

Simon Day No 334

Amateur Wireless,
April 5, 1930

A CHEAP TWO-VALVE SET—FULL DETAILS

DISTANT STATIONS—IN SPITE OF BROOKMANS

Amateur Wireless

Every
Thursday **3^d**

and
Radiovision

Vol. XVI. No. 408

Saturday, April 5, 1930

The
**EASY
TUNE**



**CHEAP
TO
BUILD**

2

RAZOR KEEN



LEWCOOS

REGD.



THE LEWCODENSER
Type "O"
Capacity 00015 - 00/MFD.
2/6 each

The advent of the new London Station radiating 30 Kw. from Brookman's Park, as compared with 3 Kw. from the old Oxford Street station, has emphasised the necessity for really efficient Wave-traps.

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The absorption type can be used for separating distant stations which are next to one another in point of wavelength. For example: Langenberg (473 m.) from Daventry 5GB (479 m.).

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ABSORPTION WAVE-TRAP
A.W.5 6/- each
A.W.20
NO CONNECTIONS ARE NECESSARY WITH THIS COMPONENT



BINOCULAR ABSORPTION WAVE-TRAP
A.W./B.A.C.5 10/6 each
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Don't Forget to Say That You Saw it in "A.W."

Amateur Wireless and Radiovision

The Leading Radio Weekly for the Constructor, Listener and Experimenter

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A Howler—Detecting Pirates—Phoning-up a “Wavelet”— The New “Song of the Nile”—High-brow Kiddies’ Hours!

A Howler—How easily the daily papers go wrong when it comes to radio technicalities. Last week, when all the fuss was made about Marconi’s scheme for lighting electrical exhibition lamps at Sydney from his yacht, 10,000 miles away, two or three national dailies made grievous errors. They made it appear that Marconi was to transmit the power required to light the lamps, whereas all the pioneer Marchese meant to do was to operate a relay by a short-wave link. We rushed out to buy a copy of the _____, when we saw the misleading headline, and now we want our penny back! The radio transmission of power has not yet arrived.

Detecting Pirates—Last week, also, a daily Press radio “expert” said in the children’s corner of his journal, regarding oscillator hunters: “When he detects a ‘howler’ he knocks at the door, explains his business, and the ‘howler’ gets into trouble. He is also able (it was stated) to find out if anyone is using a wireless set without paying for a licence.” How, please? The Post Office and the B.B.C. would give a small fortune for a set which could locate pirates. The truth, of course, is that only if the pirate oscillates can he be detected. It is a bad mistake for a newspaper to make. By the way, here is news of the Post Office detector van.

Our Pirates—The pirates’ nightmare, the Post Office detector van, is still in the north of England, and is making its presence felt. Although not many prosecutions are made as a result of the van’s visits, it leaves behind it a trail of folk anxious to get to the Post Office as soon as possible and to pay that 10s. This is at the same time an amusing reflection on the present method of giving the B.B.C. its programme money and a sorry thought on national dishonesty. They say that in Manchester alone 4,000 new licences have been taken

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out. It does sound bad, don’t you think?
Phoning-up a “Wavelet”—In Alaska, particularly in townships which are on the edge of the “great open spaces,” a



Calling to the washing! This giant washing machine at the International Laundry Exhibition in London is started and stopped by means of amplifiers and a microphone. The “mike” is in the foreground

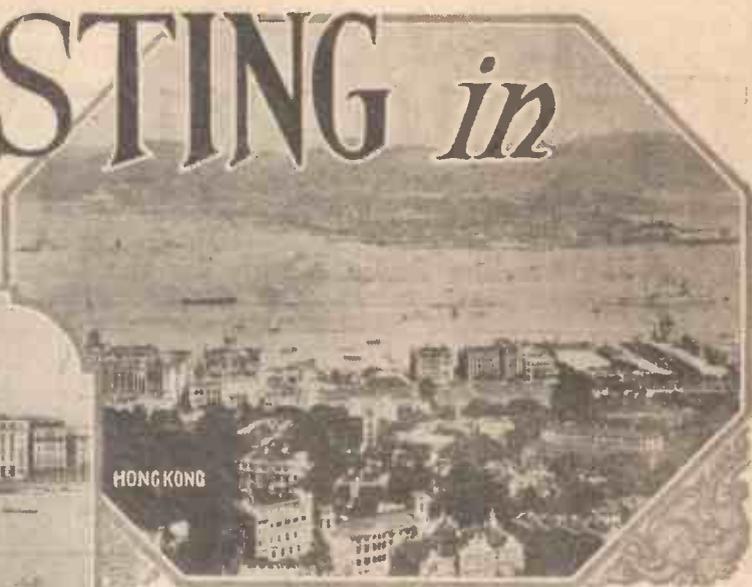
popular diversion after working hours is the tuning-in of short-wave stations. PCJ is one of the stations which comes in particularly well, and one of the listeners who regularly gets him offers to put PCJ over his telephone line to anybody who calls him on Thursday or Friday evenings between 8 and 9 o’clock, when the station is working. This enterprising listener is usually inundated with calls between these hours, and in some Alaskan homesteads it is now quite a novelty to hear PCJ over the phone.

The New “Song of the Nile”!—Lorries fitted with radio are being sent out into the desert and will link up with the present Egyptian telegraph lines. In this way the telegraph systems will have a radio link so that the difficult country on either side of the Nile can be brought into touch with the world. What a contrasting of ancient and modern! The lorries, of British manufacture, are of the six-wheel type fitted with “caterpillars” so that they can run on hard or soft desert country. Each lorry carries a medium-wave ½-kilowatt telephony transmitter and a small portable short-wave transmitter of 100 watts. The aerials are suspended from 70-ft. portable masts, and the wavelengths used are between 600 and 2,150 metres on the medium-wave set, and from 20 to 50 metres on the short-wave set.

High-brow Kiddies’ Hours!—Thank goodness the B.B.C. doesn’t put education into the Children’s Hours. A. von K., a Continental reader, tells us that German children are not bothered by radio “aunties” and “uncles” who fail to appreciate and understand the child’s point of view. Instead, they listen to lessons, which are disguised as entertainment. At the end of each session the children are invited to send reports and solutions of various little problems. Sounds like extending the afternoon school lessons! Our kiddies have not such modern radio tastes. They prefer genuine fun to “disguised education”—and so do most adults!

NEXT WEEK: A NEW FIVE-VALVE SET BY A FAMOUS DESIGNER—SEE PAGE 493

BROADCASTING *in* CHINA



FIVE weeks ago from the time of writing, we sailed from Tilbury for Shanghai; five weeks ago we were listening to the strains of Jack Payne and his orchestra from 5XX. To-night the portable set is once again opened and a small gathering of passengers await their first impression of China on the ether. A turn of the knobs appears to bring in nothing but morse, but a faint carrier is soon heard, and we are once again able to tune in a broadcasting station. At first a gramophone is playing, but a voice soon informs us that it is "Hong-Kong calling." The liner's siren blows and we realise that the harbour is in sight.

For the last hour we have been steaming up the dark narrows which lead up to the anchorage, but now, at last, the glare from the lights of Victoria (the capital of Hong-Kong) come into view on our port bow, and we stare amazed at the tiers of lights on Hong-Kong Peak. On our starboard hand is the flourishing British territory of Kowloon. Here three white lights wink steadily at us, and from the third officer we learn that it is the time signal on the flagstaff of the observatory. And here we shall find the Hong-Kong broadcasting station.

The Hong-Kong Broadcaster

A transmitter of 200 watts working on the 300-500-metre waveband has been installed through the enterprise of local wireless enthusiasts, and it is able to broadcast gramophone records two or three evenings a week between 8 and 10 o'clock. They would like to do more, but further development is handicapped by lack of funds. The population is not large enough to provide any useful revenue from licences. A Government subsidy would be of assistance, but it is doubtful, with the limited programme facilities available, that broadcasting would in the end be enthusiastically supported by the English-speaking population.

But the ship's bell is ringing and we must dally here no longer. Mails and passengers have been disembarked, and in a short while we shall be under weigh en route for Shanghai, a voyage of nine hundred miles.

Three Shanghai Stations

And so three days later we pass up the Yangste Estuary into the crowded Whangpo River, and thence to our moorings at Shanghai. Once ashore, away from the noisy stream with its hustling steamers, launches and sampans, we are able to tune in on our portable once again and take stock of broadcasting in Shanghai.

Here we are lucky, for there are three stations within the city. Firstly, there is an English station which is very similar to the one at Hong-Kong, suffering from the same financial difficulties, but with better programme facilities. A gramophone recital is given between 1 and 2 o'clock, a weather forecast at 7.30, followed by gramophone records until 9, and concluding with dance music from an hotel until 10.30. The other two stations are Chinese; since Shanghai has a million inhabitants, composed of the many and varied Chinese races, two dialects must be used in order to cover a useful percentage of the population.

These two stations are part of the Chinese national broadcasting system, which has transmitters using 1 to 10 kilowatts in all the principal towns, including Peking, Tientsin, Nanking, and Canton. They are controlled by the Government in a manner which was intended to be akin to our own B.B.C. In practice this control is very lax and hardly affects outlying stations, particularly since they are often seized by the local warlord and used for propaganda against the Government.

Financially they are well off. There are no licences, but a tax is levied by the Customs on all wireless sets and parts imported into the country. There is no

wireless manufacturing trade in China worth consideration. The Customs department of each area divides this revenue among the broadcasting stations allotted to it.

The Programmes

Programmes are good, with news at 9 a.m. and 9 p.m., and concerts and talks from the studio or outside in the evening. The speakers are usually provided by the local universities, which find in broadcasting an excellent method of assisting students in their homes. The concerts are, to us, another matter, since Chinese music uses a different set of scales to ours, and appears to be composed entirely of discords. Two Chinese friends of the author obtain immense pleasure in England by creating oscillations, which apparently mingled with the music from 2LO to form discords akin to their own!

Broadcasting is used to a great extent by the more modern and wealthy Chinese for the educational facilities that it provides, but the vast majority of the Chinese are far too poor to own a receiver. However, the proprietors of a few of the cheap eating-houses have installed loud-speakers. Here we can see crowds of coolies squatting on the floor taking their evening "chow," a meal of rice and meat literally shovelled into their mouths with chopsticks. We are unable to hear above the incessant chatter a voice from the loud-speaker lecturing on the silkworm; but the speaker is soon finished and an orchestra takes his place, and at once there is a curious change in the crowd. At first there is silence, and then slowly the coolies start a chant, nodding their heads in time with the music.

Turning to go, we take a last look at the nodding figures silhouetted in the dim light of the dirty eating-house; and there creeps over us some realisation of the grim potency of the Chinese mind, a mind which the Westerner has failed to understand, but one that he has tried to exploit, to the ruin of a mighty civilisation.

EDWARD COVERLY.

What You Gain by using a Meter

DO you realise that by using meters in your set you not only get better adjustments—and, therefore, better results—but actually save money by being able to check the consumption from your batteries? Buying a meter of any kind, even if it is a simple pocket type, is an insurance and an economy, and a little consideration of what you spend on a set during the course of a year is convincing proof of this.

When you come to think of it, the facia-board equipment of practically every car includes an ammeter, oil-pressure gauge, and speedometer. These are not just "pretty-pretty's," but are really part and

in the set is not giving twice as many milliamps as it should, that the grid-bias battery has run down, and that loss of emission of the shielded valve is the cause of those lost foreign stations? Without meters corresponding in purpose to those in the car you certainly do not know; you can only guess: and it is just because some people prefer continual guessing to the expenditure of a few shillings on a handy little meter that their radio running costs mount up to 200 and 300 per cent. above what they should be.

Take a concrete case. A simple three-valver, shielded H.F., detector, and transformer-L.F., working from dry batteries, slowly goes off colour. "H.T. must be running down," says its owner; so a new battery is bought, costing, perhaps, 30s.

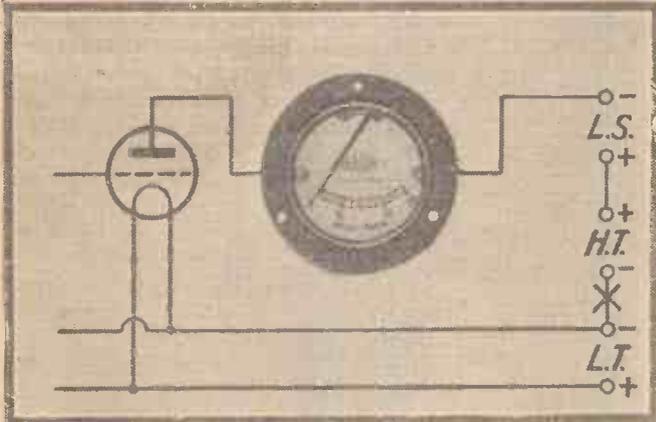
Then the trouble starts. The quality is even worse, distant stations are still as distant, and the new H.T. seems like a blot on the landscape. The owner wonders whether it really was the H.T., and regrets having given the old battery to the charwoman before having it tested! The set is

valve working properly; and still the results are no better.

"Then it *must* be the low-frequency side," says the unfortunate man in despair, and having taken the new H.T. back to the radio shop to have its voltage tested, he may do wild things to the extent of changing the transformer, having the loud-speaker re-magnetised, and otherwise wasting good money.

All this trouble and quite considerable expense could have been saved (a) by putting the L.T. side of a pocket voltmeter across each pair of valve legs in turn, which would have shown that the H.F. filament rheostat had stuck, and the shielded valve was not getting its full L.T. potential, and (b) by testing the power-valve anode-current consumption or the grid-bias voltage; a run-down G.B. battery was the cause of the poor quality.

This is a very common instance. Probably you have been faced with such troubles and have been similarly in the dark as to



How a milliammeter, such as the Bulgin, is connected to show the H.T. current consumption of the last valve. If the meter is placed at X it will show the total consumption of all the valves

parcel of the insurance of the car. The total cost of all the facia-board gadgets is probably not more than two or three pounds, and the cost of possible damage they save (through the oil pressure accidentally falling, or the electrical system going out of order, for example) by showing the immediate presence of a fault is worth three or four times the cost of the instruments.

It is just the same with a wireless set, as motoring radio enthusiasts should be the first to realise. With meters you *know*, for instance, that the oil pump of your car keeps up to the proper pressure, that the dynamo charges at the full rate, and that the cooling water never goes above "normal."

But do you *know* that your H.T. battery

still at fault, so the time-honoured method of cutting out valve by valve is adopted. As a first step he puts the phones in the plate circuit of the detector, hoping that this will show that the L.F. stage is faulty; but with phones in the detector circuit the H.F. side of the receiver is sent crazy and it is found impossible to get any other stations than the two locals, so this is no test.

Being all the time in the dark as to what the battery values are, the set-owner borrows a new H.F. valve. On first plugging in it works half as well as his own, which is consoling in a way; but the truth is that the screen-grid voltage is wrong, so a good part of an evening is spent tinkering with the battery tappings to get the borrowed

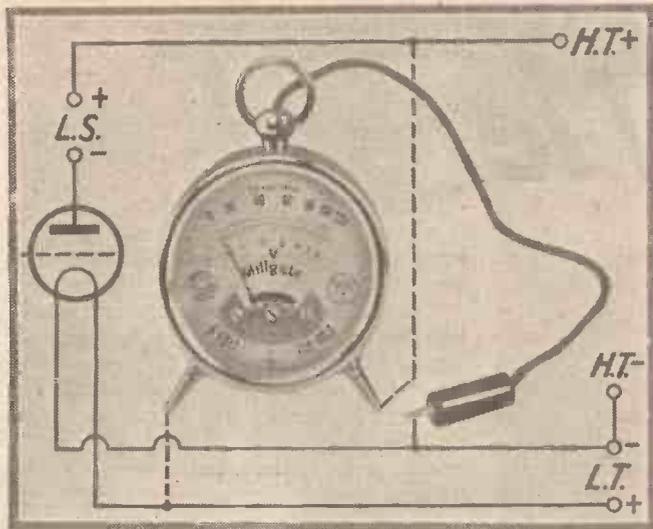


The C.F. Radio Controller which plugged in to a valve holder shows any faults in the H.T., L.T. or grid circuits

what was at fault until money had been wasted in buying new components to "eliminate" possible faulty ones. If so,

then resolve right now to invest in a meter. Whether you buy an expensive one or not will depend on how you use your set; but choose one which will do the job you want.

Meters are made for every radio purpose. They can be mounted on the panel, on the baseboard at the back of the set, or they can be had in pocket and portable types.



A dual-range voltmeter such as the Millgate shows H.T. and L.T. voltages. The dotted lines show the connections for both voltages

They can be obtained for measuring H.T. and L.T. voltage (and, of course, intermediate values such as grid bias), H.T. and L.T. current, and so on. Some types of meter can be obtained which do several jobs—such, for example, as showing H.T. current and H.T. and L.T. voltage. Such dual- and triple-purpose meters are made by Wates, Ferranti, Sifam, Gambrell, Weston, and Millgate, to mention but a few.



A useful double-range D.C. meter—the Weston

Now, just think for what purposes you will need a tester. Certainly you will want to know the H.T. voltage. That is essential, but it raises a difficulty if an eliminator is used. A voltmeter should use as little current as possible. That a meter uses any current is not obvious to beginners: but it should be clear that no wire-wound apparatus can have an infinite resistance. In the

case of a voltmeter the resistance should be, naturally, as high as possible. Unless the resistance is very high (higher than is the case with the cheaper, but otherwise quite reliable, voltmeters) and the current passed is correspondingly low, a false reading may be obtained on an eliminator. There is no need to go into this in detail, but the point should be watched that whereas a cheap meter may be serviceable with dry H.T.'s and accumulators, the reading may be false on eliminators. Firms such as Weston, Cambridge, Gambrell, and, of course, Ferranti, make voltmeters which have a specially high resistance.

If the resistance is too low, though, the current taken by an H.T. voltmeter may be considerable. It may be so great that, in the case of single-capacity cells, the current taken is greater than should normally be supplied in ordinary working. This means that quite a short period of testing will run the battery down more than a long period of legitimate use! Be sure of obtaining a meter of reliable make!

But to hark back for a moment to the choice of a meter: H.T. voltage will certainly need testing. H.T. current is equally important; it is the knowledge of the milliamps passed that is so useful in checking faults. It is handy to know the L.T. voltage, particularly when there is a doubt as to the state of charge of an L.T. accumulator.

The ideal general purpose meter, therefore, gives H.T. volts up to about 150, L.T. volts up to 6 or 10, and milliamps up to about 25 or 30. Fortunately, there are many meters available in which all these three jobs can be done. Some of the cheaper meters of this ilk are not, of course, so accurate as the high-priced specialised instruments, but at this stage one does not require more than an approximate reading. The fact that the H.T. voltage is 99 instead of the 100 shown will not trouble the average listener: it is sufficient for him to know that the voltage is 99, and not nearer 70.

For general test work, therefore, there is everything to be said for medium-price triple-purpose meters. There is only one thing to watch, though, and it is that the resistance of the meter, both for the milliamps and H.T. voltage windings, are clearly given by the makers. Too high a resistance in the case of the milliammeter section, or too low a voltmeter resistance will mean false indications. A high-resistance milliammeter may cause trouble

if the instrument is permanently connected in circuit. It will be a perpetual source of motor-boating.

Panel mounting is very convenient if one

BY USING A METER YOU—

- ensure that the accumulator is properly charged.
- can trace distortion in each valve circuit.
- prevent a waste of H.T. current.
- can work valves economically and lengthen their life.
- save the unnecessary wastage of H.T. batteries and accumulators
- prevent trouble through the overworking of eliminators.

has only one receiver, but pocket or portable meters are handier for "tinkerers." Small meters, such as milliammeters, can conveniently be placed near the corresponding valve holders, at the back of the baseboard: one does not constantly want to be watching the dials. The permanent mounting of meters in a set has the sole advantage that one's friends can't borrow treasured measurers; and the frequency with which radio acquaintances will drop in to borrow H.T. voltmeters and milliammeters is, alone, a proof of these meters' utility!

For the serious experimenter and the professional trouble-tracker there are the



This handy Gambrell 7-range tester is a bench instrument useful for all receiver tests

highly-accurate individual instruments and combined testing sets such as the Ferranti, Gambrell, Weston, Sifam, Cambridge, and the C.F. Controller, to mention but a few. No really keen enthusiast tries out a set without H.T. and L.T. meters being at hand: once you buy a meter you will find endless uses for it, and it is almost bound to save its cost in the first year of use.



Long-distance Work in spite of Brookmans

R. W. HALLOWS MAKES SOME VALUABLE SUGGESTIONS

WHEN I first heard that the southern regional station with twin 25-kilowatt transmitters was to be erected at a place fifteen miles from my aerial I had an unpleasant feeling that its coming into operation might mean good-bye to long-distance work. Luckily it hasn't, for I have always regarded the problems concerned with bringing in foreign stations at sufficient strength and with first-rate quality as amongst the most fascinating in wireless. I will go further: if I were condemned to hear nothing but my local station, I don't honestly think that I should make an enormous amount of use of my set. The B.B.C., unfortunately, does not appreciate that there are many whose attitude is much the same as mine; but that is another story.



Still a Wide Choice

Actually, with the London Regional and National transmitters in action, I have still about twenty good foreign stations at my beck and call on most evenings. Budapest, Oslo, Rome, Turin, Milan, Toulouse, Nürnberg, Kattowitz, Cologne, Bratislava, and Frankfurt are perhaps the star performers; but there are many others that can be well heard.

Against the inauguration of Brookmans Park I had prepared a set containing two tuned stages of high-frequency amplification. This was certainly selective enough, but it was not very handy to use, since there were three controls—one for each high-frequency valve and one for the detector. It had, too, the further drawback that with it it was difficult to reduce either local transmission to reasonable volume.

With only one H.F. stage the swamping was appalling, since an ordinary aerial and earth system seemed to suffer from something very like shock excitation. A wave-

trap enables such a set to cut out either transmission fairly well, but one has to be very careful that the wavetraps does not cut out also a great number of distant stations, or, at any rate, reduce their strength unduly. One day I hit upon a solution which readers may find of service. This was to employ a short outdoor aerial and to dispense with the earth connection, relying upon the batteries and their leads to furnish a counterpoise which would do the business. If this arrangement is found to make tuning too sharp or to bring about too big a reduction in signal strength, a very short counterpoise may be tried. The effects upon selectivity are almost miraculous.

The Long and Short Waves

There are, however, many people who find that, no matter what they do with their sets they are still swamped by the twin transmissions. Are they to abandon long-distance work altogether? Many, I fear, have done so, not realising that there are two separate ways of hearing foreign stations, no matter how close one may be to a regional transmitter. If you are swamped on the medium waveband, well, use the medium waveband only for the reception of the local station and for distant transmissions specialise upon the long and very short waves.

There is something very attractive about the wavelengths between 1,000 and 2,000 metres. They don't suffer in the same way as others from enormous differences in signal strength in daylight and in darkness. For this reason they can be made use of all the year round, since summer effects are much less noticeable upon them.

The long waves contain some very fine stations, and it is worth while to see that the receiving set is thoroughly up to the mark for dealing with them. Perhaps the best of all foreign transmissions, irrespective of wavelength, is that of Radio-Paris, which is an excellent signal in daylight or in darkness from year's end to year's end. Then there are Huizen, Königswusterhausen, Moscow, Warsaw, Motala, Kalund-

borg, and Hilversum, all of which can provide first-rate reception. Stamboul also is often a station worth trying for. If, therefore, your set is efficient upon the upper band you have a fairly large number of first-rate foreign stations to draw upon.

World-wide Possibilities

The second great field for the swamped DX man is to be found amongst the wavelets from about 70 metres down. The apparatus required for this kind of reception is of the very simplest, consisting, as it does, of nothing more than a detector valve followed by one or two note-magnifiers. Yet with such a set one can roam all over the world, hearing speech and music from most European countries, from Canada or the United States, from South America, from Australia, from Java, and from Africa.

Short-wave reception does not demand late hours and it is an all-the-year-round pastime. To anyone unfamiliar with the short-wave set his first tuning in of one of the great Dutch stations in Java in the early hours of the afternoon will come as a revelation that is almost staggering.

Here is what happens. With an aerial coil containing but three turns you start searching gently upwards from



zero on the condenser dial. Suddenly your ear catches faint strains of music. A slight adjustment, and you hastily change from the head telephones to the loud-speaker. Though it comes from a place eight thousand miles away, the transmission is so powerful that with a detector followed

(Continued on next page)

For the Newcomer to Wireless: HOW THE ACCUMULATOR WORKS

COULD you explain how an accumulator stores electricity?

I will do my best to give you a simple idea of the very beautiful but rather complicated process which takes place. We will begin with the discharge of an accumulator that has just had a "refill."

In that condition you have—haven't you?—the positive plates covered with lead peroxide and the negative with pure lead, whilst the electrolyte is dilute sulphuric acid.

That's it exactly. Now, remember that each molecule of lead peroxide consists of one lead atom in combination with two of oxygen. The sulphuric acid molecule in the electrolyte consists of two of hydrogen, one of sulphur, and four of oxygen.

I follow that.

When the battery is put on closed circuit positively-charged hydrogen molecules rush to the positive plate, where they combine with the lead peroxide molecules and a chemical change takes place.

And just what is it?

The lead peroxide gives up one of its

oxygen atoms to each hydrogen molecule; which consists of two hydrogen atoms. The lead peroxide thus becomes lead monoxide, whilst the combination of two hydrogen atoms and one oxygen atom produces H₂O, or water.

And then what?

Sulphuric acid is able to attack the lead monoxide violently and another interchange of atoms takes place. The lead monoxide combines with sulphur and oxygen to form lead sulphate, and more water is formed by the combination of hydrogen and oxygen. The thin coating of lead sulphate on the positive plates increases the internal resistance, and in time the battery is run down.

And now for the negative plate?

To this plate rush oxygen atoms negatively charged. These combine with the lead to form lead monoxide, which is also turned during discharge into lead sulphate.

And now for the charging process.

When it begins, each plate has a thin coating of lead sulphate. As soon as the battery is connected to a source of D.C. through a suitable resistance, oxygen atoms stream to the positive

plate and combine with the lead sulphate. This breaks up into sulphuric acid, which is restored to the electrolyte and into lead peroxide, which remains upon the plates.

Yes, and what happens at the negative plates?

Here hydrogen atoms arrive, and combination between them and the lead sulphate takes place. The result is a change back partly into lead on the surface of the plate and partly into sulphuric acid, which is given back to the electrolyte.

Then the operation of the accumulator is really chemical?

That is so. When we apply the run-down battery to the charging mains we bring about inside it a chemical change which is capable of being upset very easily. In other words, we convert the electrical energy from the mains into chemical energy, and during discharge chemical energy is reconverted into electrical energy.

It is a very beautiful process, as you say, and I had no idea that the prosaic accumulator was really such a wonderful thing.

"LONG DISTANCE WORK IN SPITE OF BROOKMANS"

(Continued from the preceding page)

by a pentode it will often fill the whole house with music. Possibly you think you have picked up some harmonic of the local station. Presently the announcer

gives out, first in Dutch, then in German, then in French, and finally in English, that the programme is from Bandoeng, and you realise what a marvellous thing a short-wave set is.

To those who live in swamp areas I would say make use of the medium wave-

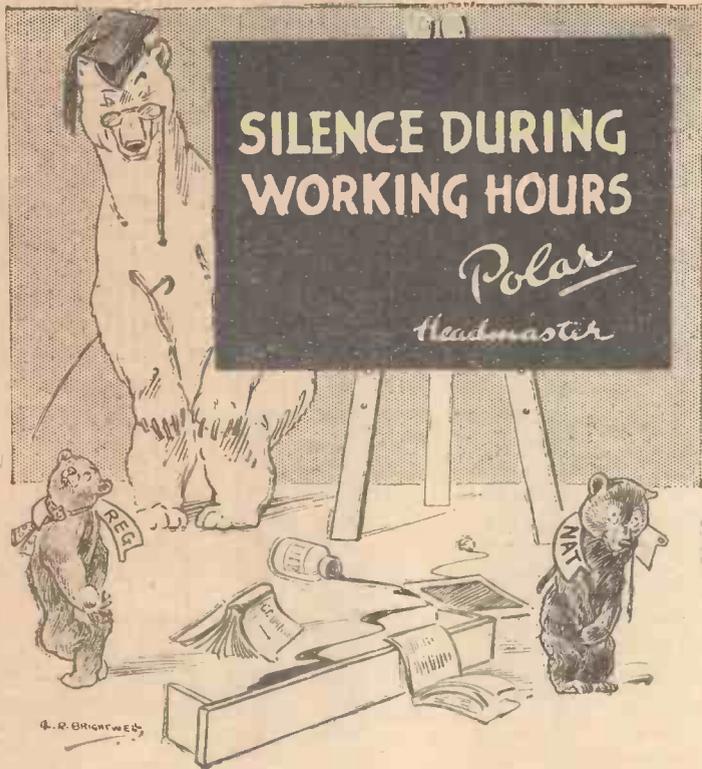
band if you can get adequate selectivity without undue trouble or expense. If you cannot, then remember that there is wonderful fare awaiting you upon both the long and the very short waves. Don't give up in despair, for there are these two splendid fields waiting for you to explore.

MR. FLEX LEARNS THE MEANING OF THE PHRASE—



—"KILLING VALVES BY KINDNESS."





Separate the Twins!

*Polar -
the Master
Condenser*

Separates the twins—Reg. and Nat.—and increases the selectivity of your receiver.

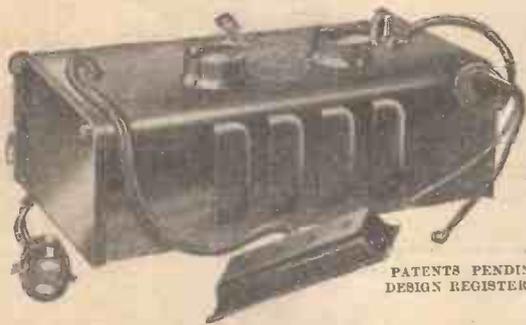
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H.T. Output: 120 volts at 15 ma. Size, 9 in. x 5 in. x 3 1/2 in.
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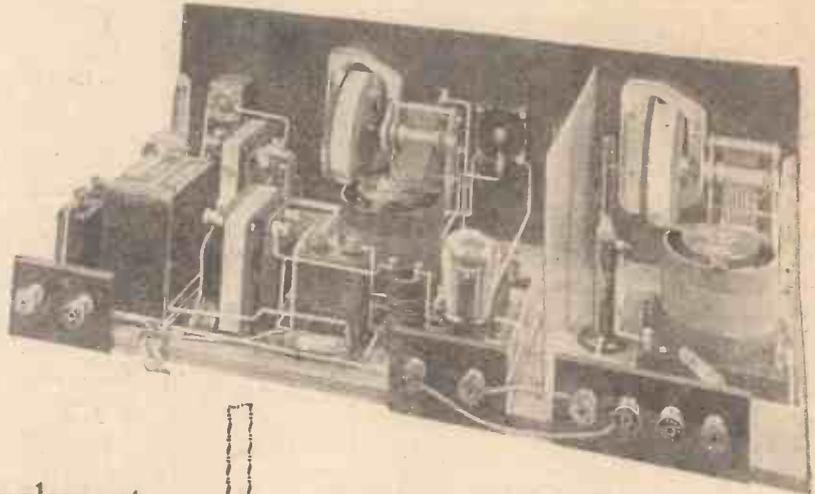
For Radio from the Mains

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WIRELESS MAGAZINE

for April is now on Sale everywhere, 1/-

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On Your Wavelength!

What About It?

OF course, I may be wrong, but my own impression was that the main idea of the regional scheme, with its twin wave-length working, was to give us genuine alternative programmes, so that each and every listener, if he didn't like an item on one wavelength, might be able to find something else likely to please on the other. But how does it work out? The other night I happened to be listening to the National and found that a talk to be given by no less a personage than the Lord Chief Justice was not the kind of thing that I wanted at that particular moment. "Never mind," sez I to myself sez I, "the Regional is sure to be giving something to suit the mood." I turned to the Regional, and there was the L. C. J. saying his piece on that wavelength too. Since the talk was billed to last from 9.25 to 10.15 p.m., I do think that here was a very clear case when an alternative was required.

Talks Are Too Long

To my mind no wireless talk should ever last for more than twenty minutes, whoever may be giving it and whatever may be the subject, and I would not let the average talker have more than ten. Curiously enough, almost anybody can discuss a subject at length, but it takes a really good man to put what he has to say into a few words. I imagine that on the night in question not a few of those in the swamp area of Brookmans Park cursed like anything at not being able to get foreign stations. I must say that I was very glad that my own set was selective enough to give me the alternative that the B.B.C. wouldn't provide.

On the Wrong Tack

A correspondent, H. H., of Carlisle, puts me on the mat for having voiced the grievances of those who live within fifteen or twenty miles of Brookmans Park. He says my remarks appear to have been made "in blind or wilful ignorance of the past position of hundreds of thousands of fellow listeners in other parts of the country." What he is driving at is that in his neighbourhood the London programmes are being received now as they never were before. Granted every time, but, dear readers, if you receive the London programmes direct at Carlisle you are indulging in long-distance listening which is not favoured by those who promoted the regional scheme. The underlying idea of the scheme is that each station shall serve a certain definite area, and Brookmans Park is not meant to provide programmes in the north. Moorside Edge and the predicted Scottish station are to do that.

In the Future

When they come into operation we in the south may say that we are hearing the northern regional programmes better than we have ever heard them before, and it will be quite fair if we accuse the thousands upon thousands of dwellers in the new swamp areas of horrid selfishness because they complain that they cannot hear anything decently. I thought I made it pretty plain in writing the article that I wanted people in areas threatened by the regional scheme to realise before it is too late what their fate may be.

A WORD from the designer of many famous sets, W. JAMES:—

My new five-valver is now finished. It has a band-pass aerial circuit filter, two screen-grid stages, a detector and two stages of low-frequency magnification.

The results are simply splendid. Quality is practically perfect. Distant stations are received at great strength. Selectivity is exceptional, tuning being sharp but non-distorting.

There is a high-frequency and a low-frequency volume control. It is the set for all amateurs who want the finest results. I am describing it next week in "Amateur Wireless."

At It Again!

It really isn't quite fair for editors of lay papers to turn non-technical journalists on to wireless subjects, for they are apt to make, in the best of good faith, the wildest statements. A Sunday or two ago, for example, I have no doubt that your eyebrows rose in astonishment when you read that Marchese Marconi was to supply from his yacht all the power needed for lighting up the Sydney Exhibition at a distance of about ten thousand miles. Old hands, of course, realise that nothing of the sort could have been invented, for it does not require much calculation to show that to keep even a hundred 10-watt lamps aglow requires a whole kilowatt of power, and to transmit this by wireless from one point to another over nine thousand miles would be some feat!

A Wonderful Advance

The truth, of course, is that Marchese Marconi has succeeded in transmitting signals over enormous distances on the short waves with very tiny apparatus. When the Exhibition at Sydney is opened a signal from the yacht *Elettra* will be picked up at Sydney and amplified until sufficient power is available to operate a relay. This relay will switch on the lights. It is some years now since amateurs demonstrated that, with a power of only 2 or 3 watts, it was possible to conduct

communication on the very short waves with the Antipodes. Marchese Marconi appears to have worked out on lines of his own a midget transmitter using very small power which is capable of conducting not only telegraphy but also telephony over great distances.

For Short-wavers

The improvement on the short waves continues, though at the moment it is not going forward quite so rapidly as many of us had expected. There are heaps of stations to be heard, but we are still troubled at times with both quick and slow fading. However, good nights are becoming more and more frequent and bad ones less and less so. One notices far fewer transmissions which seem to consist of a carrier wave and nothing else. Except on good nights, signal strength may not be very great, but the number of stations from which telephonic reception can be obtained is still increasing and when conditions are good loud-speaker reception is possible from quite a number. A station that I want to bring to the notice of fellow short-wave enthusiasts is W8XK, which relays KDKA on 25.25 metres. This station is generally at work quite early in the evening, and he comes through with surprising strength. I have not failed to get him on any recent occasion when I have tried for him, and quite often I have been able to put him satisfactorily on to the loud-speaker.

Zeesen

Another station worth attention is Zeesen, on 31.28 metres. The times are irregular and it does not, of course, work when PCJ is in operation, for both stations use the same wavelength. If you know PCJ's tuning, it is worth while to turn to it on any evening when the Dutch station is not working, to see whether Zeesen is on the air. When he is, he is a wonderful signal, both the quality and the strength being excellent. The star performers, though, on the short waves are the Dutch stations at Bandoeng, in Java, and no one who can do so should omit to try for these during the early afternoon.

A Poser

I don't know how often I have been asked which is the best loud-speaker. The question is, of course, absolutely unanswerable, for there is no best loud-speaker any more than there is a best car. All that one can say in answer to such a poser is this. The best loud-speaker so far as you are concerned is the one whose reproduction is most pleasing to you. There are thoroughly bad loud-speakers incapable of giving decent reproduction with any set. Eliminate

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On Your Wavelength! (continued)

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these, and you are left with a large number of makes which can give a good account of themselves if used with suitable sets. Go and hear each of them and decide which produces the kind of noise that is most suited to your own tastes. It is no good recommending an instrument designed for genuinely faithful reproduction to a fellow who likes boominess, or singing the praises of one capable only of moderate volume to a man who wants something that will raise the roof.

A Portable Tip

If you live in a swamp area and have a portable that is unable to separate the twin transmissions, here is a tip that is well worth trying out. Obtain from your junk box an old two-coil holder with one swinging mount. Rig up a .0005-microfarad variable condenser in parallel with the fixed holder, mounting holder and condenser in a small box. Provide the moving holder with two terminals. Disconnect one of the leads between the frame of the portable and the grid circuit of the first valve. Connect this lead by means of a piece of flex wire to one of the terminals of the moving coil and take another piece of flex from the second terminal to the point to which the frame was previously connected. Place a very small coil in the moving holder. This little coil is now in series with the frame, and its purpose is to serve as a pick-up inductance. In the fixed holder place a No. 50 or No. 60 coil.

An Absorption Wavetrap

Now set the condenser tuning this coil at zero and with the portable set tune in the twin transmission on the longer wavelength. The other will come in either slap on top of it, or as a strong background. Increase slowly the reading of the variable condenser tuning the fixed coil. When a certain point is reached you will probably find the interference weakening very considerably, and you may be able to tune it out altogether. The apparatus forms, in fact, an absorption wavetrap in whose closed circuit the energy due to the unwanted transmission is made to fritter itself away. By varying the coupling between the two coils a nice adjustment may be found. This kind of trap will not always work well with the portable, but it is worth while to try it out. The two coils of the wavetrap should be kept well away from the frame of the portable.

More About Colour Television

Further news concerning a colour television process invented by a German engineer named Albert Alexander Aronheim has just come to hand. This television system takes advantage of colour fluctuations rather than luminous shadings, and these colours are characterised by their respective wavelengths. With the ordinary

spotlight television we have light and dark picture elements with all the intermediary shades which go to make up half-tones, transmitted through the medium of photo-electric cells as a varying electrical current. In place of this a system has been devised which transmits wavelengths corresponding to colours and the coloured picture is, it is stated, presented at the receiving end.

Using a Mirror Wheel

A mirror wheel, similar to the one used in the Karolus television transmitter, serves to scan the original subject, the light spot passing over every element and, accordingly, all colour shadings in succession. The vibrations corresponding to each colour shading are, by means of a light-sensitive cell, converted into colour variations which, after having been transmitted by wire or wireless, are, at the receiving end, reconverted into the corresponding colours. Any number of wave circuits may be used, although a maximum of twelve is a sufficient number for all practical purposes, since all the colour shadings can be then rendered. One wavelength is said to be sufficient, since it is claimed that only one colour is being sent at one time.

Simple Apparatus

So far, nothing can be gleaned as to the process of reconversion at the receiving end. Actual tests have been demonstrated, however, different colour films being introduced into the transmitter and the corresponding colour appearing on the frosted glass of the receiving apparatus. Furthermore, a variegated film band, on being passed through the transmitter, produced the same sequence of colours on the receiver. Simultaneous acoustical transmissions were also given, and this produced no interference, although a second line or wavelength was required for this purpose. Apparently apparatus of only the simplest character was used in the initial demonstrations, and thus only small colour patches were transmitted. More elaborate apparatus is in course of construction to enable larger details and a greater variety of subjects to be transmitted, and the results will be awaited with considerable interest.

The Value of Invention

Sir Ambrose Fleming, in protesting against the shelving of the Marconi beam system by the Government, asks somewhat pointedly what inventive work has been done by the Post Office, as a department, since it took over the monopoly of communications. He alleges that the work of Heaviside, Pupin, and Krarup had to be thrust down their throats; and that even after being introduced to the thermionic valve, the official experts had not sufficient imagination to foresee its future possibilities, either as a telephone repeater or in wireless transmission and reception.

Now they are throwing over the work of Marconi and his talented colleagues and assistants in favour of a "rather imperfect imitation." For a department which has shown itself to be inventively sterile, Sir Ambrose regards the recent beam decision as peculiarly short-sighted. As he says, the men who first made beam signalling a practical proposition are most likely to go farther and turn the present system into a back number.

Radio Research

On the other hand, the cause of wireless science is being well served by the Radio Research Board, which has just published the results of ten years' investigation into the origin of atmospheric disturbances, the nature of the Heaviside Layer, and other fundamental problems of wireless transmission and reception. Particularly useful work has been carried out in connection with the elimination of "fading" and of the mysterious "night error" in direction-finding.

In this connection a very ingenious cathode-ray receiver has been invented by Mr. Watson Watt for indicating the incidence and wave form of various kinds of "strays and static." The same instrument is capable of taking simultaneous D.F. readings on two or more stations, even when they are transmitting on the same wavelength.

Programme Opinions

The other day I lent some friends of mine a power amplifier for a dance they were giving and, needless to say, I was at the dance in order to keep a fatherly eye on the proceedings. During the evening I danced once or twice with a lady who expressed a polite surprise at the fact that the reproduction was electrical. I asked whether she ever listened to the wireless programmes, and she said, "No, they're so appallingly feeble, aren't they?" I agreed, and there the conversation ended.

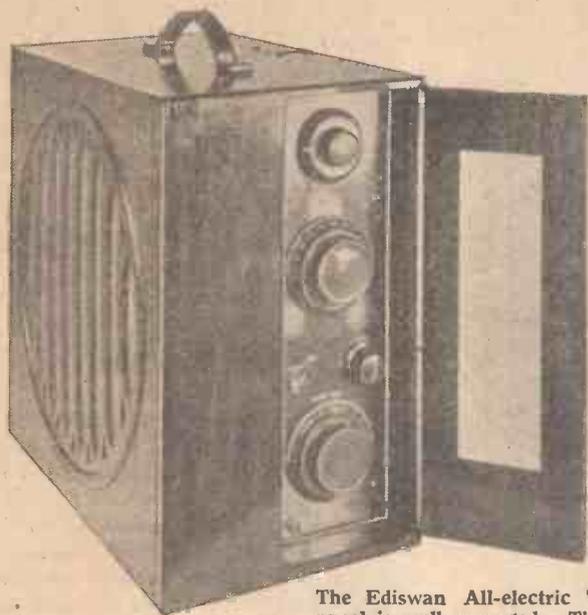
Thinking over the matter afterwards, however, I came to the conclusion that I was a heretic and deserved to be hung, drawn, and quartered. Why, when people complain about the programmes, do we always agree with them? Do people really expect to be provided by the B.B.C. every night, and all night, with items of which they thoroughly approve.

Surfeited

Even if the B.B.C. was able to provide such fare, I wonder how long it would be before the listeners tired. One can have a surfeit of good things. The great majority of people in this country do not attend the theatre two houses a night, every night of the week, and if they did I venture to think they would be complaining very bitterly about the feebleness of the modern theatre.

THERMION.

A PAGE FOR THE SET BUYER



The Ediswan All-electric Transportable; the control panel is well arranged. The Four-valve set is located in the top section; note the power unit below

Every set referred to in this regular feature by "Set Tester" has reached a certain standard of efficiency in the "Amateur Wireless" Laboratory. Reports are not given on sets that fail to reach this standard. This will explain why reports that do appear express general satisfaction with the set's performance.



WE SHALL SOON HAVE MORE

ALL-ELECTRIC TRANSPORTABLES

according to the "Set-Tester" who, in his review of the four-valve Ediswan set illustrated, contends that self-contained radio with power from the electric light supply is broadcast reception de luxe

IF we agree that portables owe their popularity to the fact that they are self-contained, the all-electric portable is a logical development. Portables relying on the electric light supply for their power supply are only illogical if we pander to the notion that people buy portables to carry about with them wherever they go. I do not, for one moment, think this notion is right.

The all-electric set is on the way to being self-contained. Nothing could be more logical than to include a loud-speaker and an aerial system in the cabinet of such a set.

By so doing, the anomaly of purchasing a battery-operated portable (because of its self-contained virtue), when an electric-light supply is available, can be avoided. So far, very few set-makers have developed the all-electric portable. I venture to suggest that the next radio exhibition will show developments in this direction. I hope so, because in testing the Ediswan all-electric transportable, I have been forced to realise the great potentialities of this type of set.

A.C. Supply

Made by the Edison Swan Electric Co., Ltd., the Ediswan all-electric transportable works from A.C. mains. Its price is 31 guineas, an inclusive figure, which I do not consider unreasonable. We can easily sum up the advantages of an all-electric trans-

portable. To many, the biggest advantage is the elimination of batteries. In some portable sets, batteries are a draw-back. In every battery-operated set, batteries can be a source of worry, especially to the non-technical listener. Another advantage is the improved quality of reproduction. This is brought about by the use of a larger output power valve than is possible in a battery-operated portable.

Greater Range

Greater range can be claimed for an all-electric transportable, because full advantage can be taken of the increased efficiency of mains-operated valves. As the aerial system in a portable is restricted, we must count the advantage of increased sensitivity as being very important.

From the illustrations, it will be clear that the Ediswan transportable is well laid out. The loud-speaker grille forms one whole side of the cabinet. The other side can be removed to inspect the valves and power-supply unit. A flap at one end of the cabinet covers the control panel. I like the arrangement of the two tuning controls, which are unusually robust and very easy to handle.

Reaction is controlled by an exceptionally large reaction knob. The volume control can only be used for gramophone record reproduction. It does not work when the transportable is used for receiving programmes. I think this is a mistake, because

the volume control is needed more for radio reception than for gramophone reproduction. I must again conclude that we really need two volume controls in a modern set, one before and one after the detector.

The four-valve A.C. set is accommodated in the top section of the cabinet. The power unit including the valve rectifier, is fitted into the lower section. Most of the A.C. supplies in this country are allowed for by a very convenient switching arrangement on the underneath of the power unit. The connection to this unit and the mains socket is supplied with the set. It is a commendably long flexible lead having a robust cord switch in series with it and the set.

I tried the set on a 205-volt A.C. supply. Its performance impressed me. Station after station came in at remarkable strength. At once, the tonal qualities of the set were manifest. I did not worry to count the number of stations received. It would have been a tedious business as there were so many. The selectivity is such that no trace of Brookmans Park on 356 metres could be heard when listening to Toulouse.

