of research all the time.

**Always Busy**

The evolution of our fifty or so sets per year keeps a pretty big staff very busy indeed. But our continued success, with its consequent

*(Continued on page 105.)*



## CIRCUITS!

Write to-night for your free copy of our fully illustrated 1931 Catalogue which gives you several useful circuits in which this Double Pole Rotary Switch can be used. All the leading circuit designers are specifying this switch.

Without terminals, 3/-  
**THE BENJAMIN ELECTRIC LTD.**  
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3/6

# BENJAMIN

The Picture Paper with the **MOST News**  
**SUNDAY GRAPHIC**

**A LOUD-SPEAKER PROBLEM SOLVED**

—continued from page 104

additional support from readers, has enabled us to supplement our resources. This has made it possible considerably to widen our activities. And the first fruits are to be found in the new "M.W." loud-speaker designs that we present next month.

In a special section, entitled "How to Make Your Own Loud Speakers," you will find the essence of all those months of work. We don't expect all of you to appreciate to the full the vast amount of research those few pages of printed matter will stand for. Unless you had been there in one of the bays of our Research Dept. every day for about three months, watching the hundreds of cone constructions that were fashioned, you could not possibly do so.

**Test for Yourself**

But what you can do is build one of these new models and compare it with an existing loud speaker. Then you will be able to endorse all our claims.

The new "M.W." loud speakers are, as we have already hinted, loud speakers for the constructor. The patent constructions can be applied to any type of movement, although full details for the assembly of complete instruments using nothing more ambitious than the ordinary electro-magnetic unit will be given.

We must make it clear that the results given will be limited by the movement employed. You will be able to get much more out of the usual type of unit than hitherto, but you must not expect moving-coil results with the cheapest of reed units.

**The Path to Perfection**

Also, we are not out to attain spurious bass and spurious high-note response by means of boomy or resonant diaphragms. Unmusical listeners can often be misled by such methods. Possibly because we have not resorted to such methods there will be those who will say that our "M.W." speakers are not as good as this or that other instrument.

We can stand it! Our claims are based on accurate measurements, not on ear-cheating resonances. Our aim has been realism—the equal treatment of all frequencies—and we have gone a long way along the difficult path towards perfection.



**They were chosen**  
—after exhaustive tests — by leading manufacturers...

In response to public demand, to protect the filaments of the Valves

**BULGIN FUSEHOLDERS**

are a safeguard which should be provided in every set. They were originated by us and are without doubt the best obtainable.

Our New 60-page Catalogue and Manual is well worth sending for. Enclose 2d. postage.



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and others.

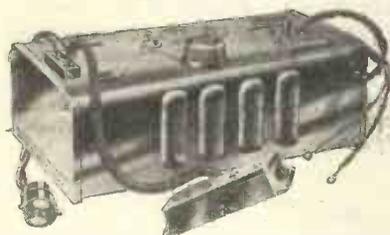
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Write for illustrated Catalogue to  
 GARNETT, WHITELEY & Co., LTD., LIVERPOOL.

THE “SUPER-SIMPLE”  
 A.C. MAINS UNIT  
 —continued from page 9

and a single one for “mid-tap”) to three terminals on the front strip of the unit.

If you are using battery valves, just disregard these terminals and use the H.T. ones alone. If you have the indirectly-heated A.C. type, however, you can run their “heaters” from the “L.T.A.C.” terminals. Try earthing the “mid-tap” one, and if there remains any noticeable hum, earth instead one or other of the outer terminals (i.e. the “L.T.A.C.” ones).

**The Mains Connection**

The connection to the mains is made in the usual way with a length of twin flex terminating in a plug or adaptor for insertion in a power or lighting point. This flex is connected to the unit as follows. One wire goes to the input or mains terminal marked “O” on the transformer, and the other to the terminal thereon marked with a voltage corresponding to or nearest above that of your mains.

Now you are in possession of the main facts about the unit and can get ahead with its construction. It is an exceedingly simple job, and the information furnished by the component list, the photos and the diagrams will be all you require.

The finished unit *must* be provided with a cover of some kind for safety reasons, and here there is obviously some choice of methods. A special wooden cover can be made to fit over it, with a space for the terminal strip, or you can do as we did with the original and put it into an ordinary cabinet with a piece of stained and polished wood to fill the rest of the panel space above the terminal strip.

**Easy to Adjust**

To put the unit into operation and adjust it is extremely simple and will only take you a few minutes. Connect up to your set, remembering that H.T. + 1 is to feed the detector and H.T. + 2 the L.F. valves; insert the rectifier; see that the cover is in place and secured; plug into the mains and switch on.

Then comes the one and only adjustment. Turn the knob of the variable resistance one way or the other until the detector valve functions correctly, giving good volume and normal reaction control. There is no need to know what the actual voltage

here is, so long as the detector is happy, but you might note that higher voltages are obtained by screwing the resistance knob inwards, and vice versa.

