

Amateur Wireless,  
July 22 1933

THE LATEST IN TUNING COILS

BRIGHT IDEAS FOR PORTABLES

# Amateur Wireless

and  
Radiovision

TELEVISION  
RADIO DODGES  
IMPROVING  
REPRODUCTION

Every  
Wednesday  
3<sup>d</sup>

Vol. XXIII. No. 589

Saturday, July 22, 1933

BUILDING THE **NEW** BRITAIN'S  
FAVOURITE



IRON-CORE TUNING & CLASS-B OUTPUT

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# The ALL-ELECTRIC "SKYSCRAPER"

THE FIRST COMPLETELY PRACTICAL COMPLETELY SAFE ALL-ELECTRIC RECEIVER for the HOME CONSTRUCTOR

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Lissen have published a fascinating Chart showing how to build the All-Electric "Skyscraper." So clear and so detailed are the instructions and photographs that SUCCESS is CERTAIN. Ask your radio dealer for the Chart of the "Skyscraper"—or post coupon.

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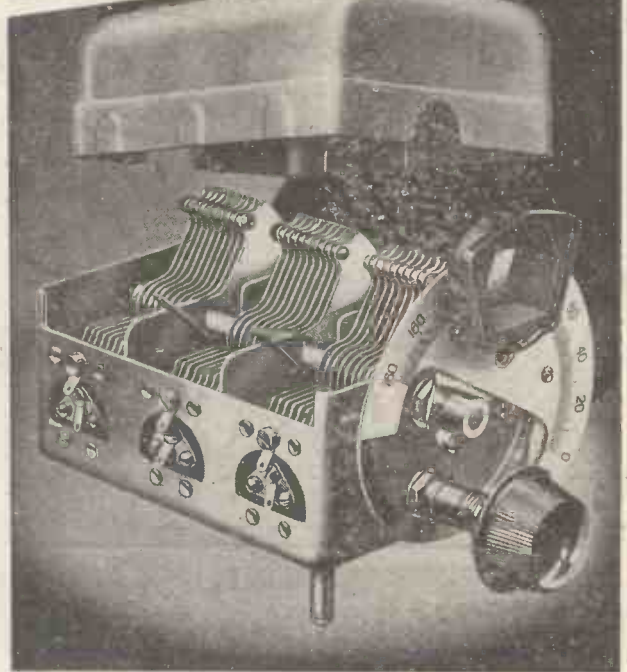
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A.W.54



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For best results from the new Metal-Cored Coils your gang condensers must be closely matched and rigid—in short J.B.



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BRITAIN'S LEADING RADIO WEEKLY  
FOR CONSTRUCTOR, LISTENER & EXPERIMENTER

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## NEWS & GOSSIP OF THE WEEK

### PORTABLES—AND THE "FAVOURITE"

**BRIGHT** ideas on portable sets are given by the "Experimenters" this week, and a very seasonable topic too. In the middle pages full constructional details are given for the new "Britain's Favourite Three," a set that well deserves to be a favourite as it has an iron-core coil and class-B among many other fine technical features.

### HENRY AT OLYMPIA

**HENRY HALL** is shortly to make his first public appearance with the B.B.C. Dance Orchestra, when they play at the Radio Exhibition at Olympia. At this Exhibition the B.B.C. will have a specially-built theatre capable of accommodating fifteen hundred

people, and tickets of admission will be supplied to clients by various manufacturing firms who are stall-holders. A revue will be staged in the theatre for one hour each day; this will run throughout the week. It will be entitled "Good Listening," and the authors are John Watt and Harry S. Pepper. The musical director is Sydney Baynes. Another hour will be occupied by a vaudeville show which will be changed once during the run of the Exhibition. This will be broadcast throughout the Exhibition, and will also form part of the National and Regional programmes. The revue will be broadcast once on the National and once on the Regional wavelength, and the vaudeville performance on four different occasions. The theatre will be up to date in its arrangements, and will have special lighting effects.

### SUCCESS AT WASHFORD

**IT** is expected that public reception tests from the new West National transmitter, using the same wavelength as the London National transmitter, namely, 261.6 metres, will start almost immediately. These tests will probably be completed within a month, thus enabling the full alternative service for the West Region to be introduced before the commencement of



This artificial "train" has just been set in operation at the Research Laboratory of H.M.V. It is used for testing radio sets by vibrating them and a set can undergo vibrations similar to a rail journey from London to Glasgow in twenty-six minutes—932 m.p.h.!

### ALSO IN THIS ISSUE

How to Improve Speaker  
Reproduction.

Bright Ideas for Portables.

W. James on the Latest Tuning  
Coils.

Building the New "Britain's  
Favourite Three."

That Radio Dodge.

the Promenade Concert Season, which will result in West Regional listeners obtaining better reception of the Promenade Concerts than would be the case if only the West Regional transmitter were in service.

### FORKS OR LINE?

**THE** engineers have not yet decided whether the synchronisation of Washford Cross and Brookmans Park will be done with a separate tuning fork at each end, or with one master tuning fork control and a landline between the stations. A special line has been booked from the Post Office, and even if separate forks are used it will be possible at a minute's notice to switch over and use line synchronisation. Unfortunately the Heaviside layer doesn't seem to be working properly during the first fork tests! It doesn't get dark until after ten these days, so there is practically no indirect signal to cause a bother. Result (at present), West National is good in South Wales when London is working. But, oh, when winter comes . . .!

### WILL IT BE TELEVISION?

**THE** energetic Mr. Partridge, who used to be "O.C. Tatsfield," has now come back to London, and is engaged in the 7-metre tests. H. V. Griffiths, who was under Partridge at the Tatsfield listening post, has now taken over full command, but expectation runs riot on the way in which Partridge will set things humming on the short waves.

### FROM THE STRATASPHERE

**WHEN** Professor ("highest-ever") Picard makes his next trip from America into the stratosphere, the N.B.C. are arranging to

**NEXT WEEK: THE "ECONOMY TWO"—A GOOD AND CHEAP TWO-VALVER**

# NEWS · & · GOSSIP · OF THE · WEEK —Continued

relay the signals he will broadcast with a portable short-waver. An eye-witness description of the balloon ascent will also be given by N.B.C. commentators. And even if the B.B.C. doesn't relay the commentary an attempt will be made (if the time is suitable) to relay Picard's comments as he goes up and away from the earth's surface.

## THE SATURDAY NIGHT DANCE BAND

THERE'S a big scramble for the enviable position of Saturday night dance band broadcaster. As Ambrose is leaving the May Fair some change will have to take place, but it is quite possible that Ambrose may make regular visits to Broadcasting House in order to give his evening broadcast from the studios. It may also happen that arrangements will be made for Henry Hall to have the much-coveted Saturday position.

## IN HOLIDAY MOOD

BY the way, Henry leaves for his holiday trip to the States on August 26. He will visit the famous Chicago Exhibition in addition to paying many friendly visits in New York. And he will be back about September 20.

## THE EMPIRE'S PROGRAMMES

UP till now Cecil Graves, the Empire service director, has shouldered all the executive work in connection with the Empire broadcasting. But now J. Beresford Clark has come down from Manchester to take over a new Broadcasting House job which has been created—Empire programme director.

## WILL IT STOP PLUGGING?

THE new scheme whereby the B.B.C. is paying outside dance band leaders in an endeavour to stop the song-plugging ramp, will cost a pretty penny. When the scheme has been going a few weeks we shall see if it has any effect. It will be necessary to get the strong co-operation of the music publishers if the B.B.C. is not merely to throw its money away. Incidentally, one well-known musical firm has appointed a "radio plugging" (sic) departmental manager.

## VERY STORMY WEATHER

SONG plugging has even affected gramophone record broadcasts, so the experiment was tried of getting record broadcasters to give a selection of records sent in by the

manufacturers themselves, in order to get a representative show. As nearly every recording concern sent in a disc of one of the most popular dance tunes at the moment, "Stormy Weather," the stormy question had to be settled some other way.

## PETER CRESSWELL

PETER CRESSWELL, one of the B.B.C. "star" producers, is now in hospital with appendicitis. We wish him a speedy recovery. Robin Whitworth had to take over one of Cresswell's productions at a minute's notice.

## SNAPPY NEWS

DID you hear the new-style news bulletin produced by Lionel Fielder the other night? The ordinary news bulletin and topical talk were run together in one very live feature. So live, in fact, that both the Prince of Wales and Lloyd George rang up to congratulate the B.B.C. on this new scheme. So in the autumn Fielder may be given the job of producing the special news bulletins as a regular feature. The Prince of Wales is a very keen radio listener, but of course it is not often that the B.B.C. receives a personal 'phone call from so distinguished a critic.

## NOT FROM THE STATES

"AMERICA Calling" (July 24, National and July 25, Regional) should prove a novel and interesting hour's entertainment, as it will consist of impersonations of America's greatest radio stars. These will include Kate Smith, Burns and Allen, Amos'n Andy, Bing Crosby, Boswell Sisters, the Street Singers, Reilly and Comfort, Cab Calloway and his Orchestra and Guy Lombardo and his Royal Canadians. The announcer will be Eddie Pola, and the impersonators will be well-known British broadcasting stars. This international exchange of radio courtesies looks like growing. The National Broadcasting Company of America has recently put on two of the "top liners" among B.B.C. plays—"Squirrel's Cage" and "The Flowers are not for You to Pick."

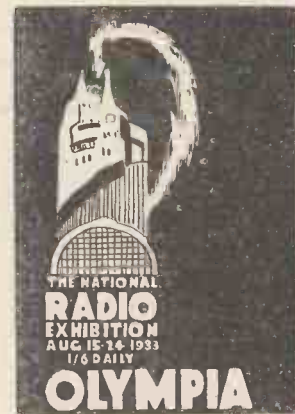
## THESE GROUPS

THE third National Summer School for the training of Wireless Group leaders is being held this year under the auspices of the Central Council for Broadcast Adult Education in two periods, namely July 15 to 22 at Hertford College, Oxford, and from August 5

to 12 at Durham University. The division is made in order to meet the convenience of those who live in Northern England and Scotland. Each part will be similar in general aims and organisation; but anyone living in any part of the country may apply for a place.

## SYMPHONY CHANGES

THIS is the time of year when the Symphony Orchestra personnel is revised. Archie Camden, the principal bassoon from the Halle orchestra is joining the B.B.C. gathering, while one of the first violins of the Symphony Orchestra is being changed. Lambert Flack, the well-known flautist is "moving up" from the Theatre Orchestra into the Symphony Orchestra, the grand total of which is now 118 instead of 117 players.



Just to remind you of the Radio Show. This is a reproduction of the attractive poster which you will soon see everywhere announcing the Exhibition

## CAN YOU REMEMBER?

A MEMORY test will be imposed upon listeners to the National programme on July 22, when "Sound Pictures" is presented. In this programme the gramophone combines with the Blattnerphone to present five groups of sound pictures which will include well-known dance refrains, sounds, musical compositions, voices and plays. Listeners are invited to identify each picture and the solutions will be given at the end.

## "HIGH LIFE" AT THE B.B.C.

FOLLOWING the dashing performance of a young Liberal M.P. named Mr. Mallaleieu, who climbed the Moorside Edge masts which happen to be in his constituency, to take photographs from the top, many hundreds of applications from listeners anxious to do the same have been received by the B.B.C. As the tops of the masts are about 1,500 ft. above sea level, and 500 ft. from the ground, the B.B.C. refuses to accept the risk. Which reminds us that at Droitwich there will be lifts inside the 700-ft. masts. Here, surely, is yet another source of revenue for the B.B.C.—a suitable charge might be made to take people up to the top!

## CONTROLLING THE STOPS

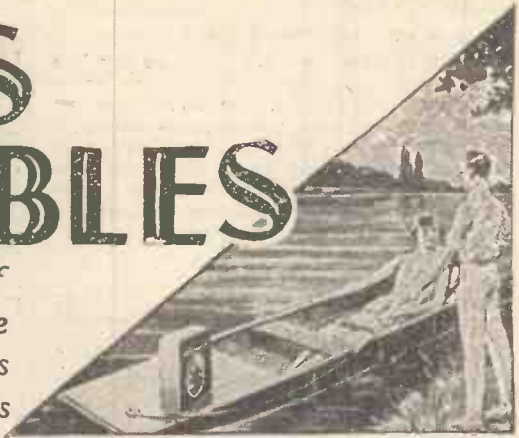
THE B.B.C.'s new organ takes some getting used to. Even Sir Walter Alcock, who has acted in an advisory capacity while the organ was being built, is not yet *au fait* with the practical end of the specification and the piston arrangement. The B.B.C. will arrange that even trained organists who come to Broadcasting House to tackle the new instrument shall have the opportunity of bringing their scores and marking the piston arrangements. Comptons have certainly produced something very special for the B.B.C. and famous organists who are the first to broadcast must not be judged too harshly until they have had a chance to get used to the new ideas.



New members of the U.S. Federal Radio Commission, controlling broadcasting in the United States. This is the first photograph, taken in Washington, of the Federal Radio Commission, since its reorganisation with a Democratic majority

# BRIGHT IDEAS FOR PORTABLES

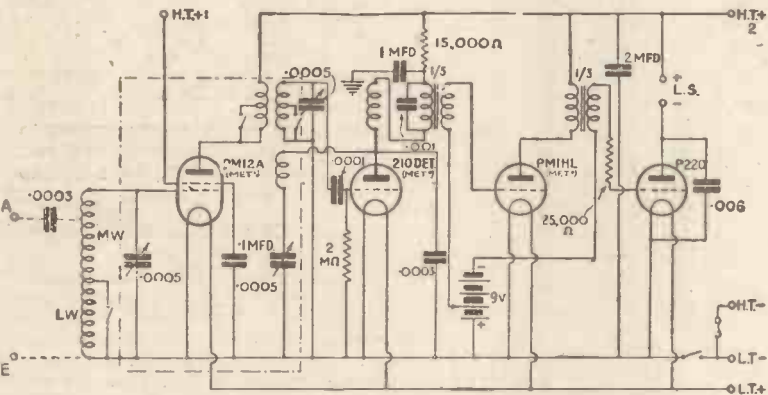
Our "Experimenters" have been busy trying out lots of bright ideas for portable radio, and in this article they give an interesting account of their adventures, including, as always, much practical data of immediate use to amateurs



FOR most of our readers there are only three types of portable: the first is the five-valver, with two high-frequency stages with triode valves; the second is the screen-grid four-valver, with only one high-frequency stage; and the third is the local or headphone portable, with a detector and two low-frequency stages. The super-het portable we

is microphonicity in the detector and/or screen-grid stage.

Just as a matter of curiosity, we hooked up a portable with two high-frequency stages on a breadboard. This type of circuit, you will recall, was very popular about two years ago among manufacturers. We twiddled about a bit, but we came to the conclusion that success



This shows a full circuit for a four-valve portable and the connections for an external aerial and earth if necessary. Note the components within the screening box

have ruled out as being rather too expensive for most amateurs, and, as most super-hets require extra care in design, it is not a circuit that specially appeals to ordinary readers.

We think that the detector and two low-frequency portable has had its day. It is suitable only when used very close to a broadcasting station or for more distant reception on headphones. We think that this type of portable is hardly worth discussing here.

Like many others at this time of year we are thinking of holidays, and naturally, being keen radio fans, we cudgelled our brains to find a circuit that would be most suitable for our portable needs. By this we certainly do not necessarily mean the most efficient. We have, in fact, come to the conclusion that a super "hotted-up" portable is more trouble than it is worth.

Usually such portables take a lot of battery juice and are more fragile. We do not mean that the set will fall to pieces, but microphonicity in the valves is very apt to arise after a very few transportations.

## THE MATTER OF RANGE

We know that when a portable is used at home its range is sufficient to bring in plenty of programmes, usually without much reaction. Such home experiences do not help you to gauge, though, the likely performance of the portable when it is taken away. All too often you will find that the reaction has to be advanced, and the result is the development of a hundred and one noises, not least of which

some extent by using one resistance-coupled and one choke-coupled stage, but really this simply decreased the efficiency of the first stage. We know quite well that if we had knocked up this set into permanent form it would have been entirely satisfactory, but there would have been no guarantee that you would have had equal luck.

## SELECTIVITY

Moreover, we found that the selectivity was not good enough unless the frame aerial was tapped. This decreased the load on the first high-frequency valve, and that lead again to instability.

We were left, then, with the straight four-valver portable with one high-frequency screen-grid stage. This really did give us scope to show our experimental mettle. If you consider a portable as two separate parts, one the high-frequency and detector, and the other the low-frequency—that is how we thought about it, anyway—you can begin to tackle the design quite easily.

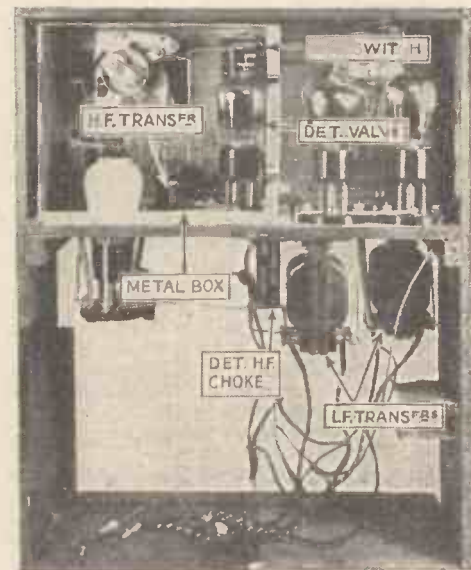
When you are designing this sort of set there are many alternative points about the high-frequency side, such as methods of coupling the high-frequency valve to the detector stage, aerial coupling, layout, and many others. What we could have done was to take a simple tuned-anode and improved that until the circuit was satisfactory; but even then, after all that, it might have been only half as good as, say, tuned-grid. We didn't know—there are several schools of thought on this business—so, as usual, we had to find out for ourselves.

You can rule out tuned-anode, although we did give it just a simple test to find out its efficiency. When we tried tuned-grid we knew at once that it was miles better than tuned-anode, and so we concentrated on this second circuit. The results we obtained were very gratifying, and then we discovered that we were taking an unfair advantage of you—our coupling choke was a Lewcos, having a very much higher inductance than the average choke, such as you probably have earmarked for a portable, from your junk box!

Then we did a few measurements. Although we could get a satisfactory amount of amplification from quite a number of chokes, the results were so erratic and uncertain that we could not risk this very variable factor in the design. So we looked round for another circuit to work without a specially good choke.

You may wonder why we are so chary about recommending the tuned-grid circuit; surely the simplest thing is to make do with this circuit and insist on a good choke? Yes, of course; but can we insist on that choke? Is it not much more likely that you will be tempted to think this advice is a bit of technical faddism, or even plain eyewash, and to use just any old choke you happen to have about.