Tuning in foreign stations is made easy by the fact that, although there are two tuning dials, there is not much difference between the readings. Moreover, a calibration chart supplied with the set renders the search for stations very simple.

When receiving most of the powerful Continental stations, the reaction control had to be set at zero, otherwise the volume was excessive. The loud-speaker is robust enough to handle considerable power without rattling. For this reason, the transportable is well worth while as a gramophone amplifier. When using the set in this manner the volume control was found exceptionally smooth in action.

The makers have eliminated all trace of hum from the mains.

MY WIRELESS

Weekly Tips,
Constructional and Theoretical—

When Changing to Mains Valves

A POINT that should be remembered by those changing over from battery to A.C. valves is that a grid leak of lower value may be needed.

The grid leak plays an important part, not only in detection, but also in the reaction circuit. Thus, with a wrong value the reaction may be fierce or ploppy, both being undesirable. The quality of the reproduction, too, depends to an extent upon the value of the grid leak. Thus, if it has a high value the chances are that the higher notes will be weakened.

A further point is that the ability of the detector to deal with strong signals depends partly upon the grid leak. With a low value the quality is usually much better and the detector is not so easily overloaded. The mere change in the value of the grid leak is itself not responsible for these changes; it is the working point of the valve which is varied and enables the different results to be obtained.

Those Strong Signals

Amateurs having measuring instruments can, of course, test the various stages of a set when looking for overloading, but those who have to rely upon listening alone must on occasions have difficulty in finding the stage causing the trouble.

With such strong signals as we get from the regional stations, amounting to as much as 5 volts on occasions without high-frequency amplification, it is as well to consider the detector circuit. Better results may be obtained by changing from leaky grid to anode bend. This change is quickly made in most instances.

Thus, when the grid leak is connected between the grid and the filament of the detector valve it is only necessary to take the lead from the filament and to join it to the grid battery. Naturally, the H.T. to this valve may need adjustment as well as the grid bias.

In Search of Quality

The demand for better quality of reproduction is in many instances, I find, satisfied by fitting a larger battery, giving 160 volts or so instead of the more usual 100 to 120 volts.

Many amateurs use a 100-volt battery of medium capacity, and expect to obtain loud and clear reproduction.



DEN ^{By} W. JAMES

For the
Wireless Amateur

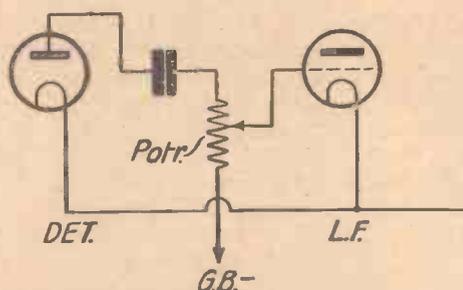
With ordinary valves and loud-speakers this is hardly possible. The valves cannot deal with strong signals with so low a high-tension, and it is not fair to blame the set itself for poor results.

Given a reasonably large high tension and a set of fair design, quite good results may usually be obtained. In fact, I should say that one of the biggest factors in quality reproduction is the use of adequate high tension.

Yet Another Control!

A reader has asked me how to connect a potentiometer-type grid leak in the first low-frequency stage of a set in order that the volume may be controlled.

The diagram shows this, and the method



There are literally dozens of ways in which volume can be controlled. Here is a useful suggestion, given by W. James, which is described in the accompanying paragraph

is a satisfactory one to adopt. When a potentiometer of the sliding-contact type is fitted, a continuous control is, of course, available.

Thick L.T. Leads, Please!

When changing over to A.C. valves, which take a filament current of 1 ampere each at 4 volts, it is just as well to replace the filament wiring, using fairly thick wire.

If there are three valves, taking 3 amperes, a resistance of only .1 ohm drops the voltage by .3. This is a fair amount, and may affect the working of the valves.

More than 9 Volts Needed

Grid batteries of 9 volts have been stan-

dardised for several years now, and there is the danger that a unit of this size will be fitted when a larger size should be used.

A user of a super-power valve, even of the 2-volt type, ought to ask himself whether his grid battery is big enough. These valves pass a lot of anode current, and it is just as well to be sure that no more than is necessary to deal properly with the signal is passing.

Rectifying "Half" or "Full"

The amateur about to build a high-tension unit usually stops to consider the relative advantages of half- and full-wave rectification. There is often a feeling that a half-wave type is not so satisfactory as a full-wave type and that more smoothing is necessary.

Actually, I find, there is not much in this; the usual values of the parts included in a full-wave filter being equally suitable for a half-wave unit. There are, of course, 50 pulses of current per second from a half-wave compared with 100 pulses from a full wave, assuming a 50-cycle supply, and it is easier to smooth the full-wave output.

But when the cost is a matter of some importance the half-wave type may be used with success. Naturally, it should not be overloaded, or a hum may be heard.

When H.F. Currents Wander

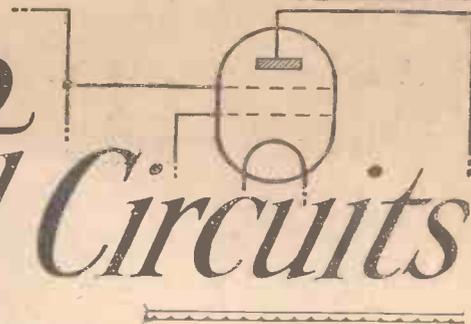
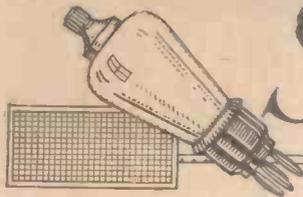
One still occasionally hears of troubles arising through H.F. currents passing through the low-frequency circuits to the loud-speaker.

In a case just lately brought to my notice a pronounced effect was produced by putting the loud-speaker leads near the aerial lead-in to the set.

This can, of course, be avoided by putting a fixed condenser across the power valve, but this still leaves the H.F. currents in the low-frequency circuits, and may tend to spoil the quality. It is, therefore, better to stop them from entering this part of the set, and attention to the detector circuit is indicated.

This may upset the reaction, so it is advisable to leave this circuit alone and to try the effect of putting a "stopper" in the grid wire to the first L.F. valve. A grid leak of 100,000 ohms will usually be satisfactory.

How To Design Screen-grid Circuits



By J. H. REYNER, B.Sc., A.M.I.E.E.

The first of a short series of articles dealing with the design of the tuning circuits associated with a screen-grid valve. This article deals with the question of stability

WHEN the screen-grid valve first came into use it was customarily employed with a simple tuned-anode circuit. As we came to know more about the subject, a centre-tapping was adopted on this simple arrangement and later still we utilised high-frequency transformers having entirely separate primary windings suitably designed to obtain the best results from the valve.

It is interesting to consider what are the principles underlying the design of a high-frequency transformer suitable for use with a screen-grid valve. We can consider in this category the use of a tapped tuned circuit, for this is only a particular form of the same circuit, even a tuned-anode being essentially a one-to-one transformer.

Three Important Factors

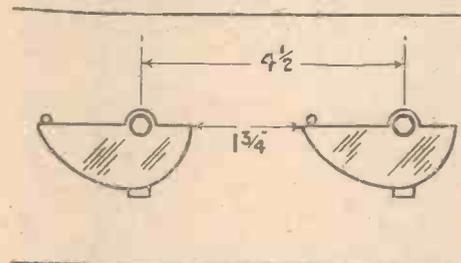
We have three factors to consider in arranging our design. These are the stability of the circuit, the amplification we shall obtain from the system, and thirdly the selectivity. With the earlier forms of screen-grid valve, the question of stability did not trouble us, for the amplification obtainable from the valve, even with the best circuits, was never large enough to permit of instability, but with the improved types of valve now available this is no longer the case.

In the input circuit of the valve we have certain voltages and these are greatly magnified in the valve, a step-up of 100 being quite feasible with modern valves. Hence in the anode or output circuit we have our energy at a higher potential, or electrical pressure. Clearly, therefore, some of the energy will tend to leak away owing to this higher pressure, just as we have greater difficulty in maintaining a cylinder air-tight at higher pressures.

Let us assume that some of this energy leaks back into the grid circuit in such a direction as to add itself to the voltages already existing there. The voltage in the anode circuit will be correspondingly increased, remembering that we have a magnification of 100 to 1 in the valve, so that an increased quantity of energy will now leak back. We thus have still more voltage in the grid circuit which is again amplified and the whole sequence continues in a cumulative manner, the voltage in the

grid and anode circuits building up, until inevitably the whole system becomes unstable, and oscillates continuously.

In practice the small capacity effect existing between the anode and grid of the valve is sufficient to permit of a leakage such as we have just discussed, and in the ordinary three-electrode valve we can only afford an amplification of two or three before



The capacity between these two condensers arranged as shown, was found to be 0.4 micro-microfarad

self-oscillation sets in. Greater amplification is permissible if we cancel out the effect of the valve capacity by the process which we term neutralising.

S.G. Amplification

In the screen-grid valve we interpose a shield in the form of a close-mesh grid between the anode and the normal grid, and this greatly reduces the inter-electrode capacity. This has the effect of throttling the leak, as it were, and we can stand a very much greater amplification than before. In fact, with the earlier forms of screen-grid valves the capacity was reduced to such an extent that with the amplification available, about 40, no self-oscillation was possible. The amount of energy which could pass through the very small leak was never sufficient to cause instability. The more recent types of valve, however, have an amplification factor of 200 or more, and although the valve capacity has been still further reduced so that it is now of the order .005-micro-microfarads (the minimum value of a reaction condenser is anything from 2 to 5 micro-microfarads), the amplification is so great that an appreciable amount of energy is able to leak through this very small path. Consequently with the modern screen-grid valve it is possible,

by the use of efficient circuits, for the system to be unstable and to oscillate continuously.

We are confining our attention, of course, to the leakage existing in the valve itself. It must be clear that the greatest precautions must be taken in the arrangement of the external portions of the circuit, to ensure that no leakage occurs here. It is, for example, of no value whatever to reduce the internal capacity of the valve to the incredibly small figure previously quoted if we allow much larger capacity effect to exist between other portions of the circuit.

An Interesting Experiment

As a matter of interest, I mounted two condensers on a panel $4\frac{1}{2}$ in. apart, as shown in the diagram. The capacity effect between these two condensers was found to be 0.4 micro-microfarad, a value which, although very small, is still far in excess of the valve capacity, and quite sufficient to cause oscillation with a relatively low amplification. In a practical receiver many of the components in the circuit are even closer than this, and we must arrange, therefore, that the capacity effect existing between components in the anode circuit of the valve, where we have relatively high voltages, and those in the grid circuit of the valve, where the voltages are low, shall be reduced to the absolute minimum.

Shielding

This can be done, fortunately, by interposing a capacity shield between the anode and the grid circuit. The valve should be passed through this shield, if the maximum efficiency is to be developed, and the shield should be extended beyond a simple partition screen (*i.e.*, along the panel or base-board or both) in order to minimise any stray coupling which may exist.

We are still left with the magnetic coupling between the coils. Now a simple capacity shield would not overcome this defect. Our only method of eliminating magnetic coupling is to screen the coil completely, or alternatively to use a really astatic type of coil. In the great majority of receivers neither of these precautions is adopted, but the coils are placed a fair distance apart to minimise the coupling existing.

(Continued in third col. of page 502)

SYDNEY MOSELEY'S WEEKLY PROGRAMME CRITICISM

Talkie Transmissions

The B.B.C. Dance
Orchestra

The de Courville Hour

Time Limits for Debates



"Diversions" are like the curate's egg. I, at any rate, don't care for the declamatory method of announcing.

tisement and an advertisement for a dog. It is hardly necessary to employ a man like de Courville for stuff of this sort.

I WANT immediately to protest against the talkies—American, or any talkies, for that matter—being inflicted upon home surroundings. The first transmission was full of the usual tripe about love and, in my view, no fare for a mixed audience in the home.

I know that Sir John Reith takes a good deal of interest in this matter, and I call his personal attention to the latest method of propagating unsuitable films or talkies at our fireside. Have a love interest, by all means, but let it be wholesome.

Incidentally, although thanks were offered to the film company for the "privilege of transmitting the talkie," my own view is that it was worth at least £1,000 for advertising a very ordinary film. Let the talkies keep to their own sphere until such time as they may come under special supervision.

The speakers in the discussion on "The Problems of Personal Liberty" were clear and interesting, but the honours obviously rested with Dr. L. P. Jacks.

The international concert which was relayed from Germany and Belgium was a technical success; but was it worth while all the effort to put over modern music of such little appeal? I rather think not.

Jack Payne and his B.B.C. Dance Orchestra start off well with varied and amusing entertainment, but later on settle down to a certain sameness that becomes boring. I noticed this particularly the other day at the 5.15 performance.

I heard only a few lines of the sketch by Eric Brand, and it was quite enough:—

"Aren't you going to propose to me? I have only had six. . . ."

"Good heavens, what fools we men are!"

Now, I don't know who Eric Brand is, but it sounded like one more of those products that are turned out by the bright young men of Savoy Hill, and who are modest enough to hide their glory under a *nom de plume*.

Arthur Fear has a big voice. I don't appear to have heard him before. By the way, he chose Parry's rendering of "There is a Lady Sweet and Kind." I really prefer the other rendering. Isn't this poem by Herrick really called "Passing by"?

A fine natural voice has Chief Os-Ke-Non-Ton. And in his songs of the prairies he rose to great heights. I should have liked to have heard a little more of Chief Os-Ke-Non-Ton.

I think I wrote recently in regard to de Courville that Leonard Henry seemed rather subdued.

I noticed that in the next hour Leonard was missing. His successor opened the programme with the tamest talk I ever heard.

Incidentally, why do so many artistes act as publicity agents for Bumble?

The first playlet had all the old dodges of a mix-up between a matrimonial adver-

Percy Merriman has been as good as his word and has sent me his MSS. of "Tommy's Little Day." I shall read it with interest, although I must say that he himself in his letter to me suggests what the offending word is. The mystery develops!

The discussion on war books was of wide interest, but the honours obviously rested with Mrs. Hamilton. Mr. Jerrold tried hard with an extraordinary difficult case, and I think if he had had another hour or two to develop it he might have enlightened us a little more.

By the way, with regard to a complaint which I have made before: These people certainly don't know how to stop. If Mr. Bartlett was meant to be chairman, he did it very badly.

The same thing happened in the last big debate, when at the end the three speakers went round and round the same old point, until much of the effect of the debate was spoilt. Surely it is easy enough to have a time limit and keep to it?

A friend of mine who appreciates Clapham and Dwyer tells me they, too, do not know when to stop. I cannot vouch for this, because I rarely listen to them. As I said before, no doubt when television comes along this type of comedian will be appreciated more generally.

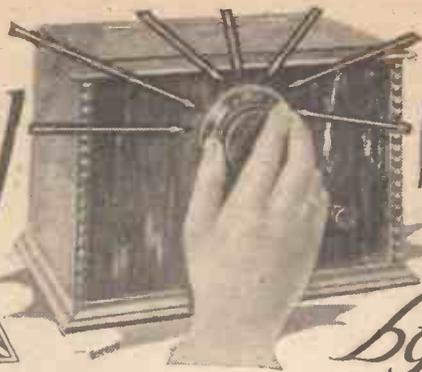
Another good singer who has not been heard very much is Frank Webster; his songs from musical comedies were well rendered. It is good to see that the B.B.C. is extending its list of "straight" singers.

Radio licences for both dealers and broadcast listeners are obligatory in Kenya, Africa; the fee is 10s. a year. The rules specify that no person in Kenya shall sell, hire, or otherwise dispose of any of the apparatus mentioned "to any person unless satisfied that such person holds a broadcasting receiving licence authorising him to use such apparatus."



Lissenen's idea of George Pizzev

How Selectivity



Affects Quality

By W. JAMES

In this second and concluding article the various factors affecting selectivity are discussed

CIRCUITS which tune too sharply are to be found in many receivers. This is particularly noticeable on the long waves, due, as a rule, to the use of coils having too low a resistance.

Reaction effects, such as are usually present in high-frequency amplifiers, may also act to sharpen the tuning, with the result that before adjustable reaction is applied, the high-frequency tuning circuits are distorting.

The distortion has a bad effect on speech, as the clarity is affected. It is the high notes which are reduced in strength, relative to the low notes, and although an attempt may be made to correct this by arranging the low-frequency amplifier to have a rising characteristic, the output obviously cannot be quite right. Coils having too low a resistance are, therefore, to be avoided when good quality is desired.

Reaction effects are usually more troublesome in medium-wave than in long-wave circuits. The stray magnetic and capacitive couplings by themselves may be sufficient practically to produce a condition of instability, and when the coupling provided by the high-frequency valve is

to produce oscillations in the aerial and anode circuits together.

A set so adjusted is extremely sensitive and its selectivity is the maximum, but in these days, when good quality is the first consideration, the results are not always acceptable. If it is possible to receive the local station with relative freedom from distortion, then the ability of the set to bring in the distant stations as well is a big point in its favour. But first we must provide for the good reception of the more

ment of the grid circuit, the equivalent resistance may be increased to 100,000 ohms, with the result that the tuning will not be so broad.

When the aerial coil is connected to the grid circuit of a high-frequency amplifying valve, the damping effect is not nearly as great, but still it is often not negligible. For one thing, even when the grid circuit is so biased that grid current does not flow, there are losses due to the valve holder and the valve itself. The effect is not very marked with ordinary coils and parts, however, although some valve holders are of such poor construction that they introduce large losses.

The effect of the anode-filament path of a valve in altering the tuning or selectivity is very easily understood when one remembers that it is across part or the whole of the anode circuit, as in Fig. 2. So far as the tuning is affected, the valve may be replaced by a resistance having the value of the impedance of the valve as adjusted in the set.

A high-impedance valve, corresponding

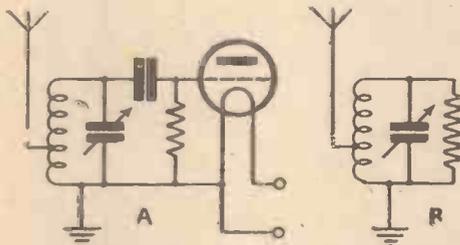


Fig. 1. A leaky-grid detector broadens the tuning, having the same effect as a resistance

powerful stations, and then if those normally out of range can be brought in with reaction and the circuits practically oscillating, we must put up with the bad quality.

The valves used and their adjustment affect the selectivity of a set in two ways. First, the grid circuits are across the tuning coils, and, secondly, when high-frequency amplification is used, the anode-filament path of the valve is across the circuit to which it is connected.

In the absence of reaction effects, therefore, the tuning of a circuit is made more broad by connecting it in a set. Let us take an aerial circuit for example. This may be connected to a leaky-grid detector. Therefore the grid leak and the grid-filament path of the valve is across the tuned circuit (Fig. 1), with the result that the tuning is made broad. The actual effect depends upon the type of valve used; its characteristics, and how the grid leak is connected.

It is possible that the grid-filament path is equivalent to a resistance of 50,000 ohms. This broadens the tuning and incidentally lowers the voltage set up across the ends. By altering the adjust-

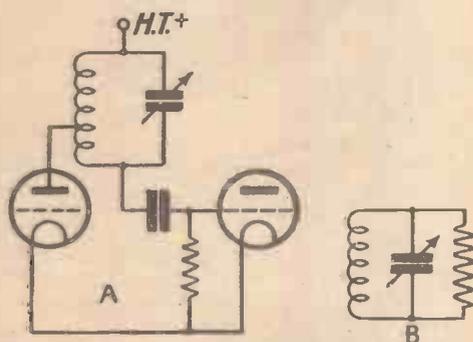


Fig. 2. The H.F. valve shown here may be represented by the shunting resistance when considering selectivity

added, self oscillations are often set up in, say, the aerial circuit when adjustments are made in the anode circuit.

Many shielded valve sets are so arranged that the aerial circuit is, if not oscillating, on the verge of doing so when the reaction applied to the anode circuit is increased. In fact, the object of some layouts has been

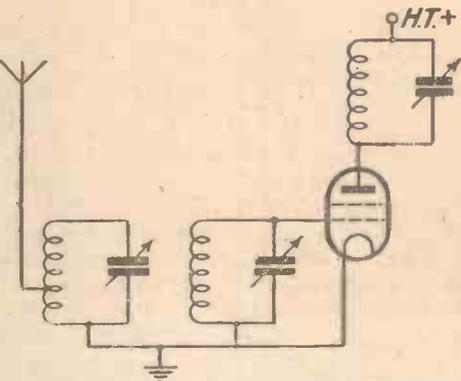


Fig. 3. With a filter circuit having a two-gang condenser the circuit capacities must be balanced

to a high value of shunting resistance, therefore, has less effect than a valve having a low impedance. Now the impedance of a valve can be adjusted within limits by altering the high-tension, grid-bias, and, of course, filament-current values. It therefore follows that the selectivity can be varied by any of these

(Continued on page 505)

THERE'S one good thing about this Brookman's Park business, and it is that—two really loud transmitters now working in the London area—almost any kind of set will give a useful programme choice on the loud-speaker, without the need for fiddling about with fine tuning adjustments.

Different Requirements

Of course, there's the other side of the picture, for with some of the older sets both the Brookmans Parks come in at once; at least, thousands of listeners in the swamp area who have not fitted wavetraps say that that is their trouble. But the simple fact is that, given a very easy-to-build set with reasonable tuning arrangements, any novice can rest assured of having plenty of programmes available on the loud-speaker. Plenty of power in the air; that is the boon given us by the Regional Scheme.

Let us enjoy the benefit of it without too much grumbling.

If you find you still have cause to grumble, then it must mean one of two things. Either your present set is not selective enough, or else it is rather complicated to handle, so that you are not getting the full measure of enjoyment from the Regional Scheme. If selectivity—or, more correctly, the lack of it—is your trouble, then, well, it shouldn't be necessary to repeat the hundred and one cures. One of the best is to fit a really good wavetraps such as the "Brookman's By-pass." Another cure is to rebuild your set. This is not such drastic advice as it may at first appear, and it will at least ensure that in the new arrangement you can incorporate a circuit which will result in easy tuning.

Ideal for B.B.C. Broadcasts

Putting the more ambitious "threes" and "fours" to one side for a moment, and thinking only of the straightforward two-valver, there is no reason why a set of this type should not suit many people; for broadcast reception it is ideal, even though an extra valve or two are called for when it comes to reaching out for the Continental stations.

Even last year, before the B.P.'s were working, the only disadvantage of the two-valver was that in very many areas it

would not work a loud-speaker properly on more than two stations, or three at the most. London listeners, for example, could get 2LO and 5XX (that is, only one programme) and in many London areas 5GB was not very strongly received. That meant that there was no real alternative.

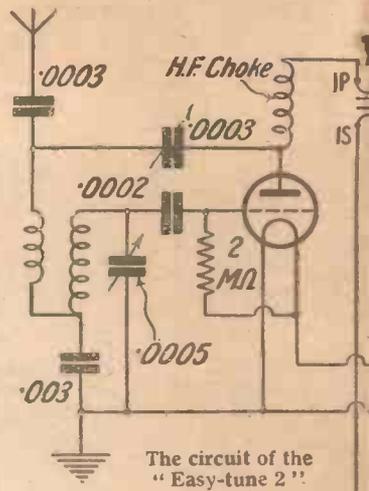
Constant Reaction

But now, with a choice of high-power alternatives at Brookmans Park, and the promise of a rapid extension of the regional scheme for listeners in all other parts of the country, the two-valver will once more come into its own. In addition to its undoubted economy—much lower initial cost, lower battery costs and so on—a simple "two" will now give a choice of

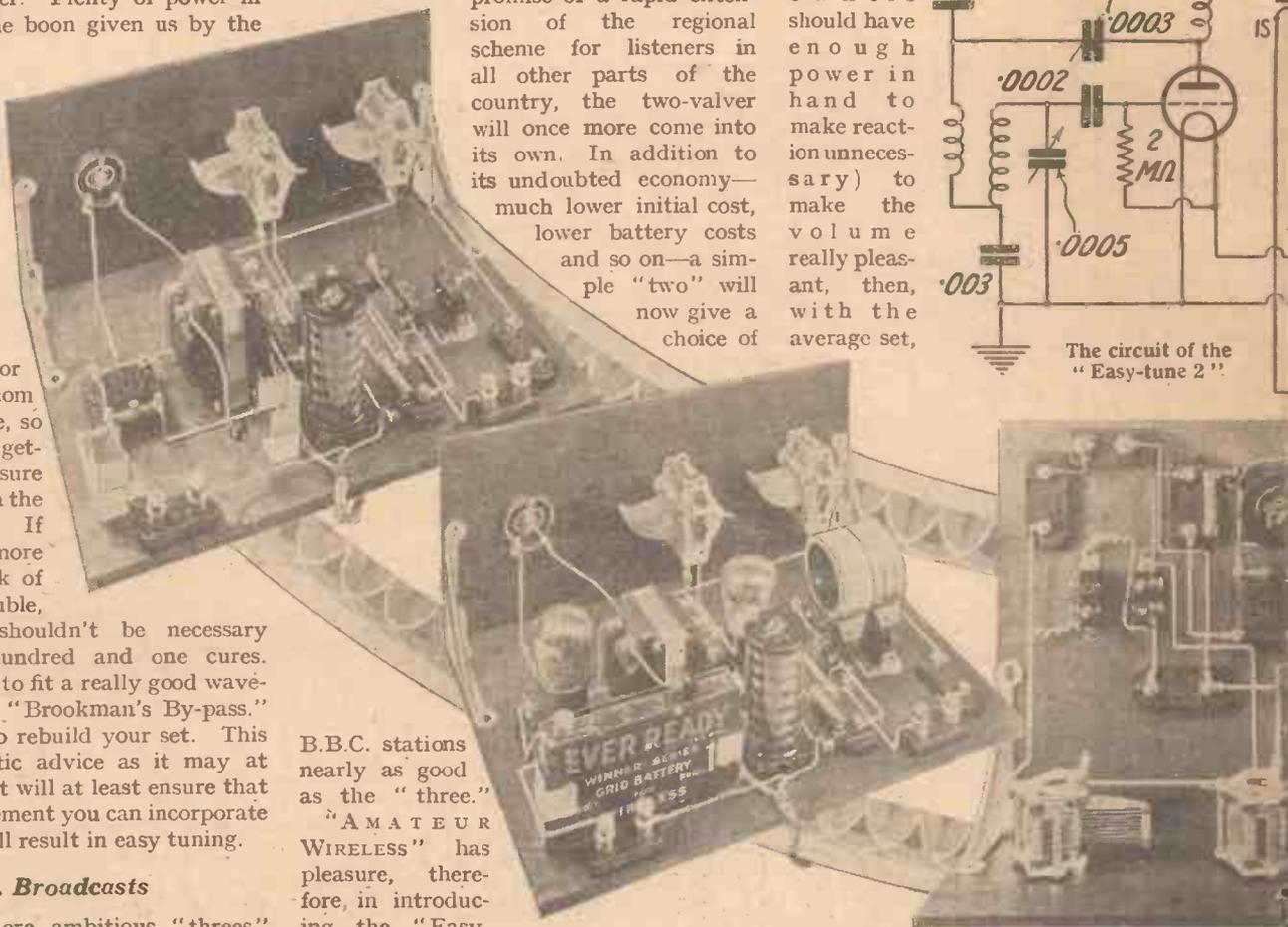
The EASY

CHEAP TO BUILD

needed (by two-valvers only, mind; your three-valve set owners should have enough power in hand to make reaction unnecessary) to make the volume really pleasant, then, with the average set,



The circuit of the "Easy-tune 2"



B.B.C. stations nearly as good as the "three."

"AMATEUR WIRELESS" has pleasure, therefore, in introducing the "Easy-tune 2."

This is a good all-round two-valve set, but the feature of particular merit which gives it its name is its simplicity of tuning. It is a feature which will appeal alike to listeners in the swamp area of local stations, and to those who are situated at just that distance which makes reaction necessary for full loud-speaker strength.

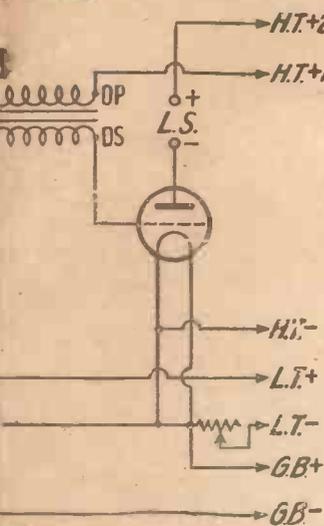
For instance, if you are at such a distance that a judicious amount of reaction is

an annoying trouble will be experienced. The "Easy-tune 2" is remarkably cost. These pictures show how few. As the tuning is changed from one station to another, so it will be found necessary to alter the reaction setting. The amount of reaction needed will vary with the amount of capacity in circuit with the aerial tuning arrangements.

This won't bother the experienced set-operator of the family, for adjustment of

EASY-TUNE

SIMPLE TO OPERATE



reaction comes under the ordinary heading of "tuning." But it is a drawback, because the family will point out that with Mr. X's set next-door, for example (a screen-grid three-valve) even the baby

too. The following list of the parts needed shows that the overall cost is low, and a glance at the small reproduction of the blueprint proves that there is nothing in the construction of which any handyman-about-the-house need be afraid.

Components Required

Ebonite panel 14 in. by 7 in. (Trolitax, Lissen, Keystone, Trelleborg, Becol).
Baseboard, 14 in. by 10 in. (Camco, Pickett).
.0005-microfarad variable condenser (Burton, Lissen, Lotus, Dubilier, J.B.,

one-knob business, and the set may safely be left in the hands of even the least technical members of the family without fear that their knob-twiddlings will bring the Post Office detector van out on an oscillation hunt in your district!

The "Easy-tune 2" is easy to build,

High-frequency choke (Varley, Tunewell, Lissen, Lewcos, Bulgin, Keystone, Wearite, Ready-Radio, Sovereign, Igranic).

Low-frequency transformer (Telsen, Lissen, Brownie, Ferranti, Igranic, Burton, Varley, Lewcos, Lotus).

.0003 mfd. fixed condenser (Dubilier).

.003 mfd. fixed condenser (Dubilier).

.0002 mfd. fixed condenser with series clips (Dubilier, T.C.C., Graham-Farish, Watmel).

Grid-leak (Lissen, Dubilier, Graham-Farish, Watmel).

Two terminal blocks marked A., E. and L.S.+, L.S.- (Lissen, Junit).

Grid-bias battery clips (Bulgin).

Five wander plugs marked: H.T.-, H.T.+1, H.T.+2, G.B.+ , G.B.- (Belling-Lee, Eelex, Clix).

Two spade terminals, marked: L.T.+ , L.T.- (Belling-Lee, Eelex, Clix).

Four yards of thin flex (Lewcoflex).

Connecting wire (Glazite).

Just two points: try to adhere as closely as possible to the above recommended components. If you have "bits" of your own which you wish to use, then please make certain first of all that they have the same electrical values as the specified parts, and that their fitting won't alter the layout to too great an extent. Don't spoil a set for a ha'p'orth of com-

ponents: which is a new version of an old motto!

Full-size Blueprint

The second point is about the blueprint. If this set is the first home-built affair you have attempted, then insure against mistakes by having at hand a copy of the full-size blueprint. It can be obtained, price is., post free, from the Blueprint Dept. of AMATEUR WIRELESS, 58-61, Fetter Lane, London, E.C.4.

The mere mention of the name "blueprint" strikes fear into the hearts of those unmechanical folk who connect blueprints only with complicated mechanical drawings. There is nothing complicated about the AMATEUR WIRELESS blueprints; rather the reverse: with one of these prints you simply can't go wrong, for the full-size layout is given, and all the wiring is shown.

The construction will later be described in detail, but the point it is desired here to

le for its simplicity and low first cost are the components required can tune in two or three stations by rotating only one knob! A lot of this, and the two-valve owner will wish he had a "three." But the alternative cure is to use the constant-coupled reaction circuit as in this "Easy-tune 2," for with this the reaction may be set right at any one point on the tuning dial, and will remain approximately correct over a large tuning variation. Tuning is, therefore, reduced to a

Ready-Radio).

Slow-motion dial (Lotus, Brownie, Lissen, Igranic, Formo).

7-ohm rheostat, (Wearite, Lissen, Varley, Igranic).

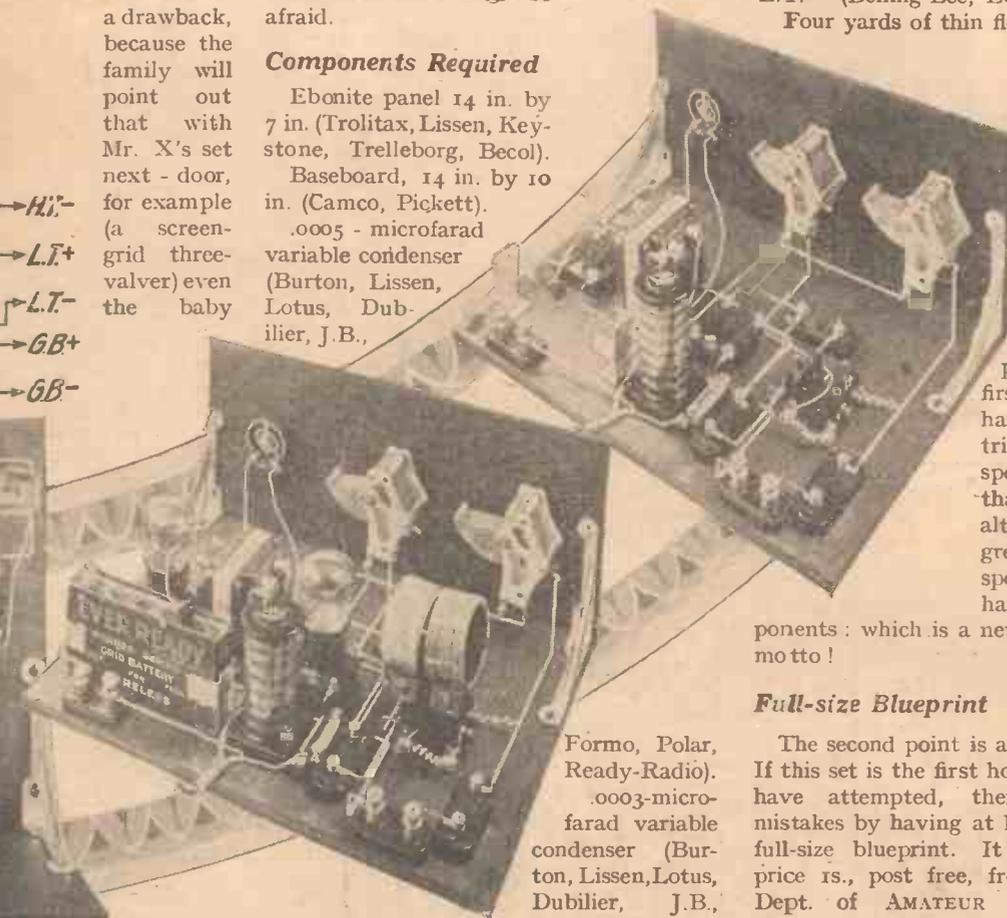
Panel brackets - (Keystone, Lissen, Bulgin, Ready-Radio).

Two valve holders (Junit, Benjamin, W.B., Formo, Igranic, Trix, Wearite, Lotus).

Two single-coil-holders (Lotus, Lissen).

Formo, Polar, Ready-Radio).

.0003-microfarad variable condenser (Burton, Lissen, Lotus, Dubilier, J.B., Formo, Polar,



"THE EASY-TUNE 2" (Continued from preceding page)

emphasise is that, so far as possible, no constructor should make a set up "blindly" following the instructions given on the blueprint with no regard for the perspective of the finished set. This applies with particular force to the wiring. It is, of course, easy to just put each lead in place guided solely by the print, but if the constructor does this only he will be no wiser at the finish, and when the set is ready to operate, than he was at the start. We do not hesitate to advise every constructor to follow the blueprint: but don't forget that the theoretical circuit is published of every AMATEUR WIRELESS set, and while the blueprint wiring is a most convenient guide to detail work, the theoretical diagram shows at a glance the purpose and arrangement of each circuit.

Try, then, to follow the blueprint in conjunction with the theoretical circuit. In this way you will find that the fun to be had out of radio constructional work is more than doubled, and you will have the advantage of knowing something about the "innards" of the finished set.

See the Set in London

The "Easy-tune 2" is, as is the case of all AMATEUR WIRELESS receivers, on show in the Somerset Street (Oxford Street) windows of Messrs. Selfridge & Co., Ltd. If you are passing that way, make a point of seeing the finished receiver. It will help you when you come to the constructional work. And in the next issue of AMATEUR WIRELESS will be given detailed constructional notes, and an explanation of the best

way of operating the "Easy-tune 2" to get the best results from it.

"HOW TO DESIGN SCREEN-GRID CIRCUITS"

(Continued from page 497)

It may be wondered why, if all these precautions are desirable, it is possible to build a satisfactory screen-grid circuit at all. The answer is that the great majority of tuning circuits used in the manufacture of receivers are relatively inefficient, so that the amplification developed never approaches the limiting value at which oscillation can occur. In other words, we are not by any means making the best use of the valve, but if we wish to do so, then all these precautions become vital, otherwise the circuit ceases to be stable, and the last state is worse than the first.

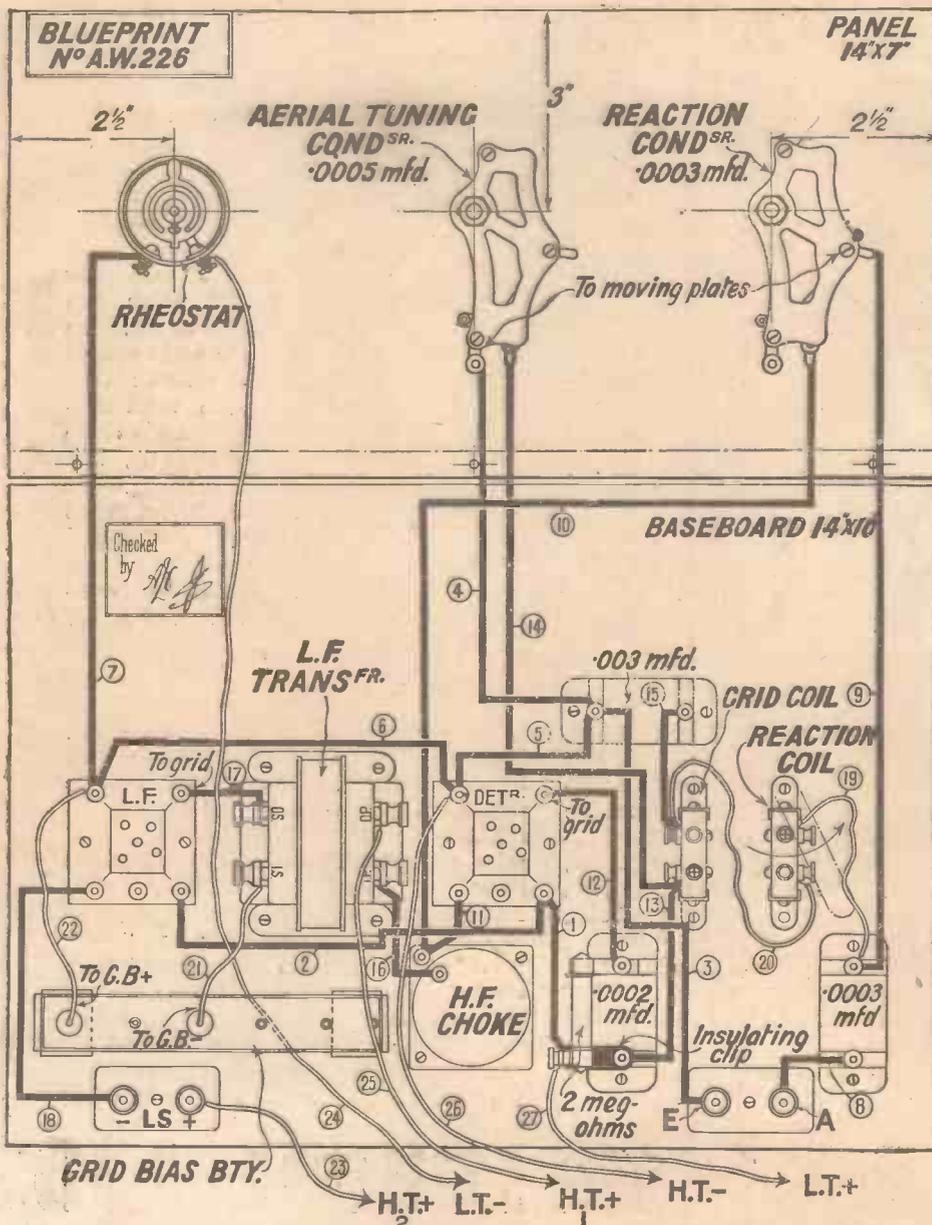
In the next article of this series I shall discuss the amplification obtainable from a screen-grid valve and shall give some figures for the maximum amplification which is permissible without oscillation. These figures will confirm the statement just made that with the type of circuit in average use the amplification does not approach the critical value, but that a good circuit can easily do so.

AT THE QUEEN'S HALL

THE B.B.C. concert on March 21 was one of the finest of the series. I would rather hear a Mozart symphony conducted by Sir Thomas Beecham than anybody else and this time he did No. 36 as well as it could be done.

The greater part of the programme was of English works, including two of Sir Edward Elgar's, conducted by himself. Sir Edward is a less inspiring conductor, but at any rate the audience knows he is authentic. Dame Ethel Smyth appeared in the circle after her famous overture, "The Wreckers," had been played, and received an ovation.

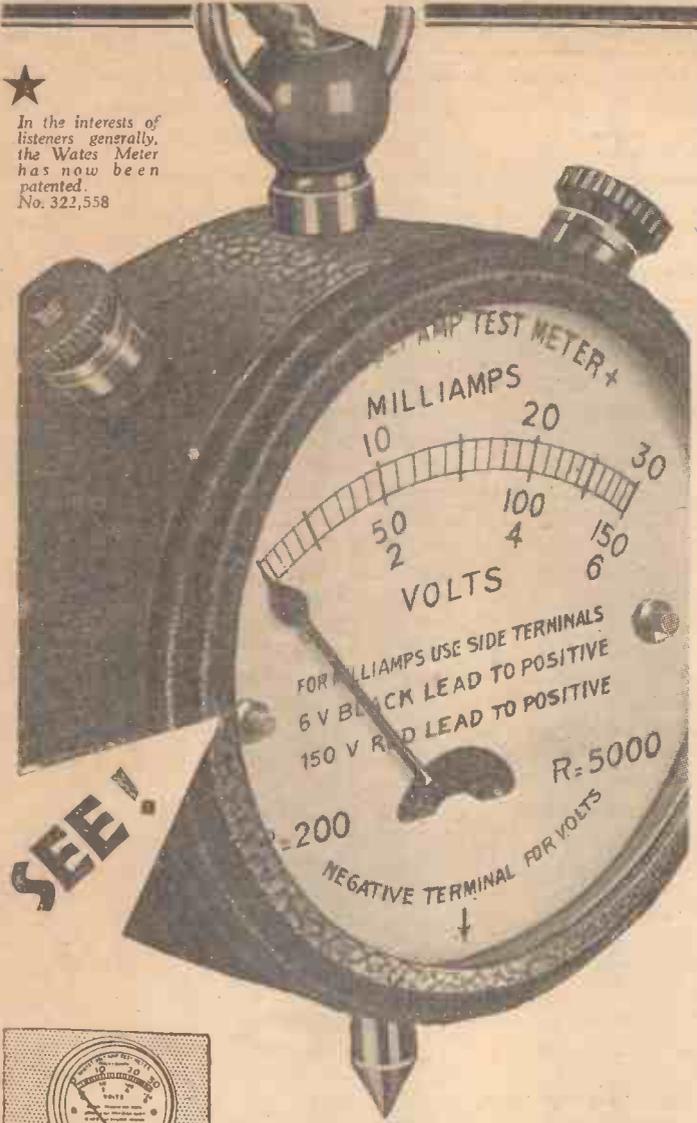
Several West of Scotland M.P.'s have been receiving protests from their constituencies against the transfer of the B.B.C.'s Scottish headquarters from Glasgow to Edinburgh. In a reply to one of the M.P.'s, Mr. Viant, the Assistant Postmaster-General, states: "I understand from the B.B.C. that this transfer will not adversely affect listeners in Scotland, and that the fact of its Scottish offices being in Edinburgh will have no bearing on the site selected for the Scottish Regional transmitting station. It is the intention to retain studios and certain staff in Glasgow."



Notice how simple is the wiring of the "Easy-tune 2." A full-size Blueprint (price 1/-) will show the exact positions of the wires



In the interests of listeners generally, the *Wates Meter* has now been patented.
No. 322,558



3 IN 1

The three vital readings essential to perfect set control, all on one clearly calibrated dial. That's what the *Wates Meter* gives you. At 8/6 can you wonder that over a quarter of a million users won't be without it. Don't delay. Experience the thrill of perfect radio with the aid of this wonder meter—but remember—ask only for the genuine *Wates*. Sold by *Halfords*, *Currys*, and all good dealers or direct.

READS:

0-150 VOLTS 0-6 VOLTS
0-30 MILLIAMPS
RES.: 5,000 OHMS.

Meter Case for standard model. Satinette lined, substantial fittings, well made 2/6



Standard Model Illustrated crystallised black finish 8/6
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WATES "three in one" VOLT-AMP RADIO TEST METER.

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NO WAVE-TRAPS

20 Stations in 5 minutes at Loud-speaker Strength



BY USING THE NEW PATENTED

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Tunes from 200-2,000 metres

Amplifies as a transformer thus producing more volume than any other coil. Any old straight 3-valve circuit can now equal the latest screened-grid circuit.

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will also separate the National and Regional Stations



Short Wave 4/6 Long Wave 5/6

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"A.W." TESTS OF APPARATUS

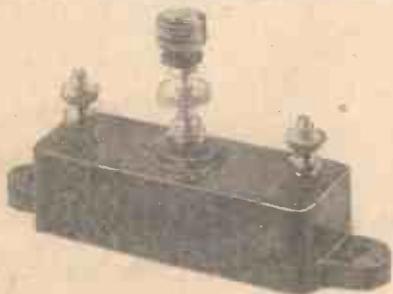
Conducted by our Technical Editor, J. H. REYNER, B.Sc. (Hons.), A.M.I.E.E.

Sovereign Compression Condenser

THE compression type of condenser has gained much popularity in the last few months, a fact that may be attributed in part to the extensive use of wavetraps. Used with such devices a pre-set condenser is ideal, for it is inexpensive and, when once set to trap on a given wavelength, does not require readjustment.

Another primary use for the pre-set condenser is in the lead from aerial to set, where it may be adjusted to increase selectivity and improve the wavelength range by decreasing the capacity of the aerial.

Amongst the apparatus submitted for test this month is a sample of the Sovereign compression-type condenser made by the J. R. Wireless Co. The plates of this condenser are made of springy metal separated



Pre-set condensers are very useful just now as an aid to selectivity. This new Sovereign condenser will therefore make a ready appeal

by strips of mica. On rotating the knob of the condenser in a clockwise direction the two sets of plates are compressed and the capacity increased. When the knob is rotated in the opposite direction the plates spring apart and the capacity is reduced.