To conclude, some miscellaneous points. The rectifying valve in the unit should be of the Mazda U.30/250 or Mullard D.U.10 type, which have extremely long lives.

Remember that an output filter for the loud speaker is most essential in mains working, not merely for safety reasons, but to prevent motor-boating. If your set does not incorporate such a filter, add it as a separate unit.

Last, but not least, do not try to measure the output voltages of this or any other mains unit with an ordinary voltmeter. The figures thus obtained are entirely misleading.

INTERFERENCE  
 —continued from page 90

The two men were alone in Slewson's luxurious study.

Suddenly the music stopped—there was silence except for a faint humming from the loud speaker and the sound of heavy, nervous breathing from Slewson. The room seemed to develop a tension—the silent loud speaker appeared to become a menacing instrument of communication from another world. Even Dare was to some extent affected by the suggestion of mysteries about to be unfolded.

**Click! Click! Click!**

The grip of his hands tightened on the arms of his chair. At the first reverberating boom from Big Ben he started, although only very slightly in comparison with Slewson, who nearly leapt from his chair.

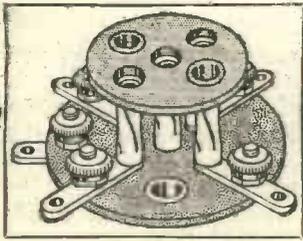
At last the chiming ceased, and the only sound from the loud speaker was the humming that denoted a poor smoothing system in the set. And then—Click! Click! Click!

Dare was just in time to catch Slewson as he fell forward from his chair.

“Poor beggar, don't wonder he's fainted,” thought Dare. “Nerves obviously in rags. And those clicks. . . . Jove, if they come along like that every night. . . !”

Slewson, suffering from a very severe nervous breakdown, was removed to a nursing home, and Dare, who told Mrs. Slewson as much as he thought wise, with her permission

(Continued on page 107.)



No. 27. Pro. Pat. Reg. Design.

## Built for Efficiency

Not for Appearance  
CLIX  
VALVE HOLDER

The Head of a Municipal Physical Laboratory writes:

"The two samples of the 5 pin type I have examined both show an insulation resistance of over 100 megohms, and as the amount of dielectric used is very small the dielectric losses must be a minimum. It is a pleasure to see a valve holder in which a great chunk of bakelite, giving large dielectric losses, is not used."

Type B for baseboard mounting

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27 Different Clix Fittings for Perfect Contact. Folder on Request.

LECTRO LINX LTD.,  
254, Vauxhall Bridge Rd., S.W.1.

## INTERFERENCE

—continued from page 106

carried on his investigations. Every night for about a week he heard those midnight clicks on the Slewson radio, and it was quite by accident that he was able to solve the mystery. The solution was a simple one, and he was not pleased with himself for having to spend so much time before arriving at it. Anyway, some weeks later we see him at midnight standing with Mr. Slewson outside the latter's residence. Both were intently gazing up at the moon-lit exterior of the building.

"You occupy the two lower floors and the two top floors are let to someone else?" he queried.

"Yes," affirmed Slewson, who was visibly shivering despite the warmth of the night.

"You must forgive this rather theatrical procedure," explained Dare, "but I want to show you exactly what happens so that your mind can for ever be set entirely at rest. Watch those three windows on the third floor."

### "Now, Watch!"

In the distance the midnight toll of Big Ben could faintly be heard.

"Now," said Dare tensely, "watch!"

"One—Two—Three, you see? Those three lights have been switched out. Mr. Slewson, you have been haunted by nothing more than tenants of regular habit. They evidently make ready for bed every night immediately following the conclusion of the radio programme.

"The clicks you hear in your radio set are clicks caused by their electric light switches being operated. It is a mere coincidence that the time corresponds with the time of that tragic phone call. Such switch clicks cause quite a lot of interference among radio sets, especially in flats."

And so the Slewson radio "ghost" was laid. By far the greatest mystery lies in the startling reappearance of the important documents mentioned by the financier earlier in this narrative. Dare read the account of this in his morning newspaper a few days later.

"I wonder——" he said to himself, smiling somewhat sardonically, "I wonder if that little squirt was really convinced it was not a ghostly message. I wonder what made the poor little rat cough 'em up? I wonder—— Oh, well! Such is life!"

# Varley

## COMPONENTS for every Circuit

Varley Components are the result of a long and specialised experience in electrical work of every description. They set the standard for accuracy of workmanship and careful, original design.

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# Varley

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The Best SPEAKER in Town

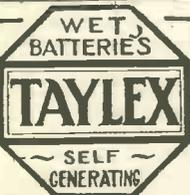
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Jars (waxed)	1 3	1 6
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Zincs	10	11
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Trade Supplied.