We were able to overcome this drawback to



Here is the layout of the various components, the position of the screening box and how the screen-grid valve holder is fixed. The panel is metal lined

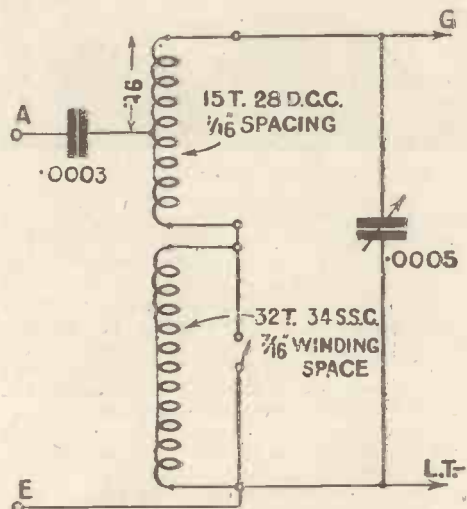
in the junk box? Yes, we think so—being almost human ourselves!

Some years ago, to change the subject, the most popular circuit for high-frequency coupling was the tuned transformer. Curiously enough, this system has very rarely been used in portables. Perhaps when you get the

**'BRIGHT IDEAS FOR PORTABLES'**

(Continued from preceding page)

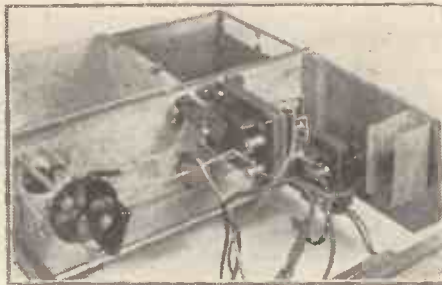
transformer down to a compact size you lose most of the advantages. Anyhow, we had a shot at this old system. We made up a coil on a 2 by 1 1/2-in. former, winding the secondary on one end and the primary on the other, with the reaction coupled more closely to the secondary than the primary. This worked well as a high-frequency transformer, and simply by putting on more or taking off a few turns you could flatten or sharpen the tuning as you wished.



Here are details of the windings for the frame aerial and the position of tapping for the optional frame aerial

This was the very thing we were looking for. By sharpening up the tuning by taking off a few turns the dweller near a regional station could be made quite happy, while the listener miles from the nearest station, could also design his coupling for his special conditions, where a few more turns would give the required signal strength.

Aurally it is difficult to tell how one arrangement differs from another, so we took the



This shows the underneath side of the baseboard, the positions of the two transformers, H.F. choke and screen-grid valve holder

precaution, which you might not be able to do through lack of gear or knowledge—no offence intended!—of taking some proper comparative

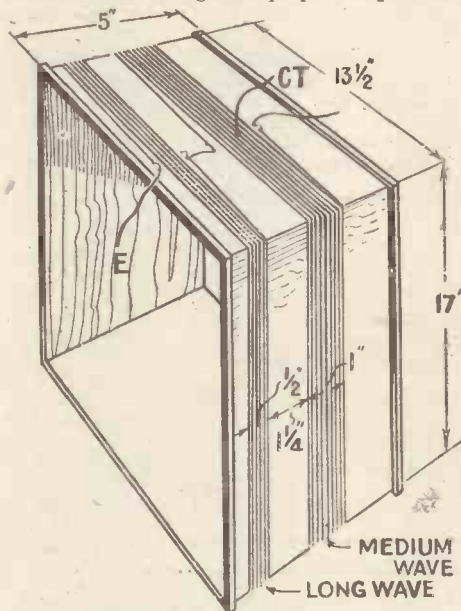
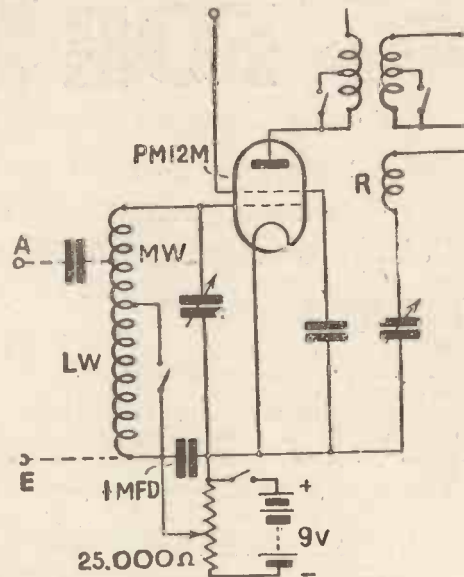


Diagram showing the way the frame aerial is wound and the spacing between the windings

measurements, and we found that there was a distinct improvement in signal strength or stage gain with the tuned transformer as against the tuned grid.

That seemed to clinch the matter for us. The resulting set we made up was beautifully stable and very sensitive. One little word of



Circuit B shows the alterations necessary to use a variable-mu S.G. valve in the first position. This is mainly for those close to a broadcasting station

warning. You will see from the photograph that all of the components in the high-frequency stages—that is, the high-frequency amplifier and detector valve—are completely isolated by means of a metal box. The valve-holder is mounted beneath the baseboard, and to push the valve into this you have to cut a hole in the baseboard and push the valve through that on to the suspended valve-holder. This holder for the screen-grid valve must be obtained from Messrs. Wright and Weaire, who (Continued on page 89)

BY the time you read these lines you will have again captured regular broadcasts from Radio Toulouse; you may also have wondered why the power of the transmission is in such disproportion to the advertised energy of the new station. And thereby hangs a tale. In view of the numerous appeals received from a large district suddenly deprived of its favourite programmes (P.T.T. Toulouse entertainments have never achieved the same popularity), the French State was more or less compelled to grant a permit to start up the super-power transmitter at St. Agnan. It has conceded the necessary licence, but with the restriction that the power used is to be that of the plant destroyed some months ago by fire and which it is allowed to replace.

Needless to add that the inhabitants of the Toulouse area are far from being satisfied, although half a loaf is better than no bread. So St. Agnan is on the air on the old wavelength of 385 metres and will continue to use it until the beginning of 1934. By that time we shall doubtless have witnessed, or heard of, a tussle in respect to a new channel, as the Lucerne Plan does not allot to Toulouse, as a private station, any definite frequency. As most of the useful wavelengths have been snapped up for the State (P.T.T.) stations, there is nothing much of value left for the privately-owned transmitters.

Equally important news emanates this week from Holland. The Hilversum and Huizeh studios, as is their wont every three months, have exchanged stations, the latter now

**OUR LISTENING POST**  
By JAY COOTE

working on 296.1 metres. In the meantime, however, the Dutch Posts and Telegraphs have been testing out their 50-kilowatt station at Kootwijk, near the Hague. Holland is one of the countries which has refused to recognise the Lucerne Plan; she maintains and, not unreasonably, that the 1,875-metre channel is hers by right of use over many years and that she is entitled to retain it. To assist in defending this plea, she has launched the new station on the ether, and you will now hear the broadcasts of the A.V.R.O., V.A.R.A. and other programme societies usually connected with Hilversum on that wavelength at much higher power.

**The Blue Danube!**

And now Vienna. Although anxious to identify itself to foreign listeners by means of some musical phrase closely connected with the Austrian capital, the Ravag has finally decided against the use of "The Blue Danube Waltz" as an interval signal. The station, therefore, will continue to use its fast-ticking metronome to fill up the gaps between programme items. The decision taken rests on the argument that even a short excerpt of this classical dance, if frequently repeated, would weary listeners both near and afar, and

in a very short period of time would bring the melody into disfavour. It has become so universally popular that that would be a pity. There's something in that.

So far, I doubt whether many listeners in the British Isles have ever logged broadcasts from Rodno-Radio (Sofia) on 318.8 metres, as it is only a 1/2-kilowatt, and I am wondering whether we shall even hear faint signals from the new 3-kilowatt station which Rome, as a personal gift, has presented to the Queen of Bulgaria. Up to the present, in that country the necessary capital has not been secured to establish a regular broadcasting system, although apparently the Government is planning to erect a 50-kilowatt transmitter at Sofia and a smaller one at Varna, for both of which Lucerne has allocated definite channels. We may—or may not—hear of them in 1934.

Monte Ceneri, the Tessin station, will be officially opened in the autumn; it will continue to work on the long-wave band.

According to a statement made by the Swiss Posts and Telegraphs administration, tests on 442 and 400 kilocycles (680 and 750 metres) were abandoned owing to interference caused to the maritime services. Although it was feared that the use of 1,150 metres (260 kilocycles) might also bring forth complaints, in this instance from aviation centres, there has been no grumble from that quarter. However, to prevent any trouble, no afternoon broadcasts will be made by Monte Ceneri on weekdays; the transmitter will only start working after traffic hours

# That Radio Dodge

## AN EMERGENCY INSULATOR

HERE'S a good tip for making an aerial insulator if the existing one should break. Take a small flowerpot (of the type known by gardeners as "thumb" pots), and thread the aerial wire through the hole in the bottom. Twist the wire firmly round a small stick so that it cannot slip



back through the hole. The aerial rope should now be tied tightly round the narrow edge of the pot, as shown in the accompanying sketch. The pull on the rope tends to shift it up towards the larger diameter, so that it cannot slip off.—C. V. W.

## COMPONENT CONTROLS

YOU can simplify the control of your set by ganging the volume control and reaction condenser. Special combined controls of this type are available and if you are ganging your own condenser and potentiometer you must make sure that they work the same way round. Preferably, couple the two by means of a piece of ebonite tubing threaded at each end or drilled to take two grub screws.

It is not always essential to set both the condenser and potentiometer at zero before coupling up. Make a few trials by hand to find the best minimum volume control setting at minimum reaction, but do not, of course, let the movement of the reaction condenser restrict the effective range of the volume-control "pot."—E. K.



## A USEFUL CONNECTOR

THE accompanying sketch shows a simple way of utilising broken spade terminals. A sound connection can easily be made in the following way. Clean the end of the lead and place it in the top of the spade. The insulated part can be kept in position. Now a little solder can be run in

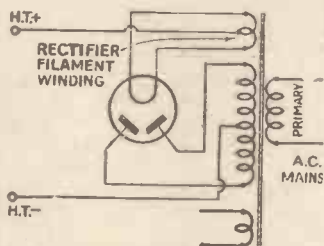
with an ordinary soldering iron to make a positive connection. W. H. G.

## THAT H.F. COUPLING CONDENSER

A POPULAR high-frequency coupling circuit at the moment is that in which there is a choke in the screen-grid valve anode circuit and a coupling condenser between the anode and the tuned-grid circuit of the detector or following valve. The value of this condenser is not critical, but if the coupling is made to it then mains ripple may be passed on to the detector stage. A preset type condenser having a maximum value of about .0003 microfarad is useful in this position. The maximum value is not sufficient to pass on low-frequency impulses, such as mains ripple, while the ability to control the value of this coupling condenser gives you a nice control of selectivity.—L. A.

## A SAFETY POINT

WHEN wiring pilot light connections from adjacent valve-holders on mains-operated sets, it is wise to avoid using the



rectifier valve filament feeds. A glance at the accompanying sketch shows that the rectifier filament is at the full H.T. voltage above earth potential. If, as is often the case, the indicator lamp-holder is earthed at one side, you may get an H.T. "short" which will damage the rectifier. G. E. H.

## L.F. STABILITY

IF you are building a set with several iron-cored inductances in it, keep their fields at right angles to one another, or you may get trouble with L.F. instability. This is especially advisable in a 2-L.F. set employing two transformers, and is even more important than keeping the leads short. Earthing the cores may help matters but it is more a case of trial and error, since it may make the trouble worse.—T. R. E.

## WATERPROOFING AERIAL ROPES

ALTHOUGH the insulated side of an aerial system should receive all the careful attention due to it, one should not forget that aerial guy ropes and other ropes appertaining to the system must deteriorate in time. This deterioration can easily be retarded by treating the ropes in the following way:—

Dissolve a pound of common alum in a bucketful of boiling water and let the solution cool down. Then put the ropes in the solution and leave for a few days. Take them out and without wringing them hang the ropes up to dry.

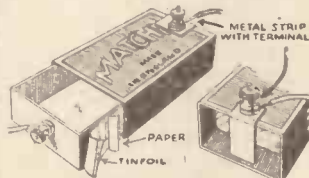
This treatment will prevent the ropes deteriorating for at least two years.—D. M.

## THRESHOLD HOWL

IS your short-wave set subject to threshold howl? Here are a few tips to cure it. A grid leak across the transformer secondary is a fairly sure cure, but do not go below 1/2 megohm or the amplification will drop off appreciably. If you have no leak on hand a .001 condenser will often do, or sometimes merely reversing the transformer connections (change over IP and OP or IS and OS) will effectively cure the trouble. A "grid stopper" consisting of several heavy pencil lines on a piece of paper in the grid lead of the first L.F. valve is another good dodge to overcome this nerve-wracking noise.—R.

## A HOME-MADE CONDENSER

THE sketch shows a simple series aerial gadget which is very handy for controlling selectivity. It consists of a simple sliding condenser made up from two strips of tinfoil, a matchbox, and a strip of paper to act as the dielectric. As the matchbox is pushed in the aerial capacity is increased. The strip at the end makes a positive contact to

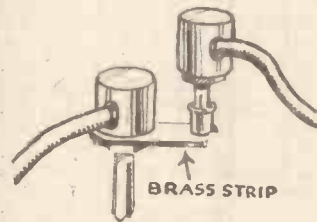


short out the home-made condenser when you want a direct aerial connection to the set.

The fact that the box is not made of a good dielectric or insulating material is not of much consequence as sufficient condenser effect is obtainable.—A. W. P.

## A HANDY DUAL PLUG

OFTEN the same H.T. or G.B. tapping is required for two leads. A useful plug can be made up to provide for this. Cut a brass strip approximately 3/4 in. by 1/2 in., and in one end drill a hole large enough to clear the threads of a wanderplug. On the other end solder a socket from an old H.T. battery. Place the strip over the threaded portion



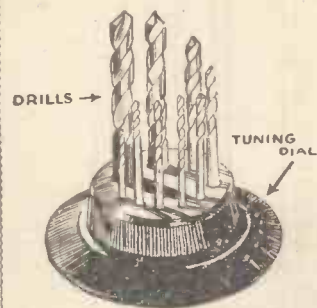
of the plug and secure by a black or red bush. The second plug can then be inserted in the socket at the other end of the strip. E. M.

## STABILITY

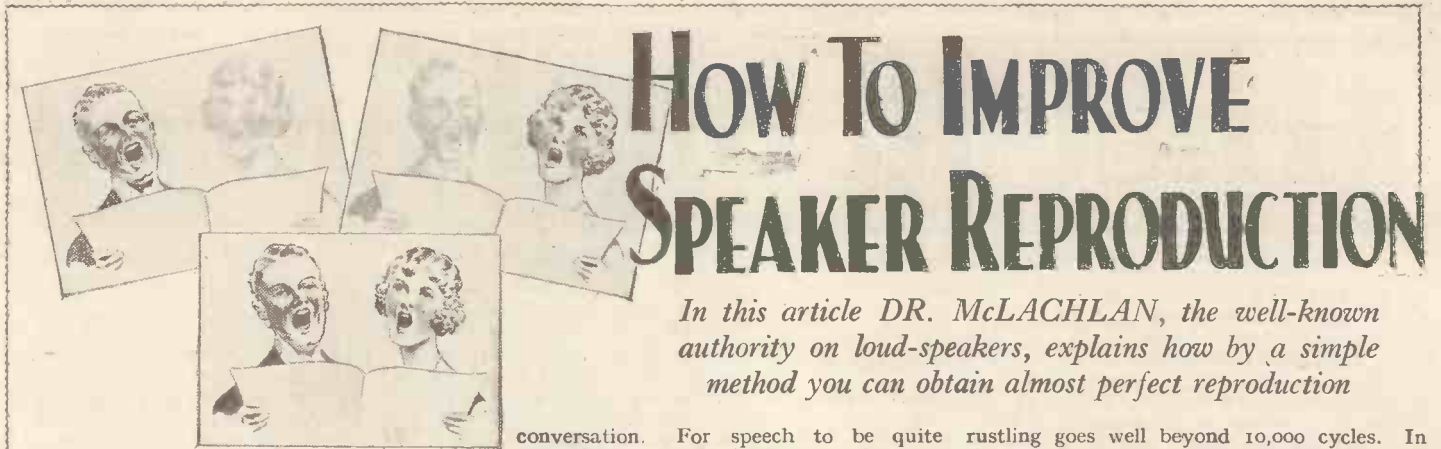
WHEN making a new short-wave set of your own design it is advisable to cover the baseboard with copper foil and to make all your earth connections to this. Some people query this practice, saying that it makes the set dead, but this is only due to the fact that it is very stable. It is not good practice to use tin foil, however, as this has a comparatively high resistance, nor is it wise to make the L.T. connections via the foil.—H. R.

## A STAND FOR YOUR DRILLS

A USEFUL drill stand can be made from an old tuning dial as shown in the sketch. With a pair of dividers describe a circle on the top of the dial.



The distance in from the edge should be half the diameter of the largest drill size plus about 1/16 in. Drill each hole about 1/4 in. deep, with the drill it is to hold, starting with the smallest drill. The dial can be screwed to the bench so that the drills will not get lost. M.



# How To Improve Speaker Reproduction

In this article DR. McLACHLAN, the well-known authority on loud-speakers, explains how by a simple method you can obtain almost perfect reproduction

IN ordinary speech and music the range of frequencies required is very extensive. On the average it works out at about 30 to 12,000 cycles per second. In musical technology this interval is roughly eight octaves. Instruments like the violin, piccolo or the flute do not reach the lower frequencies, but they all go up to the ten-thousand cycle region.

Scientific analysis of sounds from various musical instruments indicates that the average human ear can detect readily when the upper register is reduced by two octaves. If the highest frequency were 12,000 cycles, a reduction of two octaves would remove everything above 3,000 cycles. The sound would then be woolly and unnatural. For natural brilliance, therefore, it is essential that the high tones should not be seriously reduced.

## BALANCE

If the range is extended from 3,000 to 6,000 cycles we are still short of the requisite range by an octave and the musical ear can detect a lack of naturalness in the sounds. The lower register is below middle C on the pianoforte, whose frequency is taken by physicists to be 256 cycles per second, but which varies according to the "pitch" whether concert or otherwise. There are various concert pitches which average out between 260 and 270 cycles according to the class of music to be performed. Singers, of course, prefer the pitch to be down a little because their notes are then more readily obtained.

If the lower register is removed, for example, suppose all the cellos, double basses and trombones in an orchestra were dumb, the "air" of the piece being played is still distinct, but lacks background and body. Scientific investigation shows that the bass register harbours the "energy" or "power" in the music to give it body and to balance out the rather irritating influence of the high-pitched instruments if played alone. Put more concisely, the energy of music resides in the low tones, whilst the characteristics and interpretational qualities reside in the upper tones.

The same argument can be applied, perhaps a little more forcibly, to speech. If in reproducing speech all the tones above 1,000 cycles are removed, it is almost impossible to understand what is said. On the ordinary house or business telephone there is little reproduced above 2,500 cycles per second. As everyone is aware, when speaking to a stranger it is often difficult to catch his name, and his words are largely guessed from the general trend of

conversation. For speech to be quite natural it must be reproduced at the same intensity as the original, and all the frequencies up to 10,000 cycles must be present in proper proportion.

If the register below 250 cycles is removed, speech is still clear and intelligible, although some of its body and quality have gone. This proves, however, that the interpretational qualities do reside in the high audio frequencies.