All working parts are enclosed in a moulded casing with two external terminals. A nut is provided on the operating spindle for locking the condenser, once the correct capacity setting has been obtained.

The condenser tested had a rated capacity range of .00005 to .0001 and gave the actual values of .000049 to .00014.

There should be a large demand for this type of condenser.

New Metal Panels

A SET with a metal panel has distinct advantages from an electrical point of view, owing to the ease with which it is possible to obtain effective screening between H.F. and detector stages. In addition, hand-capacity effects are minimised to a great extent with such a panel, particularly in cases where neither the moving nor fixed plates of the reaction condenser are at earth potential. Appearance, how-

ever, is the chief disadvantage of a metal panel, and in consequence it is customary, where necessary, to use a wooden or ebonite panel in front of sheet metal or metal foil.

The operation of drilling holes in and handling two panels is of necessity more difficult than in the case of a single panel; it is, therefore, interesting to note that F. & A. Hughes Co., Ltd., the makers of Trolite panel, have recently introduced a metalised panel combining the excellent appearance of normal Trolite with the advantages of a metal panel. A sample piece submitted for test had a most effective polished red-briar surface, with a thin layer of zinc on the back, deposited in such a manner that it appeared to be a part of the panel, and could only be with the greatest of difficulty scratched off. Although the combined thickness of ebonite and metal is not great, the panel had ample strength for all normal purposes.

We have no hesitation in recommending this metalised panel.

New Bulgin Fuses

RADIO fuses are the insurance policy of a wireless set, for they give an added sense of security against breakdown of apparatus, caused by the development of a short circuit.

Messrs. Bulgin, who market various types of radio fuse, have submitted for test a neat set of two fuses for use with mains apparatus. The fuse wire is carried in sealed glass cartridges, which clamp securely into holders. All metal parts are protected from accidental inter-connection by the sides of the moulding.

Each fuse in the holder was rated to carry $\frac{1}{2}$ amp. On actual test a gradually increasing current was passed through the fuse wire, which blew at .7 amp. in one case and .75 amp. in the other.

This is a serviceable component and can be recommended.

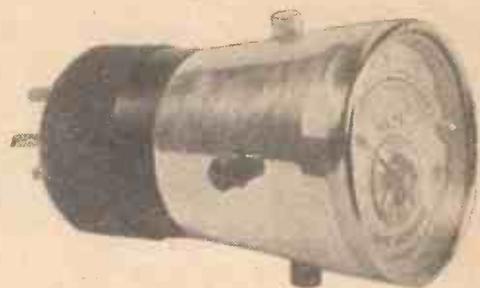
C.F. Radio Controller

MESSRS. FONTEYN & CO., LTD., have submitted for test a novel valve-circuit tester, which in appearance

closely resembles a valve. It is intended for insertion in a valve holder, and serves to test the filament voltage and also the continuity of the filament, plate, and grid circuits.

The face of the meter is on the top of the instrument and has two scales, each calibrated in volts. No reading is obtained unless two of the four coloured buttons are depressed. Filament volts are read by depressing the white and black buttons simultaneously. A reading approximating to the H.T. voltage is obtained by depressing the red and black or red and green buttons, according to the conditions of use.

In H.F. circuits having tuned anode or tuned transformer coupling an accurate reading is obtained, owing to the fact that the D.C. resistance in the anode circuit is



This plug-in tester, the C.F. Radio Controller, will be found useful in checking set faults

negligible. In the case of resistance or L.F. transformer-coupled valves the H.T. reading is not accurate, owing to the resistance in circuit; in such a case, however, a reading shows that the anode circuit is complete.

With each voltmeter printed instructions are supplied showing how a number of useful tests may be carried out, such as proving the continuity of L.F. transformers and loud-speakers.

The maximum resistance of this meter on the 120-volt range is 3,500 ohms, i.e., 30 ohms per volt; it is not, therefore, suitable for measuring eliminator voltages with accuracy.

Tested against our standard laboratory meters, the accuracy of both H.T. and L.T. measurements, taken on accumulators and dry batteries, was within 6 per cent.

Amateurs should find this a useful instrument.

There are nine Egyptian wireless-telegraph stations, exclusive of mobile land stations; some of the inland stations are situated on oases in the heart of the Libyan Desert.

THE SET DE LUXE
A 1930 RECEIVER
IN EVERY SENSE
FIVE VALVES—AND
DESIGNED BY W. JAMES

Read about it on page 493 Full details next week

"HOW SELECTIVITY AFFECTS QUALITY"

(Continued from page 499)

means, but in practice it is necessary to consider amplification and distortion as well.

Thus one finds that the selectivity cannot be adjusted to any great extent in practice without affecting the amplification, depending upon the circuit, of course.

From these notes it will be clear that the effect of connecting tuned circuits to a set is to modify their characteristics. The general effect of the valves and the detector circuit is to broaden the tuning, but the reverse effect is usually produced by the stray couplings and reactions. They tend, as a rule, to sharpen the tuning, with the result that the tuning curve of a set in operation may be a very different thing from what one would expect from the separate tuning curves of the coils and condensers.

In trying to build a circuit having a good tuning curve, as described last week, therefore, it is necessary either to make allowances for the known effects due to the valves and stray couplings or to design on the assumption that the major part of the effects will be avoided altogether. Given good shielding, a suitable layout and circuit values, which ensure that the feedback through any H.F. valves will be negligible over the tuning range, very little allowance need be made for unknown quantities and the best results will be obtained.

This is important when a filter circuit is used, as the correct value of the coupling depends, amongst other factors, upon the effective resistance of the coils. Obviously, if the coupling is fixed and the circuit is completed as in Fig. 3, the right results will not be obtained if the anode coil couples with the filter coils, nor if the feedback through the valve is enough to alter the damping of the input circuit.

I have found in practice, however, that an input filter circuit having desirable characteristics can be built. Several problems are involved, as it is advisable to employ a two-gang condenser for tuning.

The first of these is the adjustment of the two circuits to ensure proper tuning over the whole range. One coil has the aerial connected to it (Fig. 3), whilst the other has the grid and filament of a valve. Now the two coils must be of equal inductance, and we will assume the two condensers are also matched.

But across the secondary coil is the capacity of the valve, which, therefore, throws out the tuning. This may, of course, be compensated for by connecting a similar capacity across the primary.

We have the aerial to connect, however, and this has capacity. If we connect it to the top of the primary coil it will tune to too high a wavelength and, further, the signal strength will be poor. We can connect the aerial to a point on the coil, however, where the tuning of the two circuits will be satisfactory.

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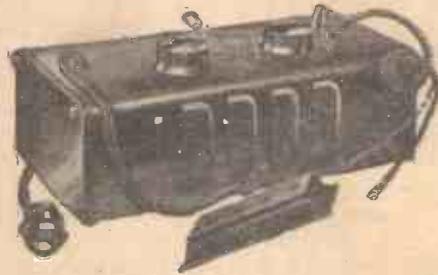
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THOSE LAND LINES } How They Distort

IT does not need a highly-trained musical ear to distinguish between broadcast items which originate in the studio of the local station and those which reach transmitting aerial only after being relayed over a long telephone line.

In some cases "line" distortion is so bad as to make a mere travesty of the original performance in the distant studio or concert room. In others, transmission is sometimes remarkably good, as witness, for instance, the original Sandler concerts relayed from the Grand Hotel, Eastbourne. Generally speaking, however, a distinct falling-off in musical quality is part of the penalty paid whenever a long stretch of telephone line forms part of the link between the microphone and the radiating aerial.

In any ordinary telephone line the received signal almost inevitably differs in "shape" or quality from the impressed signal. This is due to a number of causes, most of which can be practically eliminated by modern methods of "loading" and line compensation.

The first source of trouble is the capacity effect between the outgoing and incoming line. The two wires, being laid close together, constitute a condenser which actually forms a continuous shunt across the circuit as a whole.

Now it is well known that the impedance

of any condenser diminishes as the frequency of the applied current increases. In other words, high-frequency currents can pass across it more readily than low-frequency currents. For this reason the high notes in musical transmission suffer a greater loss in transit over the wires than those lower down the scale. They lose in intensity because part of their energy is continually being by-passed across from one wire to the other.

The remedy lies in fitting special terminal networks, known as attenuation equalisers, which serve to reduce the strength of the low notes to a corresponding degree, and to this extent restore the original balance.

Another defect in telephone transmission arises from the fact that all the different frequencies which go to form speech or music do not travel along the wires at the same speed. It is commonly said that an electric current travels along a wire at the velocity of light, i.e., at approximately 180,000 miles a second. This is no doubt true in the case of a direct current, once it has been established.

Speech currents are, however, alternating in character, and with an alternating current, the speed of propagation depends largely upon the inductance and capacity of the circuit. It may vary from a few thousand miles a second up to the velocity of light.

In a telephone circuit, the distributed inductance and capacity of a long line are such that the high notes may reach their destination an appreciable fraction of a second ahead of the low notes.

Actually the speed varies directly as the frequency of the current and indirectly as the capacity, inductance, and a quantity known as the "leakance" of the line.

In practice this type of distortion is remedied by the insertion of delay networks of inductance and capacity so designed as to retard the travel of the high notes and bring them into line with the low.

Our knowledge of the differential action of a telephone circuit upon the various voice and musical frequencies impressed upon it is largely due to Lord Kelvin in the first place, and amongst others to Heaviside—of Heaviside layer fame—and to Pupin. They investigated the mathematical properties of the ideal "distortionless" line and designed suitable combinations of inductance and capacity designed to counterbalance or "load" the naked wires until they gave a close approach to perfect transmission.

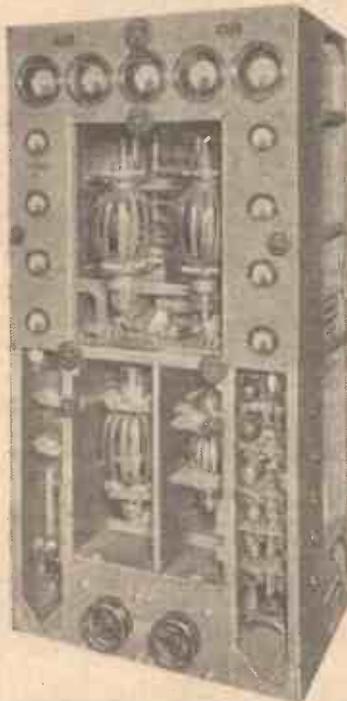
Loading a line is, however, an expensive business, and it is not surprising that the "modernising" of existing telephone lines has not yet succeeded in keeping pace with the requirements of the broadcast service. M. A. L.

THE SAVING CLAUSE } -Jottings from My Log

By JAY COOTE

DURING the last week or ten days I have been playing with some of the new portable wireless sets; and in parenthesis I might add that I have thoroughly enjoyed myself. The portables I have tested have done almost everything that the more solid-looking receiving instrument will achieve. There is one point, however, I should like to emphasise, namely, that in my experience the handy portable—not the transportable or "just movable" receiver—is more influenced by its immediate surroundings than is a set possessing an outside aerial.

By this I would explain that the same instrument in two different localities or two different buildings may prove a winner or a "dud," according to its environment. I have in mind a four-valver which, tested out in my own house, brought in some thirty home and foreign stations at full loud-speaker strength, and when taken to a friend's flat, not two miles away, proved as recalcitrant as the proverbial mule. Surrounded by one of the most modern steel-framed buildings, the poor thing had to struggle hard to give us fair signals from four of the most powerful European broadcasters. So curious and fitful is this characteristic of some portables that I



The 10,000-miles-range short-waver on Marconi's yacht *Elettra*. Signals from this when the *Elettra* was in the Mediterranean, operated a relay to light lamps in Sydney, Australia!

have actually demonstrated the preference the set may have to certain rooms of a house. Whereas in most parts of my home I could get a number of the lesser-powered stations, in my wireless den only the strong ones would come through. The cause for this falling off I put down to the proximity of the water pipes, which appeared to exercise a damping effect on the receiver's activities.

For this reason it is well worth one's while to try out different positions in a house, as I feel convinced that many owners will find that some are more favourable than others; in fact, different parts of the same room may make an appreciable difference. In many instances when visiting acquaintances I have noticed that it is quite a common occurrence to find the portable set on a small table against a wall, and considerable improvement was registered when the set was brought out into the middle of the room.

If, however, at any time you are asked by your friends whether your receiver will give them the same results in their own home, don't be too cocksure about it; to your recommendation of your pet set add a saving clause, one suggesting a trial.

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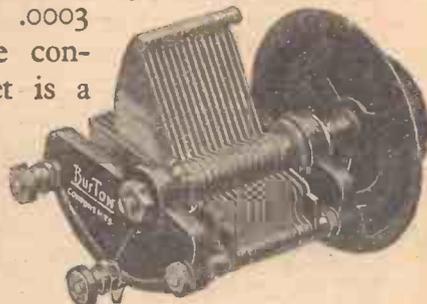
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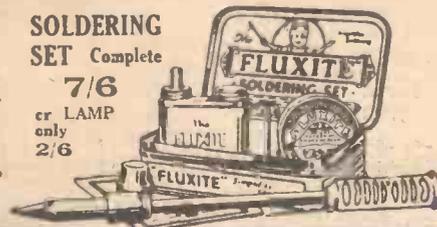
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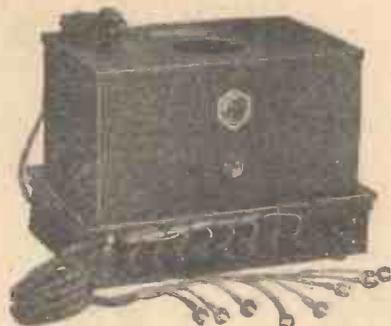
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Causton



WITH a view to the further development of Italian broadcasting, it is proposed to make Milan the centre of all International relays, and for this purpose, special pupinised cables are being laid connecting this city to the Austrian, French and Swiss frontiers. In this manner the Italian broadcasting would be brought into the International system which would allow the Italian stations to exchange programmes with Munich, Berlin, Vienna, Berne, and even London.

On March 1, 1930, the number of registered listeners in Austria was 380,906, or an increase of 4,540 over the figure declared at the end of 1929.

With a view to assisting navigation in Plymouth Sound in foggy weather, the Great Western Railway authorities are contemplating the installation of a beam wireless station and radio beacon at Penlee Point, at the western end of the Sound.

It is expected that the construction of the new Reykjavik (Iceland) broadcasting station will be finished by end May next.

For the purpose of relaying foreign stations, the Berlin Reichsfunk has now established three separate radio listening posts, at Buch, Zehlendorf, and at Schloss Solitude, near Stuttgart.

In view of the limited service given by the Nice-Juan-les-Pins (France) broadcasting station, the towns of Cannes, Nice and Mentone have agreed to co-operate in the erection of a more powerful transmitter to feed the French Riviera. According to a local paper, *L'Eclairneur de Nice*, the proposed new station would possess a minimum power of 25 kilowatts.

Following the Radio Paris plan to construct a giant broadcasting station on the outskirts of Paris, it is now rumoured in the French capital that the Eiffel Tower will increase its power to 50 kilowatts in the aerial. Although Parisians had hoped that the transmitter now working at the Ecole Supérieure was to be closed down and a new station constructed at Pontoise, it appears that the latter will be for official purposes only.

The Association Générale des Auditeurs de T.S.F., which supplies some of the best concerts broadcast by the French official stations, has decided to build its own studio, from which all performances are to be relayed by cable.

Work has already been started on the Heilsberg 50-kilowatt station to feed East Prussia, and the Königsberg district. Following a series of tests made at Munich, it has been decided that no more iron or steel aerial masts are to be used, but that the new erections are to be made of wood.

A regular interchange of wireless programmes between Hamburg, Oslo, Stockholm and possibly Copenhagen will take place in the near future.

Experimental transmissions by the PHOHI (Philips) transmitter in Holland will take place daily (excepting Tuesdays and Sundays) during April, May and June, between 1 and 3 p.m. G.M.T. on a wavelength of 16.88 metres.

On the occasion of the first round of the lawn-tennis match for the Davis Cup, which is taking place from April 24—26, between England and Germany, for the benefit of listeners in the Fatherland, the B.B.C. has made arrangements for a German running commentary.

On April 5, when the London studio switches over to the Adelphi Theatre for excerpts from *The House That Jack Built*, listeners will hear such popular tunes as *Do Your Daily Dozen*, *A Butterfly at the Wheel*, *The Thought Never Entered my Head*, and *The Ever-open Door*.

As a singer of negro spirituals, Paul Robeson, the creator of the title rôle in *Emperor Jones*, is probably the only artiste capable of filling the largest of London's concert halls; he will broadcast on April 13, 15, 22 and 27.

The National vaudeville programme down for transmission on April 3 is a particularly good one, inasmuch as it includes Wish Wynne, Corporal Phillips (animal imitations), Harry Hemsley, Fred Lake and Constance Wentworth with Patricia Rossborough, Ivor Dennis and Harry Jacobson playing on three pianos.

A one-act comedy entitled *The Fourth Proposal*, from the pen of F. Morton Howard, will be found in the Midland Regional programme on April 16.

A Bill has been introduced into the Texas legislature to check the broadcasting of libellous statements from radio stations. The Bill provides that it shall be unlawful to send over the air a verbal defamation of any person.

(More Radiograms on page 516)

GRAMO-RADIO NOTES

It is necessary from time to time to give some slight attention to spring-driven gramophone motors. The oil round the various bearings tends to thicken and, in addition, the leather pad which bears against the governor disc dries and hardens.

This pad of leather or felt, by its drag, controls the speed of the turntable, and hence it is important that it should be freely lubricated. Although oiling and the general care of the motor is very simple, I cannot help being struck by the common neglect of this very simple piece of maintenance. Many of my friends, who regard the weekly greasing of their cars or motor-cycles as something akin to a religious rite, never seem to dream of similarly attending to their gramophone, although for smooth, silent running the same care is every bit as necessary.

The penalty of neglect is usually found first to be irregularity in the running of the turntable, that is, the governor control becomes less sensitive, and, secondly, the motor becomes progressively more noisy. The actual operation of oiling the motor is relatively simple. Usually four screws have to be taken out, and then, after removing the winding handle, the motor can be lifted clean out and placed upside down on a table. In doing so remember that in quite a number of makes the turntable is only secured to the spindle by friction.

When you have lifted the motor out you should wash the bearings out with paraffin oil, and after wiping away the surplus paraffin, lubricate the bearings and the pad previously mentioned with thin machine oil. Take care in so doing that you do not put any oil on the fibre worm wheel driving the governor, as the effect of oil on fibre is to make it swell and warp. To lubricate this drive you should use motor grease or thin vaseline.

Setting a Pick-up Supporting Arm

Record wear with a fairly high percentage of the pick-ups sold to-day is considerably less than the wear with even the

best of acoustic gramophones. To give the best results, the pick-up must be balanced dynamically and the weight on the needle point adjusted to a minimum. It is frequently found that pick-up users are content if the turntable has been levelled. It must not be forgotten that it is also necessary for the supporting arm to swing horizontally.

Both the setting of the turntable and that of the supporting arm can be tested by placing on a record which has a reasonable amount of plain surface, and then, when the turntable is revolving, by placing in the centre of the plain surface the pick-up with, if possible, a fibre needle in the holder. For the machine to be dynamically balanced, the pick-up should remain steady and should not tend to shoot either outwards or inwards.

If the pick-up does not remain steady, the level of the turntable should be tested, and if this is found to be correct, the fault can probably be found in the setting of the pick-up supporting arm. Slight alterations should then be made in the level of the base of the supporting arm by packing one side with pieces of thin card until, when tested in the manner described above, the pick-up does not shoot to one side or the other.

Gramophone Pick-ups

Each system of sound reproduction, the acoustic system of an ordinary gramophone and the electric system of the pick-up gramophone, has its advantages. It is reasonably easy to obtain a satisfying tone from an ordinary gramophone, while, although ultimately all the advantages lie with the all-electric system, a natural tone free from harshness is only obtained when the equipment as a whole has been scientifically adjusted. The pick-up system enjoys the great advantage that the final tone of the reproduction is very much more under control than is the reproduction from an ordinary gramophone. The range in tone quality is infinitely greater, the loud passages being relatively much louder and the softer passages much softer.

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LETTERS TO THE EDITOR



The Editor does not necessarily agree with the views expressed by correspondents.

Correspondence should be brief and to the point and written on one side of the paper.

Use for Old Wireless Accumulators

SIR,—Many people up and down the country collect tin-foil and lead-foil from cigarettes and chocolates, etc., for their local hospital; but what about worn-out wireless accumulators and car-starting and lighting batteries, etc.? These weigh far heavier than tin-foil; and, indeed, a heavy old car-starting battery must represent at least a lifetime's work for anybody collecting tin-foil, and a small worn-out wireless accumulator a good many months of it.

The metal of accumulator plates contains a certain proportion of antimony, which renders them considerably more valuable than ordinary scrap lead. At the same time, worn-out accumulators are often only lumber, and people would be very glad to get rid of them. Also, hospitals selling collections of old accumulators in quantities direct to the smelters would be able to obtain a far better price for them than anybody would be able to get for only one or two.

No doubt people would be pleased to organise collections of old accumulators in their district, and it would benefit the hospitals of the country to the extent of thousands of pounds. E. P. F. (Spalding).

B.P. at Nine Miles

SIR,—To anticipate criticism of my letter, which you have published in to-day's issue under "B.P. at Nine Miles," I would like to point out a printer's error that may mystify your readers. My postal district is N.W.4, and not W., as is given. I expect many will be wondering what part of West London comes within nine miles of B.P.! P. F. (London, N.W.4).

"Brookman's By-pass"

SIR,—I have just completed your very fine "Brookman's By-pass." It is the best wavetrap I have come across yet. I live only five miles away from Manchester. Before, I had great difficulty in hearing London Regional at all, owing to 2ZY's terrific strength; the difference in dial readings is only 6 degrees.

E. H. (Stockport).

The Regional Scheme

SIR,—I was amused to read H.H.'s (Carlisle) letter re "Thermion's" view of the regional scheme. I certainly believe the scheme is totally unnecessary. The better plan, in my opinion, would have been to have increased 5XX to, say,

30 kilowatts; main stations, 10 kilowatts; and relays, 5 kilowatts. The majority would then have 5XX, with either main or relay stations as alternatives. With regard to alternative programmes, I notice last Wednesday all stations were switched over to the London National for a talk for fifty minutes. "Hobson's choice." If you don't like that, I would refer you to Capt P. P. Eckersley's alternative—"the switch." When all the regionals are in full swing we shall be entirely at Sir John Reith's mercy, who bluntly states that it is a mistake to give the licence holders what they want, ignoring the fact that they provide the funds. F. C. (Morecambe).

"1930 Clarion Three" Modifications

SIR,—I have just completed the new "Clarion Three" to your latest instructions, and would like to say how pleased I am with the results. I had the old model, and the improvements in the new layout are remarkable.

You may be interested in the following deviations from your specification. I have mounted it on a light oak panel, which shows up the black controls very nicely, and I have mounted the rheostat and the on-off switch on each side of the baseboard where they are not seen, and are out of the way. As I am not interested in gramophone reproduction, I have omitted the gramo switch, with its attendant wiring. The panel, therefore, presents a very clean and neat appearance, having only five controls in all.

Paris, 5XX, Motala, and Kalundborg are a joy to listen to, and the set is a pleasure to handle. I use Mullard valves and 120-volt Exide H.T.

O. (Abergele, N. Wales).

"What Lancashire Thinks"

SIR,—Our experience at Southport is the same as our neighbour, Blackpool. For some time it has been impossible to separate 2ZY and Toulouse, and complaints are general. My set is only one year old (screen grid, detector, pentode), and shortening the aerial, using series condensers, wavetraps (rejectors and acceptors) seemed to have little effect. I had given it up as hopeless.

Luckily, reading "A Selectivity Suggestion" in AMATEUR WIRELESS dated March 22, as a last resource I decided to test the two small pre-set condensers, and was amazed at the remarkable results.

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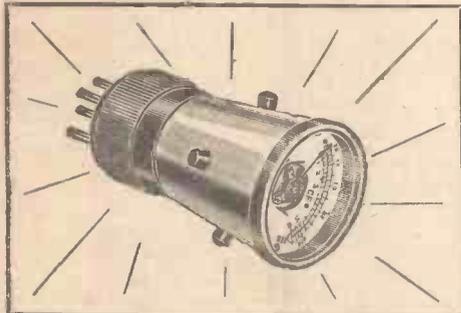
KIT A	12 equal monthly payments of	10/6
KIT B	12 equal monthly payments of	14/9
KIT C	12 equal monthly payments of	17/-

CELESTION LOUD-SPEAKERS ON EASY TERMS—Send for particulars.

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Saves hours searching in the dark. It immediately finds any fault in the filament, plate or grid circuit or in the L.T. or H.T. voltage under load. It tests the Valves, Transformers, Speaker and Potentiometer and checks all connections in the set, batteries and accumulators.

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Telephone: Welbeck 4144 (3 lines)

"LETTERS TO THE EDITOR"

(Continued from preceding page)

Instead of 2ZY and Toulouse spreading over ten degrees, I can now get Manchester, Brookmans Park, Stuttgart, Toulouse, and others without any interference whatever, and can separate them by two degrees. Tuning is very sharp, and I find I can get better selectivity by using .001 maximum condensers.

I have told several wireless users of this useful AMATEUR WIRELESS suggestion, and I hope they, as well as our Fylde neighbours, have met with the same success with your valuable idea.

In conclusion, please allow me to thank you, as it is certainly a great pleasure to get a larger number of stations without any clashing whatever. J. (Southport).

SEE THE ANNOUNCEMENT ON PAGE 493

The "1930 Clarion Three"

SIR,—I have made the "1930 Clarion Three," and the results are excellent. I am able to get all the principal stations at full loud-speaker strength.

Radio Toulouse comes through with scarcely any interference from the London Regional, which proves it very selective.

I am using the linen-diaphragm loud-speaker described in No. 334.

This is the fifth three-valve set I have made and certainly the best.

E. L. (London, S.E.).

Linen-speaker Results

SIR,—It may interest you to know that I have made up the linen-diaphragm loud-speaker described in A.W. No. 334, and am delighted with the results which it gives.

After having tried many loud-speakers of various design, I have no hesitation in saying that this is the best of the lot.

The reproduction of the bass notes, using a Blue Spot unit, is, in my opinion, quite equal to moving-coil speaker results; the clearness of both speech and music is splendid.

V. D. (Sidcup).

5XX in the South

SIR,—"Thermion" appears to think that "5XX is going to be rather wasted." Don't you believe it. In this district the London National (251 metres) is a proper washout. It wriggles and fades like a drunken man under the police chalk-line test, whilst the quality is coarse and very poor.

Its moods vary very much from night to night, and are probably due to some form of Continental interference.

On the contrary, 5XX comes through strong, pure, and splendid, and the London Regional nearly as good; in fact, these two constitute the mainstay for listeners to British broadcasting here. For anything more we tune in foreign stations.

W. W. B. (Folkestone).

(Continued on page 513)

JUNIT

specified for the EASY-TUNE TWO

TWO UNIVERSAL FOUR-PIN VALVE HOLDERS

PRICE 1/9

EACH



For horizontal or vertical mounting. Grips either solid or resilient valve pins. Well designed—completely insulated—dustproof.

USE THE VALVE HOLDERS SPECIFIED AND ENSURE SUCCESS.

Home constructors all over the country are using Junit Components. They are also specified for the following sets:—

Mullard "Orgola" Receivers.
Manchester Evening Chronicle 3.
Help Yourself 3.

and sets designed by the leading Wireless Journals.



2 JUNIT TERMINAL MOUNTS Also recommended for the EASY-TUNE TWO

PRICE 8D EACH

Moulded in Bakelite with a flange for screwing down on baseboard. Complete with the necessary holes for terminals and leads.

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Telephone - Riverside 0274

BROADCAST TELEPHONY

Broadcasting stations classified by country and in order of wavelengths. For the purpose of better comparison, the power indicated is *aerial energy*.

Kilo- Metres	Station and Call Sign	Power (Kw.)	Kilo- Metres	Station and Call Sign	Power (Kw.)	Kilo- Metres	Station and Call Sign	Power (Kw.)
GREAT BRITAIN								
25.53	11,751 Chelmsford (5SW) 15.0		255	1,175 Toulouse (PTT) 1.5		*441	680 Rome (Roma) ...	50.0
*200	1,500 Leeds (2LS) ... 0.13		265	1,132.2 Lille (PTT) ... 0.7		453	662 Bolzano (IBZ) ...	0.3
*242	1,238 Belfast (2BE) ... 1.0		268	1,121 Strasbourg ... 0.5		*501	599 Milan (Milano) ...	7.0
*261	1,143 London Nat. ... 30.0		*272	1,102 Rennes (PTT) ... 0.5		LATVIA		
*288.5	1,040 Newcastle (5NO) 1.0		286	1,049 Radio Lyons ... 0.5		*523	572 Riga ...	7.0
288.5	1,040 Swansea (5SX) 0.13		293	1,022 Limoges (PTT) 0.3		LITHUANIA		
288.5	1,040 Stoke-on-Trent (6ST) 0.13		304	986 Bordeaux (PTT) 1.9		*1,935	155 Kovno ...	7.0
288.5	1,040 Sheffield (6LF) 0.13		309	970 Radio Vitus ... 1.0		364	824 Algiers (PTT) ...	16.6
288.5	1,040 Plymouth (5PY) 0.13		*310	950 Marseilles (PTT) 0.5		416	721 Radio Maroc (Rabat) ...	10.0
288.5	1,040 Liverpool (6LV) 0.13		328.2	924 Poste Parisien ... 0.5		1,250	240 Tunis Kasbah ...	0.5
288.5	1,040 Hull (6KH) ... 0.13		328.2	914 Grenoble (PTT) 0.5		261	824 Břrgh ...	1.0
288.5	1,040 Edinburgh (6EH) 0.35		368	815 Radio LL (Paris) 0.5		385	779 Frederiksstad ...	0.7
288.5	1,040 Dundee (2DF) 0.13		447	671 Paris (Etat) ... 3.0		445	674 Kjukan ...	0.18
288.5	1,040 Bournemouth (6BM) 1.0		463	640 Lyons (PTT) ... 5.0		453	662 Tromsø ...	0.1
288.5	1,040 Bradford (2LS) 0.13		1,444	207.5 Eiffel Tower ... 12.0		453	662 Aalesund ...	0.3
*301	995 Aberdeen (2BD) 1.0		*1,725	174 Radio Paris ... 16.0		453	662 Porsgrund ...	0.7
*310	968 Cardiff (5VA) ... 1.0		GERMANY					
*356	842 London Reg. ... 30.0		*218	1,373 Flensburg ... 0.5		214	1,400 Warsaw (2) ...	2.0
*377	797 Manchester (2ZY) 1.0		*227	1,319 Cologne ... 4.0		234	1,283 Lodz ...	2.0
*390	753 Glasgow (5SC) 1.0		*232.2	1,292 Kiel ... 0.35		*313	959 Cracow ...	0.6
*479	626 Midland Reg. ... 25.0		*234	1,283 Münster ... 3.0		*335	656 Posen ...	1.2
1,554	193 Daventry (5XX) 25.0		*239	1,256 Nürnberg ... 2.0		385	779 Wino ...	0.5
AUSTRIA								
*246	1,220 Linz ... 0.5		*246	1,220 Cassel ... 0.25		385	779 Lemberg ...	2.6
*283	1,058 Innsbruck ... 0.5		*253	1,184 Gleiwitz ... 2.0		*408	731 Kattowitz ...	10.0
*352	851 Graz ... 7.0		*259	1,157 Leipzig ... 2.0		1,411	212.5 Warsaw ...	8.0
*453	666 Klagenfurt ... 0.5		*270	1,112 Kaiserslautern ... 0.25		ROUMANIA		
*517	551 Vienna ... 15.0		*276	1,085 Königsberg ... 2.5		*194	561 Bucarest ...	12.0
BELGIUM								
206	1,460 Antwerp ... 0.2		*283	1,058 Magdeburg ... 0.5		720	416.5 Moscow (PTT) ...	20.0
216	1,391 Verviers ... 0.25		*283	1,058 Berlin (E) ... 0.5		938	320 Moscow (C.C.S.P.) ...	75.0
*220	1,364 Charleroy ... 0.25		*315.8	951 Bremen ... 0.35		1,000	300 Leningrad ...	20.0
130	1,256 Binche ... 0.25		*320	937.6 Dresden ... 0.25		1,060	283 Tiflis ...	10.0
244.7	1,225 Ghent ... 0.25		*325	923 Breslau ... 1.5		1,100	278 Moscow Popoff ...	40.0
246	1,223 Schaerbeek ... 0.25		*360	833 Stuttgart ... 1.5		*1,304	230 Khar'kov ...	25.0
337.4	889.3 Forêt ... 8.0		*372	806 Hamburg ... 1.5		1,380	217.5 Bakou ...	10.0
*500	590 Brussels ... 1.0		*390	770 Frankfurt ... 1.5		1,481	202.5 Moscow (Kom) ...	40.0
CZECHOSLOVAKIA								
*203	1,139 Moravska Ostrava 10.0		*418	716 Berlin ... 1.5		SPAIN		
*279	1,076 Bratislava ... 12.5		*456	657 Aachen ... 0.35		266.3	1,124 Barcelona (EAJ13) ...	10.0
*293	1,022 Kosice ... 2.0		*473	635 Langenberg ... 13.0		*340	860 Barcelona (EAJ1) ...	8.0
*342	878 Brunn (Bruno) ... 2.4		*533	563 Munich ... 1.5		368	815 Seville (EAJ5) ...	1.5
*437	617 Prague (Praha) 5.0		*560	536 Hanover ... 0.35		426	503 Madrid (EAJ7) ...	2.0
DENMARK								
*281	1,067 Copenhagen (Kjobenhavn) 0.75		560	536 Augsburg ... 0.25		459	653 San Sebastian (EAJ8) ...	0.5
1,153	260 Kalundborg ... 7.5		569	527 Freiburg ... 0.35		SWEDEN		
ESTHONIA								
*296	1,013 Reval (Tallinn) 0.7		1,875	160 Norddeich ... 10.0		231	1,301 Malmo ...	0.6
FINLAND								
*221	1,355 Helsingfors ... 10.0		HOLLAND					
*1,706	167 Lahti ... 51.0		1128	9,590 Eindhoven (PCJ) 30.0		*257	1,160 Hörby ...	10.0
FRANCE								
20.70	10,180 Radio Experimental (Paris) ... 1.2		*293	1,004 Huizen (through Hilversum) until 5.40 p.m. G.M.T. 6.5		270	1,112 Trollhättan ...	0.1
175	1,714 Cannes (SFV) ... 0.2		*1,071	280 Huizen (through Hilversum) ... 6.5		197	1,010 Falun ...	0.5
175	1,714 St. Quentin ... 0.1		*1,071	280 Scheveningen-Haven 5.0 (from 10.30 a.m. to 5.40 p.m. G.M.T.)		*322	932 Göteborg ...	10.5
187	1,605 Radio Flandres ... 0.25		HUNGARY					
195	1,539 Tourcoing (F8DH) 0.2		210	1,433 Budapest (Csepel) ... 20.0		*436	689 Stockholm (tests) ...	00.0
210	1,410 Radio Savoie ... 0.3		ICELAND					
212	1,415 Beziers ... 0.1		*1,200	250 Reykjavik ... 16.0 (under construction)		*542	554 Sundsvall ...	0.6
212.4	1,412 Fécamp (Radio Normandie) 0.5		IRISH FREE STATE					
225	1,274 Bordeaux (Radio Sud-Ouest) 1.0		*225	1,337 Cork (IFS) ... 1.0		*770	380 Östersund ...	0.5
240	1,250 Nimes ... 0.25		*413	725 Dublin (2RN) ... 1.0		1,240	241.8 Boden ...	0.6
248	1,211 Juan-les-Pins ... 0.5		ITALY					
GERMANY								
218	1,373 Flensburg ... 0.5		291	1,039 Turin (Torino) ... 7.0		*1,318	222.5 Motala ...	20.0
227	1,319 Cologne ... 4.0		*332	905 Naples (Napoli) ... 1.5		SWITZERLAND		
*232.2	1,292 Kiel ... 0.35		366	776 Genoa (Genova) ... 1.0		*403	743 Berne ...	1.0
*234	1,283 Münster ... 3.0		HUNGARY					
*239	1,256 Nürnberg ... 2.0		450	653 Zurich ...		480	442 Lausanne ...	0.6
*246	1,220 Cassel ... 0.25		760	395 Geneva ...		1,010	297 Basle ...	0.25
*253	1,184 Gleiwitz ... 2.0		TURKEY					
*259	1,157 Leipzig ... 2.0		*1,230	243.9 Stamboul ...		1,961	353 Angora ...	7.0
*270	1,112 Kaiserslautern ... 0.25		YUGOSLAVIA					
*276	1,085 Königsberg ... 2.5		368	973 Zagreb (Agram) ...		451	695 Belgrade ...	2.5
*283	1,058 Magdeburg ... 0.5		574.7	522 Ljubljana ...		SWEDEN		
*283	1,058 Berlin (E) ... 0.5		GERMANY					
*283	1,058 Stettin ... 0.5		GERMANY					
*315.8	951 Bremen ... 0.35		GERMANY					
*320	937.6 Dresden ... 0.25		GERMANY					
*325	923 Breslau ... 1.5		GERMANY					
*360	833 Stuttgart ... 1.5		GERMANY					
*372	806 Hamburg ... 1.5		GERMANY					
*390	770 Frankfurt ... 1.5		GERMANY					
*418	716 Berlin ... 1.5		GERMANY					
*453	662 Danzig ... 0.25		GERMANY					
*456	657 Aachen ... 0.35		GERMANY					
*473	635 Langenberg ... 13.0		GERMANY					
*533	563 Munich ... 1.5		GERMANY					
*560	536 Hanover ... 0.35		GERMANY					
560	536 Augsburg ... 0.25		GERMANY					
569	527 Freiburg ... 0.35		GERMANY					
1,635	183.5 Zeesen ... 37.0		GERMANY					
1,635	183.5 Norddeich ... 10.0		GERMANY					
HOLLAND								
1128	9,590 Eindhoven (PCJ) 30.0		HOLLAND					
HUNGARY								
210	1,433 Budapest (Csepel) ... 20.0		HUNGARY					
550	545 Budapest ... 20.0		HUNGARY					
ICELAND								
*1,200	250 Reykjavik ... 16.0 (under construction)		ICELAND					
IRISH FREE STATE								
*225	1,337 Cork (IFS) ... 1.0		IRISH FREE STATE					
*413	725 Dublin (2RN) ... 1.0		IRISH FREE STATE					
ITALY								
291	1,039 Turin (Torino) ... 7.0		ITALY					
*332	905 Naples (Napoli) ... 1.5		ITALY					
366	776 Genoa (Genova) ... 1.0		ITALY					

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Advertisement of Belling & Lee, Ltd., Queensway Works, Ponders Ltd. Middx.

CHIEF EVENTS OF THE WEEK

- NATIONAL (261 and 1554 metres)**
- April 7 Vaudeville programme.
 - 8 De Courville's Hour (6).
 - 9 The Enchanted Island, an operetta by Richard H. Walthew.
 - 10 Orchestral concert relayed from People's Palace.
 - 12 Running commentary on Oxford v. Cambridge Boat Race.
- LONDON REGIONAL**
- April 6 Concert relayed from Albert Hall.
 - 8 "Any Rags?" a saga of syncope.
 - 12 Vaudeville programme.
- MIDLAND REGIONAL**
- April 8 "Any Rags?" a saga of syncope.
 - 9 Old folks' programme.
 - 10 The Apostles (Elgar), relayed from Worcester Cathedral.

CARDIFF
April 11 Concert by winners at Welsh University Inter-Collegiate Eisteddfod, Bangor, 1930.

GLASGOW
April 9 Concert by winners in musical festivals of 1929

Jenkins Television Corporation and the De Forest Company in New York are acting jointly in transmitting broadcasts in both sound and vision from their stations W2XCR and W2XCD respectively. The sound signals come from station W2XCD on 187 metres, and the television signals will be found synchronised on station W2XCR operating on 107 metres. The "movies" consist of half-tone pictures scanning in forty-eight lines at a speed of fifteen pictures each second.



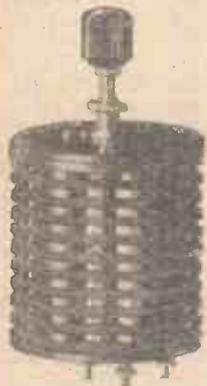
2/6
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BROWNIE WIRELESS

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Cheapest and most efficient

- Dual Range Double X Tapped Coils, Panel Mounting. For Magic 3 and similar circuits 10/6
- 6-pin Dual Range Coil, less switch 7/9
- Clarion Coil 10/6
- Separate 6-pin Coils 20/45, 40/90, 200/600 metres 3/11
- 1,000/2,000 metres 5/3
- 2-pin Coils, ultra-short 1/6
- Broadcast and High Wave Bands from Centre Tapped ditto, each extra 9d.
- X Type ditto, each extra 1/-
- Special New H.F. Choke 6/6
- Transformer 12/6
- Speaker Unit 22/6

Send for List

TURNER & CO.

54 Station Road, London, N.11

"LETTERS TO THE EDITOR"

(Continued from page 511)

A Good "Two"

SIR,—I have constructed the "British Broadcast 2" as per instructions, using a Dual Colvern coil.

On attaching same to a poor aerial and a gas-pipe earth I am able to tune in both London stations, 5GB, Hamburg, and Rome on the medium waves, Radio Paris and 5XX on the long, and several other stations which I do not know, all at full loud-speaker strength. I find that I am able to obtain far more from the "British Broadcast 2" than from my earlier three-valve set.

Having been a reader of AMATEUR WIRELESS from the first, I wish you every success.

G. (S.W.17).

Cutting Out B.P.

SIR,—I have just made up the "Brookman's By-pass" wave-trap and thought you would be interested to know that same works excellently—can cut out any station from "Cork to Milan," with very little sacrifice of signal strength on near-by wavelengths.

B. M. (Nottingham).

Short-wave Sets and Metal Panels

SIR,—I was rather amazed at a statement in an article in a recent issue, on short-wave working, that a metal panel and much metal elsewhere in a short-wave set is to be advocated. I thought this theory was as dead as Queen Anne!

A few years ago, in a determined effort to cure the hand-capacity bugbear, I used to employ metal cabinets, panels, large earthing bus-bars, etc., but never, in any single circuit of all I built in this way, did I get the desired effect.

When I subsequently dropped the metal-construction idea and adopted a well-spaced layout, with insulated, not metal, dials, hand-capacity vanished completely.

I do suggest that where we want more metal is in the broadcast sets! The old readers know that your staff can and have got some H.F. amplification on the job in the past. I quote as an example, a set which Mr. James said he had working in 1925. A model of it has only just been scrapped by me.

K. (Evesham).

The agreement between the B.B.C. and Glasgow Corporation for the broadcasting of band and concert-party programmes from Kelvingrove Park is to be terminated. Hitherto the relays from the park bandstand have been of concert parties on Saturday afternoons and band performances on Sundays, and they have taken place with great regularity throughout the summer season since 1927. The B.B.C. explanation of the change is that, in view of certain changes in the timing of the national programmes, it was becoming impossible for Scottish stations to avail themselves of any of the Sunday concerts.

8 D. PER DAY

Buy anything connected with Radio on these terms. Pay Instalments when you like. Weekly, Fortnightly, or Monthly. With or without initial deposit.

We can deliver the TELSEN 7/1 transformer, price 17/6, BY RETURN

EASY TUNE 2 kit including Telsen 7/1 transformer and Oak Cabinet. Valves 23/- extra 64/-
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AUTO-COUPLER 3 Grade A kit. Cabinet 15/- extra £8 9 0
HP terms Kit and cabinet 18/- for 12 weeks or 19/- for 12 months

COSSOR MELODY MAKER kit, all electric £15 0 0
or 12 monthly payments of 27/6

COSSOR MELODY MAKER battery kit £8 15 0
or 4/6 for 41 weeks

OSRAM MUSIC MAGNET battery kit £9 0 0
or 4/6 for 44 weeks

Tune in the world with your set. Fit an Aero SHORT WAVE Converter price £5 17 6

CABINETS for your radio or loud-speaker, lowest prices in the trade

Send a list of your requirements NOW

We quote by RETURN and deliver WITHOUT DELAY.

Free expert advice on request.

Carriage paid on all orders.

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35 OXFORD STREET, LONDON, W.1

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ELECTRADIX

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RADIO APPARATUS, LABORATORY INSTRUMENTS, H.T. and L.T. DYNAMOS and MOTORS, EXPERIMENTAL and LABORATORY GEAR in this Country.

Immediate delivery from stock to any part of the world.

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218, UPPER THAMES STREET, E.C.4

CITY 0191

Electradix, Cent, London

GOODMANS NEW IMPROVED SUPER TWIN-MAG BALANCED ARMATURE UNIT 29/6

Ideal for Linen Diaphragm Loud-speakers. Write for particulars.



Linen Diaphragm double cone bush with set screw fixing, 9d. Extension Rod, 6d. Single Cone Bush, 6d. Strained Rods and Nuts for Linen Diaphragm, per set 2/6.

GOODMANS, 27, FARRINGTON STREET, E.C.4

"A.W." Solves your Wireless Problems

WHITELEY'S FAMOUS KILDARE CYCLE

8'9 NOW CASH PRICE **£5'15'0**



Every component part of this 1930 Model is British made and is therefore of thoroughly reliable quality

FINISHED IN CHROMIUM PLATE (Nickel Plate or all Black at the same price)

DUNLOP TYRES AND RIMS
LYCETT 3-COIL SPRING SADDLE
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CYCLE & MOTOR CYCLE DEPT., 3rd FLOOR
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The **CLEVEREST** way to house **YOUR SET!**
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POLAND'S NEW STATIONS

THE second Warsaw broadcasting station, installed for local purposes only, is now testing on 214 metres; its power is roughly 1 kilowatt. As the capital now possesses two transmitters, attempts are to be made to follow England's lead in the provision of alternative programmes. The high-power station, which is to be replaced in the near future by broadcasting plant capable of putting some 120 kilowatts in the aerial, will continue to work on 1,411 metres. In view of the great difference in wavelengths, it is expected that the capture of both programmes should prove no difficulty to the city-dwellers.

At Lodz, the Polish "Leeds and Bradford," the new 2-kilowatt transmitter was officially inaugurated early this month. Although acting for the present as a relay to Warsaw on 233.8 metres, a studio is in course of establishment, and this important centre will provide special programmes.

A third provisional transmitter has also been installed at Lemberg (Lvov), and since January 15 has been working on 385.1 metres. England will, however, in the course of the summer deliver to the Polskie Radio a 16-kilowatt station which is destined to Lemberg, and upon completion of which the city will become independent of the Polish capital for its wireless entertainments.

GRIDDA.

WIRELESS IN PARLIAMENT

THE Prime Minister stated that the suggestion to broadcast the Budget speech did not commend itself to a considerable section of the House of Commons, and in those circumstances he could not adopt it.