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**THE DUAL-RANGE H.F. UNIT**  
—continued from page 70

This latter consists of a fixed condenser (not adjustable in this case), shunted by the customary resistance. The remainder of the wave-change switching is performed by a simple on-off switch, which parallels the two secondary windings for the lower wave-band in the usual manner.

The screened-grid valve is arranged in quite normal fashion, with a little grid bias to ensure satisfactory working with economy of H.T. consumption, and a parallel-feed output to the receiver circuit which follows. A moderate amount of screening is provided, and the layout has been carefully arranged to ensure satisfactory functioning.

**Important Coil Spacing**

There is a fair amount of work in the construction of the unit, because there is much more in it than just the simple conventional H.F. stage, but the clear wiring diagram on these pages will tell you practically all you need to know about it.

There is nothing particularly critical about the layout except in one respect, and as to that we must warn you. Do not on any account take liberties with the relative placing of the two coils, because any serious amount of stray coupling between these two is undesirable. Do not attempt to compress the unit into a smaller cabinet, unless you are very sure that you can maintain the desired freedom from interaction between the two coils.

When it comes to wiring there are just the usual points to note as to the use of insulated material for the

two leads which pass through the screen, attention to making a proper earthing connection between the screen and the L.T.— terminal, and so on. It is worth noting, however, that the wiring of the wave-change switch is most easily done before the screen is put in place. It is therefore suggested that the screen should be added as late as possible in the wiring-up process, everything else being done first.

**Connecting It Up**

Now to connect up the completed unit to your receiver. Place it alongside the set, on the left-hand side, and close up against it. Transfer the aerial lead to the A terminal on the H.F. unit; and shift the earth lead to the appropriate point thereon. Connect up the batteries according to the markings on the terminal strip, noting that there is no H.T.— terminal, and wire the output terminal to the old aerial-terminal on the receiver. This latter lead should be kept as short and direct and as well away from other wires as possible.

The battery voltages should be the usual 120 volts on H.T.+ 2, with something of the order of 60 to 80 volts on H.T.+ 1. The actual voltage here will depend upon the particular screened-grid valve, and a little adjustment will soon settle the point when you have tuned in a fairly distant station.

**Grid Bias for the S.G.**

A single dry cell should be inserted in the unit to provide the necessary grid bias on the screened-grid valve, the flex leads coming off the .01-mfd. fixed condenser going to this cell. The 1½-volt type of dry cell will serve the purpose here, always providing you have the full 120 volts of H.T. available (a little more is helpful provided that your valve is rated to stand it), but the .9-volt type of

special cell available in some makes is somewhat to be preferred.

To bring the unit into operation you have first to close the L.T. switch thereon, and the one on the receiver as well. For long waves, put the wave-change switch in the "off" position, which usually means pushing the knob inwards, and turn the Selector coil switch knob fully round to the right. You have then merely to tune upon the dial on your receiver and the one upon the H.F. unit, and you will soon get an idea of the relation between them required to keep the two in step.

For the medium wave-band, put the wave-change switch at the "on" position and turn the Selector coil knob somewhere back on to the range of intermediate studs. Set the coupling condenser to a half-capacity adjustment and then proceed to search for stations on the two dials alone.

**Simplified Searching**

Having found a station, next turn your attention to the Selector coil knob and seek for the stud which gives the loudest signals. You will soon find the range of studs corresponding to the particular dial readings, and thereafter searching for stations will become delightfully easy, remembering that the Selector coil can always be brought to its exact setting after the station has been tuned in.

The coupling condenser adjustment is quite simple, and this brings us to our final hint. A half-capacity reading is normally correct, but a slight reduction to obtain still higher selectivity is permissible. Volume only falls off seriously if the coupling capacity is made very small indeed.

Incidentally, this last suggests a method of controlling the volume of the local, always an important matter when a stage of H.F. is used: just cut down the capacity below the normal setting.

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**FOR ADVT. RATES SEE PAGE 97.**

# BLUE SPOT 51R

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Here is 51R, the famous Blue Spot Speaker specially chosen by the Editor for the "L.S. Three" receiver—a unique speaker chosen for a unique set giving unique results.

Remember that no other speaker will do. The receiver has been designed to fit 51R, and only 51R will give the correct results. Read the full details appearing on pages 15-18 of this issue.

The name Blue Spot represents all that is faithful and true in loud-speaker reproduction, and 51R is a wonderful example of that proud claim. It is driven by the world's wonder unit, 66R, and it is encased in a walnut cabinet of outstanding beauty—a cabinet that will add to the appearance of any room.

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Its huge power handling capacity and extremely low impedance assure this. It is sensitive, too, thus requiring a minimum of early amplification and giving a greater output—sufficient, in fact, to work a moving coil speaker at ample volume for domestic purposes.

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Anode A.C. Resistance (ohms)	1,900
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THE AMAZING

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