## FREQUENCY RANGE

Now let us consider these scientific facts in relation to the average reproduction from a radio receiver. In these enlightened days when so many listeners take an active interest in the technicalities of radio, few, if any, will go so far as to say that their reproduction is perfect. The imperfections are, of course, due

rustling goes well beyond 10,000 cycles. In the same way key or coin jingling does not come over properly. The natural frequency of a halfpenny is about 12,000, and this won't be heard if the speaker cuts off at 4,500. All we do hear is a muffled bang. Careful listening will reveal that orchestral instruments do not sound quite natural because the frequencies above 4,500 are not reproduced adequately.

Having revealed one salient reason for lack of colour and naturalness in broadcast reproduction, the reader will now ask the question, what are you going to do about it? That, of course, rests with him ultimately, but in the meantime one can indicate a path of progress.

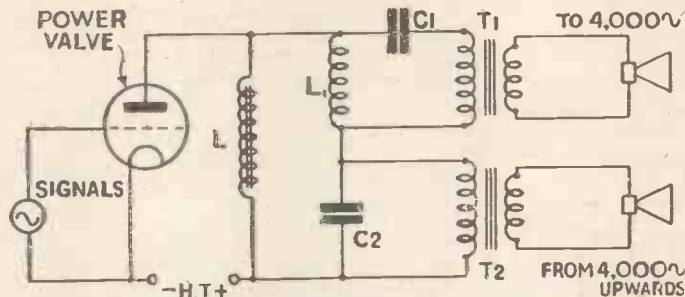
## DIAPHRAGM SIZE

The performance of a moving-coil speaker depends, amongst other things, upon the size or diameter of the conical diaphragm. A small diaphragm, say 4 inches in diameter, will sound high-pitched and squeaky, whereas one 8 inches in diameter will give results to which we are all well accustomed. Now if we combine the 4 and 8-inch diaphragms in a certain way the results will be definitely improved. The effect of the small diaphragm will be to extend the range beyond 4,000 cycles, probably up to 7,000 cycles. To go beyond this latter frequency another diaphragm might be necessary, but we will content ourselves with only two units at present.

To obtain satisfactory results it is essential to divide the output from the power valve into two parts, comprising (1) frequencies up to 4,000; (2) frequencies from 4,000 up to 7,000 or further. This division is accomplished by the aid of an auxiliary inductance and two auxiliary condensers as shown in the diagram. Each speaker has its own transformer. Although this is not absolutely essential it simplifies matters. Transformer  $T_2$  supplies the large diaphragm unit, whilst  $T_1$  supplies the small diaphragm unit. Condenser  $C_2$  is of such capacity that it by-passes currents above 4,000 cycles but obstructs those below this frequency and forces them through  $T_2$ . The choke  $L_1$  by-passes currents below 4,500 cycles, but compels those above 4,000 to pass through the primary winding of transformer  $T_1$ . Condenser  $C_1$  prevents frequencies below 4,000 from passing through  $T_1$ . When  $C_1$ ,  $C_2$  and  $L_1$  have the proper dimensions, the current from the power valve is divided.

By employing an arrangement of the nature shown it is possible to effect a very substantial improvement in the reproduction of broadcast programmes. Before attempting to do anything of this nature it is well to remember the man who took a standard motor-car chassis, removed the engine and replaced it by one of much greater power. The engine performed its job all right, but the chassis fell to bits under the increased strain. Now the radio receiver won't fall to bits, but the point is this: in these days where high selectivity is called for, so that England can hear what

(Continued on page 92)



Circuit arrangement for operating two speakers working on different frequency ranges.  $L$  is the anode feed choke

to various causes, but at the moment we want to investigate this question of clipped frequency range.

What is the frequency range to be expected from a modern loud-speaker? The extent of the range depends upon the type of speaker and also upon its design. Since moving-coil speakers are now in the majority, we can safely concentrate our attention on them alone. An average range for a M.C. speaker in the usual radio set is about 100 to 4,000 cycles. The register could be extended below 100 cycles by using a large baffle, or preferably by removing the speaker from the cabinet and fixing it behind a hole in a wall.

The range cannot readily be extended above 4,000 cycles for a single speaker without impairing its working in other respects. Referring to the data set forth above, it is evident that more than an octave is missing from each end of the frequency range required for proper reproduction.

This is at least one good reason why radio broadcasting does not sound natural. Doubtless the reader has detected distortion of various sounds reproduced by his loud-speaker. For instance, no one has heard paper "rustling" as the announcer turns over his news sheet. What we hear is like someone attacking a thick sheet of wood with a drum stick. This is mainly due to suppression of the frequencies above 4,000-cycles. Paper



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# On Your Wavelength!

## IN THE RIGHT DIRECTION

**I**T is good news that the prices of some classes of valves have been brought down by the B.V.A. Battery screen-grids and pentodes cost a shilling apiece less, whilst the mains user gains eighteenpence on screen-grids and on both high-frequency and low-frequency pentodes. He is also a bob to the good on triodes. I must say that I had expected the price reductions to cover a rather wider field, for I still think that power valves are too highly priced. Not many people know that the prices of power valves are fixed in a rather extraordinary way. The criterion is the plate current at a given plate voltage. If a valve is a fraction of a milliampere above the maximum set for the small power class it has to go up into the medium power division. This is not a very satisfactory state of affairs, for it may tend somewhat to cramp the style of designers. Surely the retail prices of valves should be based upon production costs, and not upon their appetite for high-tension current.

## A TICKLISH POINT

**I**N spite of the warm weather, two of my readers have been indulging in heated argument concerning the behaviour of the condenser in a series-tuned circuit. One says the current passes clean through the condenser just as if it didn't exist, whilst the other maintains that where there is a condenser there is essentially a discontinuity in the circuit. And they ask me who is right! Well, all I can say is that Maxwell himself found this particular problem a bit of a nut to crack. There is no doubt, of course, that the charging current on one plate of the condenser is exactly equal to the current which leaves the opposite plate; so that to all intents and purposes, the current gets through. But it isn't exactly the same current, though Maxwell showed that strains are set up inside the condenser equivalent to what he called a "displacement" current through the dielectric. Actually, it gets more complicated the further one goes into details, so that I would suggest calling the bet off.

## A BEAUTIFUL INSTRUMENT

**Y**OUR "Thermion" had the honour of being the very first writer on wireless topics to see and hear the new Columbia battery radiogram. I have long maintained that the battery user was being neglected by designers, for so many of them devoted almost the whole of their energies to mains set problems, regarding the battery set as something almost beneath contempt. I have contended again and again that, so far from being contemptible, the battery set could and should be a first-rate piece of apparatus. The Columbia radiogram provides ample proof that I was

not far wrong. It looks like a mains radiogram and it sounds like one. Absolutely the only visible difference from the outside is a small handle for winding up the clockwork motor. When the switch is turned to either the radio or the gramophone position, and the instrument brought into action, reproduction is of the volume and of the quality that we used to associate only with the best of mains receivers. In many ways the quality is better than that of mains apparatus, owing to the absolutely silent background—the hum problem does not arise with battery apparatus. The instrument should be on the market within the next few weeks, and you will be able to see and hear it for yourself. The Columbia radiogram makes use not of class-B, but of Q.P.P., which, as I pointed out a week or two ago, has certain advantages of its own. The volume that it will handle without a trace of distortion will astonish those who have never before realised what can be done with batteries.

on an ordinary set, as it was relayed from the B.B.C. transmitter.

## WAVES FROM SPACE

**I**N a recent report from the Bell Telephone Laboratories, some very interesting statements are made about atmospherics which, it is said, come, not from the air, or the clouds, or even the sun, but apparently from stars far out in the depths of space. It has been found that these long-distance crackles arrive on a wavelength of about  $14\frac{1}{2}$  metres and that they come from a definite point in the constellation Sagittarius. What is intensely interesting is that this point is near the centre around which the stars that form our universe are known to be flowing in a gigantic stream. How these atmospherics from space are caused no one yet knows, though it is believed that they are due to stupendous electrical storms, whose magnitude far surpasses anything hitherto conceived in this way.

## IN, BUT NOT OUT

**I**NTERESTING again is the fact that, though we can receive impulses from the depths of space on the  $14\frac{1}{2}$ -metre wavelength, we are apparently unable to retaliate. In other words, impulses can come through the Heaviside and Appleton layers from the outside, but most of the transmissions made on earth appear incapable of penetrating these layers from the inside to the outside. Recent demonstrations by the N.P.L. showed how a signal sent vertically upwards was thrown back in a fraction of a second from these reflecting layers. On the other hand, certain of the short wavelengths do seem able to pass through the Heaviside and Appleton layers in both directions. In short-wave work it is sometimes found that echoes of original signals occur after intervals so long that a journey of more than half a million miles out into space and back again must have been made. It is believed that these echoes are reflected back to earth by a gigantic conducting layer which surrounds the sun.

## SECRET WIRELESS

**T**HE Postmaster-General I see has called the bluff of one particular party who claimed that he could listen-in to private messages sent over the transatlantic 'phone. Post Office experts who were sent round to investigate the matter, found that the best the eavesdropper could do was to pick up occasional fragments of one side of the conversation—which is not exactly thrilling at the best! I remember one particular occasion on which quite a number of listeners reported the interception of what they imagined to be a personal conversation between two eminent financiers, but which actually happened to be an Anglo-American discussion on economics, specially arranged for broadcasting. For this transmission the secrecy apparatus was, very naturally, cut out of circuit, so that it was plain sailing for anyone who wanted to pick it up direct on the transatlantic wave. At the same time, they could have heard the whole thing much more simply and clearly

## ARTISTES IN THE WEEK'S PROGRAMMES



## On Your Wavelength! (continued)

### THE RESHUFFLE

**T**HE details of the B.B.C.'s new regional scheme came probably as a great surprise to many, though actually the scheme is on the lines that I have been urging in these columns for a long time now. It must be nearly four years since I first pointed out that the idea of relaying one and the same national programme from five different centres and on five different wavelengths had little to commend it and suggested that if 5XX's power were raised to 100, or even 150 kilowatts, this station could adequately serve the whole country with the National programme.

This whole idea is the real basis of the new scheme. 5XX is to go up to at least 100 kilowatts, and though a Scottish National probably with a wavelength of 261.1 metres finds a place in the plan, I very much doubt whether it will actually be found necessary. The Regional programmes will be supplied by London, Washford Cross, Droitwich, Moorside Edge, Westerglen, Belfast, and probably by new stations erected near Inverness and Carlisle. The Plymouth relay will also become a 5-kilowatt Regional transmitter. I have just spent half an hour drawing circles on the maps of England and Scotland and, generally speaking, the scheme seems a very sound one.

### CAN WE DO BETTER?

**I** AM not at all sure, though, that a slightly better arrangement could not be made than that which has been suggested. After all, the aim of every European country nowadays should be not to grab as many wavelengths as possible, but to make do with the smallest number that will give an adequate service to the whole of its territory. Under the suggested arrangement the service area of the Droitwich Regional very largely overlaps those of London, Moorside Edge, and Washford Cross. Again, a regional somewhere near Carlisle would overlap to a surprisingly large extent the areas of Belfast, Westerglen, and Moorside Edge. It seems possible that if the power of Westerglen, Moorside Edge, Brookmans Park, and Washford Cross were increased to the permitted maximum the Droitwich Regional, the proposed North-Eastern Regional, and Plymouth might be eliminated without loss.

### BENEFITS

**O**NE big advantage of this idea would be that we could afford to dispense with the three shortest wavelengths allotted to us—203.5 metres, 261.1 metres, and 267.4 metres. These short wavelengths, as everyone knows, are not too good for the coverage of a big area, owing to their fading propensities. If we gave them up we should be using nothing under 285.7 metres and all of the home stations could expect to maintain their services throughout the year over large areas.

### AN EYE TO THE FUTURE

**T**HE B.B.C., in the past, if I may say so, without offence, has been rather inclined to design its broadcasting schemes on a basis of the reception conditions prevailing at the time and without looking forward sufficiently into the future. Its first plans were admittedly made on a crystal basis, though even then the crystal receiver was rapidly disappearing. It could quite safely found the new scheme on a three-valve receiver basis, for by the time that all of the new stations are in operation the three-valve set, already by far the most popular of receivers, will probably be the smallest set in general use. It must always be borne in mind that the prices of valves, components, and complete sets have come down so much that the three-valver of next season will cost in all probability little more than the two-valver of last and far, far less than the single-valver of the early days of broadcasting. When the original "crystal-basis" scheme was brought out the average cost of a decent crystal set with a good pair of telephones was not much less than £4 or £5.

### A THREE-VALVE BASIS

**I**F you don't believe me—well, a set of plug-in coils for the medium and long waves then cost about seventeen shillings; a coil holder, ten shillings; a tuning condenser, ten shillings; a good pair of telephones, forty-two shillings; a fixed condenser, two shillings and sixpence; an 8 in. by 10 in. ebonite panel at three-farthings a square inch, five shillings; and terminals, etc., some two shillings. I am speaking, of course, of the days when components had begun to be produced in quantities. Just before the beginning of broadcasting a crystal set cost very much more. My first .001-microfarad variable condenser cost me £5, telephones £3 3s., a "loose-coupler" £3 15s.,

Do not screw the top terminal of a screen-grid valve too hard on or you may loosen the ebonite top piece in its cement fixing. Only a light pressure on the top terminal is needed if you have a proper spade tag



connector for the anode lead. Special plug-in adaptors for anode connections are obtainable and save the little trouble of screwing down the terminal cap—useful if you are constantly making circuit changes

a fixed condenser 5s., and crystal detector 10s. 6d. Anyhow, by the time that the Regional Scheme really settles down the B.B.C. can safely calculate on broadcasting to an audience all using a minimum of three valves, and it can therefore allow somewhat wider boundaries for their service areas, particularly if it does not make use of very short wavelengths.

### BRIGHTER BULLETINS

**M**OST listeners, I expect, are pleased with the latest type of news bulletins in which Blattnerphone records of the day's big events are turned on. Many of us cannot hear the actual running commentaries of these events during the afternoons or witness them for ourselves, and in the past we have missed a great part of the accompanying thrills. But now, when the announcer not only gives us the result of the match, but also turns on the canned commentary, we can recapture a great deal of the excitement. It is a great pity, though, that the Blattnerphone cannot be improved a bit. It is a wonderful instrument, but no one can deny that its speech records suffer from both muzziness and blasting. Myself, I wonder that the B.B.C. does not try to develop sound-on-film recording.

### SPAGHETTIS AND BREAK-DOWNS

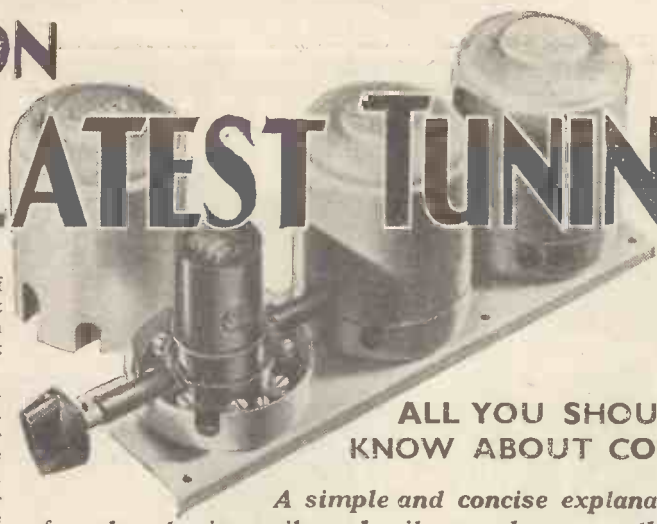
**T**HERE was a very interesting letter in a recent issue of AMATEUR WIRELESS from a Glasgow reader on the subject of troubles caused by broken-down spaghetti resistances. As many readers will know, these are made by winding fine resistance wire round a flexible core, the whole being subsequently covered with an insulating sleeve and provided with a couple of spade tags. Though spaghettis will stand up to any reasonable treatment, it must be borne in mind that they are somewhat delicate components and they will not bear rough handling. A very frequent cause of breakdown is to make a spaghetti bridge the space between two terminals by stretching it rather tightly. Matters are made still worse if it is bent sharply at the inner end of one of the tags.

### TWO HINTS

**T**O keep spaghettis in good order, there are one or two golden rules to observe. First of all, discover the maximum safe current for the resistance—this information is usually supplied by the makers—and see that you keep well below it. Secondly, never put any strain upon spaghettis by pulling them an extra eighth of an inch to reach a distant terminal and, thirdly, don't bend them any more than you can possibly help. I must have used miles of spaghettis in the last three or four years for various purposes, and the only trouble that I can ever remember having was certainly due to my own folly in ill-treating them.

THERMION.

# W. JAMES ON THE LATEST TUNING COILS



**ALL YOU SHOULD KNOW ABOUT COILS**

*A simple and concise explanation of modern tuning coils and coil wavechange methods*

THERE are three usual ways of connecting tuning coils so that the long and medium wavelength parts may be brought into circuit by switching.

In the first method, marked A in the sketch (Fig. 1), the long and medium wavelength coils are connected in series. Both coils are wound in the same direction and the long wavelength section is short-circuited when we wish to tune over the medium wavelengths.

When the switch is opened, the two coils are in series and work together. In practice the two coils are usually wound upon a single former. As the coils are fairly near together the long wavelength part may affect the medium-wave part, reducing its efficiency. Sometimes the loss is serious, but generally

will be the tuning, because the loading of the aerial is reduced. But there is no point in carrying this too far as, from a certain tap or primary of a given size and position, the improvement will be negligible.

The signal strength also depends upon the

It is somewhat like joining resistances in parallel. When there is more than one path the net effect is less combined resistance.

The long wavelength section may or may not add appreciably to the losses of the medium-wave section when they are in parallel. It depends upon how the coils are arranged, and care is needed to avoid unnecessary losses.

In the third method the coils are separate, one or the other being connected to the circuit. If the coils are so placed that they do not couple, that is, one is not influenced by the other, then it is possible to use really effective coils.

It is the medium, wavelength one which normally presents most difficulties. Not that it is difficult to produce a coil of low losses. The difficulty generally lies in using the coil, its position with respect to other parts often being such that losses are added to the circuit.

An ordinary air-core coil must be of relatively large size if it is to have low losses, and this very fact makes it all the more difficult so to position the coil that the losses are not materially increased.

Separate coils can be arranged one at right angles to the other provided they are well spaced. For better results they can be separately shielded.

However, nowadays it is rare to find so much care being taken of coils. It seems to be essential to have parts as small as possible.

**IRON-CORE COILS**

Iron-cored or dust-cored coils can be constructed to have good efficiencies. They are compact too, and meet modern requirements. The difficulties of gang tuning increase as the coils are made more efficient, but the gains which result from using good coils are so great that it is well worth using the best available provided they are used correctly.

In the case of aerial coils there is often a small coupling coil. The three arrangements of Fig. 1 when fitted with aerial couplings then appear as in Fig. 2. It is possible with the series or parallel arrangement to use a single aerial coil, but to proportion this for good all-round results is difficult, and therefore the better practice is to fit separate aerial coils to the medium and long wavelength sections.