FIELD STRENGTH AND INTERFERENCE

MUCH of the interference trouble caused by the transmission from Brookmans Park is due to the fact that the B.B.C. is compelled by International agreement to radiate on the 200-600 metres wave-band. Attenuation on these shorter waves is much more pronounced than is the case say, when using waves between 1,000-2,000 metres.

Since the B.B.C. aims at giving a service area of 100 miles radius, the field-strength near the transmitting aerial is much greater than it would be if they could use a 1,000-metre carrier. In the latter case the attenuation of falling-off in signal strength is more gradual and the necessary 100 miles signal range could be maintained without inflicting so "fierce" a field on those listeners living within 10-15 miles of Brookmans Park.

M. B.

FULL-SIZE BLUEPRINTS

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CRYSTAL SETS (6d. each)	
B.B.C. Brookman's Park Set	AW206
Regional Crystal Set	WM177
ONE-VALVE SETS (1s. each)	
B.B.C. Official One	AW208
A.T.	WM153
TWO-VALVE SETS (1s. each)	
Loud-speaker America Two	AW199
Talisman Two (D, Trans)	AW194
Hyper-selective Two (D, Trans)	AW198
British Broadcast Two (D, Trans)	AW215
Easy-tune Two (D, Trans)	AW229
Clipper Two (D, Trans)	WM135
Ether Ranger (D, Trans)	WM156
Brookman's Two (D, Trans)	WM168
A.C. Two (D, Trans)	WM175
Programme Two (D, Trans)	WM177
New Crusader (D, Trans)	WM182
Radio-Record Two (SG, D)	WM187
THREE-VALVE SETS (1s. each)	
Broadcast Three (SG, D, Trans)	AW192
All-wave High-mag. Three (D, 2 Trans)	AW199
Knife-edge Three (D, RC, Trans)	AW201
Talisman Two-three (D, RC, Trans)	AW203A
Wide World short-wave Three (HF, D, Trans)	AW207
Everybody's Three (SG, D, Trans)	AW209
1930 Ether Searcher (SG, D, Trans)	AW211
New All-Britain Three (HF, D, Trans)	AW214
Best-by-Ballot Three (SG, D, Trans) Price 4d. free with copy of "AW"	AW217
Brookman's By-pass Three (D, 2 Trans)	AW220
Everybody's all-electric Three (SG, D, Trans)	AW221
—A.C.	AW221
1930 Clarion Three (SG, D, Trans)	AW223
Auto-coupler Three (D, 2LF)	AW225
Standard Coil Three (HF, D, Trans)	WM117
Short-wave Link (D, RC, Trans)	WM142
Fanfare (D, 2 Trans)	WM157
Brookman's Three (SG, D, Trans)	WM161
Community Three (D, RC, Trans)	WM164
New Q3 (SG, D, Pentode)	WM167
Brookman's Push-Pull Three (HF, D, Trans) 1/6	WM170
Celerity Three (SG, D, Trans)	WM173
All-nations Three (D, 2 Trans)	WM178
Inceptordyne (SG, D, Pentode)	WM179
Brookman's A.C. Three (SG, D, Trans) 1/6	WM184
Music Marshal (D, 2Trans)	WM190
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Clarion All-electric Three (SG, D, Trans—A.C. Rectifier)	AW200
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Dominions Four (2SG, D, Trans)	WM134
Short-wave Adaptor for Dominions Four	WM140
Music Player (HF, D, RC, Trans)	WM144
Arrow (SG, HF, D, Trans)	WM154
1930 Monodial (2SG, D, Trans)	WM158
Electric Four (All A.C.—SG, D, RC, Trans)	WM162
Outpost Four (SG, D, 2 Trans)	WM165
Brookman's Four (2SG, D, Trans)	WM174
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Two-valve Amplifier	AW216
"Mag" Gramo Unit	AW224
Concentrator H.F. Unit	WM169
Radio-Record Amplifier (DC Mains)	WM183
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Two Ampere Low-tension Unit	WM147
A.C. Mains Amplifier	WM149
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"W.M." Linen-diaphragm	WM172
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AMATEUR WIRELESS 53-61 FETTER LANE LONDON, E.C.4

OUR INFORMATION BUREAU



RULES.—Please write distinctly and keep to the point. We reply promptly by post. Please give all necessary details. Ask one question at a time to ensure a prompt reply, and please put sketches, layouts, diagrams, etc., on separate sheets containing your name and address. See announcement below. Address Queries—**AMATEUR WIRELESS** Information Bureau, 58/61 Fetter Lane London, E.C.4

The "Music Leader"

Q.—I have constructed the "Music Leader" and fail to obtain reaction on the medium wavelength. For this reason I am unable to obtain reception on the medium waves. Although I get reception of 5XX on the long waves, it seems that there is no definite tuning point for best reception of this station. It is impossible to make the receiver oscillate in any way, whether on the long waves or on the medium waves. My wiring has been checked and re-checked, and is correct according to the blueprint.—**F. G. (Kent)**

A.—There are several faults which can contribute to your trouble. First of all, you are advised to see that there is a good connection between the moving plates of your H.F. tuning condenser and the copper screening box. At the point of contact, the copper should be cleaned with emery cloth to clean away all lacquer which affords a high resistance path. The surface of the copper around the point of contact with the metal bush of the wave-change switch should be similarly treated; in fact, at all points where an electrical connection is made to the copper the surface should be scraped clean of lacquer and brightened with emery cloth. Having attended to this point, make sure that the anode resistance in the R.C. unit has a value of 100,000 ohms, not 250,000 ohms, which value is often supplied standard with such types of R.C. unit. Check

the value of the reaction condenser. This must be .0002 microfarad. When winding the frame aerial, arrange that the turns of wire be wound closely together and that the frame winding be nearest to the back end of the receiver cabinet. Finally, make sure that you are using a tall type Parex S.G. valve holder, as the grid and anode socket arrangement in the short type Parex valve holder is different.—**L. C.**

When Asking Technical Queries

PLEASE write briefly

A fee of One Shilling (postal order or postage stamps) must accompany each question and also a stamped addressed envelope and the coupon which will be found on the last page. Rough sketches and circuit diagrams can be provided for the usual query fee. Any drawings submitted should be sent on a separate sheet of paper. Wiring plans and layouts cannot be supplied. Queries cannot be answered personally or by telephone.

H. & B.

KITS EASY-TUNE TWO

H. & B. trouble-free kit contains all that you require to successfully build this Ideal Two Valver. Panel and strips ready drilled.

Ebonite panel, 14 by 7 (Resiston)	6 3
1—.0005-mfd. variable condenser (Burton)	5 3
1—.0003-mfd. variable condenser (Burton)	5 0
1—Slow-motion dial (Formo)	3 0
1—7-ohm rheostat (Wearite)	1 6
Panel brackets (H. & B.)	1 3
2—Valve holders (W.B.)	2 6
2—single coil holders (Lotus)	1 4
1—H.F. choke (Varley)	7 6
1—L.F. transformer (Telsen)	12 6
1—.0003-mfd. fixed condenser (Dubilier)	2 6
1—.003-mfd. fixed condenser (Dubilier)	3 0
1—.0002-mfd. fixed condenser with series clip (Dubilier)	2 6
2—terminal blocks marked A, E, and L.S.+ , L.S.— (H. & B.)	6
Grid bias battery clips (H. & B.)	6
5—Wander plugs, marked: H.T.—, H.T.+1, H.T.+2, G.B.+ , G.B.— (Belling-Lee)	1 6
2—Spade terminals, marked L.T.+ , L.T.— (Belling-Lee)	9
4—Yards thin flex (Lewcoflex)	4
Connecting wire (Glazite)	1 0
1—2-meg. grid leak (Lissen)	1 0

Cash Price for this Kit £2 19 2

Included in kit is full-size Blueprint, Wire, and Screws.

Any parts sold separately.

Cabinet in Oak, 14/6 extra.
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This set built and tested on aerial, fitted in our best quality oak cabinet, together with 2 Mullard valves and royalties paid. Cash Price £6.

H. & B. specialise in all "A.W." kits and can give you perfect service. Carriage paid on all cash orders

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34, 36, 38 Beak Street, Regent Street, London, W.1

Phone: Gerrard 2834



Gentleman:

"Excuse me Madam would you mind if I smoked a . . .

Lady:

Certainly not, I'll have one with you."



N.C.C.821

MORE RADIOGRAMS

RADIO and its allied industries furnish employment for more than 350,000 workers in the United States.

A further series of night concerts will be broadcast during the month of April by German stations as under: Langenberg (Saturday, 5); Hamburg (Tuesday, 8); Frankfurt (Thursday, 10); Leipzig (Saturday, 12); Stuttgart (Tuesday, 22); Berlin

(Friday, 25); Munich (Monday, 28); and Breslau (Wednesday, 30). The transmissions are due to start at 11.30 p.m. G.M.T.

The Government of Colombia is using its radio station at Bogota to help in reducing unemployment. Help-wanted advertisements are broadcast free, as well as situation possibilities.

Two representatives of the B.B.C., three specialists in science, and two headmasters form the membership of the Science Sub-Committee of the Scottish Council for School Broadcasting. Several distinguished musicians, including Sir Walford Davies, are on the Music Sub-Committee.

The British Wireless for the Blind Fund is expected to benefit to a substantial extent as the result of a concert held in St. Andrew's Hall, Glasgow, and relayed to all Scottish stations. The Earl of Elgin was chairman.

There is to be no delay in the reorganising of the German broadcasting system. According to reports, as soon as the construction of the high-power stations at Muhlacker (South Germany) and Heilsberg (East Prussia) are well in hand, work is to be started on the stations destined to serve the northern and central districts of the country. The site for the former will be at a spot half way between Halle and Erfurt; for the latter between Berlin and Hamburg. In view of the great outlay necessitated for this new programme, the 50-kilowatt transmitter for Bavaria will not be built before the end of 1931. In the meantime the broadcasting plant at Munich is to be overhauled and improved to obtain higher power and greater range for the transmissions.

If you wish to hear San Sebastian's gramophone concerts you may be compelled to search the broadcasting band between 403 and 465 metres, for the Spanish station has been addicted to wandering during the past fortnight. It was recently located on about 463 metres, but now appears to have settled down (temporarily, no doubt) on 459 metres.

"Amateur Wireless and Radiovision." Price Threepence. Published on Thursdays and bearing the date of Saturday immediately following. Post free to any part of the world: 3 months, 4s. 6d.; 6 months, 8s. 9d.; 12 months, 17s. 6d. Postal Orders, Post Office Orders, or Cheques should be made payable to "Bernard Jones Publications, Ltd." General Correspondence is to be brief and written on one side of the paper only. All sketches and drawings to be on separate sheets. Contributions are always welcome, will be promptly considered, and if used will be paid for. Queries should be addressed to the Editor, and the conditions printed at the head of "Our Information Bureau" should be closely observed. Communications should be addressed, according to their nature, to The Editor, The Advertisement Manager, or The Publisher, "Amateur Wireless," 58-61 Fetter Lane, London, E.C.4.

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Advertisements under this head are charged **THREEPENCE PER WORD**, minimum charge **THREE SHILLINGS.**

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As the Publishers cannot accept responsibility for the bona fides of advertisers in this publication, they have introduced a system of deposit which it is recommended should be adopted by readers when dealing with persons with whom they are unacquainted. It is here explained.
Intending purchasers should forward to the Publishers the amount of the purchase money of the article advertised. This will be acknowledged to both the Depositor and the Vendor, whose names and addresses must necessarily be given. The deposit is retained until advice is received of the completion of the purchase, or of the article having been returned to and accepted by the Vendor. In addition to the amount of the Deposit, a Fee of 6d. for sums of £1 and under, and 1s. for amounts in excess of £1, to cover postage, etc., must be remitted at the same time. In cases of persons not resident within the United Kingdom, double fees are charged.
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Nickel plated, 6 colours, Standard size 2DW or Midget 21. each.
← Actual Size. Write for list J94.
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118 Bunhill Row :: London, E.C.1

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Solves all H.T. Troubles.
SELF-CHARGING, SILENT, ECONOMICAL.
JARS (waxed) 2 1/2 in. x 1 1/2 in. sq., 1/2 doz.
ZINCS, new type, 10d. doz. SACS, 1/2 doz.
Sample doz. (18 volts), complete with bands and electrolyte, 4/1 post 9d. Sample unit 6d.
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For Linen or Single Cone Speakers
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This book is an illustrated guide to the making and using of short-range wireless control apparatus, and it has been written so simply that it can be understood by any enthusiast possessing an elementary knowledge of wireless.

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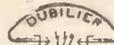
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Amateur Wireless.
April 12, 1930

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“JAMES ‘QUALITY’ FIVE” : “EASY-TUNE 2”

Amateur Wireless

and
Radiovision

Every
Thursday 3^d

Vol. XVI. No. 409

Saturday, April 12, 1930

The JAMES
'QUALITY'
FIVE

FULL PARTICULARS
IN THIS ISSUE



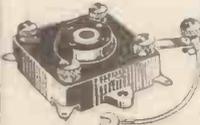
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5-Pin Valve Holder
For 5-pin valves with centre leg. In bakelite, with one-piece springs, terminals and soldering tags. ... 1/9



Pentode Valve Holder
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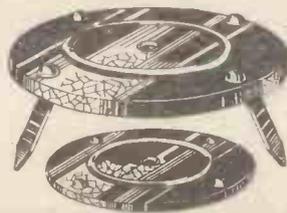
Vibrator
One-piece Bakelite construction, with one-piece springs, self-aligning feature terminals and soldering tags ... 1/6



Rotary Switch
An effective alternative to the push-pull type. All insulated and with indicating dial ... 1/9

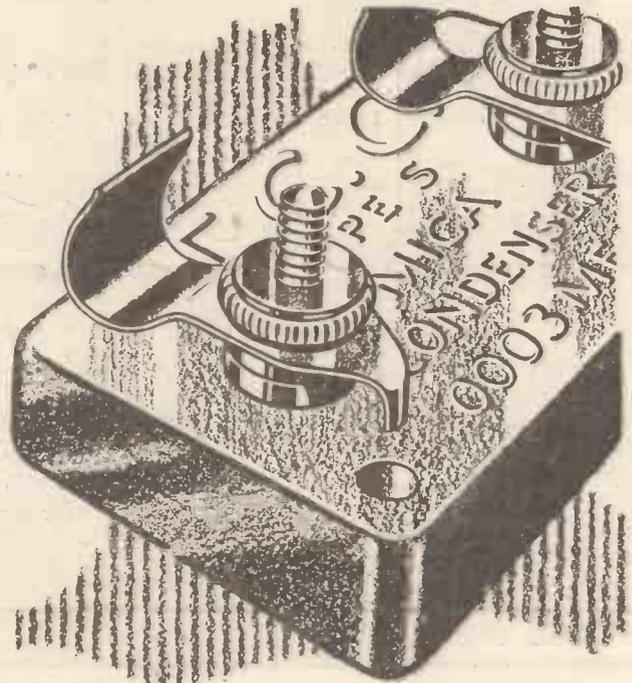
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T. C. C. MICA CONDENSERS Flat Type

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.0001 to .0009	1 3
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.005 to .006	2 0
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Tested to 500v. D.C.
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Amateur Wireless and Radiovision

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Real Television—Why Not Try This?—Make Your Valves!—Another 5SW Rumour—"PHOHI" and Others—Novel O.B.'s

Real Television—Did you listen to the first dual transmission of speech and television last week? The account of our reception is given on another page in this issue. The photograph below gives a glimpse of the "behind the scenes" at the Baird laboratories on the morning of this first dual broadcast. Seven transmissions are now being given every week until further notice. Television is *really* here, after a hard fight.

Why Not Try This?—"I have made my cone speaker better than a moving-coil," writes R. M. (Manchester). "I have fitted the cone to a baffle-board measuring 2 ft. by 6 ft., the speaker being about 1 ft. from the lower end of the board. Then I have fitted the board in a corner of the room, with the cone near the floor, and have gummed paper along the edges of the board so that a triangular tunnel is formed by the board and the corner walls. The cone faces inwards towards the wall, and the sound thus travels up the 6 ft. tunnel and comes out at the top. Bass notes are

fine, thanks to the long horn, and the 'highs' are still there." You might care to try it, but don't go gumming sticky paper to the walls till you see how it works in your rooms! It is a quaint idea.

Make Your Valves!—And, talking of quaint ideas, a correspondent asked us last week if it would be possible to get results with a "valve" working in the flame of a gas-fire! This isn't impossible, because electronic emission from some heated metals doesn't always necessitate a vacuum. Laboratory results could certainly be obtained with a cathode heated by a naked flame, the other electrodes being placed very close to it, but cooled. But it's a long step from the laboratory to the commercial world, and the fact that such a "flame valve" idea was mentioned long before the B.B.C. was thought of, seems significant, for nothing has been done.

Another 5SW Rumour—The rumour is again going the rounds that 5SW (which is not strictly a B.B.C. station), is to be supplemented by a new "Empire" transmitter. We have heard this said so often, without anything being done, that we tire of buoying up hopes with regard to a short-wave broadcaster, only to find that the reins of red tape are still hedging in the B.B.C. The real trouble, of course, is £ s. d. The B.B.C. doesn't want to plunge into a scheme which means giving programmes for colonial listeners, the money for which has to come from British listeners' pockets.



THE TELEVISION BROADCAST
Mr. Baird looks-in! There were busy scenes at the Baird laboratories on the occasion of the first sight-sound broadcast via Brookmans Park. Here Mr. Baird and Lord Ampthill are watching a televisior.

PRINCIPAL CONTENTS

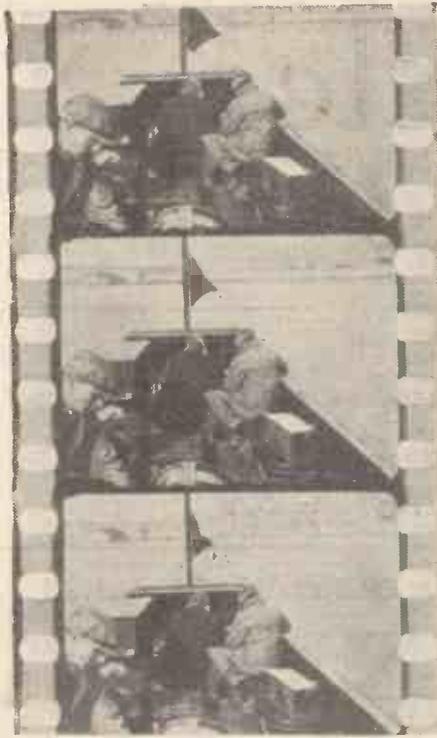
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"PHOHI" and Others—The trouble is not that 5SW is inefficient. On the contrary it is one of Marconi's best short-wave stations, and what it does succeed in doing is really wonderful considering the power used. But Chelmsford was never designed as an "Empire" broadcaster, and short-wave enthusiasts have cause to be a little bit jealous of the sixty-kilowattors such as the Dutch PHOHI, which gives regular concerts to the Dutch East and West Indies. Our own Dominions want to have news and programmes from the Motherland.

Novel O.B.'s—In Germany, more outside broadcasts are given than in this country. Effectively to handle these transmissions the German postal authorities have designed a short-waver which is operated from a car. Recently a long-distance cycle race was successfully relayed throughout a chain of German broadcasting stations. The car followed the race, a commentator relaying an eye-witness account to a central receiving station which passed it on to the transmitter. The transmitter is crystal controlled, thus ensuring a constant wavelength. A power of 10 to 20 watts is radiated which can effectively cover distances of from two to six miles on various wavelengths between 50 and 110 metres.

HOW THE BOAT RACE WILL BE BROADCAST

An account of the B.B.C. arrangements to relay a running commentary of the inter-Varsity event this Saturday



A strip of the film taken on the B.B.C. launch. The two commentators are in the prow of the boat

THIS Saturday, April 12, the B.B.C. is giving a running commentary on the annual Varsity Boat Race.

Last year the race was disappointing for the thousands of spectators, the result being rather a foregone conclusion. It was generally agreed that the B.B.C.'s running commentary—which some of the spectators were able to hear, loud-speakers being placed at points along the river banks—was more exciting than the race itself!

Everything points to a more closely-



This is the one-valve short-wave receiver which will pick up the transmission from the B.B.C. launch. It is connected through an L.F. amplifier to Savoy Hill

contested finish this Saturday, and on the radio side the inter-Varsity event will be important this year, because the B.B.C. has scrapped most of the gear that has been

used in the past few years (on the receiving side, at least), and it is expected that the results will be better than ever, with a reduced possibility of a breakdown.

The old launch, *Magician*, will follow the race, and the well-known sport commentators, Oliver Nickalls and J. C. Squire, will give an account of every detail from this point of vantage. They will speak into a microphone on the launch, and a short-wave transmitter is used to connect the launch with the land. Two short-wave receivers will be used, to prevent fading and to prevent a breakdown. One of the receivers will be situated in Barnes High Street, and the other at another point near the course and on the top of a high building.

Both of these sets will be connected through normal 'phone lines to Savoy Hill. In previous years the B.B.C. engineers have used multi-valve sets for receiving, and a super-het. was used on one occasion. This year only one-valve receivers will be used—a simple detector-with-reaction-arrangement—and these will be connected to the standard B.B.C. three-valve

"B"-type resistance-coupled amplifiers, and thence to the 'phone lines.

The transmitter on the *Magician* is a real "quality" broadcaster. The depth of modulation is very low, the quality is, therefore, good and the effective range short. It will be very difficult to resolve the carrier wave into speech at distances over five miles from the launch: so it's no use your searching with your own short-wave set to discover the wavelength used. Obviously the exact wavelength is not dis-

closed, for heterodyning by a "nosey" amateur would spoil the broadcast for millions.

The launch's transmitter is in two cases, completely shielded and almost watertight. One is the drive and power magnifier, and the other the modulator and sub-control. Only a very short aerial can be erected on the launch, and a simple vario-

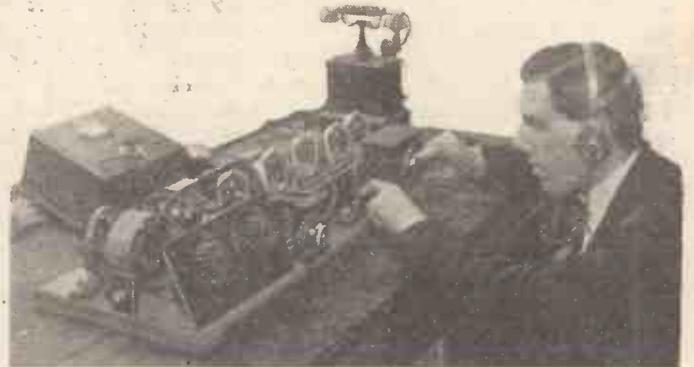
meter is used for tuning.

The short aerial has the disadvantage that the stray capacities are not always properly "anchored," and if the engineers walk about underneath the aerial wire the transmitting wavelength is altered!

H.T. is derived from large accumulators which drive a 1,200-volt generator, and accumulators and generators will be carried in duplicate to avoid a breakdown.

Ensuring Quality

Four stages of amplification are in circuit between the microphone (the usual studio Reisz type of "mike" and the main modulator. These four L.F. valves are coupled in "mixed" stages with transformers and



In previous Boat Race broadcasts complicated receivers were used. This is a scene in the receiving hut last year

resistances in the special manner always used by the B.B.C. engineers for outside broadcast amplifiers.

To make sure that the quality is right and that the launch signals are going out properly, a small "side-tone" receiver will be carried. By listening on 'phones attached to this the two commentators can judge the broadcast from the listeners' point of view. A valve voltmeter is connected to this little receiver on the launch, so that the engineers can tell if the signal strength is always constant without distortion.

Altogether a tricky business! The B.B.C. O.B. department should be glad when the "Twelfth" is over.

Taking its place alongside Chicago, Detroit, and other cities, the St. Louis police department has started installing a broadcasting station in its headquarters. Present plans call for the 64 squad cars of the department to be equipped with receiving sets.

There are 130 radio beacons in service, and it is estimated that 3,035 ships in the world are equipped with radio compasses.

HOW TO BUILD IT

The EASY-TUNE 2

HOW TO TUNE IT

LAST week we said some glowing things in introducing the latest two-valver, the "Easy-tune 2." Lest it be thought that we are over-enthusiastic about this high-performance little set, let us press on with the constructional particulars so that readers can prove for themselves that the title "Easy-tune 2" is justified.

The components needed for this "two" are few and cheap. Economies have been effected in many directions. For example, plug-in coils are used for tuning in place of the obviously more expensive dual-range coil unit. Terminals have not, except for the connecting points of aerial, earth, and loud-speaker, been used; lengths of rubber-covered flex, neatly twisted together, are used for the battery connections, and this arrangement has the advantage of being both convenient and cheap.

There are several other little points which will strike you, too, when you come to the actual constructional work. Don't forget that the full-size blueprint (which can be obtained, price 1s., post free, from the blueprint department of AMATEUR WIRELESS, 58-61 Fetter Lane, E.C.4), can be used in the very first constructional operation, namely, the layout of the components and the drilling of the panel.

The baseboard can be cut to size from any good hardwood, or from a sheet of plywood. It should be 14 in. by 10 in., as shown on the blueprint, and should be at

least 3/4 in. thick, in order to have sufficient strength and be convenient to work.

Using the blueprint as a guide, lay the parts out roughly to get an idea of the baseboard plan. There is ample space to spare, and you will have no difficulty in arranging the various components.

If you are using all parts exactly as specified, then it will be most convenient to

components; and this may be an advantage if, say, a special fancy front is being fitted to the cabinet.

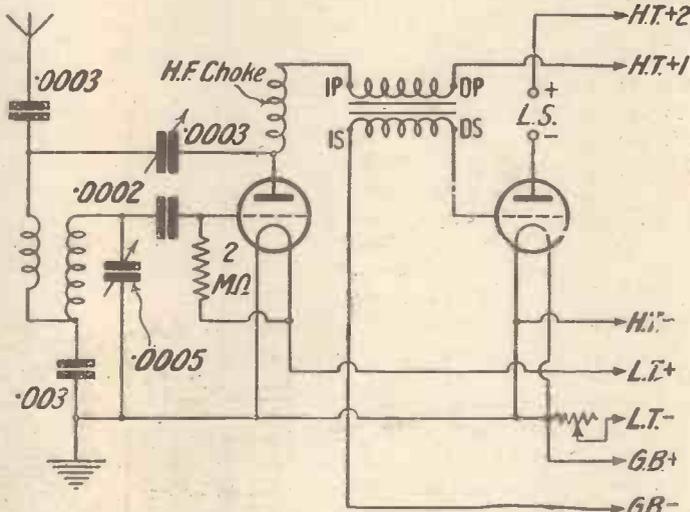
The blueprint should, of course, be used to show the drilling centres. Attach the sheet to the panel, temporarily securing it with a spot or two of adhesive at the corners, and lightly punch the drilling centres on to the panel. Be very careful not to split the panel in so doing. It is equally unwise to drill the centres direct through the blueprint, for it is difficult to make a clean hole with a hand-drill unless a small punch hole is first made to centre the point of the bit.

There are not many holes which have to be drilled. Don't forget, though, that small holes have to be drilled in connection with the panel brackets and along the bottom edge of the panel, through which wood screws are passed to attach the panel to the baseboard. The slow-motion dial for the centre condenser requires a small hole for the fixing bolt.

When the holes have been drilled and the panel parts mounted—taking care to screw the one-hole fixing nuts up sufficiently tightly to prevent rotation of the components—the panel may be attached to the baseboard. This is an easy job, because the presence of the panel brackets ensures that the panel and baseboard are assembled at right angles.

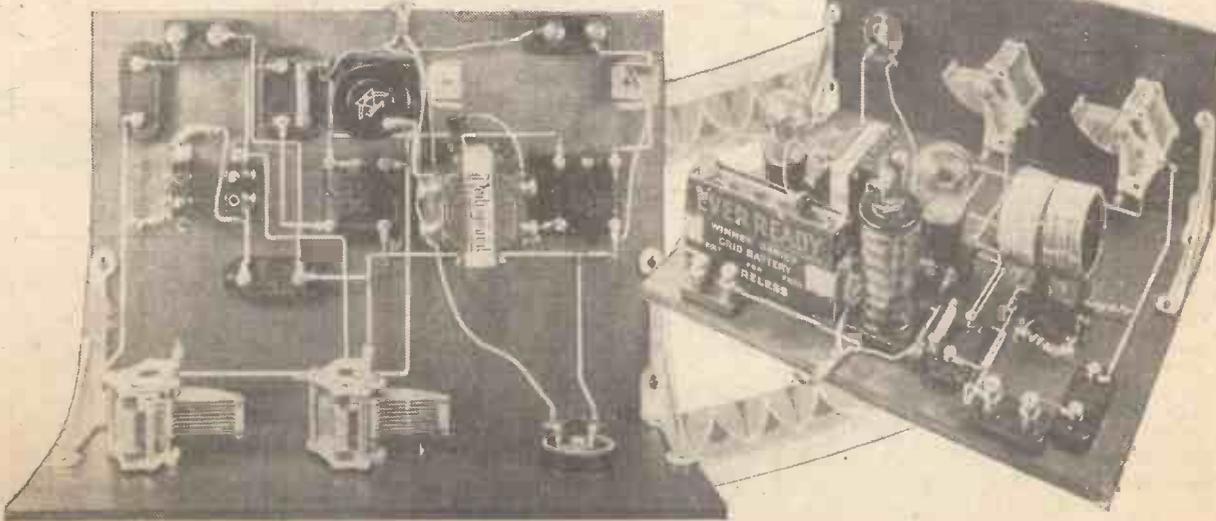
Incidentally, if one cares to do so, it is possible in this set to have the panel front inclined at a slight angle to the baseboard. With a suitable cabinet, this results in a very pleasing, "professional," and slightly unconventional appearance. In this set there is room to do this; but don't incline the panel too much or the condenser end plate may foul the coils.

When it comes to wiring, follow the blueprint and you can't go wrong. The (Continued on next page)



The tuning arrangements of the "Easy-tune 2" are unusual because of the constant-coupled reaction circuit used. Note the .003 condenser between the two coils and earth. The L.F. valve is transformer coupled

adhere to the exact panel drilling centres shown: but there is no absolute necessity to do so, for there is room for a certain amount of variation of position of the panel



These pictures will show that the "Easy-tune 2" is a cheap receiver to build, the components required being very few

theoretical diagram is of assistance, too, and by following both the theoretical and the practical layouts you get a true perspective of the reason for and the arrangement of each circuit.

The larger portion of the wiring is done with rigid insulated wire. This makes a neat job of those long stiff leads, such as those connected to the variable condensers and to some of the small components in the neighbourhood of the detector valve holder.

Rubber-covered flex is used for the battery connections, as previously explained, for the flexible leads to the coil sockets and for the connections to the grid-bias battery mounted on the baseboard.

The long battery leads should, for convenience, be twisted. The two L.T. leads should be twisted together, and the two H.T. positive leads and the common H.T. negative leads may be similarly grouped. An insulated staple, as used in electric bell wiring, enables the twisted groups of leads to be neatly secured at one point to the baseboard. It is advisable to attach the wander plugs and accumulator tags before the leads are twisted. Don't risk short-circuits by guessing which wire is which.

You will see that one coil socket is so mounted that it can be moved in order to vary the coupling between the coils. This is necessary in order to arrive at a proper adjustment of the constant coupling of the reaction. It should be unnecessary to stress the advice given each time an AMATEUR WIRELESS set is described, namely, that the easiest way to avoid disappointment is to check the whole of the wiring very thoroughly before operating. The checking should be done with the blueprint as a guide. After all, the whole job will take

only ten minutes or so, and it may save expensive burn-outs.

Now for valves and batteries. The detector should be of the medium-impedance type and the following valves are suitable. (Two-volters): Cossor 210HF, Dario Univ., Marconi HL210, Osram HL210, Six-Sixty 210HF, Mullard PM1HF, Mazda HL210, Lissen HL210, Selfridge "Key" 210H.F. (Four-volters): Mullard PM3, Six-Sixty 4075HF, Osram HL410, Marconi HL410, Dario Univ., Cossor 410HF. (Six volters): Cossor 610HF, Marconi HL610, Osram HL610, Six-Sixty D610, Mullard PM5X, Mazda HL607.

COMPONENTS REQUIRED

- Ebonite panel, 14 in. by 7 in. (Trolitax, Lissen, Keystone, Trelleborg, Becol).
- Baseboard, 14 in. by 10 in. (Camco, Pickett).
- .0005-mfd. variable condenser (Burton, Lissen, Lotus, Dubilier, J.B., Formo, Polar, Ready-Radio).
- .0003-mfd. variable condenser (Burton, Lissen, Lotus, Dubilier, J.B., Formo, Polar, Ready-Radio).
- Slow-motion dial (Lotus, Brownie, Lissen, Igranic, Formo).
- 7-ohm rheostat (Wearite, Lissen, Varley, Igranic).
- Panel brackets (Keystone, Lissen, Bulgin, Ready-Radio).
- Two valve holders (Junit, Benjamin, W.B., Formo, Igranic, Trix, Wearite, Lotus).
- Two single coil holders (Lotus, Lissen).
- Set of coils for medium and long wavebands (Igranic, Lissen, Tunewell, Lewcos, Atlas).
- High-frequency choke (Varley, Tunewell, Lissen, Lewcos, Bulgin, Keystone, Wearite, Ready-Radio, Sovereign, Igranic).
- Low-frequency transformer (Telsen, Lissen, Brownie, Ferranti, Igranic, Burton, Varley, Lewcos, Lotus).
- .0003-mfd. fixed condenser (Dubilier).
- .003-mfd. fixed condenser (Dubilier).
- .002-mfd. fixed condenser with series clips (Dubilier, T.C.C., Graham-Farish, Watmel).
- Grid-leak (Lissen, Dubilier, Graham-Farish, Watmel).
- Two terminal blocks marked A, E. and L.S.+ L.S.— (Lissen, Junit).
- Grid-bias battery clips (Bulgin).
- Five wander plugs marked: H.T.—, H.T.+1, H.T.+2, G.B.—, G.B.— (Belling-Lee, Eelex, Clix).
- Two spade terminals, marked: L.T.—, L.T.— (Belling-Lee, Eelex, Clix).
- Four yards of thin flex (Lewcoflex).
- Connecting wire (Glazite).

The power valve can be selected from the following makes and types: (Two-volters): Cossor 220P, Dario SP, Marconi P215, Osram P215, Six-Sixty 220P, Mullard PM2, Mazda P220, Lissen P220. (Four-volters): Cossor 410P, Dario SP, Marconi P410, Osram P410, Six-Sixty 410P, Mullard PM4. (Six-volters): Cossor 610P, Marconi P610, Osram P610, Six-Sixty 610P, Mullard PM6.

A triple-capacity H.T. battery is not really necessary for the "Easy-tune 2," but it is, of course, an advantage. Triple-capacity batteries always last longer than those having smaller cells, because the maximum discharge rate is not so nearly approached.

Suitable coils required depend on so many factors, such as the wavelengths of the local stations it is generally required to receive, the length of the aerial, and so on, that it is difficult to give coil sizes which will correspond with wavelengths. It is advised, however, that coils numbered 35 to 75 be available for the medium band, and coils 100, 150, 200, and 250 be at hand for long-wave reception. The reaction and aerial coil coupling should be so arranged that the well-known "constant coupling" effect is obtained. If the reaction setting does not remain approximately unaltered over a fairly wide tuning range, then the coil coupling—and also the H.T. value to the detector—should be altered.

After a little patient adjustment of these values the true advantage of the "Easy-tune 2" will be obvious. The reaction can be set at any desired value, and then the single control of the aerial condenser is the only knob to be touched to bring in station after station without the usual fiddling with reaction.

MR. FLEX HOPES FOR SOMETHING CHEERY—



—BUT HIS LUCK IS NOT TOO GOOD.



AT 11 a.m. on Monday, March 31, the AMATEUR WIRELESS Technical Staff participated in Baird's "historic event"—the simultaneous transmission of sound and vision from the two Brookmans Park stations. Whatever may be said against these twin stations, they undoubtedly provide an excellent medium for television experiments.

The television signals were sent out by the 261-metre National station and the accompanying speech and song by the 356-metre London Regional station. The importance of the event lies in the fact that, for the first time in this country, listeners with Baird televisors were given the chance to use them under dual broadcasting conditions. The B.B.C. and the Baird Company must be thanked for their co-operation, which has enabled us, at long last, to assess the entertainment value of television in its present state of development.

The immediate object of the Baird Company is to present "lookers-in" with the



Being Some First Impressions of Vision and Speech Transmission

duced by Mr. Sydney A. Moseley. We recognised Mr. Moseley (our programme critic) without difficulty. Sir Ambrose Fleming, who followed, was not hard to distinguish. The more personal contact of television, as compared with ordinary broadcasting, was emphasised by the next speaker, Lord Amptill, who was clearly seen to droop his eyelids, presumably when referring to notes in his hand. This little human touch gave a great sense of reality.

Miss Annie Croft was not easily distinguishable; she sang very nicely. Miss Gracie Fields' preliminary gesture came across well. She seems to be an ideal television subject, although she moved her head so swiftly once or twice that her face became a blur. We are sure she would not want to see herself as a blur.

Necessary Apparatus

For the reception of this programme, our standard Baird televisor, the first to be issued by the Baird Company, was used in conjunction with a three-valve set. This consists of an anode-bend detector valve, with a small amount of reaction, resistance-capacity-coupled to a P625 power valve, transformer coupled in turn to an LS5A super-power valve, with 300 volts on the anode. The lamp and coil terminals of the televisor were connected in series with the output of the last valve. The lamp current was, therefore, controlled by the anode current of the LS5A.

The television amplifying equipment, just mentioned, should be within the means of those who can afford the televisor itself, which is 25 guineas. A rough estimate shows that the three-valve set, with valves and high-tension unit, giving 300 volts from A.C. mains, costs between £10 and £12 to make. In addition to this equipment, a separate set is required for the

no adjustment was made for at least ten minutes.

Future Prospects

And the verdict—is it still too soon to judge? Perhaps so, because this is only the beginning of the real trial of television. We all want to give a favourable verdict, because we all *want* television. Wonderful though television now is, as an experiment, how much more wonderful it would be as an entertainment, if it were more perfect! The vision part of the present dual television experiments is no better than it has been for months past. But television is exercising some of the best brains in the scientific laboratories of the world. Those who desire, as we do, to see Britain pre-eminent in this new development, should not be too ready to dismiss the present efforts as impracticable.

AT THE QUEEN'S HALL

AT the nineteenth B.B.C. concert of this season Perez Casas conducted a Spanish programme. I do not think I approve of "national" programmes; they are unsatisfactory because the music is too much the same, art not being national. However, the music played at this concert reached a very high standard, and had no consciously national feeling. I think highly of de Falla's "Nights in the Gardens of Spain" and Espla's "The Devil's Good Night," and Harriet Cohen is a fine pianist.

Conchita Supervia, who has a large taste in flowers, or else her admirers have, is a contralto with a lovely voice indeed.

L. R. J.

Russia's vast plans for radio are exciting interest throughout the world. A five-year plan calls for 87 stations of 948 kilowatts total power and 101 subsidiary stations.

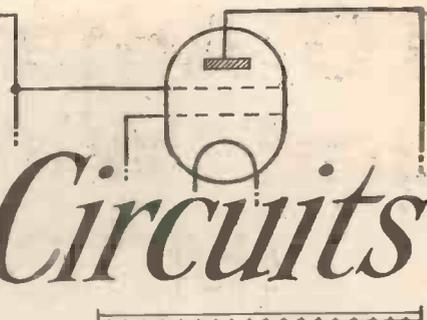
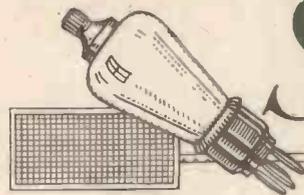


Miss Annie Croft, the variety star, who took part in the first dual television transmission. She is seen again in the heading picture together with Miss Gracie Fields who also featured

vision of a close-up of the broadcasting artiste; no further elaboration of the scene of exploration is, at present, intended.

The inauguration of "real television"—in the sense of simultaneity of scene and sound—was a half-hour of celebrities, intro-

How To Design Screen-grid Circuits



By J. H. REYNER, B.Sc., A.M.I.E.E.

This is the second article dealing with the design of the tuning circuits associated with a screen-grid valve. The subject of this is Amplification

WE discussed in the last article of this series the question of the stability of a screen-grid stage, and it was shown that, despite the very small capacity of the modern screen-grid valve, the amplification possible has increased at such a rate that instability may still result under certain conditions. Whether this is so or not depends upon the amplification actually obtained from the valve, and we shall discuss this aspect of the question in the present article.

The screen-grid valve behaves in a similar manner to other types of valve in

kind, e.g. both resistances. This state of affairs exists where we have a tuned circuit in the external circuit.)

This theory applies equally to a three-electrode valve, or to a screen-grid valve, the difficulty of design arising in the latter case owing to the much higher internal resistance of the valve. The effective impedance of a coil with a condenser in parallel, such as would be used in a simple tuned anode circuit, such as that shown in Fig. 1, is given by the expression :

$$R_{\text{eff}} = \frac{L}{CR}$$

where L = inductance in microhenries.
C = capacity in microfarads.
R = H.F. resistance in ohms.

Quite a simple calculation will show that in order to be equal to the internal resistance of the modern screen-grid valve, the circuit must be of quite a good performance. If we wish to make the circuit impedance greater than the resistance of the valve, we must make the coil even better. Let us consider, for example, a coil of 200 microhenries tuned with a condenser of .002 microfarad, having a resistance of 4 ohms. This, by the way, would be quite a good coil. Our circuit impedance would then be 250,000 ohms, which is little more than the impedance of most of the screen-grid valves in use to-day. Thus, even with a good circuit like this we should not arrive at a high condition of efficiency.

Instability

The amplification, however, is so large that even with this relatively poor efficiency we can easily obtain instability. Let us apply our figures to the case of an S610 type S.G. valve. This has an internal resistance of 200,000 ohms, with an amplification factor of 210. The amplification we shall obtain with the circuit would be obtained from the expression :

$$\text{Amplification} = \frac{R}{R+r} \mu$$

where R = effective resistance of tuned circuit.

r = internal resistance of valve.

μ = amplification factor.

If we evaluate this for the case just quoted we obtain an amplification of 216.

This looks quite nice, but in practice we should not develop this amplification, because the circuit would be unstable. An amplification of this order is beyond the limit which can be tolerated before instability sets in.

It is not possible to discuss in any detail the process by which we arrive at the limiting amplification for a valve. It depends upon the nature of the anode circuit, and upon the internal capacity between the anode and grid of the valve itself. On the assumption that we are using a tuned circuit in the anode of the valve,

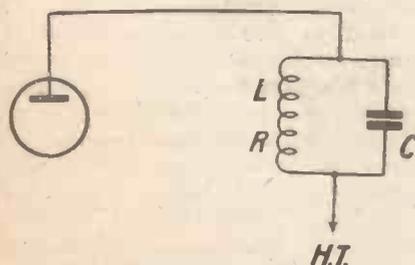


Fig. 1. Simple tuned anode circuit

that the amplification obtained from it depends upon the relative impedance of the external circuit and the internal resistance of the valve. When we apply voltages to the grid circuit, magnified voltages are set up in the anode circuit of the valve. Now the complete anode circuit is made up of the valve itself and the external circuit. Clearly, if we short-circuit the valve externally (as, for example, would be the case if we merely connected a high-tension battery between the anode and L.T.), all the voltage developed in the anode circuit would be wasted inside the valve.

In order to avail ourselves of this magnified voltage, we must arrange to have some of the impedance in the circuit present outside the valve, and it is such a logical step from this to see that the larger we make the external impedance, the greater the proportion of the total voltage which is developed externally to the valve. If we make the internal and external impedances equal, then we have half the voltage developed internally and half externally, giving us 50 per cent. efficiency. (This assumes that the two impedances are equal

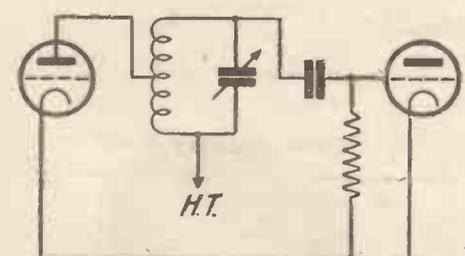


Fig. 2. A centre-tapped arrangement combines stability with amplification

however, it is possible to obtain a figure for the maximum amplification permissible with any given valve before instability occurs. While, perhaps, too much credence cannot be placed on such a figure, it does give us an indication as to whether we are likely to experience instability. By reference to the table at the end of this article, it will be seen that the maximum permissible amplification with the S610 is 90, so that we have exceeded this figure by a considerable margin and instability will be almost certain to occur.

By a simple process such as this, therefore, one can decide whether a circuit is likely to be stable or not. It may be found in actual practice that a circuit cannot be held down in use, despite the most careful precautions regarding screening, stray coupling, etc., and if a trial calculation shows that the amplification being developed is in excess of the maximum permissible value, then we know at once that no amount of precautions will make the circuit stable. We are obtaining too much amplification

(Continued on page 546)

TO Amateur Constructors and Wireless Enthusiasts

IMPORTANT

In presenting the new Triotron A.C. valves for your approval we feel we cannot do better than reproduce, for your information, the announcement we are inserting in the leading trade papers. We would draw your special attention to the last paragraph of this announcement.

A FEW STRAIGHT WORDS ABOUT INDIRECTLY HEATED A.C. VALVES

Theoretically it should be easier to make an efficient A.C. Valve than a good Dark Emitter. It is easy, for instance, to get Amplification, but in order to get music instead of noise, the emitting coating must have properties which depend on the most subtle research in Micro Chemistry.

The Manufacture of the coating embodied in Triotron A.C. Valves is the secret of a scientific Master Mind. It cannot be analysed, it cannot be imitated.

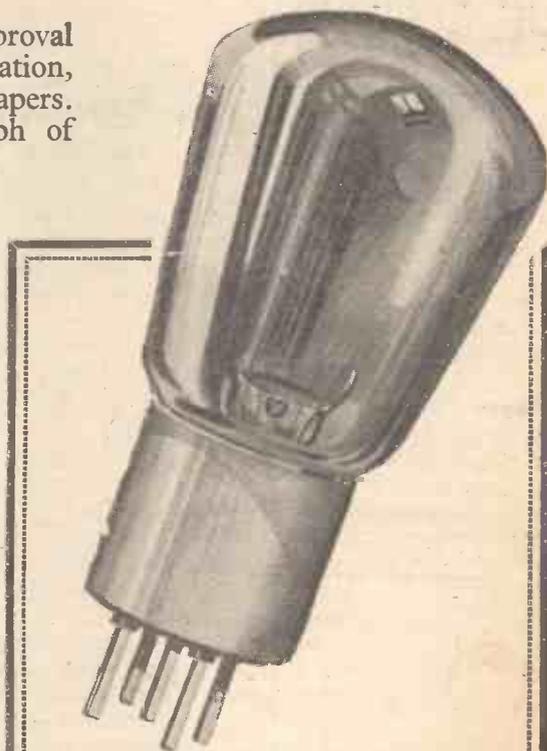
Remember: A.C. Valves work direct from the Power Supply. No amount of advertising, no amount of salesmanship can minimise the severity of this test and the drastic consequences of filament failure.

Do not experiment with your customers, give them the best that science has been able to produce.

Now Ready For Immediate Delivery

Indirectly Heated A.C. Valves			Rectifying Valves			
TYPES		RETAIL PRICE	TYPES		MAXIMUM D.C. OUTPUT	RETAIL PRICE
S.C.N.4	Screened Grid	18/6 ea.	G.A.24	Full Wave	60 m/a	12/6 ea.
S.N.4	Super Detector		G.N.24	Full Wave	30 m/a	10/6 "
	High Frequency	10/5 "				
A.N.4	General Purpose	10/- "	G.N.14	Half Wave	30 m/a	9/6 "
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Purpose	Resistance Coupling	General Purpose	Super Detector and H.F.	L.F. and Power
Filament	Standard A.C. Heaters			
Amplification Factor	45	28	22	8
Impedance Ohms	34,600	14,000	8,000	4,700

TRIOTRON

A.C. VALVES

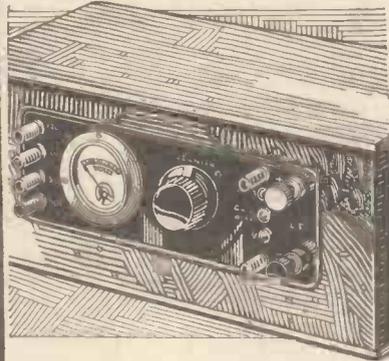
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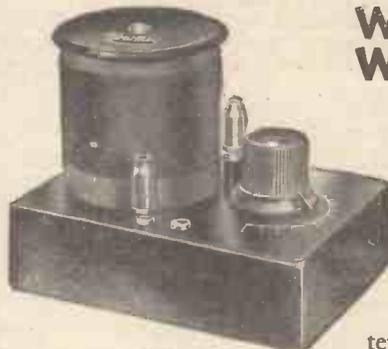
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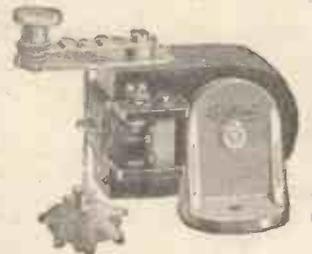
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On Your Wavelength!

5GB

IF you live in the London regional area and don't get Daventry as well as you used to some weeks ago, don't start tearing your hair or changing your valves or pulling your set to pieces, for there is probably nothing wrong. Quite a number of people don't seem to know that 5GB's aerial has been altered recently in order to provide better reception in his own area and smaller signal strength over the London regional area. In fact, in a lay paper I noticed the other day an answer to a correspondent who was greatly puzzled over 5GB's weakness. He was strongly recommended to overhaul his aerial and earth, to see that his batteries were up to snuff, and generally to "look to his set."

Don't Worry

But the pearl of greatest price was the remark that possibly one of the tuning condensers might be shorting at a point near the setting required for tuning in Daventry Junior. To show you what a difference there is in 5GB's present strength in some places and that which he used to have, let me tell you what happens to me. I am forty-five miles from Daventry as the crow flies. He used to be a good signal on a crystal set, and with anything worth calling a valve set intended for loud-speaker work the use of the volume control was generally necessary. Even on an indoor aerial, full loud-speaker volume on three valves was obtainable. To-day he is not receivable with a crystal, and four valves are needed for loud-speaker strength on an indoor aerial. On the outdoor aerial 5GB's strength is now just about the same as that of Langenberg. You will see, then, that there is no need to worry if your set is not bringing him in with his 1929 punch.

A Sidelight

An indication of the way in which the terrific power of Brookmans Park is adversely affecting the wireless trade—at any rate, in those parts of the London area which lie within twenty miles of the transmitter—came my way the other day during a talk with a retailer in a fairly large way of business. During last year he sold a great many sets whose makers stated that they would separate the two transmissions. Since there was no means then of making practical tests, he took their word for it and gave guarantees to his customers. He now finds himself faced with very big expenses for services which he feels bound to render, either free altogether or at a nominal charge. Many of these sets proved unequal to the task when the two stations came into full

operation, and he had to have a skilled man continually at work upon the apparatus in the houses of his customers. Many people won't have a wavetrap, because they don't like the complication of the extra control.

Much Extra Work

You may imagine, therefore, the amount of experimenting that has been required in the matter of shortening aerials, fitting series condensers, and in some cases erecting counterpoises instead of earth connections. Since no two cases are quite alike, an enormous amount of work, mainly unpaid, has been necessary. May I once again remind readers in places distant from London that the avowed object of the regional scheme is not to provide good reception at long ranges, but to furnish those living within its area with a first-rate and reliable service.

Exasperating

Curiously enough, one of the long-distance man's most difficult problems at the present time is to obtain up-to-date and accurate information about the doings of short-wave stations. Many of the particulars appearing in the published lists are wrong, there being many inaccuracies in the figures given for the power, wavelength, and transmission times of stations. This is a most exasperating business, for it renders the identification of stations most difficult. Here's the kind of thing that happens. You find on a certain wavelength, as shown by your calibration chart, what is undoubtedly an American station, for you can hear the words of the announcer, though he does not give the call-sign. Reference to a list of stations shows no American station anywhere near this wavelength. You may have to listen for a long time before you get the call-sign; and when it does come along the odds are that the only bit of fading which occurs happens just at that moment, or a morse signal starts up and blots out the whole thing. Again, if you hear a station at a certain time and upon a certain wavelength you imagine that you can identify it at once by turning up its transmission times. You can't, because many of the times given are quite wrong.

Can You Help?

I shall be more than grateful to enthusiastic short-wavers if they will let me have any particulars of wavelengths, power ratings, and transmission times that they pick up. Does anybody know whether it is a fact that W2XAF and W2XAD (the latter particularly) are using full power

only on occasions? I have heard that W2XAD is not working so regularly as he was and that it is exceptional for him to employ anything like full power. Any reports would be much appreciated, and I will pass on the data for the benefit of other readers.

The B.B.C. Crystal Complex

The B.B.C.'s policy of catering for the crystal user seems to have come unstuck rather badly with regard to Brookmans Park. All over the place I hear complaints that the programmes cannot be satisfactorily received on a crystal in the heart of London. The B.B.C. replies with its customary benign smile that lots of listeners in the country are now able to receive London on a crystal set. That may be so, but I should imagine that the number of dwellers in London rather exceeded those in the more remote country districts, so that the balance would be heavily against the new programme.

The difficulty is particularly troublesome with the 261-metre transmission, which is received at very weak strength, particularly on an indoor aerial. I was amazed the other day when I went to a flat in Kensington. The crystal set was of quite a good type, as I subsequently proved to my own satisfaction. I was not able to improve its performance very much, even by constructing a special circuit with Litz wire. Yet 261 metres could only be tuned in at a barely audible whisper. The result is that this listener, who has enjoyed wireless programmes for some years without any trouble, now has to go to the expense of a valve set in order to receive his local station.

The 261-metre Transmission

Talking about 261 metres, have you noticed how variable this transmission is between day-time and night-time? I was over at Elstree the other day discussing the point with Mr. Reyner, and he told me that the difference in strength even at his short-distance—only five miles or so—was quite noticeable. The transmission was weaker during the day-time than after dark. It seems incredible that there should be any difference in the transmission at this short distance, for the Heaviside layer has no time to come into operation at all. It may be that the B.B.C. do not radiate the full power during the day-time.

I wonder whether any other readers in London have experienced this difference. If so it would be very interesting to hear their views. Of course, at greater distances the variation is said to be very bad indeed, although I am told this is better now than it used to be. In the West and

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On Your Wavelength! (continued)

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North of England, however, the programme is practically incapable of being received owing to the very bad distance distortion and fadings which occur with the short wavelength.

Television Broadcast With Sound

The inaugural ceremony on Monday, March 31, when the B.B.C. twin wavelength station at Brookmans Park broadcast sound and vision simultaneously at 11 a.m., was undoubtedly a success. I had an opportunity of being an interested spectator at one of the receiving stations, and although there had been no dress rehearsal to allow the Baird Company's engineers to make any necessary adjustments to meet the new dual conditions, there was not a hitch anywhere.

Mannerisms Recognised

As was to be expected on such an occasion as this, opinions differed somewhat as to the quality of the results, but the concensus of opinion was that distinct progress has been made. The mannerisms of the stage artistes were particularly conspicuous and every detail was plainly recognisable to the whole of the watching and listening party. Naturally there was no trouble arising from lack of synchronisation between voice and lip movement because of their simultaneous transmission, and except on the top notes no interference of speech with the image could be detected. No doubt the slight interference that was noticed on these occasions as a small ripple across the viewing screen arose from microphonic valves and will be speedily rectified.

Image Colour

There was one point in which I was particularly interested during the course of the transmission and that was in the colour of the image. The room was semi-darkened, but instead of the characteristic orange-coloured neon glow which makes the images assume a similar colour, on this occasion they looked quite natural half-tones of black and white. On inquiring about this feature I had my attention drawn to the fact that the room illumination was produced by red lamps and this had completely nullified the "warm" glow of the neon and substituted the more pleasing black and white effect on the image screen. Undoubtedly this is a point that merits attention and will do much to remove the small objection that is sometimes levelled at television systems concerning the somewhat unnatural effects often produced by the neon colour until one has got thoroughly used to it.

Indoor Versus Outdoor

I have seen it stated categorically that one cannot expect such good results with an indoor aerial as with an outdoor wire.

Now, I have done quite a bit of experimenting with aerials of various kinds, and I should hesitate very much to endorse any such sweeping statement. In fact, I have come across numerous cases in which an indoor aerial gives all-round better results than one out of doors. Let us see, first of all, what there is to be said for and against the outdoor aerial. Against it we have its undoubted ugliness and the fact that it sometimes makes us do a bit of wondering when a thunderstorm occurs whilst we are away from home, and we can't feel quite sure whether we earthed the blessed thing or not before leaving. The outdoor aerial is undoubtedly a very efficient collector of oscillations; but, curiously enough, the more efficient you make it, the more apt is it to render reception difficult at times. What I mean is this. The higher the aerial, the smaller its capacity; and the better its insulation, the more liable is it to respond heartily to atmospherics, etc.

The Case for the Indoor Aerial

Now for the indoor contraption. The kind which I have generally found best consists of a single wire slung round three sides of a room a little below the ceiling. You don't get quite the same signal strength unless you add a high-frequency stage, but if you live in a swamp area you can certainly receive more stations, owing to the far higher selectivity. You have not the same worry when thunderstorms are about, you don't detract from the amenities of your house or garden, and you hear nothing like as much of sparks, atmospherics, and other interference. For these reasons I am strongly in favour of the indoor aerial, which is not half so inefficient as many would have us imagine. Actually, it will give a pretty good account of itself at moderate ranges with a crystal set.

Interesting Tests

Some time ago, when I was laid up in bed for some little time, I had some very interesting experiences with an indoor aerial of the kind mentioned. This was put up in my bedroom and a set containing one neutralised and very efficient H.F. stage, a grid-leak detector and a good low-frequency stage was installed beside my bed. Since the set had previously been used with an outdoor aerial, it required recalibrating; but once this had been done I found that practically all the Continental stations that had been heard with the outdoor aerial in use could still be picked

up. The only difference was that their strength was not so great. A second low-frequency stage would have brought all of them up to their previous strength. Now, these tests were made not during the winter, but in the month of August, when general signal strength is usually at its lowest. One night I couldn't sleep, so at about two o'clock in the morning I thought I would try round with the wireless set, using the medium-wave coils, to see if there was anything to hear. To my astonishment, I picked up WIOD, of Miami, in Florida, at once obtaining really good telephone reception. Thus encouraged, I persevered with my search, and was successful in hearing and identifying definitely by their call-signs KDKA, WGY, WBZ, and WJZ. Ever since that time I have had a strong affection for the indoor aerial, and I certainly prefer four valves with this kind of collector to three with the outdoor wire.

A Queer Happening

Sitting up with my short-wave set the other night, I was mystified by the occurrence of what was to me quite a new kind of noisiness. The set, I should explain, is a two-valver consisting of a Reinartz detector transformer-coupled to a pentode. For convenience in taking dial readings, I have on the table beside it a miniature desk lamp containing a six-volt bulb, which is lit by current from the filament accumulator. Every now and then the telephones produced a noise rather like the singing of a kettle or that made by a moving lift. It wasn't a carrier-wave squeak, for it happened with the set right out of oscillation and without my touching the controls. This queer sound was generally followed by an outburst of crackles. Since rapping the table sharply also produced crackles, it was clear that there was a loose connection somewhere.

—And the Reason

Well, I went over that set with the utmost care from end to end, and not a trace of looseness could I find in any single connection. Yet there undoubtedly was something, for the slightest movement of the table caused a fresh outburst of noisiness. For some time I was absolutely baffled. Then, quite by accident, I solved the mystery. The flash-lamp bulb in the desk lamp was not quite tightly screwed up in its holder. There had thus been fluctuations of current through it, though these were not sufficient to cause any noticeable wobbling of the light. They did, however, affect the current passing through the filament of the detector valve, since the two were supplied by parallel wiring from the same battery, and this was quite enough to produce the effects observed. Funny things do happen in wireless, don't they? THERMION.

LET "A.W." SOLVE
YOUR WIRELESS
PROBLEMS

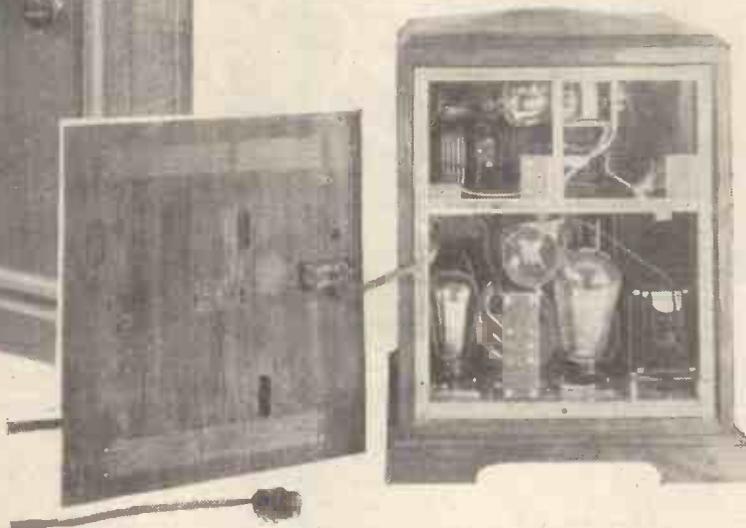
A PAGE FOR THE SET BUYER

POPULARISING MAINS SETS

Introducing the Ferranti Model 31, which "Set Tester" reviews in this article



Handsome in appearance, the Ferranti A.C. mains three-valver is sold by Ferranti Ltd. of Hollinwood, Lancs, for 25 guineas. Note the fuse arrangement in the lid



ranti set. The first thing that impressed me was its extraordinarily handsome appearance. The compactness and general neatness of the layout were also encouraging first impressions. It is easy to see inside the Ferranti set by removing the back.

A metal chassis, divided into two sections, accommodates the high-frequency components in the top half, and the mains equipment, detector, and low-frequency components in the lower half. I recognised several well-known Ferranti components. The tuning coils are extremely well made.

In taking the back off the set to look inside, I noted that fuses intercept the lead from the electric-light socket. In other words, the set is rendered in-operative when the back of the set is removed. I commend this Ferranti idea to other makers of all-electric sets.

Ferranti Ltd., describe their set thus: "A three-stage receiver incorporating a screened-grid high-frequency valve and capable of providing considerable volume of exceptional quality." I can say that this statement is more than justifiable.

My first test of the set was on an indoor aerial situated in south-west London. In under half an hour I tuned in fifteen stations on the medium waveband at full loud-speaker strength. The Ferranti set makes the most of its available valve stages. The log of stations mentioned is by no means exhaustive, as proved by a friend of mine who subsequently borrowed the set. I was able to get good separation between Milan and Oslo and between Frankfurt and Toulouse, four of the stations tuned in. Those who do a lot of Continental reception will appreciate that, for a three-valve set, this indicates good selectivity. I am not within the Brookmans Park "wipe-out" area, so no difficulty was found in cutting out both Regional and National programmes in favour of stations on near-by wavelengths.

A good point is the illumination of the two tuning scales. They certainly are an aid in logging stations. Reaction is surprisingly smooth. It shows what can be done with a swinging coil.

The Ferranti Model 31 functions well as a gramophone amplifier.

SOME set buyers are still scared of mains sets. I often read letters from readers seeking reassurance as to the safety of these sets. I reply that, if made by a firm of repute, mains sets are just as safe to use as a vacuum cleaner, electric iron, or other domestic appliance worked from the mains. Mains-operated sets are a good test of the set-makers' calibre. For this reason, only first-class firms are likely to add to their reputation by entering the "all-electric" set market.

Most of us know the name Ferranti in connection with such components as inter-valve transformers and allied accessories. But, until recently, the set buyer has not had an opportunity to try this firm's mettle. Now, with the introduction of their Model 31, Ferranti Ltd. must be ranked with the very best set makers in this country.

Technical Details

Here is some technical information about the set. It has three stages: a screened-grid valve coupled by a high-frequency transformer to a grid-leak detector, connected in turn to the output valve by means of the new Ferranti 7 to 1 audio transformer. Because of this high-ratio transformer, the output valve, which is a 6-volt super-power type, always overloads before the detector, and the tendency to overload the detector is minimised.

Reaction is controlled by a swinging coil, a method not now in general use in amateur-built sets. The idea of using this form of reaction is to provide for a reversal,

whereby tuning can be flattened to prevent a deterioration of quality. A separate volume control operates the screened-grid valve. The super-power output valve feeds the loud-speaker through a double-ratio output transformer.

The mains equipment of the Ferranti set is interesting. The screened-grid and detector valves have indirectly heated cathodes. The output power valve is heated with raw A.C., as is the rectifier valve for the high-tension supply. An interesting inclusion is a separate metal rectifier for grid bias. This avoids running the rectifying valve at an extra high voltage, as is often done when grid bias is tapped off the main output.

In accordance with Ferranti practice, special filter circuits are incorporated to prevent interaction between the stages. There is certainly no trace of mains hum when the set is in action.

I am often asked about the cost of running sets from the mains. Ferranti Ltd. supply the essential information relating to their model. The energy consumption is approximately 50 watts, which is rather less than that required by the average household electric lamp.

Built to Last

The makers have not forgotten the service aspect of set making. They declare that the only parts of the Ferranti Model 31 liable to deterioration are the valves, which it is conservatively estimated give 1,000 hours' service.

Now for my own experience of the Fer-

RECORDS FOR "NOISES OFF"



How the B.B.C. obtained "Radio Drama" effects in London's Underground.



Two unusual scenes in London's Underground. (Left). A talkie film "shot" and (right) the gramophone recording apparatus

THE Underground Railways of London have now been recorded by the B.B.C., the talkie film producers, and the gramophone recorders. Some time ago the B.B.C. linked organisation with a well-known gramophone company and delved into the depths of the Underground in order to make records for "noises off" to be heard later in radio drama.

The number of effects which the Effects Department at Savoy Hill is called upon to produce by means of the weird and wonderful wind machine, glass paper, and so on is being decreased, and gramophone records are taking their place. This has many advantages, because it is easier to broadcast noises (say, for the effects of a broadcast play) from a gramophone record than to produce them on the spot, which latter course, seeing that the noises have so often to be duplicated, means a waste of time and labour.

So when the B.B.C. decided that it wanted noises from the bowels of the earth it took the easier course of having a permanent record made of the real thing. For a few days some of the engineers of the Outside Broadcast Department of the B.B.C. and the gramophone concern monopolised special trains, lifts, and escalators at Belsize Park, Oxford Circus, and other of the larger stations.

Practically every noise connected with the Underground was put on record—the clicking of lift gates, the moaning of the lifts going up and coming down, the thumping of the escalators, the roaring of the trains, and the general noise of the bustling passengers at rush hours. Most of the "permanent noises," such as those made by the lifts, escalators, and so on, were recorded in the early hours of the morning, and a disused lift at Oxford Circus housed the recording apparatus for some time.

Crowd noises had, of course, to be captured at the busy times of the day. Nor

was this any too easy, for a microphone, unfortunately, does not listen in the same way as the human ear. All kinds of echoes in places such as the Underground, which the ear tones down, are unnaturally accentuated by the "mikes." The only way to cure this was—as was expected—by using two or three microphones judiciously placed, and balancing up the output from each before recording.

Another snag encountered was the liability of the microphone to be affected more by mechanical vibration than by the sound waves it was desired to capture. With the special type of microphones used by the gramophone people, this trouble was not serious, but still it had to be watched.

Many Difficulties

A long time was spent in getting realistic microphone impressions of an Underground train starting up on full load, of the noise caused by its cargo of conversing passengers and of the grinding of the brakes as the train came to a standstill. Some of the scraps of noise picked up in this way were certainly not suitable for permanent recording! This was more especially so because none of the passengers was informed that a stunt was on hand.

When you consider that it is almost impossible to work a portable set in the London Underground, owing to the electrical interference picked up by the low-frequency stages of the amplifier, it is all the more to the credit of the B.B.C. and gramophone engineers that such good radio noises were "bagged."

Without proper L.F. shielding and fully protected leads from the microphones to the sound-recording apparatus and from the amplifiers to the accumulator banks, hum would have been picked up from

the Underground Railway power supply. Balanced-armature electro-mechanical gramophone-record cutters are sensitive things, and to operate them, and their associated multi-valve amplifiers, in the intense interference fields present within a few feet of an electric-train power supply takes some doing!

Filming the Underground

A somewhat different kind of underground recording made a busy picture at Piccadilly Circus station on an early hour of a recent morning, when a number of scenes were shot in connection with a new British film depicting night life in London. Part of the filming was done at a busier hour of the day, in order to get an impression of the crowds.

The trouble in the Underground filming was that special lighting had to be arranged to illuminate the interior of the station even more strongly than it normally is. The ordinary arcs, or "suns," used in silent film work were not suitable because of the electrical noise and acoustic hissing caused by the carbons. In order to prevent spluttering noises being amplified into superfluous microphone sounds, 1,500-watt Osram batterns were used all round the film set. All manner of troubles had to be contended with, for the echo period of a station shaped such as Piccadilly Circus is awkward to deal with. Both light and sound reflection had to be prevented; and all within a few hours so that the normal railway routine should not be disturbed and the talkie cameras cleared away before the daylight came and the early-morning travellers crowded the trains.

KENNETH ULLYETT.

SYDNEY MOSELEY'S WEEKLY PROGRAMME CRITICISM

Sketch
Points
Television
Trans-
missions



A Censored
Song
Leonard
Henry's
Stunt

OWING to pressure of space—that old complaint!—I was unable to pay my meed of tribute to the organiser of the concert in aid of the Wireless for the Blind Fund which was recently relayed from the Royal Albert Hall. In talent and in the selection of a programme it was first class.

Lord Hewart's talk was a complete success. And if it were not, do you think it would be discreet to say so? You never know, you know! The Lord Chief, however, is severe on the bench, but otherwise kind. He once permitted me to use part of his speech as an introduction to a book of mine. But the thing got lost on the way to the publishers.

Jolly music, *The Bartered Bride*, but what the story was about—well, does it matter, anyway?

Filson Young was the narrator. Filson, I believe, is one of the secret critics employed by the B.B.C. to listen-in. One of these days we must look into this "intreeping" state of affairs.

Number 4 of the De Courville's series was decidedly better. The *compère* was sffeets ahead of the gentleman whom I recently had occasion to criticise. But I beg him again to refrain from jokes about ladies.

"The lady in question—I mean, a questionable lady," uttered in reference to one of the artistes, was feeble and in as bad taste as that referring to American wives. Otherwise he was a hit.

The Cockney sketches are good—not too much 'Appy 'Ampstead, and the sob stuff not overdone.

The sketch, *The Ford Car*, was obviously spoilt by giving the plot—threadbare as it was—away in the title.

I didn't hear *Brigade Exchange*, hoping it would be repeated from another station, as is usual with productions of this sort. I hear, however, that it was one of the best of its kind, the effects being very satisfactory and the whole thing being a triumph of realism.

One friend, however, declares that in parts the play was weak and the effects a trifle overdone.

A word, of course, about the television

broadcast. I was in the studio at Long Acre, and can only say that the interest aroused by the transmission was phenomenal. Any of my readers who may want to know why I censored Cicely Courtneidge's song, "I'm in Love with You," as being unsuitable for broadcasting should read the words. Twaddle, I called it, and I adhere to this. After all, listeners are entitled to be treated as intelligent beings.

May I suggest that shrieking of females be avoided as much as possible? A



A Slade impression of Sir Henry Wood

woman's cry, resounding through one's house is rather a terrifying experience. All right for the melodramatic stage.

And who was the kind fellow artiste in the same play, *Harking Back*, who quoted "Amazingly amazing, as Owen Nares would say."

There is never any charge for this sort of thing.

Readers who listened to the Symphony Concert instead of going along to the Queen's Hall missed a sight. Conchita Supervia, the Spanish contralto, toying with a rose, and Harriet Cohen, ever so

tall, jet black hair, and dressed in early something style. But perhaps real music-lovers prefer to listen, and not be distracted by such sights.

Dennis Noble certainly sang the popular "The Town's Factotum" with more spirit than is usually the case with British singers in attempting Italian songs. Good for Dennis!

We don't need to go abroad for music. Take one Saturday's programme from London Regional:—

- 3.30. Gershom Parkington Quintet.
- 5.15. Dance music.
- 6.45. J. H. Squire Celeste Octet.
- 7.30. A recital.

9.5. Concert by the Midland Regional Augmented Orchestra.

And all good stuff, too! For the music-lover, the finest day's feast imaginable.

A correspondent has written to me about Leonard Henry's new stunt, which, "although rather crude, should be a first-class turn by itself if enlarged and carefully produced. It was supposed to be the history of his life. Leonard recited some very comic lines, comic effects illustrated some of his words, and the orchestra played 'Hearts and Flowers.' Couldn't we hear this again, carefully edited and with more in it (and the soft pedal on, please, Mr. Payne!)?"

After a slight lapse, during which she put over some material which was scarcely justified, our Mabel seems to have got into her stride again. I had a good laugh at her sketch, *Getting Bungo Land*. The material was good and she and Michael Hogan were their old selves once more.

By order of the Hungarian Minister of Interior, the national police headquarters in Budapest is to be equipped with a powerful radio transmitter in the near future, and the 250 most important police and gendarmerie posts in various parts of the country are to be supplied with receiving sets.

Dr. C. B. Jolliffe, recently appointed chief engineer of the Federal Radio Commission in America, is the first to hold that position as a regular employee. He is to receive a salary of £2,000 a year.

RELAYING B.B.C. PROGRAMMES UNDER THE IRISH SEA

THE B.B.C. is now using a new route for relays between England and Ireland. It has been in service for relays to the Belfast station for some time, and has proved superior to the old route via Glasgow and a submarine cable from the Scottish coast; it was first used for an important relay to England on the occasion of the recent St. Patrick's Day programme.

The new submarine cable, which was laid by the Post Office last year, runs from Blackpool to Port Erin, in the Isle of Man, and then to Ballyhornan, a small fishing village on the Irish coast. When the cable was laid, the fact that it would be used by the B.B.C. for relaying radio programmes was specially considered by the cable engineers.

This new link not only provides a better route to Ireland, but it places the Isle of Man, which has many interesting possibilities for radio programmes, at the disposal of the B.B.C.

The new cable will be used to broadcast the ancient Tynwald ceremony—the promulgation of the Manx laws on Tynwald Hill—on July 5, and a relay of a running

folk-lore, and the music of the Isle of Man will also be brought to enrich British programmes over this cable on the bed of the Irish Sea; and the same, of course, applies in an even greater degree with regard to Ireland, as was indicated by the St. Patrick's Day programme.



How B.B.C. stations are connected to Ireland and the Isle of Man, showing the further connections to Armagh and Dublin used on St. Patrick's Day

Other Extensions

Armagh Cathedral, the Abbey Theatre at Dublin, and the Belfast studio were the sources of this programme. They were linked up in turn to a land line running to the Irish end of the submarine cable at Ballyhornan. At the other end, at Blackpool, the cable was connected to a land line running to Manchester. From here the programme was distributed over a network of land lines, as shown in the map, stations in the south of England

and the Midlands, and Wales receiving it via Leeds and London, and Scottish stations via Leeds and Glasgow. L. W. A. B.

PLUS CA CHANGE —

Jottings from my Log
By J. COOTE

IN Holland it is not the Postmaster-General, but the Minister of Waterways, who controls broadcasting activities in that country. Why it should come under this particular State Department nobody seems to know. However, the *Waterstaat* has issued an as-you-were order to Hilversum and Huizen, and from April 6 they went back, for another three months, to their original positions in the ether.

So from that date our excellent AVRO transmissions and our equally pleasant VARA broadcasts will be heard alternately on 298 and 1,071 metres. The sacred services and concerts and the interminable Dutch sermons will be found almost at the top of the wave band; the last station but one, as it were, for those who can hear Kovno. As a matter of fact, Lithuania does not conclude the medium broadcasting band, as for some weeks transmissions have been made by Ankara (Angora) on 1,961 metres; but to date I have not picked up a whisper from that quarter. For some reason or other, neither of the Turkish broadcasters appears in the logs which are sometimes shown to me by enthusiastic ether searchers.

A few nights ago I was seriously perturbed to find that my receiver was behaving in a strange manner; strange, in the sense that at certain points on the condenser I was finding transmissions which

had no business to be there at all! One of these, for instance, was a Swedish relay of Stockholm sitting on top of Turin, and for some time I doubted whether I could believe my ears. However, there was—and is—no mistake about it; Falun, which was working on 332 metres for some time, has been working on about 298.8 metres, or just above where Hilversum is in the day time.

Then, again, on odd nights you will find Radio Maroc now above, now below Dublin—a move which causes some trouble in that over-populated portion of the wave band. French stations, also, of late have

been responsible for many heterodynes, and Radio Alger a week ago had departed so much from the straight path that it could be logged definitely below London Regional.

The change over to British Summer Time this year takes place on the night of Saturday-Sunday, April 12-13, and from that moment we shall coincide with Central European Time.

I understand that France, Belgium, and Spain will go over with us, but nothing yet has been decided as regards Holland. In that case, if the move is not carried out, B.S.T. will be forty minutes in advance of Amsterdam time, and this allowance must be made for the Hilversum concerts.

Both Algiers and Rabat (Morocco) will retain G.M.T., so if you want their 8 p.m. concert you will search for it one hour later.

The advance of one hour on this side of the Channel presents a slight advantage from the listeners' point of view, inasmuch as certain European stations do not close until 12.30 a.m., thus allowing a short hearing after the British announcers have bid us all good night.

The growth of the radio industry in America is shown in the fact that in 1920 there were only 60,000 listeners. At present there are more than 50,000,000.

WIRELESS WIT

"The Nutcracker Suite," by Tchaikovsky, was recently broadcast by the *Cerddorfa Genelaethol Cymru*. Nutcracker, or jawcracker!

Transmissions to the schools by Sir WALTER Davies had recently appeared in the B.B.C. programmes. Why does Sir W alter his name in this way?

Advertised for the Children's Hour: "The Best Game the Fairies Play" (Johnson Boosey). Dear, dear; we are surprised!

THERMION SAYS

"We must have Brighter Sunday Programmes"



THERE is no question that the Sunday programmes are by far the worst of those provided in the course of the week. To my mind, they should be the best of all.

This is not to say that I would like to see Sunday broadcasting devoted to jazz, to vaudeville, or to entertainments. Most emphatically I would not. Nor am I amongst those who would like to see religious services withdrawn from the broadcast programmes. These make a very wide and deep appeal to listeners, and if they were no longer given many would feel the loss.

Holy Day and Holiday

Surely, though, it is possible to make the Sunday programmes bright and entertaining without rendering them inappropriate to the day. Few people nowadays maintain that gloom is the proper atmosphere for Sunday. Besides being a *holy day*, it is also a *holiday*, a time when man rests after one week's labours and prepares himself for the next.

In the old days, I have often said, in answer to criticisms of the B.B.C. programmes, that it was obviously impossible for any one broadcast to please all tastes. But now that the regional scheme is under way, and we have already twin transmitters at Brookmans Park and at Daventry, the programme builder has a far better chance of appealing to widely different tastes. Is he making use of that opportunity? Certainly not upon Sundays. Too often fare suitable for only one set of listeners is given by both National and Regional transmitters.

Before me as I write I have the programmes for a recent Sunday. With the exception of time and weather at 10.30 a.m. from 5XX, there was no transmission of any kind until three o'clock in the afternoon. From that time until five o'clock the National transmitters relayed a concert from the Albert Hall, which was given also by the majority of the local stations. The London and Midland regional trans-

mitters did not begin operations until 3.30 p.m. Both then gave the same programme—a band concert with two vocalists.

So far there is, perhaps, not very much to complain about, but we come now to a period of four hours and five minutes in which one's only choice is between items of a religious nature or nothing at all. Between 5 and 6.15 p.m. the National programme included a children's service, Bach's Church Cantata, and a Bible reading. These stations then closed down until 7.55 p.m. From 5 to 5.30 p.m. both the Midland and London regionals sent out a talk upon religion. Then both closed down for three and a quarter hours until 8.45 p.m. At this time all stations, whether Regional or National, sent out a charitable appeal, followed by weather and news. Not until 9.5 p.m. was there an entertainment programme from any station.

And these Sunday programmes are typical. Criticism which is merely destructive is of no value, for it is no use pulling things to pieces unless you can suggest a way of putting them together again in an improved form. I would not, therefore, have undertaken the task of "going for" the Sunday programmes unless I had some suggestions to make for their improvement.

Some Suggestions

First of all, I think that church services, Bible readings, talks on religious topics, and charitable appeals should be sent out upon the regional wavelengths only. The

National transmitters should send out simultaneously programmes of good music—by good music I do not mean dull music—with perhaps very occasional talks by people who really can talk upon subjects that really are interesting. If there are to be Sunday topical talkers they should be the stars of the whole week. It is only right that this should be so, for a far bigger audience is available upon Sunday than upon any other day.

On whatever wavelengths the evening church service is given, it should take place, I feel, at half-past six, and not at eight o'clock. My reason for urging this reform is twofold. The only people who have any real reason for wishing to hear a service without going to church are those who are prevented by age, infirmity, or some other similar cause from leaving their houses. Old people and invalids find eight o'clock too late an hour.

Earlier Entertainment

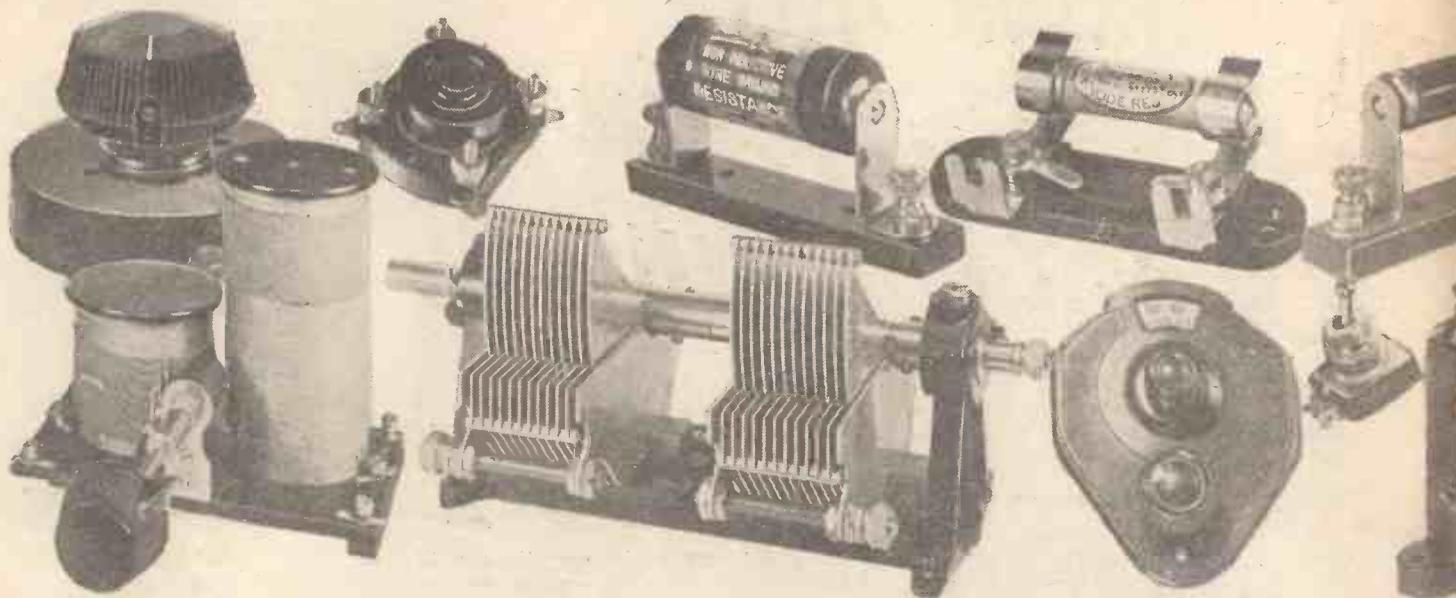
The man or woman who has been to evening service would like to listen to good music during the evening. They do not want to wait until 9.5 p.m. for the programme to begin. In many cases the necessity for early rising on Monday morning means that little or no entertainment can be received by wireless upon Sunday night as things are at present. With the church service starting at half-past six, the evening programme could begin at eight o'clock.

And here is another point. I cannot see any necessity for sending out weather and news upon both Regional and National wavelengths. The general news should be sent from the National transmitters, whilst Regional news—if anybody really wants Regional news—might occupy five minutes of regional programme time.

The B.B.C. has a big opportunity now of making Sunday the best wireless day of the week for listeners of all shades of opinion. Whether it will take that opportunity time alone can show.

EASTER HOLIDAYS

Will readers kindly note that owing to the Easter Holidays the next issue of "Amateur Wireless" dated April 19, will be on sale on Wednesday, April 16, instead of Thursday as usual.



A Super Set with band-pass aerial circuit filter, two screen-grid stages, a detector, two stages of low-frequency magnification, and high- and low-frequency volume controls

The JAMES 'QU

IN most receivers a plain aerial circuit is used, consisting of a tuned coil with a tap for the aerial or a separate primary winding. This circuit may be made fairly sharp, or it may tune broadly according to the actual parts used.

In the case of a broadly-tuned circuit,

connected across the grid and filament of the first valve. It showed that there was no clear space between the two Brookmans stations. There were, of course, two points where the maximum signals were obtained, but the two stations could not be tuned out. One could not be received, on the volt-

meter, clear of the other. Therefore, at all points between the correct tuning points of these two stations, both were setting up voltages across the grid and filament of the first valve.

The set could be tuned, however, to a station between the two

In order to avoid this difficulty in regard both to tuning and quality, it is essential to provide a good filter between the aerial and the grid of the first valve. In my sets I have usually fitted a transformer tuning fairly sharply, and either provide a grid-bias cell for the first valve, or fit a filament resistance to the negative side of the valve.

The results are, therefore, satisfactory having regard to the three valve arrangements used. But with a five-valve set of considerable power and intended for good



The "James 'Quality' Five" is of excellent appearance and, despite the number of controls on the panel, is quite easy to tune

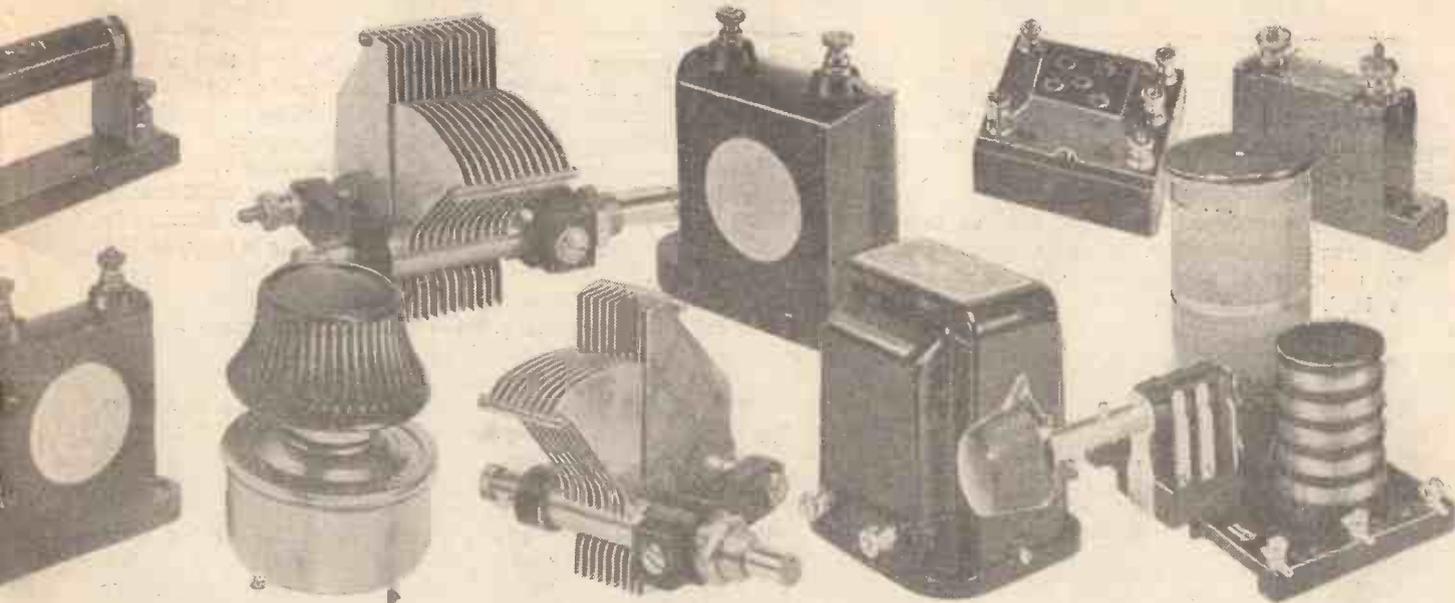
the first valve has passed to it, in all probability, an interfering signal as well as the desired one. This interfering signal is, probably, tuned out by the next tuned circuit, but my point is that the first valve is dealing with unnecessary signals

To illustrate this point I will refer to a valve-voltmeter test on a popular three-valve set having an H.F. stage and, therefore, two tuned circuits. The voltmeter was

Brookmans and heard free from interference by careful operating. This shows that the coupling between the H.F. and detector valves was adding to the selectivity of the set, as would be expected. My point is that the first valve, having to deal with interfering signals as well as the desired one, showed signs of overloading. Therefore, the signal is distorted before it reaches the detector.

COMPONENTS REQUIRED FOR

- Ebonite panel, 24 in. by 8 in. (Becol, Lissen, Trolitax).
- Baseboard, 24 in. by 12 in. (Pickett, Camco).
- .005-mfd. twin-gang variable condenser with special bracket (Formo, Utility).
- Two .0005-mfd. variable condensers (Formo, J.B., Lissen, Igranic, Lotus, Utility, Burton, Polar, Ready-Radio).
- .0003-mfd. variable condenser (Formo, Lissen, J.B., Igranic, Lotus, Utility, Burton, Polar, Ready-Radio).
- Two 1030 Binowave coils, two type C and one type E aerial circuit filter (Wearite).
- Variable resistance, 100 ohms to 5 megohms (Clarostat Standard, Regenstat, Volustat).
- 7-ohm rheostat (Varley, Lissen, Wearite).
- Filament switch (Igranic Midget, Lissen, Burton, Benjamin).
- Panel brackets (Keystone, Bulgin, Ready-Radio, Lissen).
- Two vertical valve-holders (Junit, W.B., Parex).
- Three anti-microphonic valve-holders (Benjamin, Lotus, W.B., Igranic, Formo, Brownie, Trix).
- .005-mfd. fixed condenser (Dubilier, T.C.C., Lissen, Graham-Farish, Igranic, Watmel, Atlas).
- Two .0001-mfd. fixed condensers (Dubilier, T.C.C., Lissen, Graham-Farish, Watmel, Igranic, Atlas).
- Four 1-mfd. fixed condensers (Lissen, T.C.C., Dubilier).
- 2-mfd. fixed condenser (Lissen, T.C.C., Dubilier).



QUALITY FIVE

The pictures above show the major components. Results to be obtained are splendid—quality, sensitivity and selectivity are guaranteed

quality of reproduction, such a simple circuit taken in association with other factors is not the best. I therefore use a filter in this set.

It has a band-pass characteristic. That is, its tuning curve, as previously explained, is fairly square topped with the result it gives the impression of tuning very sharply, whilst not cutting the side-bands. An improvement in selectivity and tone is, therefore, effected by the use of this filter.

It actually comprises a pair of medium-wave coils and a long-wave transformer

fitted on a single base, with a switch. A two-gang .0005-microfarad tuning condenser is used.

Tuning Arrangements

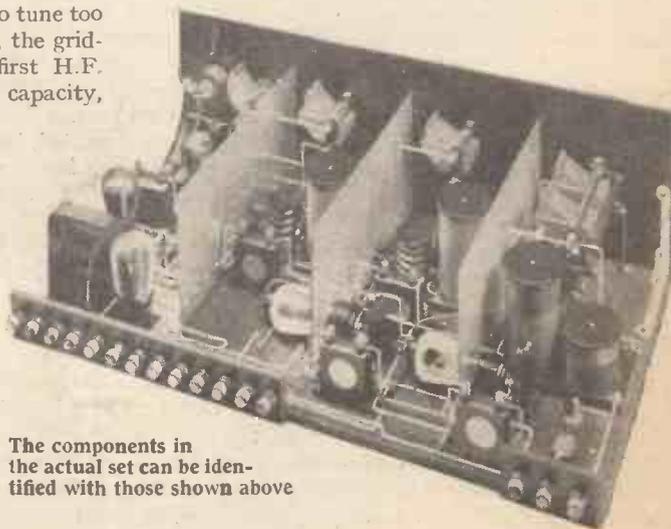
Now the two circuits must be arranged to tune together, and as the aerial is connected to one of the coils, this circuit may be expected to tune too high. Actually, however, the grid-filament circuit of the first H.F. valve has considerable capacity, with the result that when a small aerial is used the two circuits will gang nicely

When the aerial has a large capacity, the two circuits are out of tune and an adjustable condenser of the pre-set type must be used in the aerial circuit. One is, therefore, fitted in the set.

When first setting the aerial filter, this pre-set condenser is adjusted until the circuit tunes properly, and then it is left.

Following the aerial circuit filter are the two H.F. stages, having type C Binowave coils. These coils have a tapped primary and a user may, therefore, adjust the primaries to suit the particular shielded valves employed.

I have not fitted grid-bias cells to the shielded valves because my experience is that some of these will not work properly with it. Their impedance increases so greatly with negative bias of 1.5 volts, that magnification is reduced. Besides, the selectivity is ample, owing to the aerial



The components in the actual set can be identified with those shown above

filter, as well as the two inter-valve tuned circuits.

Actually a filament resistance is joined to the two H.F. valves as an H.F. volume control, and this automatically provides bias for strong signals.