Aerial coils are often tapped instead of having primaries. The results obtained from a coil having, say, centre tapplings for the aerial and primaries having half as many turns as the secondary coils, are not identical.

Generally, the smaller the primary coil or the fewer the number of turns, the sharper

will be the tuning, because the loading of the aerial is reduced. But there is no point in carrying this too far as, from a certain tap or primary of a given size and position, the improvement will be negligible.

The signal strength also depends upon the

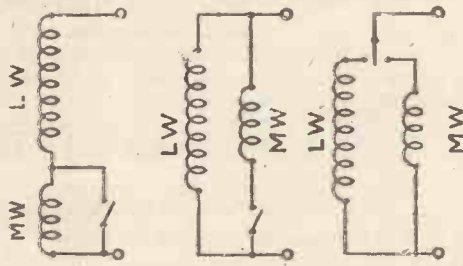


Fig. 1.—Three ways of connecting two-range coil units

the coils are so proportioned that the loss is slight and not worth bothering about.

It should be noted that the inductance of the pair of coils when the switch is in the long wavelength position is equal to rather more than the sum of the inductive values of the coils taken separately. Thus, if the inductance of the small coil is 200 microhenries and the big coil is 1,800, the total inductance measured across the outside ends is rather more than 2,000.

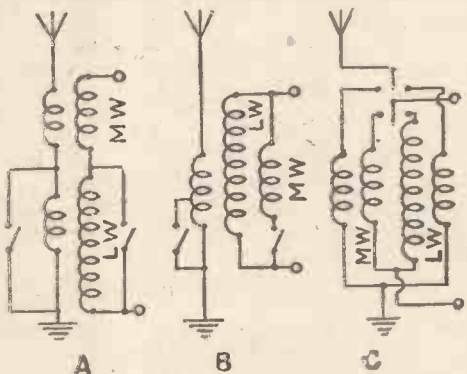


Fig. 3.—Aerial coils having taps for the aerial

If the coils are spaced the total inductance will be nearer 2,000 than if the coils are fairly close.

This style of coil, with the two sections in series, is the one most frequently used. The second method is that shown in sketch B. Here the long wavelength coil is always in

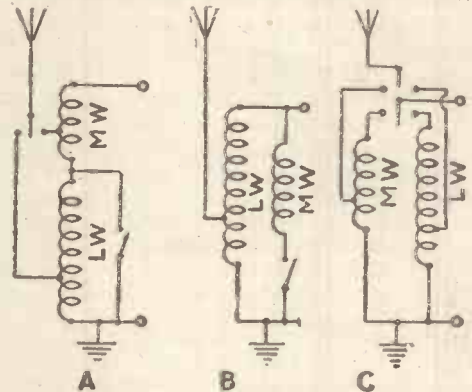


Fig. 2.—Aerial coils having separate primaries

efficiency of the coil and the position of the tap or the size of the primary. Here again, if you were testing on the local station you would discover that at one particular tap or for a primary coil of a given size and position, the strength would be the maximum.

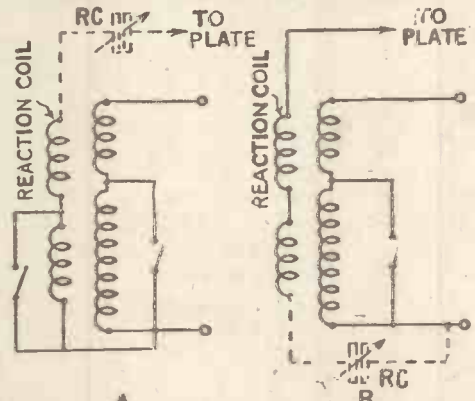


Fig. 4.—Two methods of connecting reaction coils

For primaries or tapplings giving a few turns more or a few less in the aerial circuit there would be no great difference in the results. In other words, the best number of turns is not sharply defined.

A further point now is that you would

(Continued on page 87)



Constructional details of the "Britain's Favourite Three" receiver. See centre pages last week.

ing of the baseboard layout if dimensions were superimposed on the blueprint sketch; and in any case you can easily find out where to screw down the various baseboard components by using the blueprint as a template. This will be described later. The panel is of 1/4-in. plywood, and if you intend housing

**Y**OU can build the latest version of the "Britain's Favourite Three" in one evening.

There is no metal work to be done. There are only a few components to mount and it is not absolutely essential to solder any of the leads.

When you have built the set you do not have to waste any time in preliminary adjustment, ganging or trimming. It will work right away—that is if you follow these instructions carefully!

**ASSEMBLING**

First of all put out the whole kit of parts on the work-bench and check them up with the components list to see that you have everything at hand.

If you want to make the construction

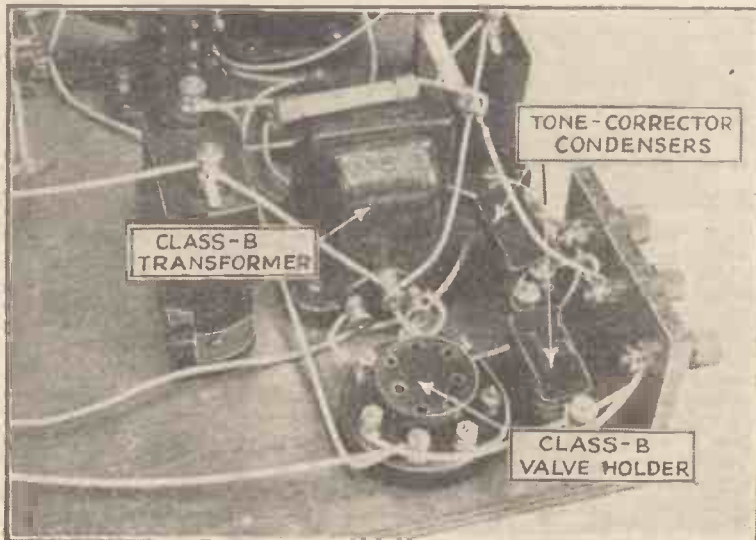
as straightforward as possible then get a copy of the full-size blueprint. It is possible to make up the set from the scale reproduction of the blueprint published last week, but there is nothing like one of the AMATEUR WIRELESS blueprints to simplify set construction.

Copies of the blueprint for the "New Britain's Favourite Three" are obtainable from the Blueprint Department, "Amateur Wireless," 58-61 Fetter Lane, London, E.C.4. Ask for print No. A.W. 394 and send a postal order for one shilling only, to cover the cost of postage and packing.

**THE PANEL**

First of all the panel must be cut to shape and then fixed at right angles to the wooden baseboard. As the panel is of plywood and not of ebonite, you won't find it difficult to do this first part of the constructional work.

You will see that on the full-size blueprint no dimensions are given regarding the baseboard, except the overall dimensions of 12 in. by 10 in., but that the drilling centres of the various components on the panel are shown. It would complicate the wiring and the draw-



The Class-B output end of the "Favourite." Note the decoupling resistance in series with the primary of the driver transformer and the two .01-mfd. tone corrector condensers across the speaker output

**THE COMPONENTS YOU WILL NEED**

- |  |   |
|--|---|
| <b>CABINET</b><br>With baseboard 12 in. by 10 in. and panel 12 in. by 7 in. (Osborn, type 237).  | <b>HOLDERS,</b><br>2—W.B. Farish, Bulgin,<br>1—W.B. Farish  |
| <b>CHOKES, HIGH-FREQUENCY</b><br>1—Peto-Scott (Wearite, Lissen, Igranie, Bulgin, Varley, Telsen, Sovereign, Goltone).  | <b>RESISTORS</b><br>3—Dubilier one 20, (Eric, Farish)   |
| <b>COIL, IRON-CORED</b><br>1—Varley aerial, with reaction, type BP30 (Colvern, Igranie, Wearite).  | <b>SUNDRIES</b><br>Three yards Connecting<br><b>TERMINALS</b><br>5—Small marked (Clix, I<br>5—Single<br>4—Belling H.T.<br>2—Belling marked (Ealex). |
| <b>CONDENSERS, FIXED</b><br>2—Dubilier .0002-mfd., type 670 (Lissen, T.C.C., Telsen).<br>2—Dubilier .01-mfd., type 670 (Lissen T.C.C., Telsen).<br>2—Lissen 2-mfd. (Dubilier, T.C.C., Telsen). |   |
| <b>CONDENSERS, VARIABLE</b><br>1—Utility .0005-mfd. complete with disc drive, type W318.<br>2—Utility bakelite; one .0003-mfd. and one .0005-mfd. (Polar, Telsen, Lissen, Magnum).             |   |

your latest "Favourite" in the recommended cabinet then the panel must be cut away at the sides as shown. This gives the receiver a very pleasing and modern appearance.

Now there are holes to be drilled for the reaction and series aerial condensers, the on-off switch, the aerial tuning condenser, shaft, the tuning dial escutcheon plate and the wood screws along the lower edge.

Cross lines are shown on the blueprint, marking the drilling centres. It will be seen that there is one hole drilled, 1 1/8 in. from the bottom of the panel. The wavechange switch rod passes through this.

**ASSEMBLING THE COMPONENTS**

Dimensions are shown of the tuning dial escutcheon plate hole. Slight variation in these dimensions may be necessary, if you use any other make of condenser.

# BRITAIN'S RITE TAREE

of the latest version of an ever-popular "Amateur  
The specification of this set was described in the  
week and these practical notes make child's play of  
the job of making up the set

This escutcheon plate hole is  $1\frac{5}{16}$  in. deep, and is cut  $1\frac{3}{8}$  in. from the top of the panel. The escutcheon plate itself should be just a push fit in the hole, so that the flange overlaps. A bridge piece at the top holds the plate in position.

Of course, if you are using the components specified first in the list and have a copy of the full-size print, you have no need to bother about marking up the

## NEED TO BUILD THIS FAMOUS SET

**VALVE**  
4-pin (Lissen, Graham-Benjamin, Wearite, Telsen, Ready Radio).  
7-pin (Wearite, Benjamin).  
**CES, FIXED**  
1-watt, one 2,000-ohm, 10,000-ohm and one 3-megohm  
Claude Lyons, Graham-

thin flex (Lewcoflex).  
wire and sleeving (Lewcos).  
**PLUGS, ETC.**  
Bellings-Lee terminals,  
A, E, L.S. (2), H.T.+  
Bulgin, Ealex).  
terminal blocks (Goltone).  
Lee wander plugs, marked:  
H.T.+ , G.B.—, G.B.+  
Ealex).  
Loc spade terminals,  
L.T.+ , L.T.— (Clix,

**SWITCH**  
1—Bulgin rotary toggle (Benjamin, Lissen, Telsen, Tunewell, Igranic).  
**TRANSFORMERS, LOW-FREQUENCY**  
1—Lissen Hypernik (Igranic, Ferranti, Varley, Bulgin, R.I., Lewcos).  
1—Lissen class-B (Multitone, Varley, Radiophone, Wearite, Benjamin, R.I.).

**ACCESSORIES**  
120-volt H.T. battery (Lissen, Ediswan, Drydex, Ever-Ready, Pertrix).  
9-volt G.B. battery (Lissen, Ediswan, Drydex, Ever-Ready, Pertrix).  
2-volt accumulator (Exide, Lissen, Ever-Ready, C.A.V., Pertrix).  
Permanent-magnet moving-coil class-B loud-speaker (Rola F5 class-B) Earth (Graham-Farish "Fill").  
Aerial (Electron).  
Down-lead (British Radiophone "Receptru").  
Lightning switch (Bulgin).

drilling centres. The print can be used as a template. Put it flat on the reverse side of the panel and scratch through the various screw holes and drilling centres.

Now you can use the blueprint as a template in just the same way to show the baseboard component positions. It is a good plan to mark these before the panel is screwed to the baseboard, but it is also equally advisable not to mount any of the components to either the panel or baseboard before the two are screwed together.

The next step is to mount the reaction and series aerial condensers on the panel. To fit the switch at the bottom and then to get the main tuning condenser into position. This condenser is mounted on a right-angle bracket at the base of which is the slow-motion shaft. The panel hole should be drilled large enough for this shaft to clear it easily.

touching it. The escutcheon plate should be clamped into position so that you can see how the condenser scale looks from the front.

The iron core coil can be mounted, and here again the wavechange control shaft must clear the panel hole.

It does not spoil the panel appearance by cutting both the wavechange shaft and tuning condenser shaft holes large enough to allow for clearance, as the knobs in any case cover the opening.

The coil is screwed down on to the bottom part of the screening can. It should be noted that a small length of bared wire is twisted around the shank of terminal No. 2 on the coil and then twisted underneath the base so that it makes contact with the bottom part of the screen. This connects the screen to earth.

Make sure that the top part of the screening can fits over the coil without touching the condenser vanes when the condenser is in its minimum position. Now

the other baseboard parts can be mounted.

When you have pricked through the mounting hole positions from the full-size blueprint, the valveholders, transformers and so on can be screwed down right away. If you are working with the reproduction of the full-size

The condenser bracket should be fitted so that the control shaft does not scrape against the hole in the panel and so that the calibrated scale is fairly close to the reverse side of the panel without actually

touching it. The escutcheon plate should be clamped into position so that you can see how the condenser scale looks from the front.

The iron core coil can be mounted, and here again the wavechange control shaft must clear the panel hole.

It does not spoil the panel appearance by cutting both the wavechange shaft and tuning condenser shaft holes large enough to allow for clearance, as the knobs in any case cover the opening.

The coil is screwed down on to the bottom part of the screening can. It should be noted that a small length of bared wire is twisted around the shank of terminal No. 2 on the coil and then twisted underneath the base so that it makes contact with the bottom part of the screen. This connects the screen to earth.

Make sure that the top part of the screening can fits over the coil without touching the condenser vanes when the condenser is in its minimum position. Now

print then it will be necessary to scale off the mounting positions from this.

The seven-pin holder for the class-B valve needs mounting with care, and you must get it the right way round. The seven socket holes are shown in their correct position on the blueprint, and as the terminals of this holder are not numbered you must make sure that it is fixed the right way round.

Right-angle-mounting terminal strips are used, there being two at the right-hand side of the set, looking at the back, and three at the left. Twisted battery flexes make connection with the high-tension, low-tension and grid-bias sockets.

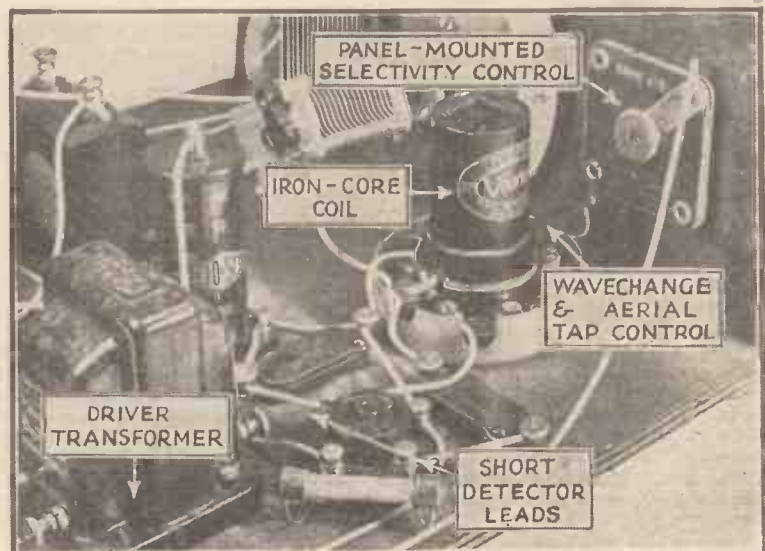
Two of the small fixed condensers are screwed to the baseboard and two others (the .01-mfd. tone-correcting condensers across the speaker output) are supported by the wiring. Three resistances are also supported by the wiring, with the result that apart from the terminal strips, coil and condenser, there are only ten components to mount on the baseboard. What could be simpler?

## WIRING

On the blueprint the wires are shown numbered, and you cannot do better than follow this order for your wiring. Most of the leads are short, but there are one or two long leads such as wire No. 1, which connects the aerial terminal of the moving plates of the series aerial condenser on the panel.

The final job in the wiring stage should be to check over all the connections. Here again the blueprint is helpful, for you can tick off in pencil each lead on the print as you examine each actual wire in the set.

A joy of this set is that it needs no preliminary setting out. When you have completed the wiring and connected up to the batteries, speaker, aerial and earth, it is all ready to work. Next week details will be given for making the most of the class-B stage and will include a full list of suitable valves.



A close-up of the detector end of the "New Britain's Favourite Three" showing the wiring of the iron-core coil. The solid dielectric condenser on the panel is the series aerial selectivity control

# OUR BROADCAST CRITIC



DINO GALVANI who took the leading role in "FLAGS on the MATTERHORN"

## A SWEDISH SINGER

MAIMA WIVSTRAND was the chief attraction in a variety programme this week, which advertised all its components as "acts being heard for the first time." I was immensely taken with this Swedish singer, whose voice I thought far above the average vaudeville voice. Moreover, she sang with great expression and her broken English added greatly to the charm of her performance. Wholly delightful.

Fritz and Schnitz, in their duologue on the subject of greyhound racing, were fairly amusing, I thought. Sorry not to be more complimentary. They must try again some time and think out something more funny to say.

Same about Max Hoffman. Somebody in the studio audience kept laughing at his puns. Perhaps I was not inclined for that sort of humour, for I could not raise a smile.

John Oliver sang "Father O'Flynn" quite as well as it need be sung, but I was surprised to learn that it was a Scottish song. The announcer said so. Therefore it *must* be.

I hope you heard *Flags on the Matterhorn* if you missed it a year ago. I did not listen for very long this time; I remembered the story too well. A vivid play.

"Please Ring, an Entertainment of Jingles and Jangles in Song, Sketch, and Story," looked rather attractive in the programme. Having heard some of it, I make the suggestion that the B.B.C. labels these things more carefully. Is it not possible to have a notice printed above thus:

### FOR THE SIMPLE-MINDED

The dialogue of this production must have delighted many simple-minded people. I suggest the notice because it is a pity for these people to miss what is obviously intended for them.

I rather enjoyed the programme by the Master Singers. I suggest they be provided with a "spot" of echo for next time. I could not avoid a strong feeling of longing for resonance. I wish someone at the B.B.C. had enough imagination to use that echo room judiciously.

Troise and the Mandoliers produced something far better than I imagined they would. And a well-thought-out programme, too.

I was also pleasurably surprised at the quite beautiful effects produced by the five saxophones of the Five Saxes. I think saxophones should be always taken neat. They do not blend with other instruments at all well. The Saxes played a delightful arrangement of the "Londonderry Air," with pleasing harmonies and still more pleasing expression.

Davy Burnaby made a charming compère to the Saturday evening vaudeville, in which Johnson Clark was very funny. The studio audience made the show go better than it would have done had there been no audience.

I noticed great response to Johnson Clark's doll when it sobbed pathetically during its song about the loss of a pet rabbit. Mr. Clark asked it if its working hours were long. The doll said, "No; just the same as yours. Sixty minutes."

Stanley Holloway's sketch was quite up to the old Co-optimistic standard. He was extraordinarily good all through.