In the detector circuit a .0001-microfarad

THE "JAMES 'QUALITY' FIVE"

Four 600-ohms wire-wound resistances with holders (Ready-Radio, Wearite).

One 30,000-ohms and one 100,000-ohms wire-wound resistances with holders (Ready-Radio, Lissen, Varley, Igranic, Ferranti, Bulgin, Graham-Farish, Dubilier).

1-megohm resistance (Lissen, Dubilier, Ediswan, Watmel, Graham-Farish).

2-megohm resistance (Lissen, Dubilier, Ediswan, Watmel, Graham-Farish).

.01-megohm resistance (Lissen, Ediswan, Watmel, Graham-Farish).

Two grid-leak holders (Lissen combinator).

Low-frequency transformer (Lissen, Ferranti, Varley, Lewcos, Igranic, Marconiphone).

Three partition screens, 10 in. by 6 in. (two with holes for screened-grid valve, one plain), (Ready-Radio, Parex, Keystone).

Pre-set condenser .0003-.00025 micro-microfarads (Formo type J, Sovereign).

Three slow-motion dials (Brownie, Lotus, Igranic).

Two ebonite strips, one 12 in. by 2 in. and the other 3½ in. by 7 in. (Becol).

Sixteen terminals marked: Aerial 1, Aerial 2, Earth, H.T.—, H.T.+1, H.T.+2, H.T.+3, H.T.+4, H.T.+5, L.S.—, L.S.—, G.B.—, G.B.—1, G.B.—2, L.T.—, L.T.—, L.T.—.

Connecting wire (Glazite).

One yard of thin flex (Lewcoflex)

“THE JAMES ‘QUALITY’ FIVE” (Continued from preceding page)

fixed condenser and a 1-megohm grid leak are used. This combination, with the leak taken to positive L.T., is such that distortion is quite negligible up to the overloading point, which is well beyond that required.

The detector has a resistance-capacity coupling with a motor-boat stopper. There is also a grid resistance of 100,000 ohms, which stops H.F. currents entering the L.F. amplifier. The whole detector stage is so arranged that distortion is negligible.

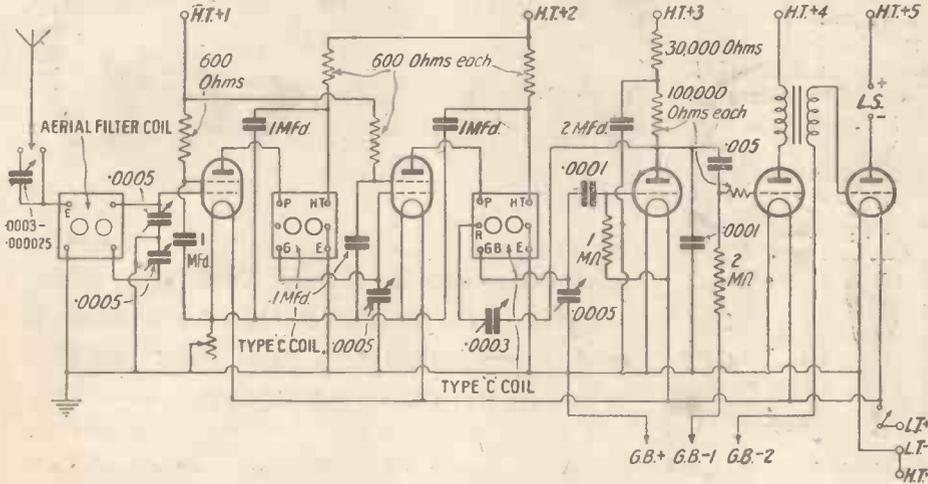
Now, the amount of the high-frequency magnification obtained depends upon the design of the high-frequency transformers, as well as upon the valves used. Shielding is employed for the purpose of reducing to a negligible amount the inter-circuit capacities, as this affects stability. Further, stopping resistances and by-pass condensers are used in each shield and anode circuit to prevent high-frequency currents from passing to the H.T. supply. The coils, too, are wound in the astatic style, excepting the

The selectivity is so good that a large number of stations are received in daylight. Testing from 1 to 2 p.m., for example, five long-wave stations are regularly received without reaction and with the volume control partly in. This is with an aerial having 60 ft. of wire and an earth wire attached to an earth tube. The tuning is easy, as the stages tune together, and, taken by themselves, the inter-valve circuits are not sharp. Collectively, they provide sharp tuning, it being possible to receive a number of stations between the two Brookmans, for example, at a place only a few miles away. I will give a tuning chart in a future issue.

Many Fine Features

I have heard many stations with this set that cannot be brought in by forcing “Everybody’s Three” or the “Brookman’s Three,” both sets built in large numbers and giving every satisfaction. The second H.F. stage makes an amount of difference to the sensitivity of the set, whilst the second L.F. valve adds power.

Two volume controls are ideal, as one is able to make the most of the selectivity or magnification as desired. Thus the local station can be brought in at suitable volume by operating both controls, whilst the distant stations can be dealt with to obtain clear reception. By turning down the H.F. control the selectivity is, of course, improved for the more difficult cases. Full constructional details will be given next week.



All the latest principles are embodied in the “Quality Five”—a real “super” set

There is plenty of bass response and the higher notes are not cut down owing to the relative values of the resistances and condensers.

Following the detector is a transformer-coupled stage, and here again, with a valve of moderate impedance, the response is good.

No output filter is fitted, as readers who will make the set no doubt have a filter or transformer of the right type for their loud-speaker by them.

The L.F. Control

The circuit shows the connections of a low-frequency volume control comprising an adjustable resistance connected across the primary of the low-frequency transformer. This control is a very useful one, as with two stages there is a marked tendency for the last valve to overload with all except the more distant stations.

No gramophone connections are indicated, but I intend to show how a pick-up can be joined to the first L.F. valve.

Some may prefer a push-pull output stage to the single valve shown. This, too, is easily arranged.

Separate H.T. terminals are provided for the convenience of those who will use a mains unit, and the grid-bias connections are also taken to terminals. Here, again, the reader will be able to fit the grid-bias battery inside the set if desired and to dispense with the terminals.

aerial filter, and they do not couple.

Thus the set is quite stable and great magnification is obtained.

The illustration shows the front of the set. There are the three tuning condensers, with the dual-wave coil switches below them. On the right-hand side of the panel are the H.F. and L.F. volume controls and the filament switch. The reaction condenser is also fitted here.

No space is wasted, but yet the parts are not put so close together as to reduce the efficiency of the set. Special valves are not needed, but needless to say the amount of the volume to be obtained is decided very largely by the size of the output valve and

the amount of the high-tension. With only 120 volts, the power is limited. I prefer 160 volts or, say, three super-power batteries of 60 volts each. These should last six months, but it would naturally be better to employ a mains unit if possible. It is the last valve that has to drive the loud-speaker, and one must remember that if a 2-volt power valve of about 5000 ohms is used, with a grid-bias of -7.5 volts and a high tension of 120, the power to be obtained is limited. This type of valve is all very well in three-valve sets, but it does not do justice to a powerful five-valve receiver.

PHASE-RELATION IN RADIATION

IN a transmitting aerial, the electro-magnetic and electrostatic fields are definitely out of phase with each other. A period of current flows with its associated magnetic field, is followed by a moment of quiescence, when the aerial is fully charged and the ether is the seat of an electrostatic field. A reverse current-flow then sets in, during which the static field is again replaced by a magnetic field, and so the process goes on.

According to Sir Oliver Lodge, this out-of-phase condition of the two fields persists in the radiated wave for a short distance from the aerial. In some mysterious fashion, however, once the wave is established, both the magnetic and electric components fall into phase with each other and thereafter maintain this relation.

M. A. L.

Radio station WRVA (Richmond, Va.) has applied to the Federal Radio Commission for permission to install new equipment capable of broadcasting with 50 kilowatts power. The station at present uses 5 kilowatts.

THE WIRING DIAGRAM WILL BE PUBLISHED IN NEXT WEEK'S ISSUE

The SECRET PROCESS

that puts power into your set!



DIRECT FROM FACTORY TO DEALERS SHOPS

every Lissen Battery is fresh when you get it!

There is a secret process and a new chemical combination used only in the Lissen Battery which puts new power into your radio set. It gives to your reproduction of dance music a new liveliness, makes speech distinct, song clear and true.

The current of a Lissen Battery flows smoothly, steadily, sustainedly throughout the longest programme. The large cells have a great oxygen content which gives the battery long life and produces all the time pure power, with never a trace of ripple in it, never a sign of hum.

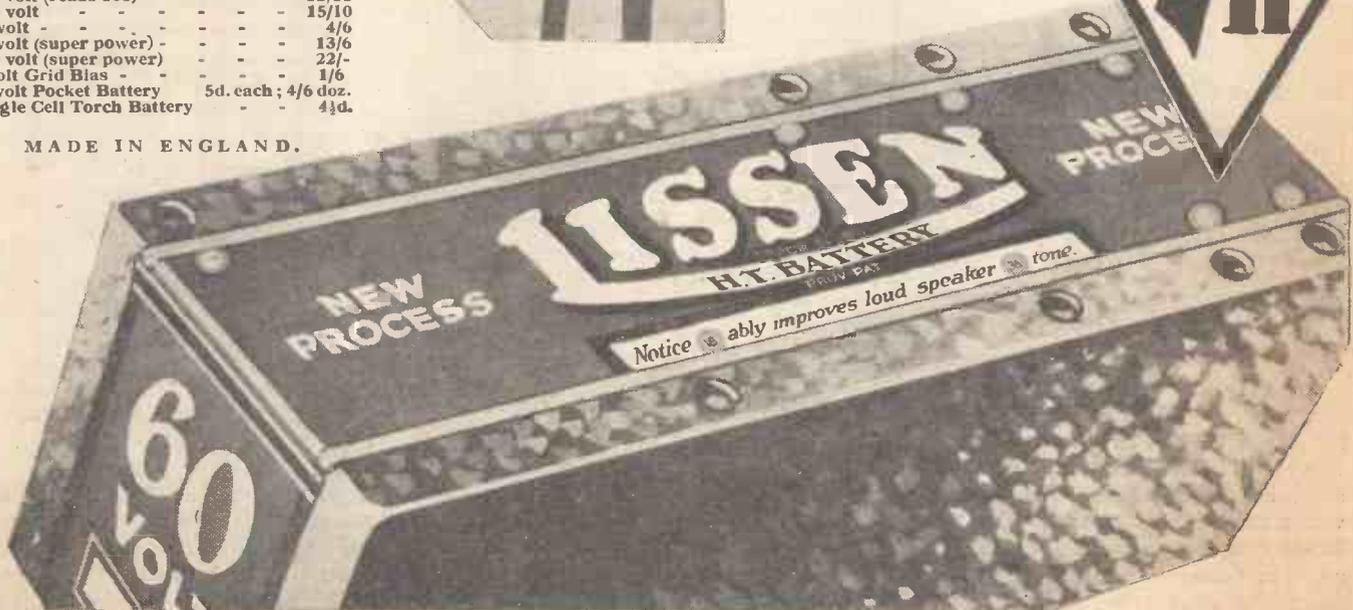
You want pure power for your radio; any good wireless dealer will supply you with the Lissen Battery that will give it to you.



PRICES.

60 volt (reads 66)	7/11
100 volt (reads 108)	12/11
120 volt	15/10
36 volt	4/6
60 volt (super power)	13/6
100 volt (super power)	22/-
9 volt Grid Bias	1/6
4 1/2 volt Pocket Battery	5d. each; 4/6 doz.
Single Cell Torch Battery	4 1/2d.

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"A.W." TESTS OF APPARATUS

Conducted by our Technical Editor, J. H. REYNER, B.Sc. (Hons.), A.M.I.E.E.

Omega Switch

THE normal valve set seldom has a filament current exceeding .5 of an amp., so that a quick current break is hardly necessary; in consequence, "on-off" switches are often very simple in design.

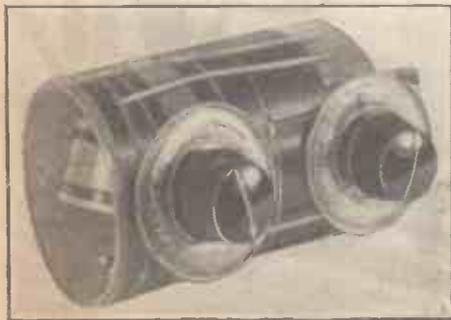
The Omega switch manufactured by the Earl Engineering Electrical Co., of Coventry, has only one moving part, for it consists of a threaded spindle which, on rotation in a clockwise direction, makes contact with a metal electrode. Such an action is quite fool-proof and self-cleaning, with the added advantage that a small rotational energy will give high pressure evenly distributed between the two contact electrodes of the switch. In operation there is no tendency for the spindle to stick, and a quarter of a turn in either direction will open and close the contact sufficiently.

Should the owner desire to keep the benefits of wireless to himself he may remove the spindle entirely after switching off the set.

This practical component sells at 2s., and may be recommended.

Chakophone Tuner

ALL-WAVE tuners with tapped inductances and swinging reaction coils have not been much in the public eye since the advent of the regional system, probably owing to the fact that designers have been modifying them to conform to the new conditions.



A convenient form of all-wave tuner—the Chakophone

After testing a Chakophone all-wave tuner, made by Messrs. The Eagle Engineering Co., Ltd., of Warwick, our opinion of this type of component has risen considerably, for its performance is comparable with a good dual-range coil.

The construction is simple and the windings are placed in six sections on a 3-in. impregnated cardboard former. There are three terminals for aerial, grid, and earth connection, whilst a rotary switch, with a

ball selector, short-circuits the turns of the coil not in use. A suitable gauge of enamel-covered wire is used with the object of obtaining high electrical efficiency.

By tapping the aerial near the grid end of the coil, selectivity automatically becomes greater on the shorter wavelengths, where it is most required. Reaction is obtained by the use of an internal swinging coil attached to flexible leads. Two circular oxidised bronze panel plates in conjunction with suitably engraved knobs give the necessary tuning indications. Each tapping point, of which there are five, is inscribed in wavelengths, but owing to the differing constants of the aerial, the figures can only form an approximation.

On test the coil behaved in an entirely satisfactory manner. Reaction was both smooth and adequate on all wavelengths, provided that a capacity of not less than .0003 microfarad was connected across the anode impedance, which happened to be the primary of an L.F. transformer in the circuit used. On a short aerial the range extended from 150 metres up to 1,850 metres, ample overlapping in wavelength being provided between consecutive taps.

As an interesting experiment an indoor aerial was coupled to the tuner through a small neutralising condenser; the Brookmans Park stations were then tuned in separately, each being received free from mutual interference without a wavetrap.

The results on all wavelengths were quite good, and this tuner can be recommended.

C.D.M. Duonator

A NEAT C.D.M. combined condenser and grid leak has been submitted for test by Messrs. C.D. Meluish. The overall dimensions of this component are 2½ in. by 1½ in. by ¾ in., including terminals. The condenser consists of circular brass plates with mica separation, and a composition resistance grid leak is included in the bakelite container. The grid leak is connected to one of the condenser terminals, whilst the other end is taken to an extra terminal. It may thus be used in parallel with the condenser or connected separately to filament, according to the type of circuit used. A strong metal bush with central hole provides a suitable hole for a single fixing screw.

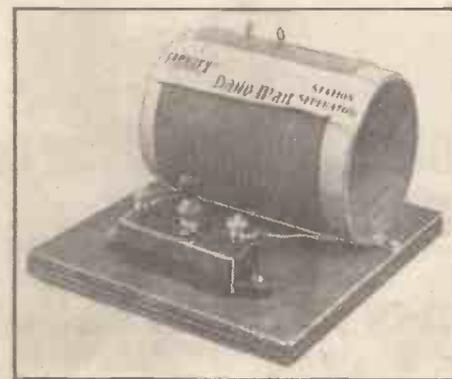
NEXT WEEK:
FULL CONSTRUCTIONAL
DETAILS OF THE "JAMES
'QUALITY' FIVE"

The rated capacity of the condenser is .0003 microfarad, and the grid leak, 2 megohms; on test the capacity proved to be .00024 and the resistance 1.9 megohms.

This component may be recommended

Faradex Wavetrap

WE have received for test a simple Faradex series rejector made by Messrs. Rooke Bros., Ltd., to the *Daily Mail* specification. The single-layer winding is placed on a 2½ in. cardboard former, with taps in the form of loops at a quarter and a half of the total number of turns. The complete coil is tuned by a Faradex compression type of condenser. Both the former and the



The Faradex wavetrap is a useful aid to selectivity

condenser are mounted on a stained plywood base, without terminals; and in this simple form the trap sells at the modest price of 2s. 11d.

This wavetrap operates quite effectively in cutting out either Brookmans Park stations. The extent of trapping can be varied by connecting the aerial to any one of the tapping points, allowing the aerial circuit to include one-quarter or one-half of the coil.

A NOVEL INSULATOR

A NEW insulating-material, described at a recent meeting of the American Institute of Electrical Engineers, has the extraordinary property of suddenly changing into a conductor at high potentials. This kind of behaviour would not at first sight appeal to most electrical designers, but in the case of Thyrite, as the new insulator is called, the "change over" is not erratic. In the case of a wireless aerial, for instance, Thyrite is a reliable insulator for all ordinary voltages, but should the aerial be struck by lightning it at once affords a safe discharge path to earth for heavy surges of current.

M. B.



TELEVISION IS HERE!

At last the greatest Radio achievement of the era—the Baird Televisor becomes a “home” proposition. Everyone has been eagerly awaiting the advent of this apparatus, at a reasonable price, and its coming heralds the commencement of the greatest radio boom in history.

The wonder of ordinary radio is now amplified by the additional wonder of the Baird Televisor. To SEE and HEAR is the expressed desire of everyone interested in radio, and only the Baird Televisor with its actual reproduction of every movement of living things can solve the problem. No laborious building up of “still” pictures can ever be more than experiment of limited interest. The Baird Televisor Home Reception Set *alone*, can give permanent satisfaction.

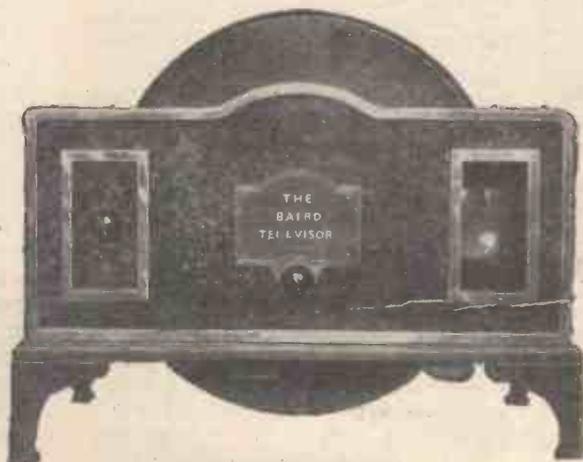
Daily broadcasts both from the National and Regional Studios at Brookmans Park have been a feature since March 31.

The Baird Television Company has given great thought and care in producing a Kit of Parts bearing the BAIRD brand. This will interest the Home Constructor and experimenter, and will open up a new wonder to tax his ingenuity. Ample “Service” is arranged for.

Prices for the complete Receiver and Televisor, Televisor only, and Kit of Baird branded parts will be sent on application to:—

The BAIRD TELEVISION DEVELOPMENT
COMPANY, LTD.

133 Long Acre :: :: London, W.C.2



the birth of a wonderful radio era

Mention of "Amateur Wireless" to Advertisers will Ensure Prompt Attention

MY WIRELESS

Weekly Tips,
Constructional and Theoretical—

S.G. Valves as Detectors

I SEE that the shielded valve is now being used for detection in various American sets. A resistance coupling is, of course, used and fair magnification is obtained.

We in this country are, however, fortunate in having numerous types of valves amongst which is one specially designed for resistance-coupled stages. No doubt the shielded valve properly used makes a good detector and I am trying the arrangement.

The Americans, too, seem only lately to have discovered the five-electrode (pentode) valve. I wonder whether this valve will ever become really popular. There is no reason why not, provided the valves are strongly built and have suitable characteristics.

Most American sets are mains driven, so the current consumption is not a matter of great importance. The deciding factor will no doubt be the "undistorted" output power to be obtained for a given input voltage. One can trust American engineers to make the tone suitable.

H.T. and ϵ s. d.

A point which is sometimes overlooked by those who use a dry-battery for high tension is that it is not economical to buy small units excepting for one- and two-valve sets.

The cost of a battery does not increase as rapidly as the weight of active material employed in batteries, with the result the larger types represent better value than the small units. At the same time, a big battery will last more than proportionately longer than a small one. The makers' figures as to the best discharge rate ought to be examined and a type chosen which is best suited to the current requirements of the set.

This is fairly easily estimated by looking up the slips provided with the valves. As a rule, the current is given for different high-tension voltages.

My Little Troubles!

Lately I seem to have had more than the usual number of faults due to defective parts.

A bad grid leak, of which there are not many, nowadays, was spoiling the quality from a set being tested. The detector was rectifying, but choked easily and it was this which led me to suspect the leak. Its



DEN By W. JAMES

For the
Wireless Amateur

Effecting the Pianissimo!

One of the most satisfactory methods of separating the two Brookmans with a simple set is by reducing the input to the detector. How people who have one of the popular three-valve sets, S.G., detector, and power, manage without a high-frequency volume control, I do not know.

At the place where I usually test, it is not possible to receive one without the other, and the volume is too great. By fitting a filament resistance to the shielded valve, and reducing the magnification, not only is the quality improved, but it is easy to separate the two stations.

The operation is simplified and much better results are obtained. Those living miles away from a station may not need a control of this type, but to me it seems a necessity.

Watch Those Switches

A point to note in connection with switches is that the contacts must be good. Thus a switch for short-circuiting a part of a coil should properly short it.

If the contacts are not clean or are badly adjusted, it is possible that instead of shorting the portion of coil, the switch merely puts a resistance across the coil. This may very seriously affect results.

Grid Current—the Bête Noir

The only point in a wireless set where grid current should be allowed to flow is in a leaky-grid-detector circuit.

Grid current is not wanted in high- or low-frequency stages. When it flows in a low-frequency stage distortion is produced, if only for the reason that the voltage applied to the valve falls when the grid current passes. With a transformer-coupling the distortion may be severe if only small amounts flow through the secondary.

Transformer curves are, of course, taken with no load across the secondary coil. If a load, such as a 100,000 ohms resistance is connected, the output falls off and further, the shape of the amplification curve changes. When grid current flows, the valve is acting as a conductor and produces an effect like the resistance referred to. But as the resistance of the valve is changing with the grid current, the resulting distortion is very marked.

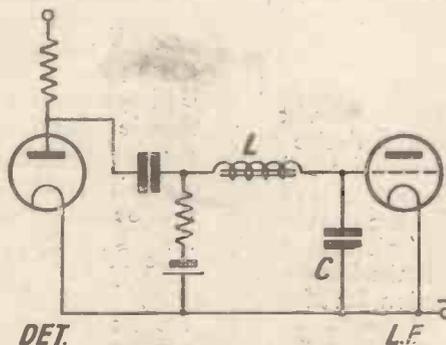
resistance was about 10 megohms, instead of the 1 megohm marked upon its shell.

Little faults, as this one, are bound to occur and I often wonder how often a reader decides that a set is not very good when one little part is not doing its work properly.

An L.F. Hint

It is sometimes necessary to put in the low-frequency circuit a piece of apparatus which will compensate to an extent for losses in the high-frequency or detector stages, or for a peculiarity of the loud-speaker.

Sometimes the trouble is that the repro-



This is a good method of improving the tone of a set by increasing the relative strength of the high tones

duction is dull and without "life," owing to the higher notes being weak. This trouble may be cured by increasing the relative strength of the higher notes and the diagram shows a method, due to Capt. Round, I believe, applicable more particularly when resistance stages are used.

A small iron cored choke is connected in the grid lead of the valve. This choke is marked L in the figure. It resonates with the condenser formed by the grid and filament of the valve and its holder and therefore tends to strengthen the higher notes.

When the capacity is not enough, a small condenser may be added, as at C. A good value would be .00005, although .0001 is not too large. The best value obviously depends upon the size of the choke. This choke also acts to stop H.F. currents from passing into the amplifier.

A Simple Set for the New Conditions

The Music Marshal

is a powerful three-valve set specially designed for the new conditions. It incorporates a special selectivity unit—not a wave-trap—that can be added to any existing set. By sharpening the tuning it enables you to receive many more stations without interference.

Fully described in the April number of the "Wireless Magazine," now on sale, 1/-.

OTHER CONTENTS OF THE "WIRELESS MAGAZINE."

THE SUPER Q FOUR. A new Set designed by J. H. REYNER, B.Sc., A.M.I.E.E.—**THE OVERSEAS FIVE**, a set with three Screened-grid Stages, designed by J. Sieger.—**The Battle of the Giant Broadcasters.** By J. Godchaux Abrahams.—**Before you build a New Set.**—**The Shielded Valve** is all right. By W. James.—**Gramo-Radio Section.**—Reviews of the Latest Records.—Special Test Reports for the Set Buyer, on Five New Receivers: Etc. Etc.

WIRELESS MAGAZINE

for April is now on Sale, 1/-
GET YOURS TO-DAY!

MAKE YOUR OWN WIRELESS BATTERIES AND SAVE MONEY!

You have made your own Wireless Set and saved money on it—and enjoyed it all the more because you did make it. Why not go a step farther and make your own batteries and save money on them, too?

"Batteries?" you say. "Too technical." Not by any means. The work is easy and pleasant—it can be commenced on your kitchen table and it is so simple that the family can help. But where you will gain—and gain a lot—is in the fact that the batteries manufactured by our Patent Methods are far and away more efficient and longer lasting than the average factory-produced article. This is proved by independent experts' tests. Besides, you will know there are no "defects," to let you down at critical moments.

You will find the work so fascinating that you may want to go farther into this profitable business. Why not make your friends' batteries, too?



MAKE YOUR FRIENDS' WIRELESS BATTERIES AND MAKE MONEY!



NO EXPENSIVE MACHINERY

No previous knowledge or skill is necessary. No expensive plant or machinery is required. You need only simple hand tools and presses. Most of these you can make yourself at a very small cost. Very little instruction is necessary and we will give you that FREE!

WE GUARANTEE YOU PROFITS

Once you and your friends see how Highly Efficient our batteries really are, and how easily you can make batteries to equal the best you can buy, you and they will never want to use any other kind. Many readers of "Amateur Wireless" who are now making our batteries find that repeat orders and new orders come in faster than they ever imagined; so fast, in fact, that sometimes the combined efforts of the entire family fail entirely to cope with the immediate demand. If, however, you are unable always to sell all you make we will buy sufficient of your output to Guarantee you a weekly profit, providing the same reaches the required standard of efficiency, which is easily attainable, and we undertake to continue your training FREE until that Standard is reached. Could anything be more definite or more fair?

BE UP AND DOING—TO-DAY!

It costs nothing to write for further particulars TO-DAY. Send the Coupon below and learn all about the Wonderful Opportunity that we offer you! Anything up to £300 a year per Licence can be made according to the time you have to spare. Don't hesitate. You've nothing to lose, but may be a lot to gain by acting quickly.

SEND THIS COUPON TO-DAY!

To Mr. V. ENGLAND-RICHARDS,
The ENGLAND RICHARDS Co., Ltd.,
1218 King's Lynn, Norfolk.

Sir,—Please send me at once, and FREE, full details as to how I can Make Wireless Batteries and Make Money at Home in my spare time. I enclose 2d. stamp for postage.

Print your name and address boldly in capital letters on a plain sheet of paper and pin this coupon to it.

"Amateur Wireless." 12/4/30.





DARIO VALVES

Best Way
to All
Stations!

NEWEST TYPES

SCREENODION

Enormous Range
BIVOLT .15 amps.
FORVOLT .075 amps.

15'6

SUPERBLY SELECTIVE
The best Screen Grid in
the world.

SUPER HF

BIVOLT .15 amps.
FORVOLT .075 amps.

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HYPER POWER
Bivolt .3 amps.
Forvolt .15 amps.

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Super DETECTOR

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FORVOLT .075 amps.

A super sensitive detector for anode-bend or leaky-grid rectification.

6'6

UNIVERSAL RESISTRON **5'6**
SUPER POWER **7'6**
and the Super Power **PENTODION** **18'6**

DARIO L.F. TRANSFORMER

A little marvel. Guaranteed for two years. Completely shrouded. Perfectly designed and perfectly made.

5'

5-1 or 3-1.

Write for Free Folder to:
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Dept. J, 538 High Rd., Leytonstone,
London, E.11

ON April 14 Mr. Gerald Barry, in the National programme, will supply an eye-witness account of the way in which the House of Commons receives the Budget. On the following evening the Chancellor of the Exchequer will himself explain his scheme to cope with the British financial problems.

Miss Violet Loraine's appearance before the microphone in a potted revue, entitled *Red Pepper*, has been postponed to May 7, in view of the artiste's indisposition. The performance will be broadcast through the National transmitter.

April 15 has been fixed as the date on which, with Miss Norah Blaney as hostess, the B.B.C. offers a cocktail party through London Regional. Amongst the guests will be found Flotsam and Jetsam, Vera Lennox, Harold French, Billy Mayerl, and Irene Russell.

Cecil Lewis (Uncle Caractacus), now back from New York, where he has been teaching the studios to produce plays, is at work on a radio adaptation of A. E. W. Mason's novel, "The Four Feathers."

Roughly 1,331,000, or 50 per cent., of the total number of licences in England are held by listeners in London, Lancashire, Yorkshire, Warwickshire, and Surrey; of these, 500,000 odd have been taken out by London. Scotland represents only 195,000 registered listeners.

Notwithstanding the rumours to the effect that a 6-kilowatt transmitter was to be installed at Oran (Algeria), it is now definitely stated in Paris that the relay will be carried out by the old 1-kilowatt plant, previously used by Radio Alger.

The Caen (Normandy) broadcasting station, which operated twice daily from 1923 to 1926, is to be entirely reconstructed. Under the title of Radio Normandie, with a power of some 600 watts in the aerial, it is expected to start testing during this month. Although the wavelength has not been definitely fixed, it is probable that it will be found working in the neighbourhood of 320 to 325 metres.

Should you hear the call of Radio Agen on a wavelength associated with Toulouse, bear in mind that the former, having been completely destroyed by floods on March 4, is putting its broadcasts through its colleague Radio Toulouse on 381 metres at 12.30 and 7.30 p.m. G.M.T. daily.

Contemporary with the "Old Berlin" Exhibition, to be opened in the German

capital on May 23, that city has organised a musical festival from that date to June 16. It is stated that the New York Philharmonic Orchestra will take part in the concerts to be broadcast to listeners. The performances will include cycles of Mozart, Wagner, and Richard Strauss compositions.

In view of the success achieved by the Stuttgart midnight transmissions in English, French, and Spanish, several German broadcasters have decided to follow this example at regular intervals with the hope of giving to foreign listeners an insight in the Teutonic programmes. As at that hour most of the Continental transmitters have closed down, these broadcasts are picked up over the greater part of Europe.

Nowadays most of the broadcasting transmitters work without interruption from the time they come on the air until the final good night. Leipzig has decided to give its engineers a fifteen minutes silent interval daily at 4.40 p.m. in order to attend to any slight adjustments the transmitting plant may require.

The new 60-kilowatt Radio Paris station will be situated at the Moulin Bichere, on the main Paris-Rambouillet road. Work is to be started at once in order that the transmitter may be completed by next spring.

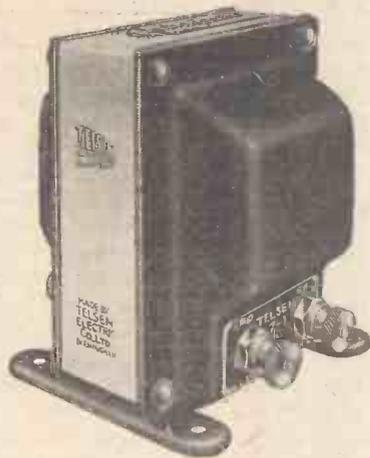
It is stated that negotiations have begun in Nice with a view to installing a studio in one of the more modern hotels on the Promenade des Anglais. Backed by prominent industrial concerns, a company is to be formed for the purchase of a 25-kilowatt transmitter for this portion of the French Riviera.

According to a report from Berlin, the German Posts and Telegraphs hopes to finish the construction of the Heilsberg (East Prussia) high-power transmitter by October 1 next.

The Soviet Government has solicited the aid of John J. Higgins, of East Orange, New Jersey, a valve expert. Mr. Higgins is en route to Moscow, where he will take charge of Soviet valve production.

Another U.S.A. station is to broadcast television shortly. It is WMAQ (Chicago), owned by the *Chicago Daily News*, which will broadcast under the call letters 9WXAP on 6,040 kilocycles.

THE TRANSFORMERS THAT PUT 'AI' IN RADIO



Telsen "Radiogrand" New Ratio 7-1 Transformer.

Price 17/6

Telsen Transformers are the most outstanding range of radio components known, each model is the outcome of careful research and representing the finest value for money, transformers ever made.

Made in three models, Telsen "Radiogrand" New Ratio 7-1, price 17/6, gives enormous amplification without distortion.

Telsen "Radiogrand" Standard Model, made in ratios 3-1 and 5-1, price 12/6.

Telsen "Ace," the ideal transformer for Portable Sets and where space is limited, made in ratios 3-1 and 5-1, price 8/6.



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LOWDEN IMPROVED PROCESS RADIO VALVES

FOR REALISTIC RECEPTION AND LONG LIFE!

The station you want, when you want it! —Get it with a Lowden Valve—the valve with the special spiral wound anode that gives you greater volume and richer tone. Double strength Barium-coated filament specially made to withstand hard knocks. A British-made valve that gives you the perfect reception you've always hoped for.



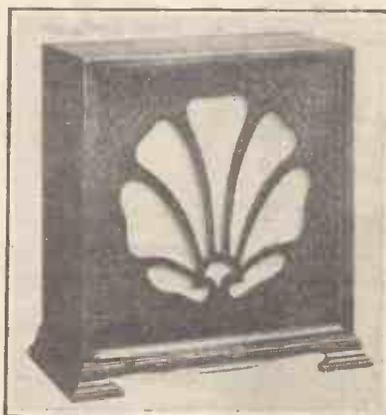
NOTE THE PRICES!

Screened Grid	Each 17/6
2, 4 and 6 Volts, General Purpose, L.F. & H.F.	6/6
Power Valves	8/6
Super Power Valves	10/6

YOUR LOCAL DEALER CAN SUPPLY!

In case of difficulty write direct to the manufacturers:—

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You will obtain better results!

No. 1. Inside Dimensions.

13½" x 13" x 6½" deep for 12" Cone and Chassis.

Oak : 22/- Mahogany : 24/-

No. 2. Inside Dimensions.

15" x 15" x 10½" deep. Specially suitable for Brown Vee Unit and Chassis, Ormond, Large Blue Spot, Ultra, etc.

Oak : 30/- Mahogany : 33/-

The Melodee Loud-speaker cabinet has been constructed on technical lines. Special care has been taken to avoid resonance. The front of the Cabinet is of sufficient thickness to carry a chassis and is backed with selected fabric.

Call and see full range of Camco Cabinets at New Showrooms:—

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LETTERS TO THE EDITOR



The Editor does not necessarily agree with the views expressed by correspondents.

Correspondence should be brief and to the point and written on one side of the paper.

The "By-pass" Again

SIR,—I have made and built into my set the "Brookmans By-pass" unit, and it has solved all my troubles in regard to Brookmans Park. In fact, the reception, using a Dario super-power valve in the final stage and an Amplion Dragon loud-speaker, is now better than ever, the "By-pass" making reception very much clearer than before. I am still using a 70-ft. outdoor aerial. My compliments and thanks to the designers and to AMATEUR WIRELESS.

F. H. (London, E.2).

In Touch with the *Discovery*

SIR,—In your issue of February 8 (No. 400) there appear photographs of the radio cabin on the *Discovery* and of a lighthouse stated to be in daily touch with the exploration ship.

This is not strictly accurate, for the lighthouse is Slangkop Lighthouse and is not equipped with radio. The aerial masts

adjoining are those of the coast station known as Cape Town Radio (call sign, ZSC), with which the *Discovery* has frequently communicated. Wishing your paper still the best "By Ballot."

"SPARKS" (South Africa).

New Super-hets Wanted

SIR,—Thermion has suggested that anyone who is interested in super-het receivers should ask for new designs.

I possess an old seven-valve super-het, and would welcome a new design, or particulars for bringing up to date, say, to use the modern 2-volt valves and efficient screening. My set is not now in commission and has not been used for a considerable time. The circuit has been lost, but I believe it is similar to the "Easter Portable," which I built two years ago for home use. I feel sure a modern version would be greatly appreciated by many.

W. H. L. (Suffolk).

The "1930 Ether Searcher"

SIR,—Having now constructed the "1930 Ether Searcher," I write to inform you how satisfied I am with it and with the results obtained. On occasions I have heard at least twenty stations during the time London's transmitters were not working, all at loud-speaker strength. Even when London is at work I have a selection of about ten stations to receive.

I think it only fair to your designers to state that this set is streets in advance of two proprietary kit sets I have previously had and scrapped for being non-selective.

I have had to dismantle the set to trace a most interesting fault. I could not get the screen-grid valve filament to light; nor did the long-wave sections of the coils operate. After I had tested every component, I found that the two new switches I bought were unsuitable for this receiver, inasmuch as the contact screw end is insulated by the ebonite piece from the spindle or shaft, and is, therefore, not in contact with the panel. Other "1930 Ether Searcher" constructors may care to note this point. C. R. S. (London, E.15).

Those Short Waves

SIR,—I read with interest "Thermion's" recent article on the short waves, but I cannot quite agree with his last remark, in which he gives hope to the DX man who is suffering from broadcast interference.

Personally, I find it very trying resolving carrier waves, the majority of which turn out to be harmonics of the local transmitters.

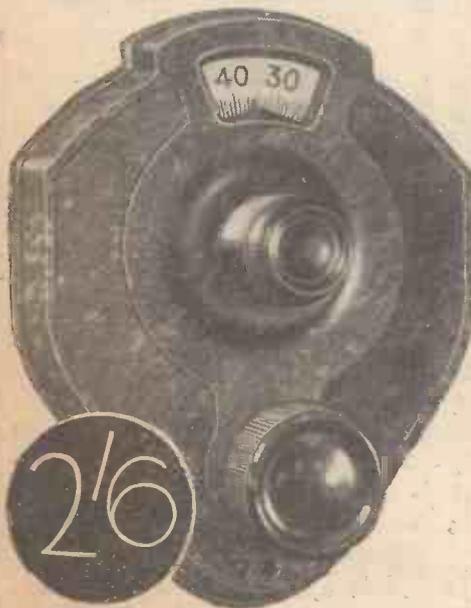
R. A. C. (Hatfield).

Regionals in the North

SIR,—In AMATEUR WIRELESS dated March 29, you publish a letter from "Northern Sufferer" (Manchester) which, to say the least, is a little perplexing.

Your correspondent informs us that, prior to the Brookmans Park transmission, he was able to get stations all the way up to just below Manchester (377 metres), including Toulouse PTT (255), Kaiserlautern (270), Rennes (272), Hörby (257), and Leipzig (259). The latter two are now interfered with, whilst the others are cut out completely. The 261-metre Brookmans is no use to him because Manchester swamps it. The puzzle to me is that if Manchester is so much "round the dial" as to swamp the 261-metre transmitter, how did he ever get the foreigners mentioned above, especially considering that neither the wavelength nor the power of Manchester has been changed?

I also am a Manchester listener and live only two miles from the transmitting aerial. My set is a three-valver, with a wavetrap. With this I am able to cut out Manchester and listen to the 356-metre regional with very little interference, although this station is only three degrees from the local on my dial. All my usual stations right down to Cork (224) come in as usual and the "Nat." (261) programme has to be searched for like a foreigner. "MANCUNIAN."

SPECIFIED FOR THE JAMES
'QUALITY FIVE'!

FOR the JAMES QUALITY FIVE described in this issue, three Brownie DOMINION Vernier Dials have been specified. Only Brownie's huge production enables them to offer this really splendid dial for 2/6. The special non-backlash design makes hair-breadth tuning a matter of delightful ease, while its handsome appearance (black or beautifully grained mahogany bakelite) will add vastly to the good looks of the set that you build.

BROWNIE

'DOMINION' VERNIER DIAL

BROWNIE WIRELESS CO. (G.B.) LTD., NELSON STREET WORKS, LONDON, N.W.1.

**NOW
YOU CAN HAVE YOUR
OWN TEST LAB!**

**HERE
IS THE TESTER
CONSTRUCTORS HAVE
BEEN WAITING FOR!**

**THE
"MULTITEST"
SEVEN RANGES IN ONE
INSTRUMENT**



Dead beat Moving Coil. It can be used as a Milliammeter, Ammeter, Voltmeter, Resistance Tester, Cell-testing Voltmeter, Earth-leakage Indicator, etc., etc.

The range required is selected by inserting plug in required socket. No external Shunts or Resistances are necessary. The scale is evenly divided into 50 divisions for accurate reading. Internal resistance values 200 ohms per volt.

Seven ranges: 5 m/a., 50 m/a., 500 m/a., 5 a., 5 v., 50 v., 250 v.

COMPLETE with pair of 3 ft. flexible leads, terminating in SPECIAL TEST CLIPS, enabling the set to be quickly connected to any form of contact surface.

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MERTON ROAD, SOUTHFIELDS, S.W. 18**
Telephone: Putney 3641.

PICTURED "STATIC"

THE Radio Research Board proposes to make use of radio "picture" transmissions as a means for investigating the nature and incidence of static disturbances. The suggestion is to transmit a series of pictures (consisting merely of squared paper) from a central station.

These will be received at various widely-separated stations at home and abroad. The atmospheric will appear as marks or "dashes" superposed on the squared paper "picture." The various records will then be collected and analysed by the Radio Research Board. In this way any particular static discharge can be identified and its effect at one receiving station compared with that at any other.

B. A. R.

*When Asking
Technical Queries*

PLEASE write briefly

A Fee of One Shilling (postal order or postage stamps) must accompany each question and also a stamped addressed envelope and the coupon which will be found on the last page. Rough sketches and circuit diagrams can be provided for the usual query fee. Any drawings submitted should be sent on a separate sheet of paper. Wiring plans and layouts cannot be supplied. Queries cannot be answered personally or by telephone.

Owing to the demands upon our space in this issue we have been obliged to omit the Information Bureau feature.



**New DE LUXE
AERIAL
TUNER**

With Variable Reaction

**300 TO
2,000
METRES**

Greatly improved, this tuner is highly efficient. Eliminates loose coils and no reaction condenser required. Fixing is simplicity itself, only four connections to be made. Oxidized fittings will enhance the appearance of any set.

Over 60,000 "Chakophone" Aerial Tuners have been sold, never before has an aerial tuner of such quality and efficiency been offered at such a low price.

In carton containing full particulars for fitting and circuit for wiring
OBTAINABLE EVERYWHERE

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fit -*



GENUINE Fuses in circuit with your most expensive Milliammeter. In case of excessive overload—in the split fraction of a second a Competa Fuse does its work, and safeguards the needle, springs, and windings.

Separately packed in the little orange cartons.

From all dealers or direct in case of difficulty



A. F. BULGIN & Co. 9-10-11, CURSITOR STREET, CHANCERY LANE, LONDON

Reputation

Plymouth, 18.3.30.

Dear Sirs,

Your reputation for prompt attention and service is certainly not over-rated. I must congratulate you. I ordered a complete kit of parts for the "1930 Clarion Three" on the 15th inst. and in THREE DAYS had the set working. It is a "Corker."

Will you send me one of your .0005 variable condensers for which I enclose postal order for 4/6.

Accept my best thanks,

Yours faithfully,
A.C.

**KITS OF PARTS
for all CIRCUITS.
CASH or EASY
TERMS**

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FOTOS valves that guarantee perfect reception? Do not judge a valve on price because FOTOS are as good as any valve at any price—a valve masterpiece. Save money by using

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CONCERT VALVES
THE HEART OF EVERY SET

56

GENERAL PURPOSE AND POWER
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LOUD-SPEAKERS REPAIRED 4/-

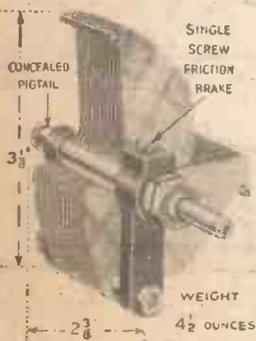
Transformers 4/- Headphones 4/-

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METEORS AND THE HEAVISIDE LAYER

RECENT investigations in connection with beam and similar short-wave transmissions have shown that irregular changes occur in the temperature and composition of the Heaviside region of the atmosphere at heights between 50 and 100 kilometres. On the other hand, purely physical calculations would lead one to expect a uniform mixture of gases between these levels, normally subject to regular and seasonal temperature variations.

An attempt has been made to explain this apparent discrepancy as being due to the action of meteors. It has been calculated that the frictional resistance offered to its passage by the attenuated atmosphere is not sufficient to account for all the energy radiated by a meteor.

The theory is that when a high-speed meteor strikes against the first molecules of rarefied air, the violence of the impact is sufficient to strike off some of the atoms and molecules forming the substance of the meteor.

These ejected particles possess considerable energy by virtue of their enormous velocity, so that when they come into contact with neighbouring air molecules they give rise to the characteristic incandescent trail of the "shooting star."

This in turn radiates much of its energy as ultra-violet light, probably mixed with a certain content of X-rays, all of which help to increase the temperature and ionisation of the Heaviside layer. In fact, it is probable that roughly nine-tenths of the total radiation is in this form, the remaining tenth constituting the visible trail.

It is known that an unending stream of meteoric bodies—some of considerable size, others mere particles of dust—is constantly passing from interstellar space into the upper reaches of the atmosphere. The incidence of the stream is, however, irregular, and may well account for the fluctuations which have been observed to occur in the character and properties of the Heaviside layer.

D. A. L.



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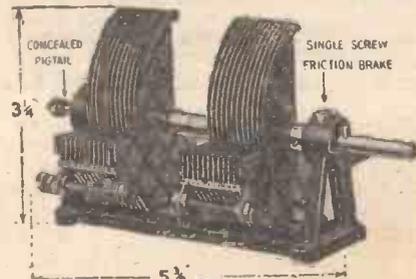
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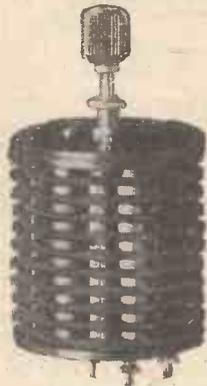
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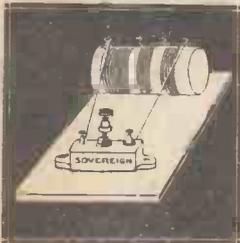
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"HOW TO DESIGN SCREEN-GRID CIRCUITS"

(Continued from page 522)

from this stage, and our only remedies are to reduce the amplification or to neutralise the valve capacity.