Leo Mussi's voice is far above the average vaudeville voice. As there have been two people this week of whom that may be said, perhaps it is not too much to hope for a general improvement in this respect.

Also there were two tenors in the relay from the Shakespeare Theatre, Liverpool, worth mentioning. One of them took a high E flat without breaking into falsetto. That is very unusual.

Herbert Heyner's diction—I heard him sing a song by Delius—is remarkable. I wish all singers would imitate him in this respect.

Listening to Rudolph Dolmetsch playing on a harpsichord, I was exercised in my mind as to why he called his own composition "The Waves." I liked it, and thought it real harpsichord music, but failed to see the justification for such a title. The Dance for Harpsichord of Delius (which followed) was exactly what should not be written for that instrument. The modernity of its construction was wholly

## PROGRAMME POINTERS

*Outside broadcasts, particularly of a light nature, are always welcome. We have had one or two recently which have proved acceptable. There is, however, a great danger with these relays. They are not all designed for broadcasting in the first place. The relay from the Shakespeare Theatre, Liverpool, was a bad one in the broadcasting sense, not only because the comedians played to their visible audience without a thought for the wireless listeners, but because the encores were too many. The tenors (mentioned in these notes) sang in all about eight songs, in response to tumultuous applause. This was rather tiring for wireless listeners who could not see what was going on. The B.B.C. pays for these relays—pays heavily, no doubt; it is not unreasonable to suggest that the B.B.C. must insist that all relays from outside fall in with wireless ideas. It has been done, and it can be done again.*

foreign to the spirit of the old-world harpsichord. I hope next time Mr. Dolmetsch will play Bach and Couperin rather than modern works.

An acquaintance of mine stopped me the other evening and asked me to "tick the B.B.C. off." I said I should be delighted. He had, he said, been listening to a running commentary of a match at Wimbledon when, just as the excitement was at its height, the silly things (a translation of what he actually called them) faded it all out for the (vivid) news. He was furious. Will the B.B.C. kindly consider itself "ticked off?"

I heard a little of G. D. Cunningham's midday recital from the Birmingham Town Hall and enjoyed the resonance of the building. Which makes me firmer still in my belief that the echo-room should be used with the B.B.C. organ.

An occasional harp recital is by no means amiss. I enjoyed Frederick Hall. There is no doubt that the harp broadcasts well.

A word for the Western Studio Orchestra relayed from the National Museum of Wales in the lunch-hour. A nicely chosen programme, thoughtfully rendered.

Enid Cruickshank is always worth hearing. She sang most effectively with the C Orchestra this week. Look out for her again, especially my lady readers who sing. She will teach you something in control.

If you have not tried any of the Readings from Classical Literature (now as far as No. 24) on a Sunday afternoon, between five and half-past, please do so. I did not find Thucydides boring in the least, nor yet highbrow. Mr. Ronald Watkins is a delightful reader, and you will find the whole couched in dignified English. I shall listen again next week.

Eda Kersey's violin recital was worthy to be included in the five-thirty series on Sunday afternoons. I was very taken with playing of Joachim's arrangement of Brahms.

The Popular Oratorio Programme on Sunday evening was an excellent production and, moreover, thoroughly suitable for the hour (nine-five). We can do with many more of them until the symphony concerts come on again.

WHITAKER-WILSON.

A relay from the West Region will be taken from the annual camp of the Urdd Gobaith Cymru at Llangrannog, Cardiganshire, on August 3.

Tom Pickering will sing a number of Welsh songs in the Welsh Interlude for Daventry National listeners on August 5.

The second broadcast by the Society Six and their pianist in the Orange Hall, Portrush, will be heard by Belfast listeners on August 11.



"THE LATEST TUNING COILS"

(Continued from page 83)

discover that the best tap position or number of turns varies with the wavelength of the station used for testing. A good idea, therefore, is to make the tests at three spaced wavelengths in each range and to find the best average. This also applies to the sharpness of tuning, and the result in the end will be that the value chosen will not be the best for all wavelengths, but will be the best fixed tap or primary which gives the more nearly uniform results.

One of the chief points in coil design is this matter of getting the best average results. Some coils give best results at the lower end of the tuning range and the set feels lively over this range but practically dead at the top end.

Break through is that defect which is noticed when tuning over the lower part of the long wavelength range, the local medium wavelength station being heard. The station is said to be breaking through, and while this was a common enough fault at one time, it is so easily got rid of that modern sets are usually free from the defect.

As a rule a correctly proportioned coil is all that is needed, but in difficult cases the cure is to fit a small high-frequency choke in the aerial lead to the set. This stops the local station of medium wavelength from passing through to the grid coil, but hardly affects the strength of the long wavelength stations.

It is possible to make good coils having a tap for the aerial, but my own preference is for coils having primaries.

REACTION CONNECTIONS

Coils used in the detector circuit often have a reaction winding. Here again sometimes a single winding will suit over both wavebands, but it is usually much better to have separate coils. These are shown in the sketches of Fig. 4. One end of the reaction coil may be taken to the end of the grid coil that is normally connected to earth. In other cases it may be preferred to join one side of the reaction condenser to earth and then the two ends of the reaction coil are brought out to contacts.

When we come to consider the coils to be used in a set having ganged tuning, we quickly realise that accuracy of tuning must be given first place and that it might be necessary to change the design of, say, the aerial coil from the most efficient to one that allows of accurate tuning.

The point is this, that when you connect an aerial to the aerial coil you alter the tuning. This alteration must be one that can be compensated. Gang condensers have trimmers and it must be possible to adjust these once and for all. Therefore the effect of the aerial must be balanced over the whole range of adjusting the trimmers.

If now the aerial is taken direct to a tap near the grid end of the coil, you will find that the tuning can be made correct at one wavelength. At other points in the range, however, the tuning will be out of balance.

To avoid this the aerial is connected through a condenser of little capacity or it is taken to a tap near the earth end of the coil. In the case where a primary winding is fitted, the number of turns is reduced.

My point here is that the arrangement of the aerial circuit, when gang tuning is to be used, must be such that accurate tuning is possible at all points. This may well involve losing signal strength in the aerial tuning circuit, the tap or the size of the primary being below the optimum for maximum all-round strength. There will, however, probably be a gain in the selectivity.

From these remarks it will be clear that there is something in coil design after all. It is very interesting to make and to compare different coils, particularly for use in gang-tuning circuits.



- What size Eliminator do I need?
- How can I cut out Mains Hum?
- How can I eliminate Interference?
- When should I use an Electrolytic?
- How do I build an A.C. Power Pack?
- What special precautions for D.C.?
- What resistance do I need?

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**T.C.C.**  
ALL-BRITISH  
**CONDENSERS**

# AN AMPLIFIER FOR YOUR TELEVISION RECEIVER

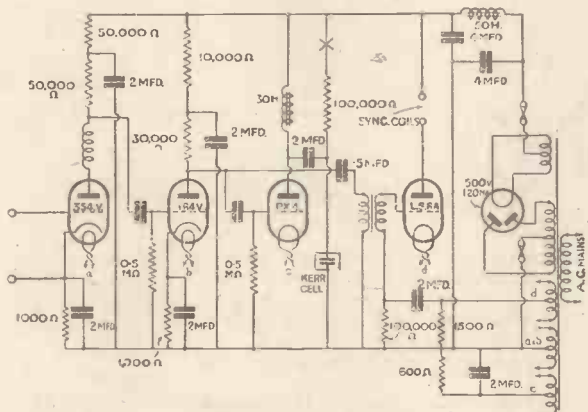
*Details of a good quality power amplifier giving distortionless output*

To get the best results from the home-built television receiver described in AMATEUR WIRELESS you need an amplifier giving distortionless output and working at a fairly high voltage.

This need not be expensive, however, and for the benefit of those who want to make up a special amplifier for the job, technical details are given here. These will be sufficient for the average keen enthusiast who wants to make up a television outfit.

All the values are given on the theoretical circuit diagram and the lettered photograph shown here explains the general layout.

It is not proposed to give detailed constructional information of this amplifier as we feel that most technical enthusiasts will be able to make up the whole job from the theoretical circuit. In a forthcoming issue, however, we hope to give full constructional details of a television amplifier and a blueprint will be available for this. There is no blueprint



Here is the theoretical circuit of the television amplifier showing the mains rectifier section. Note the two output valves, one for the synchronising coils, and the other for the Kerr cell modulator

available for the amplifier shown here.

Good quality is essential and to prevent H.F. and detector distortion a screen-grid stage followed by a diode detector has been used. In previous experiments a crystal detector was used and although this was satisfactory from the point of view of quality, the constant adjustment of the cat-whisker upset reception.

Now that a diode has been substituted for the crystal, consistently good distortionless reception is obtained.

## TWO OUTPUT CIRCUITS

The accompanying circuit diagram gives details of the amplifier section only.

In brief, it consists of two resistance-coupled stages, followed by a PX4 type valve used as the Kerr cell modulator and an LS6A valve to feed the synchronising coils. A 500-volt, 120-milliampere type rectifier is used to give the "juice."

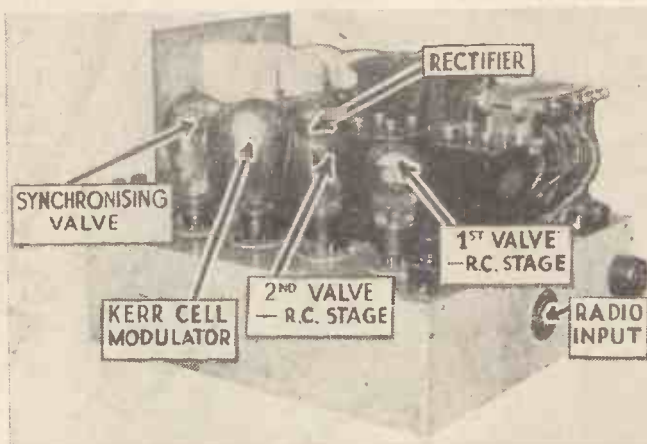
The first valve of the R.C. stage is a 345V type valve with 250,000-ohms in series with the anode circuit, one for the R.C. coupling and the other for stabilising. Automatic bias

the LS6A.

Details of the H.T. supply are given in the theoretical circuit diagram. A DW4 type rectifier is used with 4-microfarad condensers and a 50 henry choke for smoothing. The three sections of the low-tension secondary windings of the power transformer are marked A, B, C, D, so that you can follow the heater wiring.

A valve type plug is fitted to the side of the metal chassis on which the amplifier is mounted and this is the radio input point to the grid circuit of the first R.C. valve.

Once the amplifier has been correctly set up



This lettered photograph of a television amplifier shows you how the low-frequency and output stages are arranged. The circuit of this amplifier is shown below

is provided by a 1,000-ohm resistance with a shunt 2-microfarad condenser.

The second valve of the R.C. stage is a 164V type "tube" with a 30,000-ohms coupling resistance. There is a 10,000-ohms decoupling resistance in series with this and the usual 2-microfarad shunt condenser. Bias is again provided by a 10,000-ohms resistance.

The grid circuits of the Kerr cell modulator and the synchronising valve are connected to the anode circuit of the 164V type valve. The Kerr cell modulator (PX4) is resistance coupled, of course, but the synchronising coil valve is parallel fed through a .5-microfarad condenser and an L.F. transformer.

## KERR CELL COUPLING

The circuit shows the arrangement of connections between the PX4 type valve and the Kerr cell. A 2-microfarad condenser is used to couple the valve to the cell and there is a 100,000-ohms resistance between the cell and the main H.T. supply. If any additional biasing voltage is needed on the cell it should be placed at the point marked "X" in the circuit diagram.

The synchronising coils of the television receiver are connected directly in the anode circuit of

*suitable for the television receiver designed by E. J. and J. W. Holmes*

it is quite automatic in action. It is switched on, the valves allowed to heat up and the motor of the mirror drum section started.

It should be noted that the scheme of connections for the Kerr cell shown in the accompanying diagram is that used when a crystal detector is used on the radio side. If a diode is used, it is necessary to reverse the positions of the Kerr cell and limiting resistance in the output of the PX4 valve.

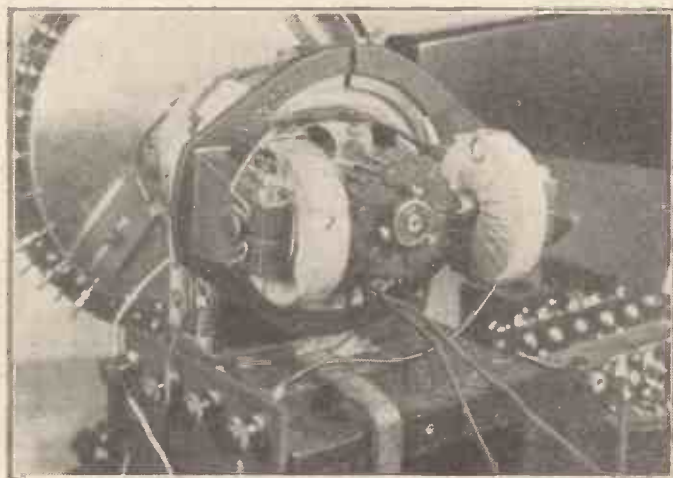
## MOTOR SPEED

First of all it is advisable to ascertain if the motor will run at somewhere near the correct speed, which is 750 revolutions per minute. This is the speed at which the transmitting motor rotates at Broadcasting House, and the receiving motor must run in synchronism.

For those with 50-cycle A.C. mains it is comparatively simple. All that is necessary is an easily made stroboscopic device to be temporarily stuck to the mirror drum flange. It is a 3 in. disc of thin white card divided into eight with thick black lines, and when the drum is revved up and the disc viewed by the light of a low wattage lamp, say 50 watts, the spokes of the disc will appear stationary when a speed of 800 r.p.m. has been attained. This is, of course, slightly faster than need be, but will give a good idea how the motor is running. For those on D.C. mains, some form of revolution counter will be useful, and a cyclometer has been utilised for this and proved satisfactory.

The correct wattage lamp, or lamps, to use for the voltage dropping resistance will have to be found by trial and error, but as a rough guide a 40 and a 25 watt lamp for 230 volt mains will be about right. The variable speed controlling resistances on the front of the cabinet are of the standard Baird type. Those on unsteady mains will probably need an extra controlling resistance of the slider type in series with the others.

In next week's issue further helpful notes will be given which will enable you to get a good television picture and ensure steady synchronism.



The synchronising side of the television mirror drum driving motor. The output circuit of one of the two output valves in the amplifier is connected to the synchronising coils

## KEEPING MAINS UNIT OUTPUT STEADY THE NEON STABILISER TUBE

UNTIL recently the only source of high-tension supply at constant voltage has been the accumulator. In Fig. 1, A is a voltage-current curve of a typical eliminator or power unit, whose normal output is 40 m/A. at 140 volts, and shows how the voltage falls from over 200 volts at no-load to 100 volts when the load is 60 m/A. This variation of the output voltage is frequently the cause of distortion

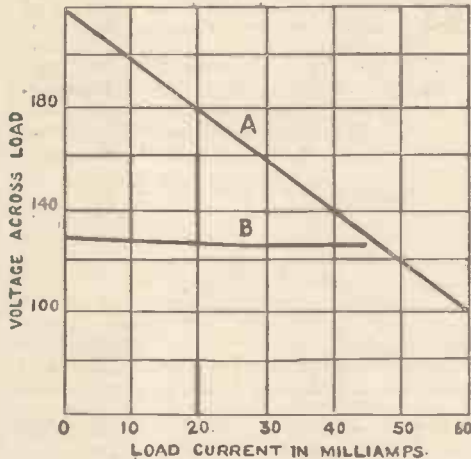


Fig. 1. Regulation curves of typical eliminator and stabilised eliminator

and oscillation, and in addition, it makes measurement of the voltage difficult unless a high-resistance meter is available. It is well known that a neon lamp connected across the output terminals tends to stabilise the voltage and maintain it at a constant value, but the simple neon lamp is only partly effective. Specially developed glow-discharge tubes are now available, and the effect of using one of these is shown in curve B. It will be seen that the voltage is remarkably constant, a variation of only 4 volts taking place when the current varies from 0 to 40 m/A.

In appearance, the neon tubes are very similar to valves. The illustration shows the Stabilovolt TRT10 and the Cossor type S130. The Cossor has two electrodes connected to the grid and anode pins of the standard valve base; the filament pins being left blank. The Stabilovolt functions

as a potential divider as well as a stabiliser, and has five cup-shaped electrodes mounted concentrically, as can be seen from the drawing in Fig. 2. If the eliminator is connected to the innermost and outermost electrodes, the voltage will be maintained constant at 280 volts, and tapings may be taken from the other electrodes at 70, 140, and 210 volts. If the maximum voltage of 280 is not required, two electrodes can be connected together, when the total voltage will be 210, or if three electrodes are connected, 140 volts. All of these voltages remain practically constant from no-load to full-load.

Referring to the two circuits in Fig. 3, it will be seen that the current from the eliminator flows through a resistance R and then divides, part going through the load and part through the tube. Imagine a case using a Cossor tube where the load is 40 m/A. at 130 volts, and 10 m/A. flows through the tube, making a total current of 50 m/A. Suppose that when the eliminator is delivering 50 m/A., its voltage  $V_0$  is 170. In this case the resistance would be 800 ohms; thus, with 50 m/A.

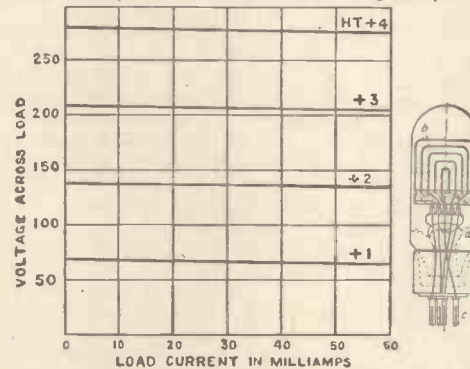
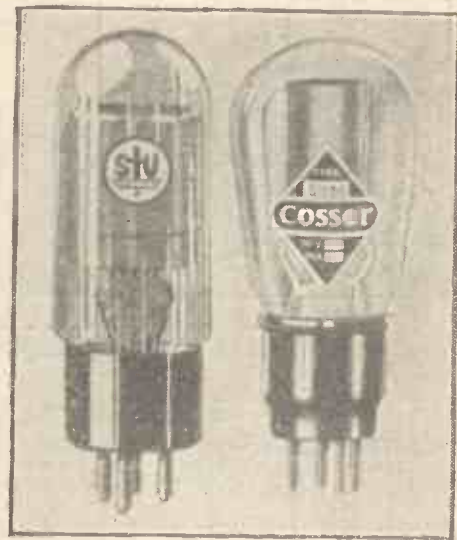


Fig. 2. Sectional drawing of Stabilovolt tube (right) and output curves

flowing there would be a drop of 40 volts, leaving 130 volts at the output terminals. (The value of R is found from curves provided with the tubes.) On no-load, the eliminator voltage would tend to rise to a high value, which might be dangerous to condensers and insulation, but a very slight increase in the voltage across the tube causes a large increase in the current flow-



Stabilovolt TRT 10 and Cossor S130

ing through it, and this increase of current causes a drop across the resistance so that the output voltage remains 130. If the load were greater than normal, the tube current would be correspondingly reduced to a few m/A. until the glow discharge

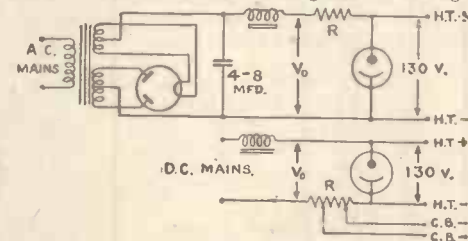


Fig. 3. A.C. and D.C. eliminator circuits. Free grid bias may be obtained by placing "R" in the negative lead

ceased altogether, when the tube would have no effect.

Since the tube stabilises the voltage at a definite value, it is apparent that it will smooth out the ripple in the current from a rectifier or D.C. mains, and in fact, the usual smoothing condenser is not necessary, as the tube has an effective capacity of at least 6 microfarads. The maximum permissible current for the Cossor S130 is 75 m/A., and for higher voltages any number may be connected in series, each one maintaining 130 volts across it.

F. G. RUTTER.

### "BRIGHT IDEAS for PORTABLES"

(Continued from page 76)

can supply the special supporting brackets all complete.

So much for the high-frequency stages. We must give you one or two tips about the low-frequency side. We have to get the maximum amplification possible, so we decided to use two transformer-coupled stages rather than the more usual resistance and transformer coupling sequence. By the way, with transformer coupling after the detector the reaction is noticeably smoother—a big advantage in a portable.

In our original circuit, and in the photograph too, we have shown a normal detector anode choke. Since we did this work we have found that a screened choke helps to overcome any residual instability, so, if you have one on hand, or have to buy a choke specially, get a screened one.

The low-frequency side is quite conventional.

Just two transformers—and tremendous output! Owing to the complete screening of the high-frequency stages, including a metallised screen-grid valve, and a transformer with an adjustable primary, there is no trace of instability.

We need not say anything about the layout—that is obvious from the photographs. These do not show that the panel is lined with metal foil. Make quite sure that the components on the panel make good contact with foil.

The frame aerial is fully explained in the drawing, but you will find it is not so easy to wind as it looks. We suggest that across each corner of the chassis you put a little piece of some fibrous material, keeping it in place at each corner with tacks, which will also help to anchor the first turn of the winding. As a final precaution, at infrequent intervals put on a spot or so of amyl-acetate to keep the wires firmly in position.

The batteries can, of course, be fitted in the bottom of the chassis, but remember that a

speaker has also to be fitted in this space, so get a cone speaker with an integral unit—inside the cone for compactness, or a small Rola moving-coil type.

Valves are important; in the screen-grid stage we suggest a PM12A, detector a Cossor 210Det, first low-frequency 210HL—all these three valves being metallised. The output valve, a Mullard PM2A, is not metallised.

It occurred to us that you might prefer to use a variable-mu valve for the screen-grid stage, and so we have given an additional circuit showing how to use either a Mullard PM12M or a Cossor 220VS. This is a good thing to have if you are near a powerful station and want to cut down the volume without distortion.

*The Experimenters*



The records reviewed below are a careful selection of the best of the recent issues. It will be noted that criticism is chiefly devoted to the treatment of the music and quality of recording rather than the actual composition

### ORCHESTRAL

- Bird of Love Divine and I Hear You Calling Me**, 4s. H.M.V. C2563  
Two very impressive symphonic arrangements by the London Palladium Orchestra. These two old songs have been embellished in fine style.
- Venetian Nights and A Vision of Spring**, 4s. H.M.V. C2565  
Two very atmospheric numbers, built up of very suitable components with vocal assistance. The New Mayfair Orchestra gives very dainty performances of each.
- Lament for the Living**, 4s. BRUNS 119  
There are four pictures to the set of this Suite in G flat—Lament—Searching—Phantoms—Why. The whole thing is modern, but none the less melodic. Well played by Victor Young's Orchestra.
- The Enchanted Forest and The Little Company**, 2s. DECCA F3565  
Although Ilja Livschakoff's Dance Orchestra play these, there is a skill behind them that exceeds that of most bands of this sort. The first is especially good.
- Lilac Time**, 1s. 6d. BRDCST 3309  
The Commodore Orchestra, plus organ. It's all there, all right, but it is played in rather too heavy-handed a fashion for Schubert's dainty music. All the same, it is well played.
- Ecstasy and Golden Kisses**, 2s. 6d. PAN R1533  
Two tuneful waltzes in the old style well played by Edith Lorand and Orchestra. The first is one of Sydney Barnes's well-known compositions.
- La Scala di Seta (Rossini) and Arrival of the Queen of Sheba (Handel)**, 6s. COL LX255  
A very distinguished record, but in a wholly popular sense. The overture to "The Silken Ladder" has a very marked affinity to the "Barber" overture. The change to the short prelude from "Solomon" is a most startling contrast. Sir Thomas Beecham takes the London Philharmonic Orchestra through some jolly music which everybody will like.
- London Suite (Coates)**, 4s. COL DX470  
By a symphony orchestra, the composer conducting. You have Covent Garden (Cherry Ripe motif); Westminster and Knightsbridge. The last is a fine, inspiring march. The suite is typical of the music Coates writes so well.
- Viennese Memories of Lehar**, 4s. COL DX472  
Here Henry Hall's B.B.C. Dance Orchestra show what they can do in straight orchestral pot-pourri, and mighty well they do it.
- Play of Butterflies and Fairy Tale**, 2s. 6d. COL DB1131  
Two compositions by Hey Kens, played by Albert Sandler's Orchestra. The first is a dainty "minuetish" thing, brilliantly played, but the second is only the famous "Serenade"—thinly disguised. Nevertheless, a very pleasant record.
- Rhapsody in Blue**, 1s. 6d. REGAL-ZONO MR957  
A surprisingly good performance by Billy Cotton's Band. This famous classic taxes the best band, especially the pianist. Arthur Sandford officiates and, on the whole, does well. A record well worth having.

### BAND

- It's the Band and Marching to a Military Band**, 1s. 6d. REGAL-ZONO MR954  
Here's a good holiday record—by the Marine Pavilion Band. The second reminds me forcibly of the old "When the Band Begins to Play."

### DANCE

- For You, Rio Rita and I Want Nothing But Your Love**, 2s. 6d. H.M.V. B6342  
A real star record, these two (Paso-Doble and Argentine Step) by Marck Weber's Orchestra. The real thing, all through.

### INSTRUMENTAL

- Ballade in G minor (Chopin)**, 5s. DECCA-POLYDOR CA8155  
By Alexander Brailovsky. Brilliant, undoubtedly, but far too heavy. There seems to be a late tendency to "go baldheaded" for Chopin, and somebody ought to do something about it. The light and shade proper to most of these pieces is disappearing.

- Air from Suite in D (Bach), Transcription and Quartet No. 1 in D major—Finale Allegro (Dittersdorf)**, 2s. 6d. COL DB1133  
A most delightful record by the Lener String Quartet. This is one of those performances that win over scores of people to string music of the intimate kind. *Dave I say chamber music?*

### VOCAL

- And Love Was Born and The Song is You**, 4s. H.M.V. DA1313  
How very delightful to hear Laurence Tibbett again. His singing of the first of these two from "Music in the Air" is superb. It is a good song, too. This performance ought to tempt anybody to buy the record, although it puts the other quite out of court.
- Border Ballad and Fairings**, 2s. DECCA F3478  
By Irving Naismith, a lightish baritone of very pleasing style. His first, in good Scots dialect, is the better and is very well sung indeed.
- Remember Me and Farewell to Arms**, 1s. 6d. BRDCST 3307  
Morton Downey undoubtedly can sing this type of song. The first has an especially good orchestral accompaniment.
- Wandering and Secrecy**, 2s. 6d. DECCA-POLYDOR PO5068  
These two songs of Wolf's are sung with sonorous power by Josef von Manowarda, baritone of the Vienna State Opera. His voice is extraordinarily rich but he has a tendency to wobble a little. Nevertheless, the performance is well worth hearing. In German, of course.
- Celeste Aida and Je Crois Entendre Encore**, 6s. H.M.V. DB11875  
Another Caruso, electrically revived. The voice sounds deeper than usual, but it is still the old Caruso with all the fire and magnificent high notes. Quite a triumph.
- When I Think of You and This Lovely Rose**, 2s. 6d. COL DB1126  
The Hon. W. Brownlow, who sings these, is a baritone with a most delightful voice and a very highly developed artistic sense.
- Edward and Wee Willie Winkie and Jenny Wi the Lang Pock**, 4s. PAN E11236  
If you have a fancy for drama in song—tragedy, rather—hear Robert Burnett sing "Edward." It is done with tremendous force.
- Gipsy Love and The Czarevitch**, 2s. 6d. PAN R1517  
John Hendrik in two very appealing Lehar songs. If you like Tauber—just hear Hendrik.
- Vimy Ridge and Light of Foot**, 2s. 6d. H.M.V. B4416  
Here are two stirring songs by Stuart Robertson. Very good to listen to; with any amount of sparkle.
- My Sheepdog and I and With a Song**, 2s. 6d. COL DB1134  
Harold Williams in very good voice with orchestra and organ.
- The Rattacher's Daughter and Botany Bay**, 1s. 6d. REGAL-ZONO MR945  
The Victorian Quartette are new to me, but they give a creditable performance of these old Cockney songs.
- Elégie (Massenet) and La Maison Grise (Messager)**, 4s. COL LB10  
Two fine performances by that fine tenor, Georges Thill. Quiet, melodic compositions which are sung with perfect phrasing.

### MISCELLANEOUS

- Home Chat**, 1s. 6d. BRDCST 3311  
Billy Caryl and Hilda Mundy in more wordy warfare. What a happy home! Highly amusing.
- Jekyll and Hyde and Actions Speak Louder Than Words**, 2s. 6d. PAN R1529  
By Ann Guster. Without exception, the first is the best of the near-naughty school for many, many moons.
- The Blue Bird and In Vienna One Night**, 2s. 6d. PAN R1532  
Two pleasant tunes played by Gino Bordin and His Hawaiians. This guitar and violin band play straightforwardly, putting the melody first all the time.
- Sam's Medal and Many Happy Returns**, 4s. COL DX474  
These two brilliant monologues by Stanley Holloway were first done on the wireless recently. "RECORDER"

# MORE ABOUT THE NEW TELEVISION SYSTEM

Last week "Amateur Wireless" was, as usual, first in the field with news of the latest development in television—the Scophony receiver—which will be one of the outstanding exhibits at Olympia. Judging by the number of enquiries we have received, interest in this subject is keener than ever

"COMING events cast their shadow before," and there is now solid ground for thinking that those who have steadily believed in the future of radio-vision will soon find their faith justified.

Many listeners are looking forward to real television in the hope that it will help to brighten things up a bit. But there is more in the air than pious hopes of this kind.

Developments are afoot in different directions—the cathode-ray tube for one, and the new Scophony receiver for another. Scophony, by the way, is a term covering both vision and sound (compounded from telescope and telephone) because it is naturally intended—in the long run—to reproduce both pictures and speech.

In the Scophony receiver the rotating disc is replaced by a small vibrating mirror—so small that it can be carried in one's waist-

giving a ten-fold increase in definition on the present standard.

So much is known. For the rest we must "wait and see" at Olympia, where the new receiver is to be publicly exhibited for the first time. The big question is whether or not it will beat the cathode-ray tube on its own ground. Whether it does or not, Messrs. Ferranti, Ltd., deserve full credit for being the first of the British manufacturers to strike out on an entirely new line of development.

"Striking a new line," describes the Scophony system of television in a double sense, because it was originally based on the discovery of a most ingenious method of "line scanning."

According to this process the picture to be transmitted is simply focused on to a stationary mirror or prism, which automatically cuts it up into a number of parallel strips or

For instance the reflection of the top strip of picture is slightly displaced to the right, the second strip is thrown a little more to the right but in line with the first, whilst the third is thrown still further to the right, and so on until one gets to the bottom strip (reflected from the bottom "step" on the mirror) which gets the maximum displacement.

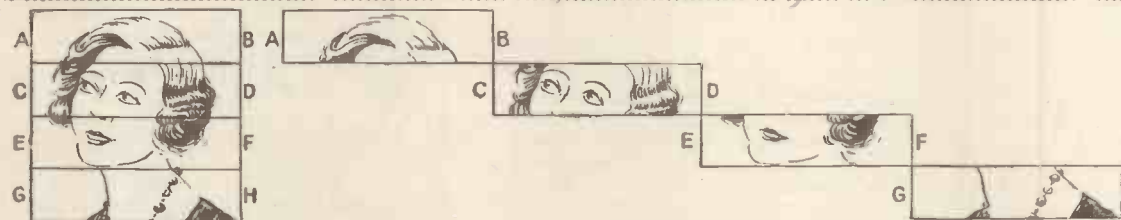
It follows that after reflection from the stepped mirror, the picture is no longer a square or oblong, as the case may be, but is laid out in successive strips, set end to end, so as to form in effect a single straight line. At this stage the whole picture can be completely "scanned" by the single movement of a second small mirror. This second mirror is mounted so that it swings to and fro about a centre pivot. In its movement it picks up all the varying light and shade effects of the "line" picture and throws them in their

proper sequence against a light-sensitive cell.

It will be seen that the ordinary large rotating disc is no longer required. The only moving part is a small swinging mirror which, because it scans the whole "line" picture in one movement, need only be driven at the rate of fifteen vibrations per second to reproduce the required "moving picture" effect.

Problems of scanning have forced designers to seek the most flexible and convenient method up to the present. One promising solution seems to be the cathode-ray tube, where the only moving part is a nimble stream of electrons. Because electrons have neither mass nor inertia, they can be moved in orderly fashion, and at enormous speed, so as to build up the receiver picture on a fluorescent screen. In the cathode-ray receiver the actual size of the picture, as first received, is still limited by the size of the cathode-ray tube itself.

In the Scophony receiver we have a definite rival to the cathode-ray instrument. For the time being it must necessarily be used for receiving the ordinary B.B.C. transmissions, instead of the special "line scanning" system described above. Whilst its full possibilities may to some extent be limited by this fact, it certainly represents a definite advance towards the goal of real television in the home.



Above is the picture divided up into scanning strips. Only four are shown for convenience though, of course, in practice this number is greatly exceeded

Here is the staggered arrangement of the picture produced by the echelon device. This can be scanned by a mirror oscillating in one direction only

coat pocket—and so light that the power required to drive and synchronise it is only a small fraction of a watt. The control is simplicity itself—one touch of a knob and the picture is framed; and what is more, once it is framed it "stays put."

It can be used with any broadcast receiver giving an output of two watts—certainly not a high standard in these days of Q.P.P. and class-B amplification. By comparison one may need an output of from 5 to 10 watts, with high-tension up to 500 volts, to get even a fair picture with a rotating-disc receiver.

## A NEW SYSTEM

On the present B.B.C. television programme—which is based on a 30-line scanner at the transmitting end—the Scophony receiver gives a definitely clear picture. But it is so elastic that the makers claim that it will handle a 100-line transmission with equal ease—thus

"zones," and lays them out side by side so that they form what is practically a single straight line.

It seems difficult at first sight to grasp how this can be done. The explanation is that the face of the mirror used is not a plane surface, but is "staggered" or stepped from top to bottom. In a sense it resembles a glass stairway—as broad as it is long—at least that is what it would look like if it was magnified enormously.

## LINE SCANNING

The picture is thrown on to this staggered mirror at such an angle that the reflection from one "step" is displaced relatively to that from the next step. Each separate strip of picture is thrown further afield—or more to one side—than the next. And this "dispersion" increases as one goes from the top to the bottom of the mirror.

## DO YOU KNOW—

THAT a 25,000-ohm resistance put directly in the grid lead to an ordinary triode power valve immediately following the detector will often make the set work better by cutting out H.F. strays?

THAT it often pays to mount valve holders on small blocks of wood so that they are raised above the baseboard? In this way there is more space in which to wire up and in compact receivers this hint is well worth noting.

THAT if you get resonance in a console set where the speaker is fitted above the receiver unit too close to it, you should try packing cotton wool round the speaker compartment?

THAT a two-point switch can be converted for temporary testing jobs into a three-point switch by soldering a length of flex to the metal tip? Solder the wire to the ball end point and anchor the other end of the wire to a convenient terminal.

THAT in a short-waver crackling noises can sometimes be heard as the knob

is turned, owing to a faulty connection to the rotor? These noises are more noticeable on the short waves than on the medium and long and can often be cured by making a good pigtail connection.

THAT in a metal baseboard set you should take care that small fixed condensers do not have their capacity increased by the fact that they are clamped to the metal earth chassis? It is often better to support these small condensers in the wiring so that there is no additional capacity.

SETS OF THE SEASON

# COSSOR MODEL MELODY MAKER



TO have produced a set that beats the high standard of performance and value for money of the preceding Melody Makers is an achievement in itself. Because Melody Makers have always been pretty snappy jobs, the makers had to do something out of the ordinary this year—and they have done all that chiefly with the aid of the wonderfully efficient class-B valve, the Cossor 220B.

This, then, is a Class-B set, so that at once you can assume the volume output is above the average for a battery set. More than that, though, the quality of the reproduction is better than usual, because there is a good-class moving-coil loud-speaker housed in a console type of cabinet.

The whole set is remarkably neat and compact, yet there is a distinctive appearance about the walnut-finished cabinet, which

From the front of the cabinet project the control knobs from the chassis. They are well arranged to make station logging as easy as possible. I like the tuning-dial arrangement, which consists of a main knob for the two-gang condenser and a small superimposed trimmer to gang up the aerial tuning. Once this trimming has been done at a low reading on the dial there is no need to touch it, and tuning is virtually a one-knob business. The two subsidiary controls play a most important part in the set's selectivity. On the left is reaction and on the right volume on the screen grid. As the makers take care to emphasise, reduction of the screen-grid control and increase of reaction materially sharpens up the tuning and enables, as my tests prove, quite amazing feats of station separation to be achieved.

The only remaining control is the wave-

brought up to full strength—the class-B output stage being well in evidence when the loud passages are handled.

ECONOMICAL H.T.

For such fine volume the anode current is not at all excessive. I found that the average over an evening, with loud and soft passages of local and foreign stations taken into account, was around 11 milliamperes, which is a load well within the capabilities of a double-capacity battery.

The stations that come in during daylight prove the set is sensitive and in the coming season I expect some spectacular logs will be compiled. Even now you do not have to wait until it is dark before logging half a dozen or so of the powerful stations. This logging is gratifyingly simplified by the makers' provision of a comprehensive tuning chart, which relates most of the stations of Europe with the dial degrees on the set; it is a wide-angle-view dial marked in degrees from 0 to 180.

Long waves give Radio Paris, Huizen, and Luxembourg at fine strength during all parts of the day, and at night I have got as many as eight stations up there at entertainment

BRIEF SPECIFICATION

Makers : A. C. Cossor, Ltd.

Price : £9 19s.

Valve Combination : Screen-grid variable-mu (Cossor 220VS), detector (Cossor 210HF or HL), driver (Cossor P215), and class-B output (Cossor 220B).