The question of neutralising is one which I do not propose to discuss now, and we are left, therefore, with the other alternative, that of reducing the valve amplification. Note that the valve amplification is what must be reduced, and not necessarily the circuit amplification. The arrangement shown in Fig. 2 is a system whereby we may limit the amplification of the valve itself, but obtain, perhaps, an increased amplification from the whole circuit. If we take a centre tapping on the coil such as this, the effective anode impedance is reduced.

Clearly, therefore, if we tap our anode some way down the circuit (say, at the centre-point), we reduce the impedance, and in consequence the valve circuit becomes less efficient and we obtain a smaller proportion of the theoretical amplification factor from the valve. By this means we reduce the valve amplification itself below the safety limit and the circuit becomes stable. With the arrangement shown, however, we have a step-up for the voltage developed across the whole circuit is greater than that developed across the tapped portion and, therefore, the total amplification should be multiplied by the step-up ratio. In the case of the centre-tapped circuit just discussed, this would be 2 to 1, and this would, more than compensate for the reduced amplification obtained from the valve. Consequently we have not only made the circuit stable, but have brought the amplification back to its original value, if not increased it.

Our solution, therefore, to the problem of instability is to reduce the tapping on the tuned circuit. This automatically reduces the effective anode impedance, so that the

(Continued on next page)

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"HOW TO DESIGN SCREEN-GRID CIRCUITS"

(Continued from preceding page)

valve amplification is kept within safe limits. The exact extent of the tapping, from the point of view of amplification and stability only, can easily be worked out to give the optimum overall amplification, for there is clearly a point where the combination of the amplification obtained from the valve itself and the step-up ratio reaches a maximum value.

I do not propose to discuss this point, however, because one's design is limited in practical cases by considerations of selectivity. This is affected to a considerable extent by the connection of the valve to the tuned circuit, and we often find it desirable, in the interests of selectivity, to sacrifice a certain proportion of amplification. This question will be discussed in the final article of the series.

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Valve	Resistance	Amplification Factor	Maximum Amplification
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Osram	200,000	170	80
Mazda 215SG	270,000	300	150
Mullard PM12	230,000	200	80
Cossor 220SG	200,000	200	90
Marconi S610	200,000	210	90
Mullard PM16	200,000	200	90
Marconi MS4	500,000	550	180
Mazda AC/SG	600,000	1,200	230
Mullard S4V	1,330,000	1,200	120

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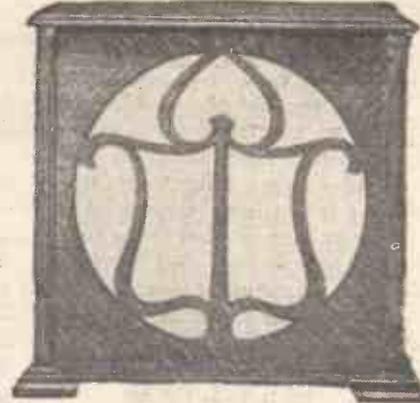
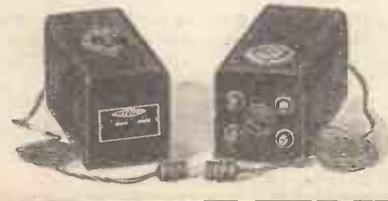


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THE Hague Telephone Administration for some months past has been experimenting with a new system for the distribution of wireless entertainments to its telephone subscribers. Over four hundred receiving instruments have now been fitted with the new device, and by pressing a button the subscriber is given the choice of three wireless programmes, which may be received on headphones or loud-speaker. At present the telephone system is in direct connection with the Hilversum and Huizen transmitters. The alternative to these is called a cocktail programme consisting of excerpts of Dutch and foreign entertainments.

The instrument is so attached to the existing telephone that the wireless transmission is automatically cut out in the event of an incoming call being put through, and restored, if so desired, at the end of the conversation.

At present, the fee charged for installing

the apparatus is 18s. 6d., headphones being supplied at a nominal charge.

"GRIDDA."

Further information is now to hand regarding the new high-power transmitter under construction at Brumath in the French province of Alsace. It will develop an energy of 20 kilowatts in the aerial, but has been so planned that when necessity warrants it, the power may be doubled. The studio has been installed in the police headquarters at Strasbourg and is connected to the transmitter by a specially pupinised cable. It is expected that further studios will also be built at Mulhouse and Nancy, and all speech transmissions will be made in both the French and German languages. A new cable has been laid between Strasbourg and Paris in order that the station may also broadcast the capital programmes and thus become a unit of the French official P.T.T. system.

The largest broadcasting station in Mexico will shortly open at Reynose. It will have a power of 500 watts and will operate under the call letters X1BC. Spanish and American programmes will be presented from the station.

The Edinburgh studio is notable for its sombre colour scheme. Orange and black predominate to give a very austere appearance to the chamber.

The English Players, a small, but select troupe of British artistes who have been touring the Continent, are to broadcast at Vienna towards the end of April.

Work has been started on the construction of two high-power transmitters, one in the neighbourhood of Leipzig, the other on a site roughly midway between Berlin and Hamburg.

On a recent occasion a charity ball at Munich achieved a record success owing to the permission given by the Radio Authorities for the broadcasting by visitors of short private messages to friends. A microphone was specially installed at the theatre where the fête took place, and all transmissions were relayed to the Bavarian broadcasting stations.

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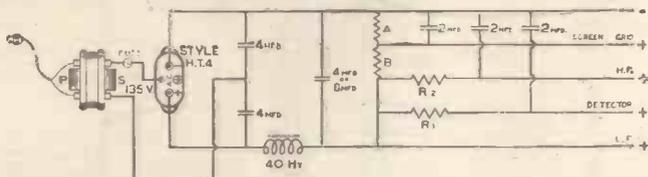
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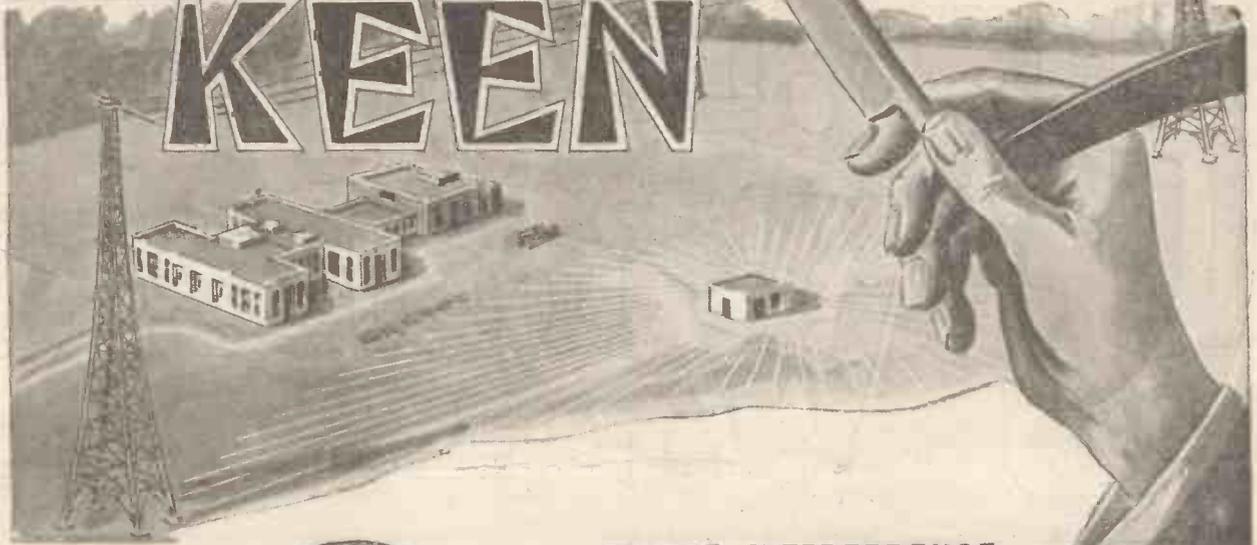


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Amateur Wireless and Radiovision

The Leading Radio Weekly for the Constructor, Listener and Experimenter

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J. H. REYNER, B.Sc., A.M.I.E.E.

Research Consultant:
W. JAMES

Assistant Editor:
H. CORBISHLEY

This Football Business—Radio From a Cave—Where Has 5GB Gone?— That "Radio Power"—An Old Tale



Norway's big voice—the new 60-Kw. Oslo station. He is to be heard regularly now on 493 metres. This front view of the transmitter building gives a good idea of "Radio Oslo"

This Football Business—It would be unwise at this stage to make biased comments on the quarrel between the F.A. and the B.B.C. anent the broadcast of "running commentaries" on Association matches. The trouble was that, as usual, the listener was entirely omitted. The B.B.C. has its own views and the F.A. also has decided opinions: and the listener—the man who really matters—doesn't have any say at all. It should be patently obvious that the methods both of the B.B.C. and the F.A. were faulty and unworthy of both bodies. It is ridiculous that "policy" and a very small amount of £ s. d. should prevent the public from having what it wants. We counsel the extremely undiplomatic B.B.C. O.B. Department and the stupidly obstinate F.A. Council to stop bickering now that arrangements have been made for the Wembley broadcast.

Radio from a Cave—An enterprising member of the Nicholson Expedition which is now exploring giant caves in the Guadalupe Mountains took with him a portable transmitter. When new sections of the

5GB Gone?—"Thank you, Thermion!" writes B.M. (London, S.W. 19), "We had been wondering where 5GB had gone, since the arrival of the Brookmans Parks. Now you tell us that 5GB has altered his aerial in order to give better local reception. Very nice, too. We don't mind much, in the London Regional area, for the B.P.'s give us all we want, but *why didn't the B.B.C. announce the change?* Personally, I spent three evenings pulling my set to pieces to find out why it wouldn't bring in the Midland station. Now I know—too late!"

The Choice—Well, of course, the alterations to the Midland Regional station were all part of the regional scheme. Few London listeners, however, could have realised that such a difference in received strength would result in an effective "good-bye" to 5GB. Another correspondent, R.D.S. (Stratford) says: "Before the regional scheme I could get 2LO and 5GB—two good alternatives with no mutual interference. Now I get the two Brookmans, which are not good alternatives, and there is mutual interference.

famous Carlsbad cavern were discovered the explorers were thus able to transmit on the short waves greetings to a friend in London. The signals were picked up from the Expedition's transmitter, W5QK, by at least one amateur in this country, and were subsequently confirmed by post.

Where Has

It has cost the B.B.C. thousands and, so far as I am concerned, it has been money wasted."

That "Radio Power"—We are asked by the Marchese Marconi to state that reports attributing to him the statement that his experiment in transmitting a radio signal to switch on the lights at the Electrical Exhibition in Sydney "points the way to a future day when there will be no electric wires and all current of electric power will be transmitted directly through the air," was not made by him and is obviously incorrect. The statement was not made in AMATEUR WIRELESS, of course, but in several daily papers, the radio "experts" of which are always too willing to distort technical facts to make their "headlines."

An Old Tale—Here it is again! A correspondent says that "a Swiss engineer opens and closes his garage doors without leaving his car and does this by means of a small transmitter. Pressure of the transmitting key sends out a wave which, through relays, operates an electric motor which winds up the roller shutters of the garage." The last time we heard this story, it was an American motorist who was responsible. But perhaps there are lazy drivers in Switzerland, as well!

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A
UTILITY
INSTRUMENT

FOR
EVERY SET
OWNER

AN "ALL-IN" TESTER

THE instrument about to be described will be found of very great utility to every set owner. It will serve for every ordinary test and is perfectly safe to use, even for testing where mains units are employed. The cost of construction is small and the constructional work entailed negligible.

What the Instrument Will Do

With this instrument, one can take voltage readings of the accumulator, when the set is operating, without disturbing

will be required. First, a Wates three-in-one panel-mounting test meter, which costs, complete, 13s. 6d. In addition to this, a small panel will be required, measuring 5 in. by 6 in., a valve holder of the panel-mounting type, a pocket battery lamp with holder for panel mounting, a 9-volt grid battery, and some two-coloured flex wire. In addition to this, some odd wood for the box and the plugs. These should be of the Ealex type in four colours (type 14). Four of these will be required, each a different colour, and two spade adaptors to slip on to the plugs for use as required, in addition to two grid-battery plugs.

components for continuity, such as coils, transformers, etc. In the case of coils the lamp tester may be used. This test will also serve for circuit continuity, where there is not sufficient resistance in circuit to dim the lamp.

Testing Low-resistance Windings and Continuity

Use the lead plugs specified. Each of these plugs, it will be observed, will plug in or act as a socket for plug connection, or may be fitted with the spade adaptors for connection to terminals. Lead plugs A and D to component or circuit. Panel plug 1 "in."

If the circuit is continuous, or the winding, the lamp will light. If not, it will fail to light. Working the other way round—that is, if one is testing for shorts—the order is reversed; that is to say, if there is a short in the circuit, the lamp will indicate the fact by lighting. For this test, of course the grid battery is used with, say, 4½ volts in circuit.

Testing High-resistance Windings and Continuity

For the test of any component with high-resistance windings, such as H.F.

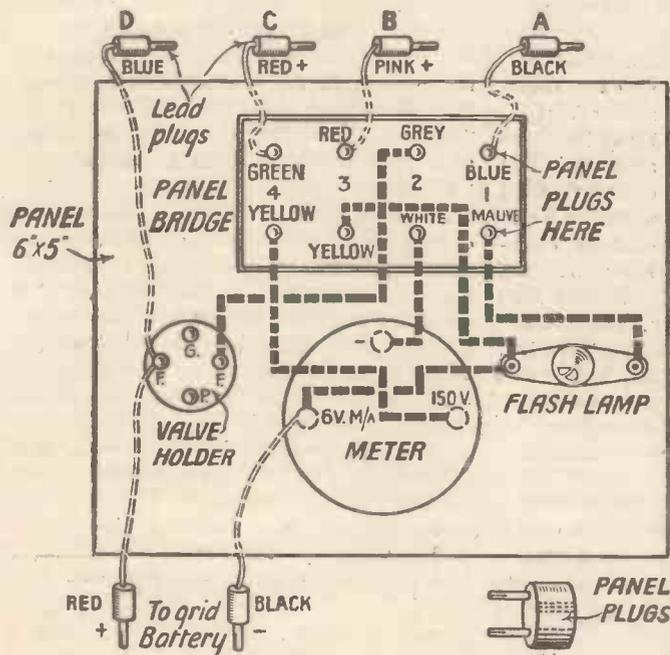


Fig. 1. Details of connections of Tester

any connections, or of the H.T. battery. Milliamp readings of H.T. consumption may also be taken by making one simple disconnection. Valves may be tested, or any components, circuits, etc, and there are many other uses which will occur to the user as necessity demands. In its design every detail of simplicity and safety of use has been considered.

Construction

The following components and material

Assembly

The first procedure is to mount the meter, with the panel bridge supplied, to the panel of the instrument. The valve holder is mounted on the left and the lamp holder on the right. For the rest, the connections are made as shown in the diagram, two short leads being fitted with plugs for connection to the grid-battery, which is housed inside the box. The other flexible leads, four in number, are fitted with plugs as shown. From the diagram the colour scheme may be followed; the colour

scheme of the bridge is also indicated, with the various possible positions for the insertion of panel plugs, indicated by numbers. These plugs are supplied with the meter outfit. The box may be simply made to suit the panel, and deep enough inside to clear the projections beneath and carry the grid battery. This completes the constructional work.

Using the Instrument

First, we will consider the testing of

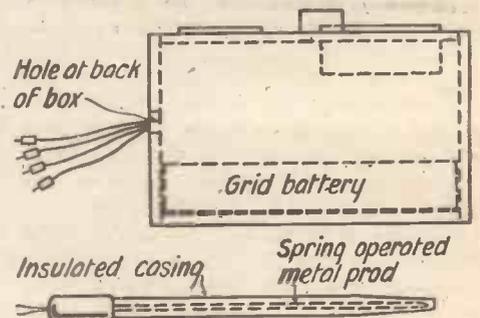


Fig. 2. Sketch showing arrangement of interior of case and detail of prod

chokes, etc., or any high-resistance circuit, it is necessary to use the meter. Otherwise the test is the same in theory. The procedure is as follows: Lead plugs A and D to circuit or component. Panel plug 2 "in."

If the winding or circuit is continuous, the needle of the meter will move; if the reverse, it will remain stationary. Shorts can also be ascertained by the same indications. The grid battery is used as before and, as there is high resistance, the 9 volts may be employed.

Testing Valves

To test a valve to ascertain that the filament is not merely O.K., but in good working condition, observe the following: Insert the valve in the holder, with the grid-battery connections fixed at the voltage which the valve filament is to take. If this cannot be done exactly, fix to the nearest figure below, but not above. The lead plugs are not used. Insert panel plug 2.

On doing this the meter will give a reading; thus proving, first, that the filament is intact; secondly, the reading should correspond to the voltage applied, proving its good condition.

Accumulator Testing

For this test the receiver should be working. Connect lead plugs A and B to accumulator. Insert panel plugs 2 and 3. The spade adaptors are fitted to the lead plugs. A voltage reading under working conditions will thus be obtained from the meter.

H.T. Voltage

This test should also be carried out while the set is working. Connect lead plugs A and C to H.T. negative and positive. Insert panel plugs 2 and 4.

Milliamp Readings

For this test the procedure is quite simple and as follows: Lead plug A is taken to H.T. negative of battery; H.T. negative from set to battery having been removed, this in turn is connected to lead plug B. Insert panel plugs 2 and 3.

This procedure presents no difficulty in following out, as plug A naturally plugs to

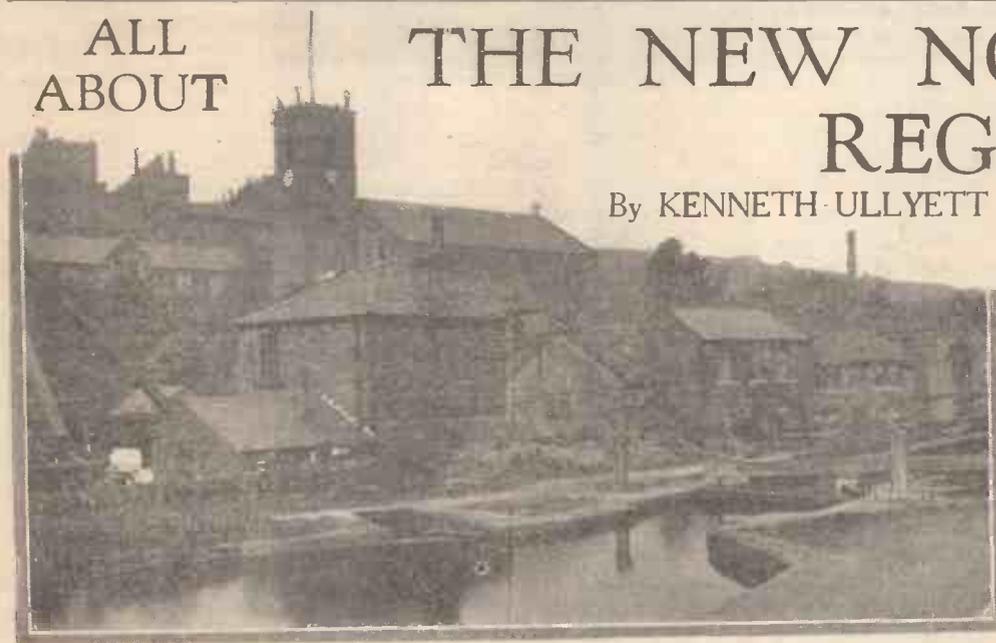
socket of battery, and the plug from the set fits to the socket element of lead plug B. The milliamps will be ascertained from the milliamp scale.

Be sure to get polarity right, otherwise the needle will kick the wrong way, and the meter may be damaged on high-voltage tests. The same rules as those detailed may be employed for eliminator readings; but here it is advised to make all connections first, and then finally complete the testing circuit by the insertion of the panel plugs, which are insulated to avoid shock. When testing mains units, Eelex testing prods may be fitted to the test leads. These prods are extremely useful for going over an entire set. The actual prod is entirely sheathed in insulated casing and is operated by pressing the head, when the metal spike protrudes. If they are laid down they are still safe, as immediately the pressure is released from the head of the prod the metal spike recedes into the casing.

ALL
ABOUT

THE NEW NORTHERN REGIONAL

By KENNETH ULLYETT



A view of Slaithwaite, the nearest town to the Moorside transmitter

"SLAITHWAITE," "Slewitt," "Slaithit," or however you like to pronounce it; that is to be the centre of the new northern regional station, the next step in the B.B.C. regional scheme now that Brookmans Park is complete.

Strictly speaking, the new transmitter will not be at Slaithwaite, but at Moorside Edge, near Pole Moor, above Slaithwaite, on the Pennines dividing Yorkshire and Lancashire. The B.B.C. has before been unfortunate in the names of its chosen sites.

You remember, for instance, the fuss there was about the pronunciation of the place-name Daventry when the B.B.C. first moved there from Chelmsford. It was said that the natives of the district pronounced it "Daintry," but some of the natives themselves said they didn't! Any-

way, most people call it Daventry nowadays. It is too much to hope that ordinary listeners will ever refer to the northern regional transmitter by this high-flown title. They will just call it Moorside.

What is worrying northern listeners now is something much more practical than pronunciation. They are wondering what the wipe-out will be. Moorside Edge is to have transmitters which will be replicas of those at Brookmans Park, but the aerials will be higher. It is generally expected that the "punch" of the Northern centre will be somewhat greater than that now prevailing in the Southern area, and this will mean that all the Northern listeners who are now enjoying good reception from Brookmans Park will, when their own station comes into action, be suffering the same kind of woes that are now

the lot of the Brookmans Park-ites.

One might be unkind enough to say that it will then be the Londoners' turn to laugh, for it was always the way of the north to want to go one better than the south, both in radio and in sport; but perhaps Huddersfield will not be happy when it finds that the extra powerful, super-efficient Moorside station causes a big wipe-out around the dials.

Work on the building at Moorside Edge is proceeding apace. The B.B.C. engineers state that the general design of Brookmans Park has been very satisfactory and the northern station will be somewhat the same in its layout as the B.P. twins. It is understood, however, that the exterior of the building will be different, being in red brick, and not in stone, as is the major part of Brookmans Park.

It has been arranged that Moorside will use the longest medium wave under the regional scheme. What effect this will have on northern reception remains to be seen, for a wipe-out at the higher end of the medium-wave tuning scale may be more serious; but there will not be so much mutual interference between national and regional as is experienced by listeners close to Brookmans Park.

The full available power of 30 kilowatts will be used for each transmitter, and the same degree and system of modulation as at Brookmans Park. Three 500-ft. masts will be used to support the two aerials, whereas at London there are four 200-ft. masts. The difficulty at London was that

the Air Ministry could not be persuaded to give the necessary permission, for it was thought that in the Brookmans Park area danger might be caused to aircraft by masts higher than 200 ft. The natural



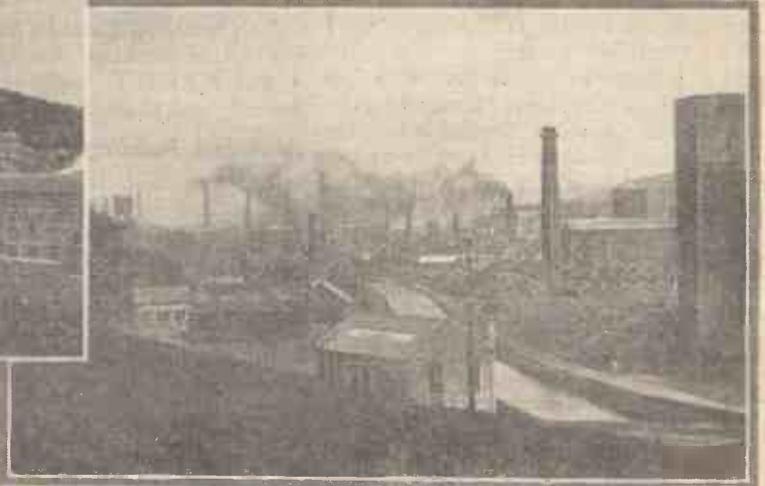
(Above) There may be more listeners on the edge of the open country at Moorside, close to the transmitter, than there are at Brookmans Park. (Right) Slaithwaite, the nearest town, has many factories, and the metalwork may have a directional effect

mans Park. It would be an exaggeration to say that the Brookmans Park side of London is densely populated, though, of course, there are thousands of listeners affected by the great local field strength.

It is equally untrue to say Moorside Edge is bleak and open coun-

other large industrial towns are all within a circle which will be affected by the opening of the Moorside station. Until listeners in these towns get a taste of regional scheme reception they cannot appreciate what Brookmans Park means to London.

The studios and offices connected with Moorside are those newly erected in Piccadilly, Manchester. The studios here are



altitude of Moorside Edge is considerable, and it is therefore quite on the cards that the Moorside station will be better heard than some of the other regionals.

The first difficulty that will be experienced when Moorside comes into operation is that the number of people in the wipe-out area will be found greater than at Brook-

try, quite unpopulated! There are houses reasonably close to the transmitter.

Huddersfield, with a population of approximately 110,000, is about five miles away as the radio waves travel, and Halifax, with a population only slightly less, is six miles distant. Manchester, Leeds, Bradford, Oldham, and all the

the most up-to-date type at present possessed by the B.B.C. The control-room at Manchester is a great improvement on that now at Savoy Hill. Of course, when Broadcasting House is finished at London, the studios will be the very latest thing. But at present the studios for use with the Moorside station are the B.B.C.'s best.

For the Newcomer to Wireless: WHEN IS A VALVE WORN OUT?

I HAVE noticed recently that many people suffer from various kinds of bad reception because their valves are really worn out, though they don't know it. Can you tell me what is meant by worn out and also give me some simple means of discovering when a valve is no longer up to its job?

Perhaps the best way of putting it is to say that a valve is worn out when it is no longer able to do the same work as it did during the first months of its service life.

Just what happens to bring this about?

Dull-emitter valves are used by practically everyone nowadays. They are able to produce a satisfactory electron stream between filament and plate owing to the special treatment of the filament itself.

Some filaments are coated and some are blended, aren't they?

Yes. In one type of dull-emitter the filament has an activating layer of oxide compounds; in the other its electron-emitting properties depend on the presence upon the surface of a due proportion of thoria.

I see what you're driving at: either the coating disappears, or there is no

longer sufficient thoria.

Just so. Now consider what this means. When the valve is in good condition, heating its filament to the required temperature and applying to its plate a suitable positive voltage means that a definite amount of current travels through it. The amount will, of course, be regulated by the negative grid bias.

I follow that.

Now suppose that the filament becomes less and less active. The electron stream becomes thinner; in other words the internal resistance of the valve increases.

Then I suppose that its impedance goes up too?

As a rule it does.

But since high impedance goes hand in hand with high magnification doesn't this mean that the valve should be producing more and more signal strength?

Not necessarily. When the emission falls off the mutual conductance—this, by the way, is a term that lots of people use, though few understand it—declines too, and though the impedance increases, the valve becomes less and less efficient

all round. In fact the results obtained from a worn-out valve are very much like those from a new valve with only a fraction of its proper filament voltage.

Well, I suppose that you get a complete alteration in the whole of the characteristics.

That's so. Even on its last legs a valve will still function in some kind of way, but it will quite likely introduce distortion and it will certainly lead to a loss in signal strength. If it is a high-frequency amplifier or detector, a worn-out valve may also mean decreased selectivity.

And how can one find out whether a valve is decrepit?

The most certain method is to make use of a milliammeter and to take the plate current with, say, 100 volts on the plate and the appropriate negative bias on the grid. If this differs greatly from the makers' figures then the valve is done for.

But not everybody has a milliammeter.

That's true. In the absence of this instrument the only reliable method is to substitute a new valve of the same kind and to see whether a considerable difference is not noticeable.

A PAGE FOR THE SET BUYER

WHEN TO USE A PENTODE

Set buyers in need of an inexpensive all-electric set, giving good-quality reproduction of the local stations, should read the "Set-tester's" comments on his experiences with the Igranic Model A.C.2.



Robust controls are a pleasing feature of the Igranic A.C.2, priced at 13 guineas, complete with valves

SOME readers will be Irish enough to say that the best time to use a pentode is never! But those who have tried this type of power valve will not so readily condemn it. British pentodes are without parallel; in America they are only just waking up to the principle of the pentode, while we have actually been using pentodes for over a year. True, the need in America is not so much for greater sensitivity as for a greater power output.

The first reason I would give for using a

ensuring sufficient anode current for a pentode. Worked under correct conditions, a pentode makes a big difference to the range and power of a small set, such as a two-valver having a detector and one stage of low-frequency amplification.

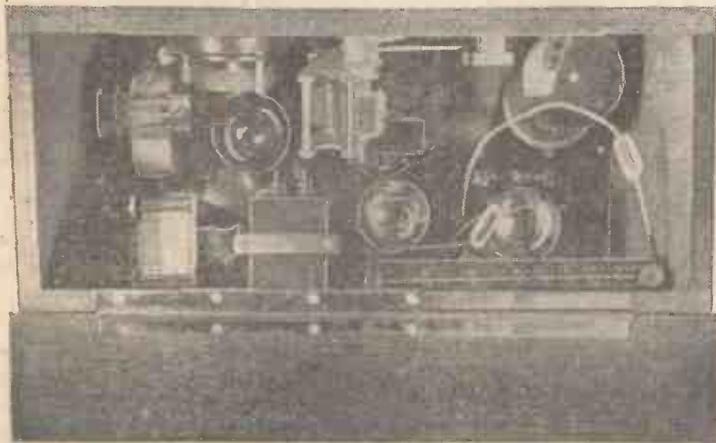
Some such considerations on the pentode must have been borne in mind by the Igranic Electric Co., Ltd., who recently introduced a two-valver for A.C. mains, called Model A.C.2. This set has a 4-volt indirectly-heated detector, a Marconi

externals. A good aerial and earth would be required, and a loud-speaker. Four different models are listed for the widely differing A.C. mains supply voltages. According to the makers, this A.C.2 set is designed for local-station reception. It is suggested that *under favourable conditions* many other stations can be received. My tests were carried out to see how the A.C.2 performed under the somewhat trying conditions prevailing in the London Regional area. The London and Midland National and Regional stations were all tuned in at good loud-speaker strength. A good outdoor aerial was in use, having a total length of 65 ft., situated some fifteen miles southwest of Brookmans Park.

Rome, Frankfurt, Toulouse, and Langenberg were all clearly heard on the loud-speaker, although not at full strength. What interested me was the fact that the London Regional, on 47 degrees, was perfectly clear of the National on 30 degrees. A wavetrap was not required. On the long waves, Radio Paris and Hilversum were fair loud-speaker signals. I think the makers have been very honest about the capabilities of their set.

In this new Igranic product will be found several standard Igranic components. This in itself is a recommendation. For example, the Igranic variable condenser is used for tuning. The Igranic reaction condenser and type "J" low-frequency transformer are also included. The large mahogany cabinet is further evidence that the makers had no intention of introducing anything but the best material.

The A.C.2 is not entirely "all electric," since the grid bias for the pentode is derived from a 9-volt dry battery. I agree that in such a simple set it is not worth while eliminating such a trouble-free battery, which could only be done by increasing the cost of production. Altogether, the Igranic A.C.2 is a fine little set. It should have a special appeal to those wishing to take advantage of their electric-light supply without undue expense.



Looking into the neatly - arranged Igranic A.C.2 mains - operated two-valver

pentode is when extra amplification is wanted without increasing the number of valve stages. The second condition for using a pentode is that the input voltage to the last valve shall not exceed the restricted grid swing of the pentode. Since extra amplification is only wanted when the signal is initially weak, this condition is usually fulfilled.

The third pentode point is very important. It is the provision of adequate high-tension anode current, usually 20 to 25 milliamperes. Fourthly, one needs a well-designed pentode output transformer, to match the high resistance of the pentode with the low resistance of the loud-speaker.

Dissatisfaction with pentodes is usually caused through lack of sufficient anode current, overloading, omission of an output transformer, or a combination of these circumstances.

Mains power offers an obvious means of

MHL₄, which has extremely good characteristics. The output valve is a 4-volt directly-heated pentode, with an output transformer and 150 volts high-tension supplied by a mains rectifying valve.

The price of the Igranic A.C.2 is low, being £13, complete with valves and including royalty. A complete installation utilising this set would involve very few

SOME SPECIAL FEATURES IN NEXT WEEK'S ISSUE

AN EASILY-MADE CONE
SPEAKER

AN UP-TO-DATE THREE-
VALVE PORTABLE

OPERATING THE "JAMES
'QUALITY' FIVE"



The Land of the Samovar

Continental Nights

ARE you game for a dip in the ether—a Continental night? A tour with an object; not a mere potter round, but a careful exploration of likely or even unlikely spots in and around the broadcasting band? You cannot fail to pick up something of interest.

As a jumping off point, let us search the lower part of the band that is marked "long" against the change-over switch of most factory made sets. Give those condensers a slight twirl either way, until you hear—what? Fog beacons. Listen carefully to these long drawn-out wailing howls, interspersed with slow morse. It wants but little knowledge to translate their calls. There they are—MMH, the Spurn Light Vessel, and behind it, for the moment, you can hear GGG, the Round Island Lighthouse; and there's GCM, the Casquets, marking the famous cathedral-like rocks off the Island of Alderney. With patience you will log many others from Great Britain, France, Holland, Germany, and Denmark.

A Novel Signal

But at the back of this mush, we hear a voice—a woman—or is it a man?—speaking. Carefully we adjust the condensers; the sudden decrease in the noise of the fog beacons enables us to identify the transmission. Leningrad on 1,600 metres. If we are lucky we may hear the cuckoo call which is used for somewhat extended intervals in the programme. The "Bolshie" to-day, however, is anxious to impress the world with his great industrial activities, and is experimenting in a more novel manner to attract the attention of listeners to his transmissions. So far, I have only gathered the new signal once from Leningrad, but several times from Moscow Popoff. At first you hear a deep siren which gradually fading out, makes way for a sound reminiscent of whirring machinery. After a few seconds this dies away and one catches the strains of the Internationale, the Red National Anthem. The melody? Well, any evening you are sure to hear it from one or other of the Russian stations. So far as I can recall, it is the old German traditional: *O Tannenbaum, O Tannenbaum wie grün Sind deine Blätter*, or a very colourable imitation of it.

From Leningrad also, you will probably

pick up a call, especially if you tune in towards 6 p.m. G.M.T., the time at which the main evening broadcast is put on the air. Phonetically, it sounds something like: *Sloo-schah-eet-ye* (twice) *Leningrads Hay-ya rah-dio vescht-chattel-naya stan-Ceeya na voln-ee lee-satscha may-troff*, which translated asks you to listen to the Leningrad broadcasting station on a wavelength of 1,000 metres. Between items, the announcer merely gives us *Sdie Govoreet Leningrad*, namely, "This is Leningrad speaking."

WIRELESS WIT

A correspondent complains that the B.B.C. music library does not contain many works by Spohr. Instead of grumbling, why not present the library with some—a sort of Spohrting offer, in fact.

Another listener has written to the B.B.C. declaring that he is a human receiver and has heard broadcast programmes without any set (excepting, of course, his teeth), and while seated in a taxi. Taxim twice over, of course.

Leningrad, contrary to the principle adopted by the other Russian transmitters, does not devote itself so much to educational talks as to actual entertainment. Turn, for instance, to this wavelength on Tuesdays and Thursdays and, providing morse signals are not too persistent, you will hear some excellent operatic performances or orchestral and vocal concerts. On Saturdays the station goes the round of the ether, towards 10.15 p.m., G.M.T., and from it you will frequently pick up relays of broadcasts not only from other Russian transmitters, but also from Copenhagen, Motala, Oslo, Paris, Berlin, Rome and even from Great Britain, especially if dance music is being transmitted.

The Moscow Transmissions

Just below Leningrad, but fortunately clear of the fog beacons, you will find a powerful transmission, that of the Moscow Professional Trades Union on 938 metres. What its power is to-day, I am not certain; it is given as 40 kilowatts, but you may safely assume that it is more.

Here, on many nights I have taken pot luck, for in no publication can I find any definite programmes. The call is somewhat similar to that of Leningrad, with the exception that the word *Moskva* (Moscow) is frequently repeated, and on most evenings references are made in Russian, German, and French to the Radio Central, of the Palace of Industry, Moscow. Most of the time is devoted to long-winded talks in German, French, Russian and English, in which you are led to understand that everything in the (Soviet) garden is lovely!

Again give your condenser a twirl and reduce wavelength to 824 metres, a position on the dials which should bring in the Moscow Experimental PTT station. It is also a powerful transmitter, but does not appear to work daily. On Tuesdays at 8.30 p.m., G.M.T., I have logged an English lesson from this studio, and on Saturdays a series of relays of other Russian programmes. Even Kharkov, on 1,304 metres, although nearly 1,600 miles distant can be heard on the loud-speaker in London.

Another Soviet Giant

Now for a jump to 1,103 metres, roughly midway between Hilversum and Kalundborg, and frequently causing interference with both these stations, we "bag" Moscow Popoff, the third of the Soviet giants. It gives operas, plays and dance music on most evenings. From this station in particular you will get excellent concerts of balalaika music.

Higher up again on 1,481 metres, immediately above the Eiffel Tower, we strike the old Komintern station which still remains an important factor in the Soviet broadcasting system, and is frequently linked up with Kharkov, Leningrad, and other Russian cities.

In view of the difference in time, 6 p.m. is also the hour of its chief broadcast, although if you care to do so, you may hear its transmission of physical jerks daily at 4 and 5.20 a.m., or an hour later on Sundays. Try for it at 9.55 p.m., G.M.T., when a short message or commentary is given regarding the Red Square, from which noises are collected. At 10 p.m. the bells of the Spassky Tower peal out the hour of midnight and a cracked carillon plays the Red Anthem.

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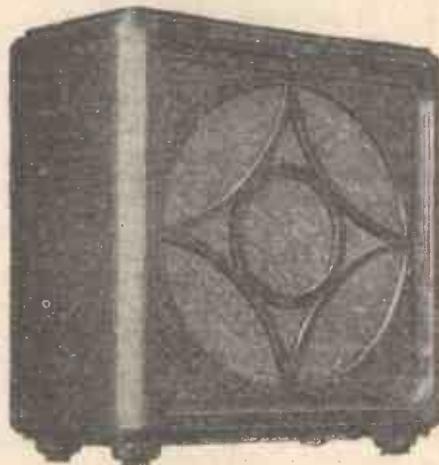


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On Your Wavelength!

Now is the Time

NOW is the time to fit an earthing switch to your aerial, if it hasn't already got one, or to bring existing earthing arrangements up to date. Some so-called earthing switches are not a bit satisfactory and their use is really very little protection to the set. What you have to guard against, remember, is not so much the actual striking of the aerial by lightning as the induction in it of high potentials when a thunderstorm is passing overhead. If this happens when the aerial is not earthed the only escape is by way of the coils in the set, and since these are not made to stand potentials such as 5,000 volts or so, they are apt to look a bit second-hand if such treatment comes their way.

What is Safe?

The average single-pole switching arrangement is no real safeguard, for it acts simply as a shunt across the aerial-tuning inductance. To be really secure, one must cut out the receiving set altogether and provide a straight-through path from aerial to earth. By far the best way of doing this is to use a double-pole change-over switch of decent size, which should most certainly be out of doors. Connect the aerial to one of the middle contacts and the earth to the other. Short one pair of the other contacts with a piece of thick wire or copper strip. This leaves one pair free. These should be connected to the aerial and earth wires of the receiving set. In one position the aerial is straight through to earth and the set is clean cut out; in the other, the set is brought into action. Protect your switch by housing it in a small wooden box.

Cat's-Cradle

I mentioned some time ago that I had seen a few dangerous all-from-the-mains sets constructed by amateurs who preferred to work on their own lines rather than follow proved designs such as those which appear in *AMATEUR WIRELESS* and the *Wireless Magazine*. Never, though, have I seen anything quite like what I found the other day when a friend asked me to have a look at his set, which was not functioning. This was a three-valve set, and one look was quite enough for me. The wiring was done on the Clapham Junction method, mainly with ancient D.C.C. and bits of worn-out flex. But you really ought to have seen the all-from-the-mains department. The leads from the mains consisted of the thinnest and commonest flex, whilst the switch to which they were connected (a small tuppenny-ha'penny affair) was simply lying on the floor under the table. The condensers were of the ordinary type, not designed for high volt-

ages, and inside the eliminator many of the connections carrying mains current were made with odds and ends of double-cotton-covered wire, quite loosely arranged, and with bare patches here and there.

Taking a Risk

There were no fuses, though there were about a hundred points where short circuits could have been produced by blowing hard on the wiring. "I wonder," said my friend, "if you would just . . ." "Not in these trousers," said your THERMION hastily backing away from the horrid thing. That there has been no accident with that set up to date is a matter of sheer unadulterated luck. It is about as safe in the house as would be a gunpowder canister used as a fireside ornament. If you, reader, have any friends who are misguided enough to use apparatus of this kind, do, for heaven's sake, tell them that, though a properly made mains set is as safe as a church, these cat's-cradle contraptions are simply asking for it.

A Happy Ending

It is good to hear that a running commentary on the Cup Tie at Wembley is, after all, to be broadcast on April 26. It seems to me that the B.B.C. was by no means wise in the way in which it conducted negotiations, and we have to thank Dr. Philip Eliot, Bishop of Buckingham, for his intervention, which saved the situation. He made an appeal on behalf of sick folk and chronic invalids, who, if there were no broadcast, would be cut off from one of the greatest thrills of the year. The Football Association showed itself sympathetic and it was left for the B.B.C. to make a further application. It seems a great pity that there should be so much bickering over theatre, music-hall, concert, sports, and outside broadcasts; for surely, if matters were tactfully handled by the B.B.C., arrangements could be made in an amicable way and without unseemly squabbling.

Portable Economy

Those who like portables because they provide really "wireless" wireless, but cuss them because of their way of eating up high-tension batteries, might seriously consider the question of employing a battery eliminator for H.T. supply when the set is used—as it probably is for 99.9 per cent. of its time—in one of the rooms of the house. So long as you have electric light, there is no difficulty about it, though don't be like one fellow I heard of who imagined that an eliminator will eliminate batteries in homes lit by gas, acetylene, paraffin, or candles! Well, then, if you

have electric light, why not make use of your mains, keeping the portable still as portable as you like for indoor use?

I believe that a tiny eliminator is made nowadays, which will fit into the battery compartment of many portables. This, of course, solves every difficulty, for you simply slip it in and make the necessary connections to the terminals of the set. Then all that you have to do is to stick a plug into the wall-socket in any room when you want the set to operate. If, however, you like something rather larger in the way of eliminators it can easily be housed in a small neat box provided with a carrying handle.

Easily Satisfied

Some of our manufacturers receive queer letters at times from prospective customers. I was shown, the other day, one which goes to prove that the man in the street never dreams of expecting too much for his money. "Dear Sir," it read, "I am intending to start a transmitting station as soon as I obtain my licence, which will be when I have learnt the morse code. I don't want anything very powerful. Can you supply me with a 2,000-kilowatt transmitter with a wavelength of 300,000 metres? I should like it to work all from the mains and I am prepared to spend up to £15." Just the thing—what?—for the odd corner in one's wireless den. And wouldn't it be jolly to work on 300,000 metres?

Thermion Recants

In the past I have suggested more than once that there was a good deal to be said for the American system of making the advertiser pay for the programmes. And so there is, so long as you can keep the advertiser in his place. Originally (and this still holds good for some of the most important stations) the advertising was confined to nothing more than a statement such as "We are indebted for the following hour's entertainment to the Phlyphlap Fly-Swatter Manufacturing Coys. Inc., whose products are so well known to you all." This kind of thing was quite innocuous and it usually meant jolly good programmes. To-day, though, I notice when listening to transatlantic stations that there is sometimes pretty well as much advertising as programmes. One can, in fact, observe the effects of the thick end of the wedge. Radio Toulouse is another appalling example of what may happen.

In view of all this, I here and now withdraw unreservedly any suggestion of mine that the B.B.C. should consider allowing large firms to provide programmes. If such a thing did happen, we should probably wear out our on-and-off switches far too rapidly.

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On Your Wavelength! (continued)

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The Better Way

Of course, there is this much to be said for allowing advertisers to broadcast, that you do get the most popular and highly paid artistes. As an example, I may mention Mr. Will Rogers, the cowboy philosopher, who has just signed a contract for Sunday night broadcasts at a rate of pay which works out at just about £200 a minute. He is to give five broadcasts of a quarter of an hour apiece on fourteen Sunday nights. For the first of these he receives £2,500 and the others will net him £1,000 apiece. He is receiving this salary from a firm of druggists for putting him on as their star turn. One can't help thinking rather wistfully of our own Sunday evening programmes . . . Still, I don't think that even Will Rogers would compensate one for having to listen to a little chat about Dr. Somebody's Rich Red Syrup for Pale Green Sailors.

A Novel Television Scanner

Television has given an impetus to inventive minds which are endeavouring to put into practical politics any ideas which they feel will hasten the day when television becomes as common as listening by wireless. Under these circumstances no possible avenue of development should be left unexplored, and on this score I was interested in hearing about a new type of scanning or exploring arrangement which has been designed for use at the receiving end. The inventor is A. H. Watson, of Chicago, and the scheme operates on the principle of reflecting light on to a screen instead of viewing a glowing neon plate through a perforated disc. Of course, the principle is by no means new, as witness the Karolus system, which makes use of the Weiller mirror drum. The method by which the desired effect is secured, however, appears to be very practical and merits attention.

Using Metal Reflectors

Obviously one of the first requirements was for a type of reflector which retained its lustre and could be bent at fairly sharp angles without injury. This was finally forthcoming in highly polished monel metal, which substance was used quite extensively to make unbreakable mirrors during the war. Since the complete drum is only about 7 in. in diameter, the receiving unit is of comparatively small dimensions; indeed, one model has the size of 18 in. by 9 in. by 15 in. high.

The drum is built up from small segments bent to the correct angle and held together by an outer and an inner ring. One advantage of the inventor's scheme is that it is applicable to either horizontal or vertical scanning, the mounting of the drum being determined by the type of exploration

employed by the station transmitting the television impulses. The neon lamp is of the crater type and the light variations brought about by the television signals are thrown on to the reflecting elements of the drum.

A Crater Neon and Mask

So that the "light spot" shall be of the correct dimensions, a mask is associated with the lamp, and this just lets through a ray of predetermined size. After striking the surface of the polished monel metal segments, the light is reflected on to a frosted screen at the front of the cabinet and the image built up in the familiar strip form. By this method no lenses or optical reflection or refraction devices come into play, so that the magnification is really quite natural, if one may use such a term in this connection. When adapted to the forty-eight hole scanning standard used by Jenkins in America, the picture size as seen on the screen is approximately 5 in. by 6 in. This can be conveniently displayed to quite a number of observers, provided the glass screen does not distort the image as soon as an end-on view is departed from.