Power Supply : Self-contained batteries.

Anode Current : Varies with volume, but average is 11 milliamperes.

Type : Pedestal console battery set, with moving-coil loud-speaker.

Remarks : High-grade performance at an exceptionally low price. Good quality; easy control; plenty of stations; moderate battery running costs; the best Melody Maker yet!

stands on its own legs and does not need a table for support, measuring 2 ft. 11 in. high, 1 ft. 2 in. wide, and 11 in. deep.

At first sight it seems incredible that such an imposing instrument can be offered at the price, but subsequent tests show you are getting value in the real sense—high-grade performance at low cost.

THE CIRCUIT

The circuit is interesting enough to merit description. There is a variable-mu screen-grid stage tapped-tuned anode coupled to the detector. This is transformer coupled to the drive valve, which is, of course, coupled to the class-B output valve by means of a special driver transformer with centre-tapped secondary.

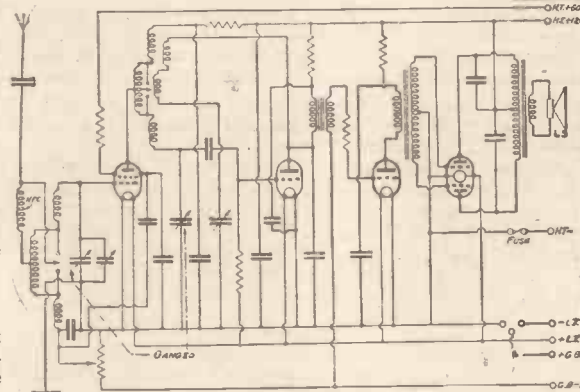
The output valve stage is transformer coupled to the moving-coil loud-speaker, so that accurate matching is ensured with maximum power transference.

The circuit as a whole is notable for the adequate de-coupling arrangements at each stage, and tests show that the high-frequency stages are perfectly stable, while retaining a very good overall signal gain.

There is no negative bias for the class-B stage, of course, but bias is applied to the grid of the driver valve and to the grid of the variable-mu valve through a potentiometer, which forms a smooth and effective volume control.

The metal chassis embodying this circuit is exceptionally compact, most of the parts being sub-chassis, with wiring done underneath as well, so that just the valves and tuning condenser take up the top portion.

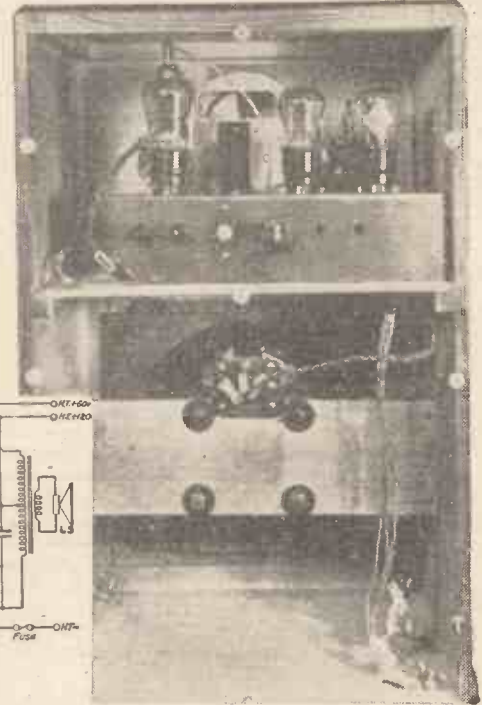
Features of this fine set are an all-metal chassis with underneath wiring. The Cossor 220B class-B valve is incorporated and the result is plenty of volume with low running costs. The circuit is shown below



change switch, a lever being fitted for this below the tuning. The battery on-off switch is combined in the volume control, which switches things off when set at its minimum position.

A special fuse bulb is fitted to the chassis to protect the valve filaments. Coming from a maker of valves I regard this filament as a really unanimous gesture, don't you?

Now for tests. The first thing I noticed was the really excellent quality from the moving-coil loud-speaker. There is no suspicion of box resonance, thanks to the ample size of the console cabinet. The quality is just as good when the locals are cut down to a whisper as when a distant station is



strength. Selectivity holds good on the long waves, I find.

A pick-up can be fitted to the back of the chassis, but it is necessary to insert a volume control between the pick-up and the sockets. SET TESTER.

HOW TO IMPROVE SPEAKER REPRODUCTION

(Continued from page 78)

Australia thinks to-morrow morning (twelve hours time difference), the radio side-band frequencies are cut off about 5,000 cycles in many cases. Consequently, for the two-speaker experiment to be successful, the reader must be quite certain that during operation on his local station, where the quality ought to be best, the receiver is capable of reproducing adequately up to about 8,000 or 9,000 cycles per second.

To complete the job some form of control may be required on one of the speakers so that its output can be regulated to combine properly with the other, since in all probability one of the units may be too powerful for the other.

EVERY SET YOU WANT

is to be found in the "A.W." blueprint range. These full-size blueprints make child's play of set construction

# WHAT OUR READERS THINK

The Editor does not necessarily agree with the views expressed by readers and does not accept responsibility for the letters published. Letters cannot be published which do not bear the sender's full name and address

## INTERFERENCE DEVICES

**SIR**—As it seems possible that the letter of "M.J." (London, E.8), published in AMATEUR WIRELESS, July 8, may be acted upon by readers troubled by radio interference from motors, etc., a word of warning may save some burned fingers, or perhaps worse.

The frames of all motors should be efficiently and permanently earthed as per I.E.E. Regulations, the introduction of a fuse in the earth connection is a breach of these regulations and introduces a source of danger because, should the insulation of the motor windings become defective, the resultant earth current would most likely blow the fuse in the earth connection and leave the motor frame alive.

Fuses or circuit-breakers should be provided at the starter to protect the motor and feeding cables.

There are plenty of quite cheap condensers on the market which will stand up to the low or medium pressures used for small motors, but if fuses are desired for further protection against condenser break-down, the correct position in the circuit is between each brush and its condenser.

Two 1-microfarad condensers connected across the brushes, with mid-point earthed direct to frame of motor, will usually stop interference, but on motors above about .5 h.p. it often becomes necessary to fit chokes in the supply mains close to motor, in addition to condensers.

All anti-interference apparatus should be enclosed in cast-iron or sheet metal boxes—also earthed—"hook-up" methods are unsafe.  
J. A. M. (London, N.)

## A READER'S THANKS

**SIR**—As a wireless enthusiast I recognise that a paper like AMATEUR WIRELESS is absolutely necessary for those who follow the game. It forms part of a chain linking manufacturers, dealers, and customers. What "A.W." says goes. We living in remote parts have to rely on its verdicts in test reports, circuits, etc. When a firm advertises extensively in your paper and you recommend their goods we have every confidence and feel that such a firm will do its best to satisfy its customers. It earns a deserved high reputation and for its own sake will listen to any bona fide complaint.

I had some accessories sent out a few months ago, and with them a variable-mu screen-grid valve for trial. To my disappointment I got no results from this valve. Could my circuit be wrong or was it some careless dealer who failed to test such a vital and fragile item as a valve? Later on I decided to send it to the makers (Osram). This firm, without any question, replaced it by return post, and such action on the part of the Osram people deserves some notice, which I would be glad if you could see your way to give by inserting this from one of your regular readers.  
C. F. (East London, South Africa).

## TELEVISION RESULTS

**SIR**—With reference to Mr. L. A. Chapman's article in a recent issue of "A.W." on the television demonstration we gave him, we feel it should be pointed out that at the time we were experimenting with crystal detectors and, as experimenters, are continually altering circuits, etc. Obviously, every modification cannot be for the best. However, we have since had the pleasure of giving Mr. Chapman a further demonstration, this time using a diode detector, and are sure he will agree that

the images during the whole transmission equalled the best he has described.

Had we known that the former demonstration was to be subject matter for publication, we most certainly would have used a more dependable form of detection.

EDWARD J. HOLMES  
JOHN W. HOLMES (Ilford).

## IRON-CORE I.F. COILS

**SIR**—We notice in a recent issue that a claim is made for some new I.F. coils that they are the first ever to use an iron core.

We should like to point out that in the Marconiphone Model "82"—which was marketed in 1927—the I.F. transformers employed a core of electrolytic iron.

The stampings were of conventional form but very thin, and were therefore quite efficient at the intermediate frequencies of 55 kilocycles. Of course, such a core would not be as efficient as Ferrocart at higher frequencies, but in its day was perfectly satisfactory.

This set had a selectivity of 20 kilocycles overall, the cut-off being exceedingly sharp.  
THE MARCONIPHONE COMPANY, LTD.

## TRUST THE P.O.

**SIR**—We are enclosing an envelope received recently, the humour of which will no doubt appeal to you.

The chief joke, however, is that if the good man who wrote the envelope had addressed it to "Kenyon Street," which is our old address, the post office would have returned it to him "Not known," which in similar instances has been our experience for some years past.

We thought we would send along the envelope as it may appeal to your humorous readers.  
WILKINS & WRIGHT, LTD. (Birmingham.)

**RADIO ON THE CAR**  
**SIR**—I very strongly disapprove of the idea, which seems to be catching on, of incorporating a radio set in a car. This appears to me to be a purposeless and most dangerous idea, as if one wants music in the car, on a picnic, for instance, why not take the family portable? Why go to the trouble of fitting a set in the car, and it is trouble, too, what with spark suppressors, remote tuning,

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compact design, and inefficient frame aerials. This is definitely not worth the expense and time of fitting in. Also, it cannot be safely used when the car is travelling without great risk of danger to the occupants of the car and other road users. I have heard it argued that it does not attract the attention. If this is so, why have it there at all, as it cannot be worth listening to if it does not. If it does, it is dangerous.

I think there will be many who support this opinion, but I shall be glad if you will publish this letter, and also other people's views.  
W. E. L. (Pontefract)

# PILOT

## AUTHOR KITS

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3 Specified Valves	£1 8 0
Cabinet to specification	0 15 0
1 Rola F.5 Class-B P.M. Moving-coil Speaker	1 12 6
Baseboard, 12 in. by 10 in., and Drilled Panel	0 3 9
1 Varley Iron-cored Aerial, B.P.30	0 10 6
1 Lissen Hypernik L.F. Transformer	0 12 6
1 Lissen Class-B Transformer	0 12 6

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## PILOT CLASS "B" CONVERSION KIT

Converts your present Battery Set to Class "B" Send Amplification. Complete with all necessary components, including Peto-Scott driver transformer, Peto-Scott Class "B" output choke, W.B. 7-pin valve holder, Cosor 240B valve, wire and screws, etc. Full-size Blueprint, assembly instructions and diagrams. Cash or C.O.D., 37/6. Balance in 7 monthly payments of 5/6.

All CLASS "B" Components and other Parts obtainable from your local dealer SENT C.O.D. We have the largest stocks in the country. Orders over 10/- sent Post Paid. (Easy Terms available on orders over 35/-). Quotations by return. No obligation.

## TELEVISION MIRROR-DRUM KIT-BITS

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Mirror Drum Kit, comprising 7-in. aluminium drum, drilled and tapped, nuts, bolts, 30 ribbed mirror carriers, and 30 light spot tested mirrors	£2 18 6
Electrode Assembly for Kerr Cell, without container, with fixing plate and terminals	0 12 6
Nicol Prisms of first quality Iceland Spar, mounted in brass tubes—8.5 m.m., 22/6 ea.; 9.0 m.m., 26/- ea.; 10.0 m.m. 30/- ea.	
Universal Angle Mirror Stand for directing light to mirror drum	0 7 6
Phillips 12 volt 100 watt	10 9
Main Transformer for Projection Lamp, tapped 200 v., 230 v., and 240 v., 40-60 cycles. Other voltage ranges supplied	1 5 0

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**EPOCH "20 C" P.M. MOVING-COIL SPEAKER.** Send with 5 ratio input transformer. Cash or C.O.D. Carriage Paid, £1/15/0. **6/6** only Send Balance in 5 monthly payments of 6/6

**BLUE SPOT TYPE 99 P.M.** Including matched transformer. Cash Price, £2/19/6. **5/6** only Send Balance in 11 monthly payments of 5/6

**LISSEN ALL-ELECTRIC SKYSCRAPER 3.** Complete with 4 valves and constructional chart in sealed Lissen carton. Cash or C.O.D., £7/19/6. Carriage Paid. **14/8** only Send Balance in 11 monthly payments of 14/8

**LISSEN SKYSCRAPER 3, BATTERY MODEL.** Complete with valves and constructional chart in sealed Lissen carton. Cash or C.O.D., £4/9/6. Carr. paid. **8/3** only Send Balance in 11 monthly payments of 8/3

**NEW ROLA F.5 (P.M.32) CLASS "B" MOVING-COIL SPEAKER.** Class "B" With Class "B" input transformer. Cash or C.O.D., £1/12/6. Carriage Paid. **5/2** only Send Balance in 6 monthly payments of 5/2

**ROLA PERMANENT MAGNET MOVING-COIL SPEAKER F.5.** With Universal tapped input transformer. Cash Price £2/8/6. Carriage Paid. **4/6** only Send Balance in 11 monthly payments of 4/6

**ATLAS ELIMINATOR.** Type A.C.244. Three tapings, 8.G., Detector and Power. Output: 120 volts at 20 m/A. Cash Price £2/19/6. Carriage Paid. **5/6** only Send Balance in 11 monthly payments of 5/6

**GARRARD AUTOMATIC RECORD CHANGER** for A.C. Send mains. Mounted on unit plate complete ready for fitting in position, including Garrard pick-up and tone-arm. Cash Price £10/0/6. Carriage Paid. **18/6** only Send Balance in 11 monthly payments of 18/6

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# BROADCASTING STATIONS

\*Broadcasting Stations classified in order of wavelengths. For the purpose of better comparison, the power indicated is that of the carrier wave.

Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)	Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)	Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)
13.97	21,470	Daventry (GSH)	15.0	271.2	1,105.1	Rennes	7.0	453.2	652	Milan (Vigentino)	7.0
16.68	17,770	Daventry (GSG)	15.0	273.7	1,096	Turin (Torino)	60.0	456.6	657	San Sebastian	(EA1) 83.5
19.68	15,243	Paris	8.0	276.5	1,085	Heilsberg	14.0	459.4	653	Beromuenster	60.0
19.73	15,200	Konigsbrunn	15.0	279.9	1,071.4	Bratislava	0.75	465.8	644	Lyons (PTT)	15.0
19.82	15,140	Daventry (GSF)	15.0	281.2	1,067	Copenhagen	2.0	472.4	635	Langenberg	60.0
19.84	15,120	Vatican (HVJ)	10.0	282.2	1,063	Lisbon (CT/AA)	0.5	476	630.2	Smirferopol	15.0
25.20	11,905	Paris	10.0	283.6	1,058	Innsbruck	0.5	480	625	North Regional	50.0
25.28	11,865	Daventry (GSE)	20.0	283.6	1,058	Berlin (E)	0.5	483	621.1	Ivanovo	Vosnesensk 20.0
25.4	11,810	Rome (ZRO)	8.0	283.6	1,058	Magdeburg	0.5	488.6	614	Prague	120.0
25.53	11,750	Zeesen (DID)	20.0	286	1,049	Montpellier	0.9	495.8	605	Trondheim	1.2
25.63	11,705	Paris	10.0	288.5	1,040	Bournemouth	1.0	500.8	599	Florence	20.0
30.0	10,000	Madrid (EAO)	20.0	288.5	1,040	Scottish National	50.0	501.7	598	Gorky	10.0
31.25	9,598	Lisbon (CT/AA)	2.0	291	1,031	Vilpuri	10.0	509	590	Astrakhan (RV35)	10.0
31.3	9,585	Daventry (GSC)	20.0	293	1,022	Kosice	2.5	509.3	589	Brussels (No. 1)	15.0
31.38	9,560	Zeesen (DJA)	8.0	293.7	1,021.5	Limoges (PTT)	0.7	517	581	Vienna	100.0
31.55	9,510	Daventry (GSB)	20.0	296.1	1,013	Huizen	20.0	525	572	Riga	15.0
31.6	9,494	Poznan (SRI)	0.5	298.8	1,004	Tallin	11.0	532.9	563	Munich	60.0
32.26	9,300	Rabat	0.5	301.5	995	North National	50.0	537.6	558	Palermo	3.0
40.3	7,464	Radio Nations	20.0	304.3	986	Bordeaux (PTT)	13.0	542	554	Sundsvall	10.0
45.38	6,611	Moscow	12.0	306.8	978	Zagreb	0.75	550.5	545	Budapest (1)	18.5
46.6	6,438	Moscow	12.0	307	977	Falun	0.5	559.7	536	Tampere	1.0
49.4	6,073	Skamlebaek	0.5	308.5	972.4	Vitus (Paris)	1.0	559.7	536	Kaiserslautern	1.5
49.59	6,050	Daventry (GSA)	20.0	309.9	968	West Regional	50.0	559.7	536	Augsburg	0.3
49.6	6,048	Vienna (UOR2)	2.0	312.8	959	Cracow	2.0	563	533	Wino	22.3
49.83	6,020	Zeesen (DJC)	10.0	313.9	955.6	Genoa (Genova)	10.0	566	530	Hanover	—
50.0	6,000	Moscow	20.0	315.8	950	Marseilles	1.6	569.2	527	Freiburg	0.2
50.26	5,969	Vatican (HVJ)	10.0	318.8	941	Naples (Napoli)	1.5	571.9	524.6	Grenoble (PTT)	2.0
58.31	5,145	Prague	0.5	318.8	941	Sofia (Rodno Radio)	1.0	574.7	522	Ljubljana	7.5
202.3	1,483	Liege (Exp)	0.2	319.7	936	Dresden	0.25	583.6	514	Tartu	—
202.7	1,480	Kristinehamn	0.25	321.9	932	Goteborg	10.0	719.4	416.6	Moscow (RV2)	20.0
205.8	1,458	Seraing	0.2	325	923	Breslau	60.0	743	404	Samara	10.0
208.3	1,440	Liege (Wallonie)	0.3	325	923	Poste Parisien	60.0	760	395	Geneva	1.25
209.8	1,429	Miskolcz	1.25	328.2	914	Milan (Siziano)	50.0	770	389	Ostersund	0.6
209.8	1,429	Magyarovar	1.25	331.5	905	Poznan	2.0	779.2	385	Peterzavodsk	(RV29) 29.0
209.8	1,429	Pecs	1.25	335	896	Brussels (No. 2)	15.0	824.2	364	Rostov (Don)	35.0
211.3	1,420	Newcastle	1.0	342.1	877	Brunn (Brno)	32.0	833	360.1	Heston Airport	5.0
214.3	1,400	Aberdeen	1.0	345.2	869	Strasbourg (PTT)	11.5	840	357.1	Budapest (2)	3.0
214.9	1,396	Antwerp	0.4	348.8	860	Barcelona (EAJ1)	8.0	857.1	350	Leningrad	100.0
215.6	1,391	Chatelineau (EL)	3.0	351	854.7	Leningrad (RV70)	10.0	882	340	Saratov (RV3)	20.0
217.1	1,382	Konigsberg	0.9	352.1	852	Graz	7.0	937.5	320	Kharkov (RV4)	20.0
217.1	1,382	Brussels	0.25	355.9	843	London Regional	50.0	967.7	310	Alma Ata (RV60)	10.0
218	1,373	Salzburg	0.5	358	838	Tiraspol	10.0	986.9	304	Sverdlovsk	60.0
218.5	1,373	Plymouth	0.2	360.6	832	Muhlacker	60.0	1,000	300	Moscow	100.0
220	1,363.8	Beziery	0.5	363.6	825	Algiers (PTT)	16.0	1,034.5	290	Kiev (RV9)	100.0
220.3	1,362	Binche	0.1	364.1	824	Bergen	1.0	1,060	283	Scheveningen-Haven	10.0
222.3	1,354	Liege (Coite)	0.15	367.5	816.2	Bolzano	1.0	1,071.4	280	Tiflis (RV7)	100.0
223.2	1,344	Swedish Relays	—	368.1	815	Fredrikstad	0.7	1,083	277	Oslo	60.0
224.4	1,337	Cork (6CK)	1.2	368.1	815	Helsinki	13.2	1,107	271	Minsk	35.0
225.9	1,327.3	Fecamp	10.0	368.1	815	Seville (EA15)	1.5	1,117	268.5	Moscow (RV5B)	40.0
227.4	1,319	Flensburg	0.5	368.1	815	Santiago (EAJ4)	0.2	1,143	262.5	Monte Ceneri	15.0
230.6	1,301	Malmö	1.2	370.4	810	Radio LL (Paris)	0.8	1,153.8	260	Kalundborg	7.5
231.8	1,294.7	Kiel	0.25	372.2	806	Hamburg	1.5	1,171.5	256	Taschkent (RV11)	25.0
235	1,283	Lodz	2.2	376.4	797	Scottish Regional	50.0	1,190.5	252	Luxembourg	150.0
235.5	1,274	Kristiansand	0.5	381.7	788	Lwow	16.0	1,200	250	Istanbul	5.0
237.2	1,265	Bordeaux (S.O.)	3.0	384.6	780	Radio Toulouse (suspended)	8.0	1,200	250	Reykjavik	21.0
237.9	1,261	Nimes	1.0	385	779	Stalino (RV26)	10.0	1,229.5	244	Boden	0.6
238.9	1,256	Nurnberg	2.0	389.6	770	Leipzig	100.0	1,237	242.5	Vienna (Exp.)	3.0
240.6	1,247	Stavanger	0.5	394.2	761	Bucharest	12.0	1,266	237	Bakou	35.0
242.3	1,238	Belfast	1.0	398.9	752	Midland Regional	25.0	1,304	230	Moscow (I.U.)	100.0
244.1	1,229	Basle	0.5	399	752	Vladikavkaz	10.0	1,354.4	221.5	Motala	30.0
245.9	1,220	Berne	0.5	403	743	Sottens	25.0	1,380	217.5	Novosibirsk	(RV6) 100.0
245.9	1,220	Cassel	0.5	408.7	734	Katowice	12.0	1,411.8	212.5	Warsaw	120.0
245.9	1,220	Linz	0.5	413	725	Athlone	80	1,445.8	207.5	Eiffel Tower	13.5
245.9	1,220	Swansea	0.12	416.4	720.5	Radio Maroc (Rabat)	6.0	1,481	202.5	Moscow (RV1)	500.0
245.9	1,220	Schaerbeek	0.25	419.5	715	Berlin	1.5	1,538	195	Ankara	7.0
247.7	1,211	Trieste	10.0	424.3	707	Moscow-Stalin	100.0	1,554.4	193	Daventry (Nat.)	30.0
249.5	1,202.4	Juan-les-Pins	1.0	424.3	707	Madrid (EAJ7)	3.0	1,600	187.5	Irkutsk	10.0
250.9	1,196	Barcelona (EAJ15)	6.0	424.3	707	Madrid (España)	2.0	1,620	185	Norddeich (KVA)	10.0
253.1	1,185	Gleiwitz	5.0	430.4	697	Belgrade	2.8	1,634.9	183.5	Zeesen	60.0
254.7	1,177.6	Toulouse (PTT)	0.7	431	696	Parede	1.5	1,685.3	178	Kharkov	25.0
257	1,166	Horby	10.0	435.4	689	Makhatch-Kala	100.0	1,725	174	Radio Paris	75.0
259.3	1,157	Frankfurt-a-M.	17.0	435.4	689	Stockholm	55.0	1,796	167	Lahti	40.0
259.3	1,157	Trèves	2.0	441.2	680	Rome (Roma)	60.0	1,875	160	Kootwijk	50.0
261.6	1,147	London National	50.0	447.1	671	Paris (PTT)	7.0	1,935	155	Kaunas	7.0
261.6	1,147	Western (Nat.)	50.0	449.8	667	Danzig	0.5	2,625	119	Konigs-wuster-Hausen (press)	20.0
263.8	1,137	Moravska-Ostrava	11.0	450.3	666	Klagenfurt	0.5	2,650	113	Eiffel Tower	15.0
265.4	1,130	Lille (PTT)	1.3	451.8	664	Madona	25.0				
267.4	1,122	Nyiregyhaza	6.25	453	662	Agén	0.25				
267.6	1,121	Valencia	6.0	453.2	662	Odessa	10.0				
268.5	1,117.3	Bremen	0.3								
268.9	1,115	Salonica	1.0								
269.8	1,112	Bari	20.0								

The Coventry Hippodrome Orchestra, conducted by Charles Shadwell will be heard by Midland Regional listeners on August 3 and August 5.

On August 5, the Mason and Armes Concert Party, known as the Regional Revellers, give an hour's light entertainment for the Midland Region.

### INFORMATION BUREAU

Will every querist please observe the following revised rules.  
Please write concisely, giving essential particulars. A fee of one shilling postal order (not stamps), a stamped, addressed envelope and the coupon on the last page must accompany all queries.  
Not more than two questions should be sent at any time.  
The designing of apparatus or receivers cannot be undertaken.  
Slight modifications of a straightforward nature only can be made to blueprints. For more serious alterations the minimum charge is 2/6.  
Blueprints supplied by us will be charged for in addition, but of course, readers may send their own blueprints for alteration.

Modifications to proprietary receivers and designs published by contemporary journals cannot be undertaken. Readers sets and components cannot be tested by us. Queries cannot be answered by telephone or personally. Readers ordering blueprints and requiring technical information in addition should address a separate letter to the Query Department and should see that their remittance covers the price of the Blueprint and the amount of the Query fee.  
We do not answer queries in cases where the fee is omitted.  
Queries should be addressed to the Query Department, "Amateur Wireless," 58/61, Fetter Lane, London, E.C.4.





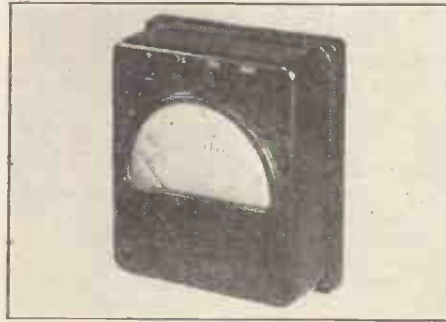
A Weekly review of New Components and Tests of Apparatus  
Conducted by J. H. REYNER, B.Sc., A.M.I.E.E.

**THE OSRAM MHD4**

THE new Osram MHD<sub>4</sub> valve, which has recently been placed on the market, is an indirectly-heated double-diode triode for use in A.C. mains receivers. As readers will know, this type of valve has been developed for use in receivers with automatic volume control. The diodes are used for rectification and volume control purposes, while the triode amplifies the L.F. signal output from the diode.

The construction of the valve is quite normal. A long cathode is used, the top part being surrounded by the usual grid and anode system, while the bottom portion accommodates the diodes. It is interesting to note that the portion of the cathode between the diode and triode sections of the valve is not coated with electron-emitting substance, so that there is no source of stray emission to affect the operation of the valve. The two diodes are surrounded by a circular shield to prevent interaction with the other electrodes. The

accuracy surprisingly good, and its readings can be considered as quite reliable. The scale is open over the portion which will be most used



A new Leslie Dixon pocket tester for A.C. and D.C. volts—the Dixmipanta

in practice and it should prove a very handy accessory.

Altogether, the instrument is well designed and neatly produced. It sells at 19s. 6d. complete with a pair of leads and plugs, and since it covers both A.C. and D.C. measurements it should prove an attractive proposition.

**WEARITE CLASS-B TRANSFORMER**

A NEW Wright & Weaire component which we have just tested is the class-B driver transformer, illustrated herewith. This instrument is of the multi-ratio type, having two ratios, viz. 2:1 and 4:1 step-down. These ratios are obtained by tapping the secondary winding, and not the primary, as is more usually done.

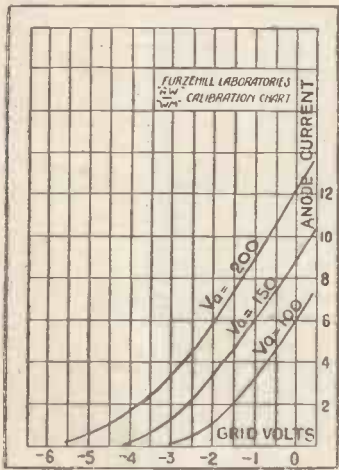
The windings are enclosed by means of metal shrouds and two pressed metal feet are provided to facilitate fixing. The connections from the transformer are brought out to two



This new Wearite class-B driver transformer has a tapped secondary giving a choice of ratios

small bakelite terminal boards, the terminals provided being suitable for spanner or screw-driver tightening.

On test the transformer was quite satisfactory the secondary winding resistance being 250 and 180 ohms respectively according to the ratio, while the primary was 425 ohms. The primary inductance was approximately 23 henries with 4 milliamps D.C. in the windings, while the full load efficiency at 500 cycles was approximately 85 per cent.



Performance curves of the Osram MHD<sub>4</sub> double-diode triode valve tested

valve is provided with a seven-pin base, one of the pins being connected to the metalising, so that this may be earthed independently of the other electrodes. A deviation from standard practice is that the grid of the triode portion of the valve is brought out to the top tap of the valve.

The rating of the triode is quite normal, the impedance being 18,000 ohms and the mutual conductance 2.2.

**THE DIXMIPANTA**

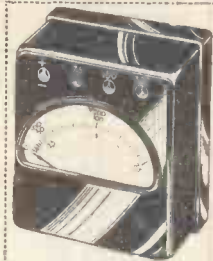
MESSRS. LESLIE DIXON & CO. have recently introduced a small pocket meter known as the Dixmipanta. The instrument measures 2 1/2 in. by 2 1/4 in. by 1 in. thick. It has a scale just over 1 1/2 in. long and weighs only 3 oz.

It is a multi-range instrument suitable for A.C. or D.C. and having ranges of 7.5, 150, and 300 volts. The full scale deflection requires a current of 14 milliamperes so that for D.C. testing its use is rather limited to checking the voltage of batteries and tests of this nature unless one is prepared to allow for voltage drop. This current consumption, however, is low for such a small meter as the customary pocket meters take over twice as much.

For so small an instrument we found the

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A.C. or D.C.

From Test Reports on the DIXMIPANTA:

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**POSTCARD RADIO LITERATURE**

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Here "Observer" reviews the latest booklets and folders issued by well-known manufacturers. If you want copies of any or all of them FREE OF CHARGE, just send a postcard giving the index numbers of the catalogues required (shown at the end of each paragraph) to "Postcard Radio Literature," "AMATEUR WIRELESS," 58/61 Fetter Lane, E.C.4. "Observer" will see that you get all the literature you desire. Please write your name and address in block letters.

**New Celestion Pick-up**

**I** UNDERSTAND that Celestion are producing a new combined pick-up and tone arm which, although built up to the usual Celestion standard of quality, is to sell at a very competitive price. A fine feature of it is an integral volume control regulated in an ingenious fashion. I advise you to drop a note through my Catalogue Service for full details. **1065**

**A Super Junior Epoch**

The Epoch Super Junior permanent-magnet speaker is really very good value for 27s. 6d. It has an 8½-in. specially treated diaphragm, a tapped input transformer giving a choice of five ratios and has a large-size cobalt-steel magnet. A leaflet has just been sent describing this very economical speaker. **1066**

**The Airclipse Aerial**

Here's a new gadget—the Airclipse auto-inductive aerial. It is contained in a small moulded case only 3½ in. long and it is claimed to be as effective as an outdoor aerial. Get in touch with Airclipse, Ltd., for full details. **1067**

**A New H.F. Choke**

I see that Amplion's have just brought out a very well made H.F. choke which is effective between approximately 200 and 2,000 metres. It costs only 4s. 6d., and is fully described in the latest Amplion literature. **1068**

**Clix Valve Holders**

Have you seen the new Clix anti-microphonic valve holders? These are available for all the latest types of valve, 4, 5, and 7-pin. Lectrolinx, Ltd., will send you free leaflets describing these. **1069**

**The Bush A.C. Three**

I learn that price reductions are being made in connection with the popular Bush A.C. Three receiver. You can have it in a choice of cabinets and details are given in a new Bush Radio publication. **1070**

**A Lightning Arrestor**

Summer thunderstorms compel you to consider the advisability of fitting a lightning arrester to a large outdoor aerial system. Take my tip and write to Graham Farish, Ltd., for particulars of the handy Gard lightning arrester. **1071**

**Lion H.T. Batteries**

A new folder of Lion batteries has just been produced by Vince's Dry Batteries, Ltd. Four sizes of H.T. battery are made and numerous dry batteries for grid bias and lighting. **1072**

OBSERVER.

Readers will be interested to know that Mullard valves are being used in the radio gear taken on the Oxford Expedition to the Arctic, under Mr. A. R. Glen. The radio gear has been designed specially for the expedition by Mr. R. F. Loomes and Mr. N. E. Read, G6RL and G6US respectively.

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Melody Ranger Two (D, Trans) . . . . . AW388  
Screen-grid Two (SG, Trans) . . . . . WM289  
A Two for 7 Metres (D, Trans) . . . . . WM295  
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**THREE-VALVE SETS (1s. each)**

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£2 2s. Family Three (D, 2 Trans) . . . . . AW368  
Build As You Learn Three . . . . . AW366  
Build As You Learn SG 3 (SG, D, Trans) . . . . . AW372  
James Push-Push Three (SG, D, Q.P.P.) (1/6) . . . . . AW378  
Everybody's Home Radiogram (SG, D, Trans) . . . . . AW381  
Home-Lover's New All-electric 3 for A.C. mains (SG, D, Trans) . . . . . AW383  
Our Up-to-the-Minute Three (SG, Westector, LF, Trans) . . . . . AW384  
Class-B Three (D, Trans, class B) . . . . . AW386  
S.S.3 (A.C.) (SG, SCDet, Pen) . . . . . AW390  
"Up-to-the-Minute Three" with Class-B, 1/6 . . . . . AW384B  
Multi-mag Three (D, 2 Trans) . . . . . WM288  
Percy Harris A.C. Radiogram (D, RC, Trans) . . . . . WM294  
Prosperity Three for Batteries (SG, D, Trans) . . . . . WM296  
1933 Economy S.C. Three (SG, D, Trans) . . . . . WM306  
Harris Ethergram (SG, D, Trans) . . . . . WM308  
A.C. Calibrator (SG, D, Trans) . . . . . WM309  
Narrow-pass Three (SG, D, Trans) . . . . . WM314  
£6 6s. Radiogram (D, RC, Trans) . . . . . WM318  
Simple-tune Three (SG, D, Trans) . . . . . WM327  
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Gold Coaster (A.C. Short-wave) . . . . . WM292  
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Calibrator (SG, D, RC, Trans) . . . . . WM300  
Table Quad (SG, D, RC, Trans) . . . . . WM303  
"Words and Music" Radiogram (2SG, D, Trans) . . . . . WM307  
Home Short-wave (SG, D, RC, Trans) . . . . . WM311  
"Words and Music" Radiogram de Luxe (SG, D, RC, Q.P.P.) . . . . . WM307A  
Empire Short-wave (SG, D, RC, Trans) . . . . . WM313  
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1932 A.C. Super 60 (A.C. Super-het) . . . . . WM272  
James Class-B Super (Super-het) . . . . . WM326  
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Plug-in Short-wave Adaptor . . . . . AW382  
Voltage Regulator . . . . . WM287

Copies of the "Wireless Magazine" and of "Amateur Wireless" containing descriptions of most of these sets can be obtained at 1s. 3d. and 4s. respectively, post free, under letters "A.W." refer to "Amateur Wireless" sets and "W.d." to "Wireless Magazine." Address letters: Amateur Wireless-Blueprints Dept., 58-61 Fetter Lane, London, E.C.4.

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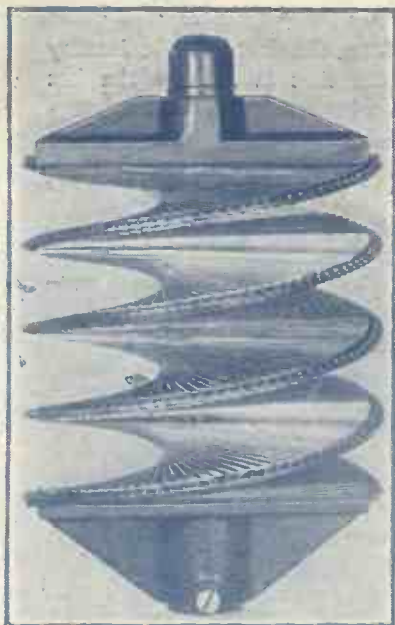
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# PHOTO CELL EXPERIMENTS FOR ALL

By PERCY W. HARRIS M. Inst. Rad. E



This ambitious mirror is a German attempt to get 180-line television scanning.

## Radio "SCOPHONY"

THE August WIRELESS MAGAZINE discloses the imminent release of a new type of television receiver based on a new principle called Scophony. This new arrangement of television is simply explained and profusely illustrated; it is based on the idea of an arrangement of stationary prisms without the use of moving parts or mechanism.

In the August WIRELESS MAGAZINE Percy W. Harris explains how interesting simple photoelectric experiments can be and throws open a new field which every amateur can enter. The costs are not great and the possibilities are tremendous. You cannot now consider yourself up to date if you do not know something about the radio transmission of light. See the following details of "light" radio, which is now developing so rapidly.

## The NEW TELEVISION by CATHODE-RAY TUBE

ALTHOUGH cathode-ray television is still very much in its infancy, it already shows great promise and development is likely to be rapid. The mirror-drum method is being given considerable attention and complete receivers are now available to the public. Morton Barr, in the August issue, runs through the main difficulties that are encountered, and discusses the different methods of reception—disc, mirror-drum, and cathode-ray.



A typical cathode-ray tube

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 THE SELF-CONTAINED FOUR—WITH IRON-CORE COIL AND CLASS-B OUTPUT. By the "W.M." Technical Staff  
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 VARLEY FOUR-VALVE SUPER  
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GRAMOPHONE-MOTOR HINTS. By P. Wilson, M.A.  
 CHOOSING YOUR RECORDS. By Whitaker-Wilson and Chopstick

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AUGUST ISSUE

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