Ingenious and Effective

A most ingenious form of wireless beacon has just been installed near the mouth of the Clyde. By means of a constantly rotating gramophone disc this broadcasts automatically at frequent intervals. It sends out its call-sign simultaneously by wireless and by an under-water sound signal. When a ship is doubtful about its bearings, owing to fog or to falling snow, the wireless operator dons a pair of phones, which has one earpiece connected to an under-water sound receiver and the other to a wireless receiver. In the latter he hears the call-sign transmitted through the ether, which reaches him, of course, at the speed of light. The voice reproduced by the gramophone disc then proceeds to count, each figure given corresponding to a tenth of a mile. The sound signal travels at a slower but quite definite rate through the water. If it arrives just as the wireless signal has said twelve and four-tenths, then the operator knows that that is his distance from the beacon. By means of the direction finder the exact position of the ship can be plotted on the chart in a matter of moments.

A Short-wave Don't

The importance of keeping all leads short is not so great as it once was in the medium-wave set where efficient screening and the use of decoupling circuits is now the rule. But in the short-wave set it is a point that really does matter. This was brought home to me the other day when I was listening to PCJ, working on the short wavelength

that he is adopting just now on certain days of the week. I was using the telephones, and on the table was lying a lead with a plug connected to it which runs to a loud-speaker. This lead passed in front of the panel carrying the tuning controls. For some quaint reason, capacity effects seemed much more noticeable than usual, and I could not at first make out why it was. Then I happened to touch the loud-speaker lead, which was not, remember, connected in any way to the receiving set. There was an immediate squeal in the phones. I found that I could vary the tuning by altering the position of my hand with regard to the loud-speaker lead, and I suppose that currents were being induced in it either from the aerial lead-in or from the tuning coils of the set. Anyhow it was very distinctly alive. If there are no decoupling circuits one may find, too, that similar effects are produced, when the short-wave set is in action right down towards the bottom of the short-wave band, by touching or pinching the battery leads. The moral seems to be to keep all leads as short as one can and not to leave any loose ones lying about near the set when it is in use.

A Point to Notice

Not once, but several times, I have come across people who, though they use either H.T. accumulators of good capacity or dry-cell H.T. batteries which should be up to the work of supplying their normal plate current, yet complain that they have to recharge or renew far too often. Whenever I am told this I always ask: "Do you let your set oscillate when you are searching for foreign stations?" As often as not the answer is that they do, since there is a screen-grid valve on the H.F. side, so that no interference can be caused. Without going into the question of the efficacy of the S.G. valve as a preventer of interference through howling, there's one little point that I would like to bring before readers.

If you have one of the most popular types of set—that containing a screen-grid valve, a detector, and a pentode output valve—you can consume something perfectly horrible in the way of H.T. current whenever your set goes into oscillation. If you don't believe me, get hold of a milliammeter, by hook or by crook, and put it in the common H.T. negative lead. Normally it will read, let us say, 15 milliamperes. Now make the set oscillate and see what happens. Unless the instrument reads up to a pretty hefty maximum you will find the pointer whacking hard up against the end stop. And every time that you allow oscillation to take place you give the H.T. battery one in the neck, which is not at all good for it. THERMION.

ALTERNATIVE programmes might, at first sight, be thought to solve the problem of pleasing the greatest number of listeners for the greatest number of broadcast hours. But after a talk with the B.B.C. programme compilers I am not so sure of this. In fact, I can see that the B.B.C.'s task is greater than ever.

The first thing the programme compilers had to decide was the basis of contrast. Should they oppose what is called high-brow to what is called low-brow? Should a low-comedy turn, for example, be considered a fit contrast to a chamber-music item? Could any two such broadcasts be more contrasted?

The answer to these questions gives us the clue to a fundamental fallacy. It is not good enough to contrast one specialised broadcast with another one equally specialised. In catering for the high-brow on one wave and the low-brow on the other, only the minority would be satisfied. It is an incontestable fact that the majority of listeners are neither high-brow nor low-brow. They like some jazz, yet they appreciate good music; they can laugh at vaudeville turns, and yet listen attentively to a good speaker.

What is an Alternative?

The "middle-brow" is you and I, and most of our friends. We have been catered for when only one wave was available. Now that there are two, the B.B.C. emphatically does not intend to serve up two unbalanced programmes instead of one balanced programme.

The beautifully simple idea that jazz is an alternative to chamber music must, so far as programmes are concerned, be regarded as a fallacy. If there were as many broadcast channels as there are types of specialised programmes we could have done away with the B.B.C.'s idea of a balanced programme. (Incidentally, my recent article on the regional scheme was written with this ideal in mind.) As it is, we must try to see how the B.B.C. can make the most of the two channels provided for the London and Midlands regions.

Once grant that two specialised programmes, as one of jazz and one of chamber music, do not mean alternatives to the majority, and we can begin to see the broad principle upon which, I am told, those at Savoy Hill are now working. Looking



A timely article by one of our special correspondents—Alan S. Hunter

through the programmes, it will be seen that the contrast in the Regional and National stations is between a specialised programme and a programme of general interest. While there was only one channel for each region the B.B.C. knew that every time it broadcast something specialised it was appealing to the minority. The regional scheme enables it to give these specialised programmes and at the same time provide the uninterested listener with an alternative of a more general appeal.

Specialised Service

Adult education is a good example of what the B.B.C. means by a specialised service. It admits that to some listeners, possibly to the majority, broadcasting is not regarded as a medium of education. While it is acting as a popular educator it can, under the regional scheme, now act at the same time as a popular entertainer. Because a serious talk is being broadcast, the B.B.C. does not feel it necessary to contrast this with a humorous turn. It feels that a more urgent necessity is to contrast a serious talk with a programme of general interest. Whenever it appeals to a specialised interest it is endeavouring to offset this by an unspecialised programme.

Programme Compositions

Let us see how the main evening programmes are divided to achieve this object. The first main Regional programme is between 6.40 p.m. and 8 or 8.30 p.m. During this time, or at least for the earlier part of it, the National transmitter is giving specialised services. The second Regional programme period is between 8.30 and 10.15 p.m. The equivalent National programmes take place between the periods of 7.45 to 9 p.m. and 9.40 to 10.45 p.m. One can now go right through an evening without touching a specialised

service, with the exception of the news.

Those specially interested in adult education can listen on the National wave from 7.25 to 7.45 p.m., from Monday to Friday inclusive. On Tuesdays they have a half-hour period from 8 to 8.30 p.m. on the 5XX channel. From Monday to Saturday, inclusive, adult education is given on the Regional wave from 8 to 8.30 p.m. On Sunday the Regional wave provides another period of adult education from 5.15 to 5.45 p.m.

I have given this example of adult education to show how, under our monopoly system of broadcasting, lasting good may be done to the community of listeners without upsetting those whose principal idea in buying a wireless set is to be entertained.

FILTERING OUT NEEDLE SCRATCH

QUITE a fair proportion of noise called "needle scratch" represents background and set noises recorded at the same time as the record is made. If attempts are made to cut out these noises, some of the useful and necessary sounds are bound to go also. Within a short time every pick-up reproducer will have a frequency characteristic control. Just as to-day we vary volume by rotating a knob—a much more satisfactory method than using special needles or closing gramophone cabinet louvres—so in a short time we will either accentuate or cut down the upper frequencies by a simple control.

There is, of course, one such device on the market to-day. With Dr. McLachlan's "Novotone," a variable high-note characteristic is readily obtained. It is not unduly difficult to design a "stop-pass" filter which will have similar characteristics. Given such a control, a working compromise between brilliant reproduction on the one hand and diminished needle scratch on the other is easily obtained.

The International Congress of Amateur Short-wave Transmitters, will take place at Antwerp (Belgium) in July next.

All closed models of Chrysler cars are now wired for the installation of radio sets. Aerials are concealed in the roof.

SYDNEY MOSELEY'S WEEKLY PROGRAMME CRITICISM

Those
Delays!
Worth-
while
Talks



A Hint to
Sir John
Reith
The
Alternatives

IRRITATING delays on Sunday. First, the Rev. J. Pitt Watson, of Edinburgh, had a full innings, and thus the appeal on behalf of the Church Army was late; so was the news. Then the news for which the world waited—the dramatic challenge of Ghandi—was, so to speak, put on the back page while the usual Court Circular was read out. I have always said they had no sense of news value at Savoy Hill. Here was one more instance.

Although we are supposed to have three programmes, the Midland was taking London, so that the metropolis was again treated to an irritating series of silences while, no doubt, the affairs of Mrs. Poodle, of Pudnam, were being gone into.

The anonymous scribe in the *Observer*—how brave and bold the critics are!—is superior and sniffing about my half-serious suggestions that there should be high-brow and low-brow critics. Self-conscious like, he loathes that very expressive term, "high-brow," and thinks the B.B.C. should not permit it!

Now the fact is this scribe (he is not so anonymous as he thinks) himself appeals through a medium which is "high-brow," but mercifully not the widest among newspapers. The *Observer* has its appeal, but heaven forbid that we were all made to read it.

Leonard Gowings, since we exchanged polite notes on his repertoire, seems to sing more new songs than ever; and he is in fine voice, too.

When is the Sir Thomas Beecham farce going to stop?

The Salvation Army Service, a note on which was crowded out last week, was as inspiring as it was when I heard one some thirty years ago or more. The Army has some of the best bands in the country. It was one of the first to realise the potency of music in relation to religion.

By the by, what was really meant by "The Perfect Trust" (Salvationist Publishing and Supplies, Ltd.)? One knows that the Army is original, but this is originality run riot in religious programmes.

The series of talks by the Rev. G. S. Waterhouse, D.D., on "Religion in the Light of Psychology" is not so terrifying as it sounds. Indeed, the talks are worth

listening to. On the other hand, a smart sub-editor would have made varied and more attractive announcements of these talks. For instance, one of the latest would have captured the imagination of more than one listener if it had been quoted, "Interesting Facts about Dreams," rather than keeping to the stereotyped heading.

On the whole, Mr. Waterhouse supplies good, sound, common-sense, although one would not go all the way with him in regard to his theory about dreams.

Mrs. Snowden got away with it again. When she first gave a talk some long time ago I commented on its excellence. On the last occasion not only the manner of delivery, but her subject matter—"Why Women Want Peace"—offered a very wide appeal. As one of the governors, Mrs. Snowden certainly ought to be able to show us how to do it. Now, what about Sir John Reith? A good straight-from-the-shoulder talk from him would be listened to with more than usual interest.

Certainly the B.B.C. can make no complaints as to the number of vocalists who are at their disposal. Miss Garda Hall has a voice of high range and sang songs by Verdi, Sandersons, Curran, and Terry most pleasingly.

The alternatives are not always as contrasted as they should be, but one cer-

tainly deserves comment. There was a great work by Mr. Gustav Holst, from London, while a lesser light, Mr. Alfred Reynolds, offered music from the National transmitter. The music of the great composers may have offered some messages, but it sounded like Babel to me, while the still small voice of the lesser known Reynolds sounded as sweet music. You know, dear readers, you must be educated up to some masters. Blame my upbringing—not me.

That was a delightful reading from W. H. Hudson on "A Dog called Jaques." After listening to it I immediately went out and bought a dog; but his name is Nanky-Poo.

The discussions between Dr. Cyril Burt and Mr. C. A. Siepmann on "Problems of Personal Liberty" are good stuff. If you haven't listened-in, try it next Tuesday. That is, if the series has not ended by that time!

The last-minute substitution of a varied programme in place of Violet Loraine's "potted revue" was most acceptable, and I doubt whether even Violet would have pleased us more. And I enjoyed the same day the organ recital by Dr. Harold Rhodes relayed from Coventry Cathedral. Not every organ recital comes over well, but this one did.

I didn't care for the way the Russian, Moussorgski Vocal Quartet sang "The Volga Boatmen" song. It lost that swing of rhythm that made the song. You would have thought Russians would know how to sing it.

I preferred Chaliapin's idea of the song, and the manner of his rendering haunts me to this day.

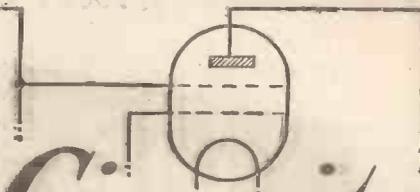
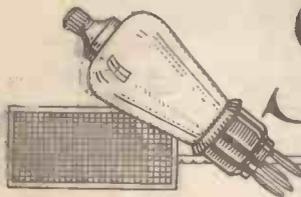
Something different and pleasing in the revue line was *You Ought to go on the Wireless*, by Graham Squiers. I found this an entertaining little show, full of originality and good humour. The "Milkman's Park" episode was particularly funny.

Two organisations have petitioned the Federal Radio Commission for permission to build new television transmitters. They are the Jenkins Television Corporation, of Union City, N. J., and the Southern Broadcasting Company, of Atlanta, Georgia.



An impression of Harry Brindie

How To Design Screen-grid Circuits



By J. H. REYNER, B.Sc., A.M.I.E.E.

In this third and final article of the series our Technical Editor deals with the question of selectivity

THE final point which we have to consider in connection with screen-grid circuits is the effect of the valve on the selectivity. We have here to regard the arrangement in a slightly different light. So far, we have considered the circuit from the point of view of the valve, the equivalent circuit being as shown in the diagram.

From the point of view of an imaginary generator introduced at the point *x*, the valve resistance and the tuned circuit are in series. When we consider the selectivity of the circuit, however, we are concerned with the actual tuning properties of the external circuit, and we must therefore look at the arrangement from this viewpoint. Regarded in this light, it will be clear that the valve resistance *R* is in parallel with the tuned circuit, being connected directly across the circuit. How will this affect the tuning?

Now, the tuning properties of the circuit depend upon two things. First of all, we are concerned with the ratio of inductance to capacity. The circuit tunes more sharply if the inductance is large and the capacity is small. Secondly, we must consider the high-frequency resistance of the circuit. This is situated mainly in the coil, although the tuning condenser may introduce a small additional loss. The smaller we can make the total resistance in the circuit, the greater is the voltage developed across the circuit at the resonant point, and consequently the less the voltage, by comparison, at any other point.

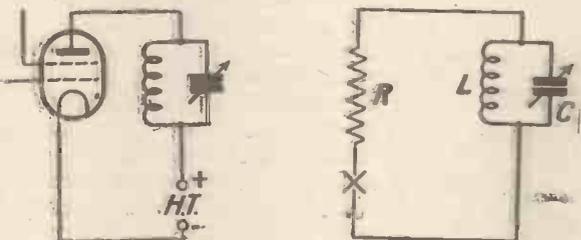
An Analogy

It is very helpful to bear in mind the effect of a tuned circuit in building up an oscillating current. If a pendulum consisting of a short length of cotton with a weight on the end is attached to a suitable point so that it can swing freely, we have an excellent mechanical model of a tuned circuit. If the pendulum is made about three feet long it will swing to and fro approximately once every second. Suppose we allow the pendulum to come to rest, and then administer a series of rapid

rate—say, five or six times a second—the pendulum will, to all intents and purposes, remain where it is.

Damping Effects

Let us now give the pendulum a single tap. It will move to one side, swing back, and one second later will be in the same position as it was originally. At this point we give it another tap—quite small, but exactly timed. The pendulum will continue to swing, this time with a larger amplitude than before, but it will again return exactly on time to the original spot, and if we continue to administer slight



Equivalent circuit of tuned-anode arrangement

taps every second we shall succeed in causing the pendulum to build up to a very large swing. The limit is reached when the friction of the air, as the pendulum moves through its swing, becomes sufficiently great to check the motion.

In an exactly similar manner the application of a relatively small periodic voltage to a tuned circuit will cause a very large oscillation to build up in the circuit, always provided that the applied voltages are exactly timed to the natural period of oscillation of the circuit, or, as we say, are in tune. The oscillations are limited by the resistance in the circuit, and it does not require much imagination to appreciate that if we connect a resistance across the condenser we shall prevent it from building up to as high a voltage as it otherwise would do. The presence of the valve across the tuned circuit, therefore, introduces a limiting or damping effect which prevents the circuit from building up to its maximum voltage.

Clearly this effect is exactly the same as increasing the effective resistance of the

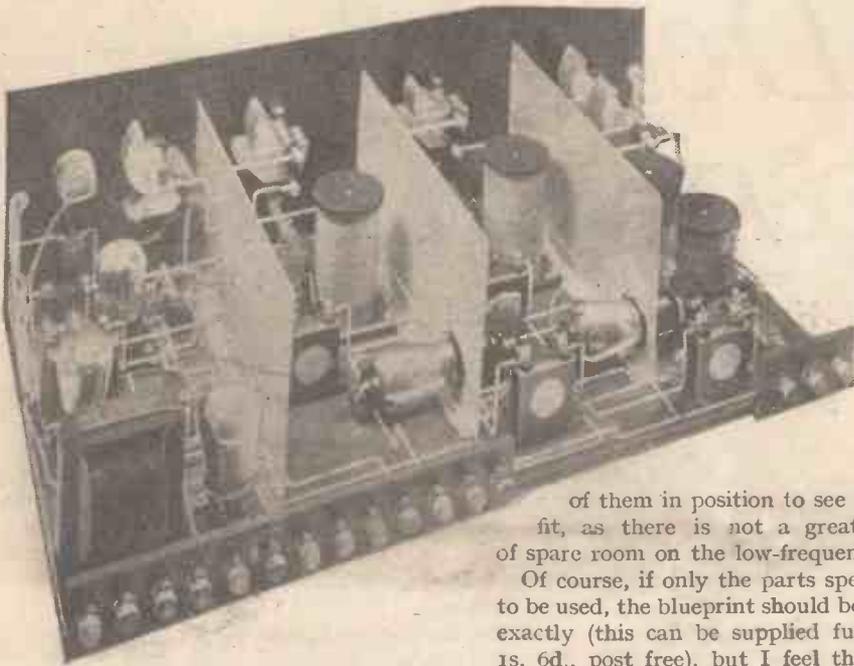
circuit, and, as we have seen, the sharpness of tuning depends very largely upon the resistance present. Therefore, apart from any other consideration, the presence of the valve across the circuit reduces the selectivity and broadens the tune. It remains to find how serious this effect is in actual practice.

We have already seen that a tuned circuit is equivalent to a resistance of value L/CR . The effective resistance of a tuned circuit will be doubled if we connect an equal resistance in parallel, and we can find fairly easily by calculation the exact effect of any value of resistance. Let us consider a practical example in order to appreciate the effect. A circuit comprising a coil of 200 microhenries tuned with a condenser of .0002 microfarad, having a resistance of 5 ohms, would have an effective resistance of 200,000 ohms. If we connect this in the anode circuit of an S6r0 valve we shall have a damping resistance of 200,000 ohms across the tuned circuit, which will be exactly equivalent to increasing the circuit resistance to 10 ohms. We have added 5 ohms effective resistance to the circuit, due to the presence of the valve, and the better we make our tuning circuit, the worse this effect becomes by comparison.

The Matter of Selectivity

We saw last week that for reasons of stability it is often desirable to tap the valve across part of the circuit only. One naturally asks what the effect of such a step would be on the selectivity. Fortunately, it is very helpful, and, indeed, provides partial solution to our problem. It can easily be shown mathematically that if we connect the valve across $1/n$ th of the circuit, this is equivalent to connecting a resistance n^2 times as great across the whole circuit. Hence a resistance of 200,000 ohms across half the coil just considered will be equivalent to $4 \times 200,000$, i.e. 800,000 ohms across the whole circuit. The extra resistance introduced by this means would only be a little over 1 ohm, which is a much better proposition.

(Continued on page 571)



THE theoretical considerations of this receiver were dealt with in last week's issue, and we can now proceed to deal with the construction.

Before commencing to screw down the various parts, it is advisable to place all

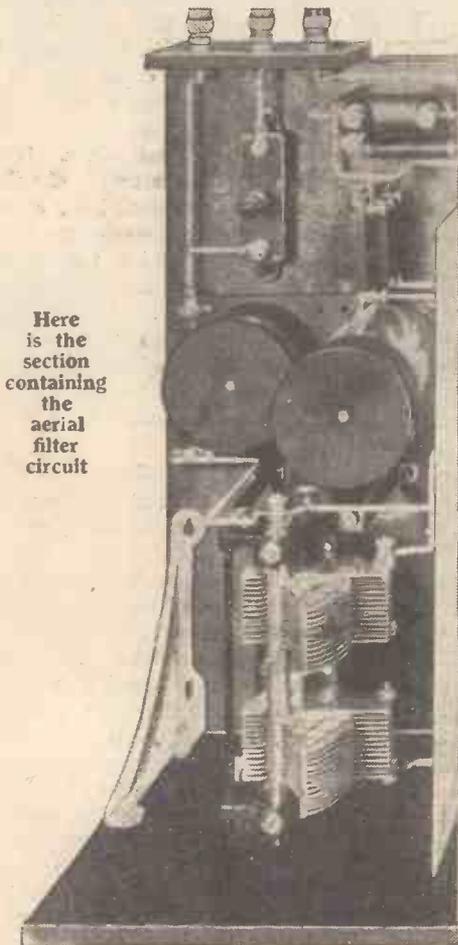
of them in position to see that they fit, as there is not a great amount of spare room on the low-frequency side.

Of course, if only the parts specified are to be used, the blueprint should be followed exactly (this can be supplied full-size for 1s. 6d., post free), but I feel that a proportion of readers may have various parts to hand which they would like to use.

The Grid Stopping Resistance

Note should be made that in the list of parts a .01-megohm resistance was specified last week; this should be a .1 megohm, as indicated in the circuit diagram.

No connections are shown for a pick-up. Various types are made, some with an adaptor and others with a plug suitable for use with a jack. All that is necessary here is that a terminal be provided. This should be joined to the grid-leak side of the .005-microfarad condenser which couples the detector and first L.F. valves. The pick-up is then joined, when required, between this terminal and the grid-bias terminal G.B. - 1.



Here is the section containing the aerial filter circuit

COMPONENTS

- Ebonite panel, 24 in. by 8 in. (Becol, Lissen, Trolitax, Keystone).
- Baseboard, 24 in. by 12 in. (Pickett, Keystone, Camco).
- .0005-mfd. twin-gang variable condenser with special bracket (Formo, Utility).
- Two .0005-mfd. variable condensers (Formo, J.B., Lissen, Igranic, Lotus, Utility, Burton, Polar, Ready-Radio).
- .0003-mfd. variable condenser (Formo, Lissen, J.B., Igranic, Lotus, Utility, Burton, Polar, Ready-Radio).
- Two 1930 Binowave coils, two type C, and one type E aerial circuit filter (Wearite).
- Variable resistance, 100 ohms to 5 megohms (Clarostat Standard, Regenstat, Volustat).
- 7-ohm rheostat (Varley, Lissen, Wearite).
- Filament switch (Igranic Midget, Lissen, Burton, Benjamin).
- Panel brackets (Keystone, Bulgin, Ready-Radio, Lissen).
- Two vertical valve-holders (Junit, W.B., Parex).
- Three anti-microphonic valve-holders (Benjamin, Lotus, W.B., Igranic, Formo, Brownie, Trix).
- .005-mfd. fixed condenser (Dubilier, T.C.C., Lissen, Graham-Farish, Igranic, Watmel, Atlas).
- Two .0001-mfd. fixed condensers (Dubilier, T.C.C., Lissen, Graham-Farish, Watmel, Igranic, Atlas).
- Four 1-mfd. fixed condensers (Lissen, T.C.C., Dubilier).

Up to date in every way, with band-pass aerial circuit filter, two screen-grid stages, a detector,

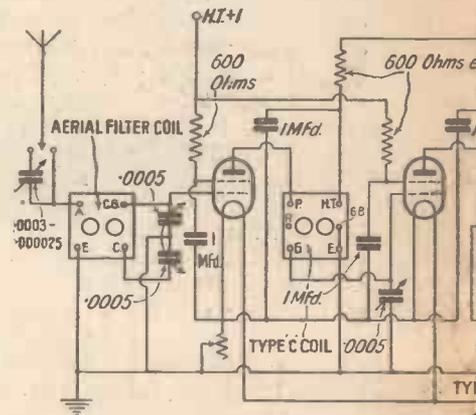
BUILD
The James
QUALITY

When in use, the H.F. valves may be switched off by the filament resistance. I will give a diagram next week showing how a jack may be fitted, but actually, only a small proportion of those who wrote me about this set asked for pick-up connections.

The tuning coils are provided with extension spindles and should therefore be properly placed. It is necessary to use brackets to support the two-gang Formo tuning condenser used with the filter coils. This component is not made for fixing to the panel in the usual way.

Take care not to twist the frame of the condenser, as this might upset its balance.

Dials of not too large a size must be



The circuit of the "James 'Quality'"

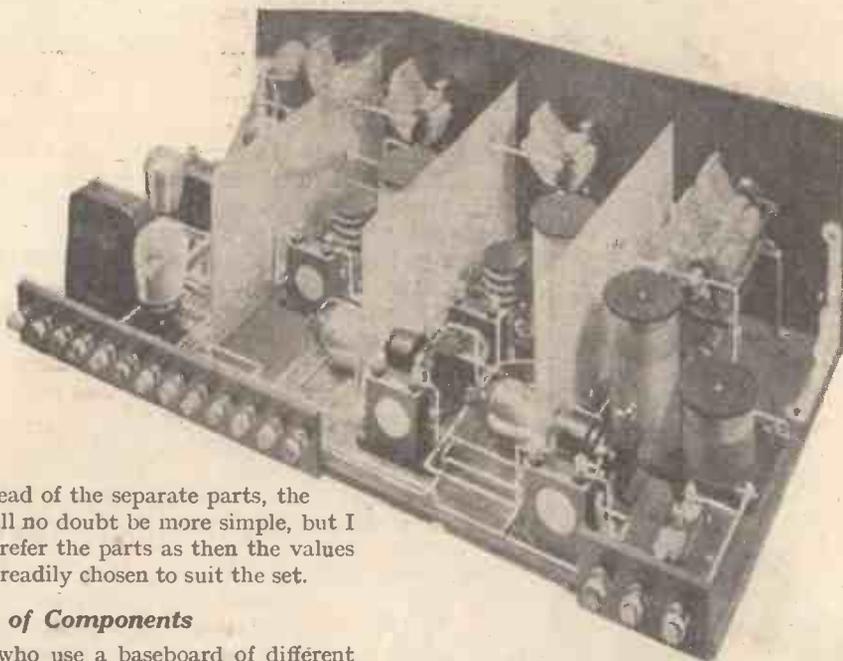
used as the spindles of the coil switches pass below the condensers. Ordinary dials could be employed, but slow-motion types, having not too slow a movement are better. Those suggested have been found satisfactory.

A good filament resistance is a necessity. A poor one will probably cause noises to be produced as it is turned.

The wiring is best proceeded with in

DING AMES TY FIVE

two stages of low-frequency magnification, and high- and low-frequency volume controls



used instead of the separate parts, the wiring will no doubt be more simple, but I usually prefer the parts as then the values are more readily chosen to suit the set.

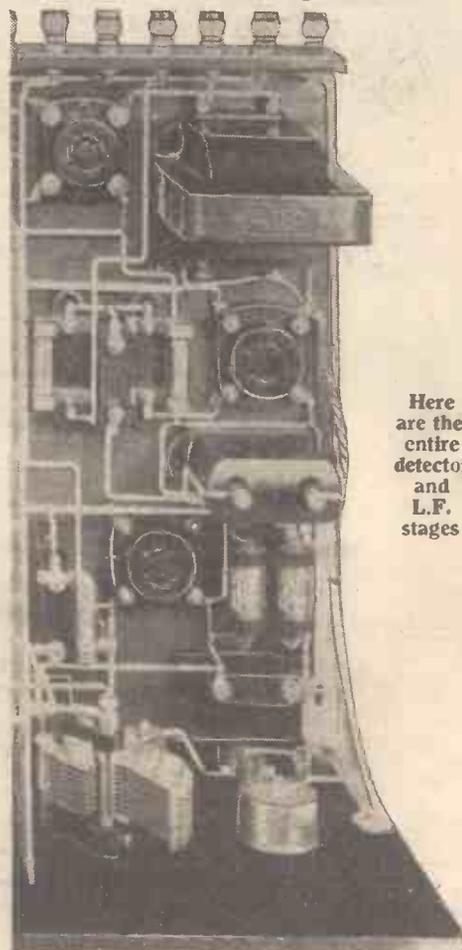
Spacing of Components

Those who use a baseboard of different size from that illustrated will have to see that the wiring is satisfactory. Use the shortest possible connections in the high-frequency circuits, including the by-pass condensers, but if necessary, spread out the low-frequency side. I mention this because some readers will desire to use a gramophone or other cabinet which may not take the set as illustrated.

It may be possible to fit the grid-bias battery on the baseboard, thus saving various terminals.

When the wiring is completed, test it before putting in the valves. The right valves are two shielded grid; one of moderate impedance such as an H.F. for the detector, a further valve of this type for the first L.F. stage and a good power

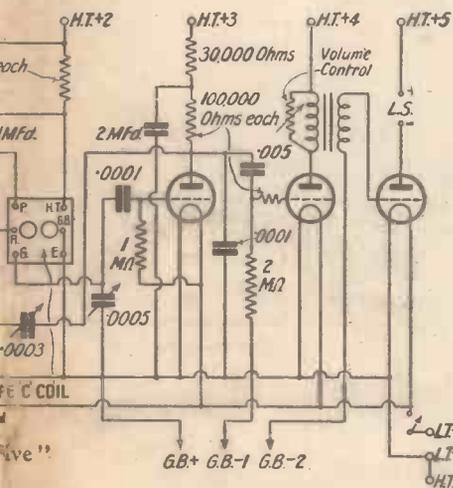
valve for the last stage. If exceptional volume is not needed, an L.F. valve may be fitted in the first L.F. stage. A high tension of 160 volts is suggested. This may be applied to the anodes of the shielded valves as well as the first L.F. and power valves.



Here are the entire detector and L.F. stages

sections. Take the panel off, and also the screens and put in a number of the wires. Then put back the screens, and fit soldering tags beneath those screws to which wires are taken for earthing. All coils are clearly marked, so there will be no difficulty in wiring them correctly. At the same time, do not hurry the wiring as it would be easy to miss one lead.

It is advisable, but not essential, to use Glazite or similar covered wires. Ordinary tinned copper wire of No. 22 gauge will serve with systoflex for a covering. One or two of the wires are fairly long, but they are not important ones. All H.F. wires should be made as short as possible and



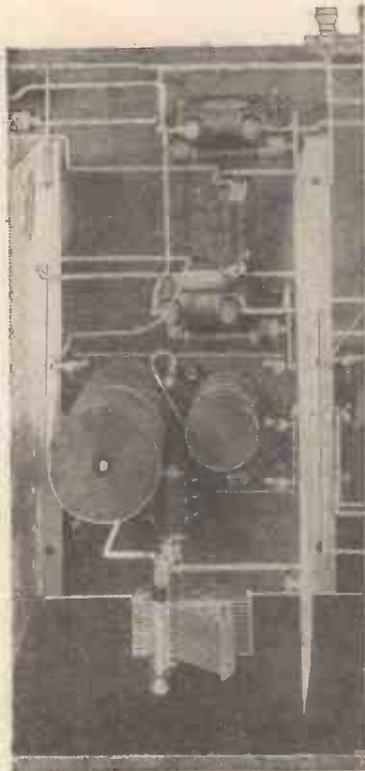
COMPONENTS continued

- 2-mfd. fixed condenser (Lissen, T.C.C., Dubilier).
- Four 600-ohms wire-wound resistances with holders (Ready-Radio, Wearite).
- One 30,000-ohms and one 100,000-ohms wire-wound resistances with holders (Ready-Radio, Lissen, Varley, Igranic, Ferranti, Bulgin, Graham-Farish, Dubilier).
- 1-megohm resistance (Lissen, Dubilier, Ediswan, Watmel, Graham-Farish).
- 2-megohm resistance (Lissen, Dubilier, Ediswan, Watmel, Graham-Farish).
- 0.1-megohm resistance (Lissen, Ediswan, Watmel, Graham-Farish).
- Two grid-leak holders (Lissen combinator).
- Low-frequency transformer (Lissen, Ferranti, Varley, Lewcos, Igranic, Marconiphone, Telsen).
- Three partition screens, 10 in. by 6 in. (two with holes for screened-grid valve, one plain), (Ready-Radio, Parex, Keystone).
- Pre-set condenser .0003-.00025 microfarads (Formo-type J, Sovereign).
- Three slow-motion dials (Brownie, Lotus, Igranic).
- Two ebonite strips, one 12 in. by 2 in. and the other 3½ in. by 2 in. (Becol, Keystone).
- Sixteen terminals marked: Aerial 1, Aerial 2, Earth, H.T.—, H.T.+1, H.T.+2, H.T.+3, H.T.+4, H.T.+5, L.S.—, L.S.—, G.B.—, G.B.—1, G.B.—2, L.T.—, L.T.— (Belling-Lee, Clix, Eelex, Burton, Igranic).
- Connecting wire (Glazite).
- One yard of thin flex (Lewcoflex).

there is not much to be gained by fancy wiring. The wiring can be made to look neat and to be effective without a number of right-angled bends.

Particular care is perhaps needed with the wiring of the detector and low-frequency stages. The illustrations will be of help here as they show many of the wires quite clearly.

If a resistance-capacity coupling unit is



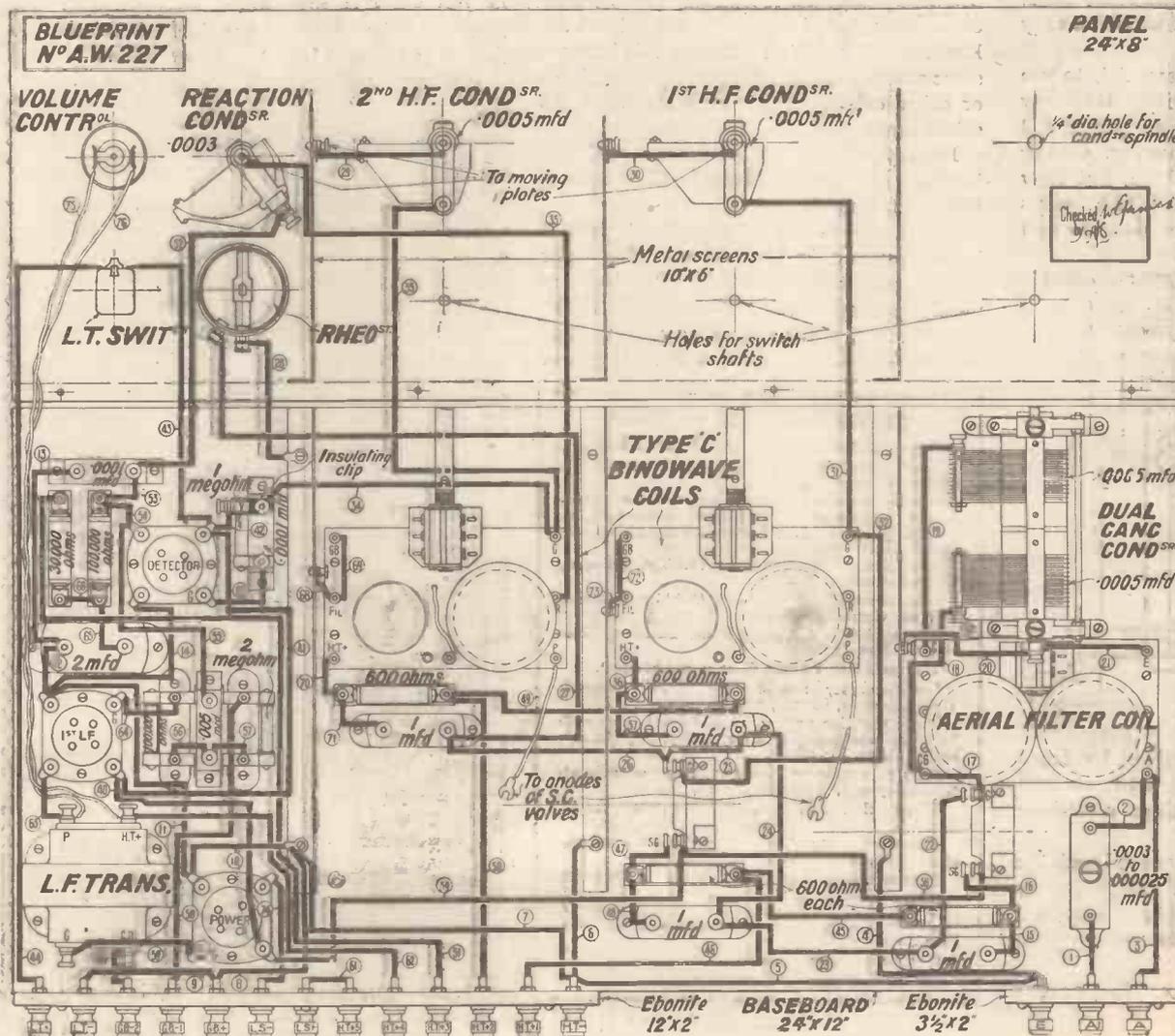
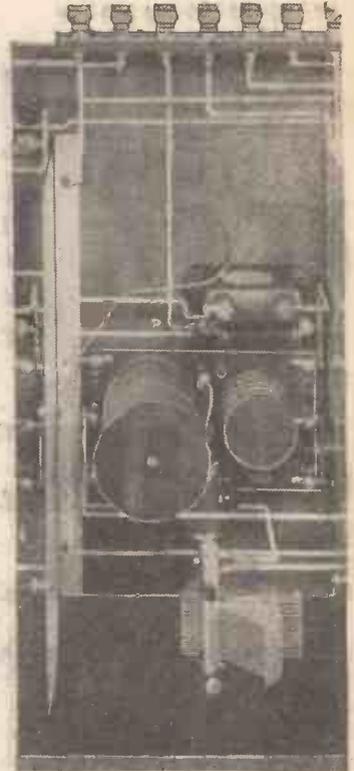
For the detector, a voltage of about 120 will be suitable. The shields of the S.G. valves should be given the voltage suggested by the makers and will be from 60 to 90. The set will, of course, work with the usual 120-volt battery, but the amount of power will be limited.

A good power valve is essential and it should have the bias advised by the makers for the H.T. used. This may be 18 volts or more, according to the type. Probably 3 volts bias will suit the first L.F. valve. The amount of power output to be obtained does not depend upon the magnification of the set, but upon the size of the last stage. If this has an ordinary small power valve, taking a grid bias of, say, 9 volts, the volume to be obtained is limited and it will be easily overloaded. This point will be more fully dealt with in the next issue, which will also contain tuning curves and a tuning chart.

The volume controls are, of course, so arranged that overloading may be prevented, but the fact remains that a user expects more volume from a five-valve set than from a three. What he does have is many more stations at the maximum strength. By using a greater H.T. voltage with more grid bias the power output to be obtained is increased. This is sometimes better than fitting a super-power valve and using only 120 volts of high tension.

The original receiver can be seen in the Somerset Street windows—the radio department—of Messrs. Selfridge & Co., Ltd., Oxford Street, W. Somerset Street is just at the back of the main Selfridge buildings in Oxford Street.

The pictures show (left) the first H.F. stage and (right) the second H.F. stage



The wiring diagram of the "James Quality Five." Comparison with the section photographs will help in wiring. A full-size Blueprint can be obtained from this office, price 1/6

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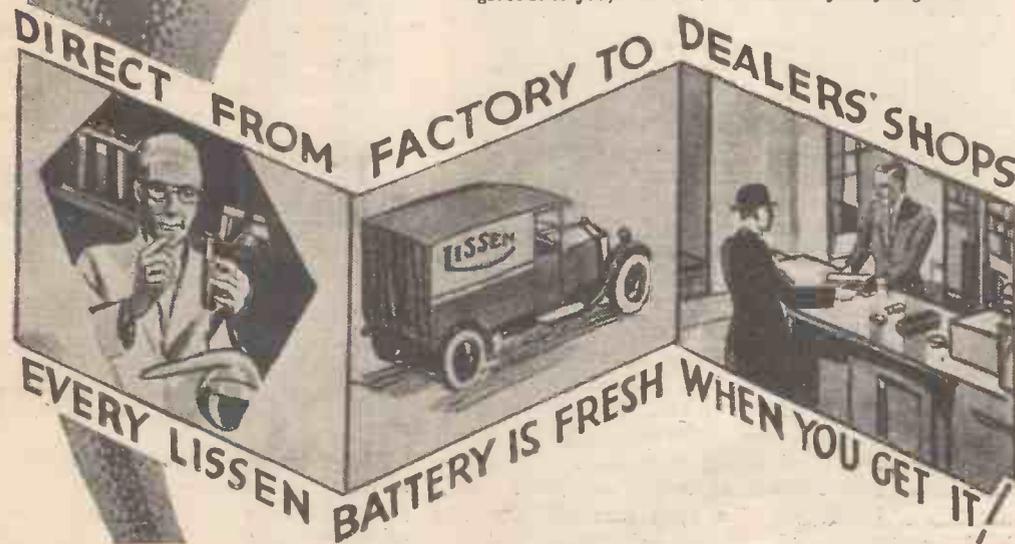


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"A.W." TESTS OF APPARATUS

Conducted by our Technical Editor, J. H. REYNER, B.Sc. (Hons.), A.M.I.E.E.

A Selectivity Unit

THE selectivity trouble is undoubtedly most deeply felt by those who possess very simple tuning systems in which the aerial is connected directly on to the end of a tuning inductance. Under these circumstances an advantage is sometimes obtained by connecting a series condenser in the aerial, but this is no general solution to the problem.

In view of these facts it is interesting to note that the British General Manufacturing Co., Ltd., are marketing a selectivity unit designed specifically to benefit users of simple tuners. The unit consists essentially of a tuned circuit on which the aerial is tapped some way down. This circuit is connected across the tuner or tuned circuit in one's receiver and produces the effect of a tapped aerial coil. The constants of the unit are chosen to give results on any wavelength between 200 and 2,000 metres, the whole being housed in a bakelite moulding, 2½ in. in diameter and 2½ in. high. The unit has three terminals, one for connection to the aerial, another for the aerial terminal of the set, and a third to be connected to earth. No alterations need, therefore, be made, apart from disconnecting the aerial from its terminal.

We actually tested the device across a standard all-wave tuner. Using a medium-length outdoor aerial, it was possible to separate the two stations sufficiently to be able to enjoy the one programme without hearing the other, except during a silent period. This performance is quite impossible with the tuner as normally used, showing that the unit performs the work



This is the British General Selectivity Unit which can be connected to practically any receiver

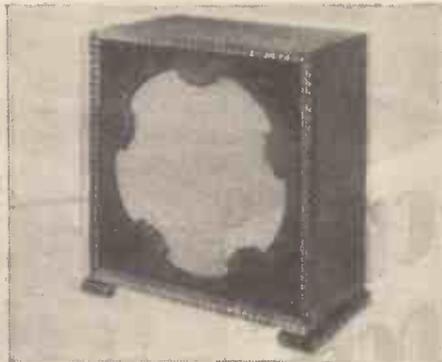
for which it was designed. We were also able to receive several Continental stations on all wavebands whilst the Brookmans Park stations were working.

This little unit appears quite practical and has the advantage over a wavetrap

that it affords selectivity on all wavelengths and requires no adjustment. It can be recommended.

New Amplion Loud-speaker

AMPLION loud-speakers have established an enviable reputation. Messrs. Graham Amplion, of Slough, do not special-



A new model Amplion cabinet loud-speaker, of very handsome appearance

ise only in expensive instruments, but also cater for the man who requires a small reproducer costing less than 30s. The purchaser knows that whatever model he chooses it will be suitable for the purpose for which it was designed.

This week we have tested a new Amplion loud-speaker, model A.C.8, the design of which is similar to the well-known Guinea Cone, with the exception that it has been housed in a polished oak cabinet. A 12-in. diaphragm made of a rigid but light material is used, and this rests freely on the front panel of the cabinet. The speaker has overall dimensions of 12¼ in. by 6½ in. by 13½ in. high. At the back of the cabinet there are four large diameter holes drilled for the purpose of preventing undue box resonance.

A very simple operating unit is employed, consisting of a reed in close proximity to two electro-magnets. An accessible adjustment is provided at the back of the cabinet, together with two terminals marked positive and negative. High-impedance windings are used to match the normal power and super-power type of valve.

We gained quite favourable impressions of this speaker on test. In consideration of the price, the results are good, both speech and music being reproduced with clarity and absence of undue resonance. The quality is of a type that one has long associated with good-class cone speakers, and when used after a normal power valve, with a 100-volts high tension, is capable of filling a small room with undistorted volume.

This speaker is attractive in price, appearance, and performance, and can be recommended to readers.

Handy Test Prods

THOSE who use mains apparatus and go in for high-voltage amplifiers will realise the advantages of being able to check the voltages at various parts of the circuit, provided, of course, that a suitable high resistance meter is used.

There is always some difficulty and, perhaps, risk in going over high voltage points with a meter. Owing to the liability of receiving a shock, one cannot hold the meter leads on to the terminals with the fingers, and, therefore, has to balance them in place. We think, therefore, that the appearance of special test prods marketed by Messrs. J. J. Eastick is certainly timely, as such contrivances are of the greatest assistance for making checks without the danger of receiving a shock.

In appearance these two prods, one red and one black, resemble a pocket pencil, for they are shrouded completely in polished insulating material. There is no accessible metal at all, until one exerts pressure on the top of the prod, forcing a small pointed brass electrode to make its appearance at the far end of the prod. During testing, therefore, it is merely necessary to place the prods on the terminals across which the voltage is to be measured, and on pressing the prods contact will be made, giving a reading on the voltmeter. There are times when one cannot exert pressure on taking a measurement, as, for instance, in finding the voltage between two fine wires. In such cases it is necessary to grip the prod lower down with two fingers and press the top with the thumb in order to obtain a reading.



These test prods with insulated handles and sheathed contacts will be very handy for use by all experimenters

The connections are taken to the tops of the prods and are held by a grub screw sunk well below the surface, thus preventing accidental contact.

We recommend that all those readers possessing high-voltage apparatus should possess a pair of these prods.

THE TRANSFORMERS THAT PUT 'A1' IN RADIO



The wonder transformer giving enormous amplification without any trace of distortion, equal to another valve stage in two valve sets, in addition to which we find on test that this New Ratio 7-1 Transformer gives remarkable results in many three valve receivers if used in the last stage using a 3-1 ratio transformer preceding it.

Made in three models, Telsen "Radiogrand" New Ratio 7-1 price 17/6, gives enormous amplification without distortion.

Telsen "Radiogrand" Standard Model made in ratios 3-1 and 5-1 price 12/6.

Telsen "Ace" the ideal transformer for Portable Sets and where space is limited, made in ratios 3-1 and 5-1, price 8/6.



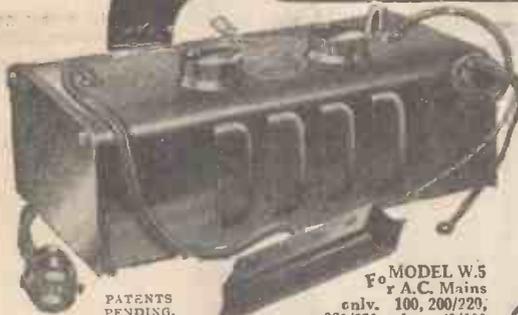
Telsen "Radiogrand" Standard Model ratios 3-1 and 5-1, price 12/6.

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L.T. side. H.T. Output: 120 volts at 15 m.a. H.T. Tappings: 2 variables (one S.C.) and one power. L.T.: Trickle Charger, for 2-, 4-, or 6-volt accumulators. Size 9 in. x 5 in. x 3 1/2 in.

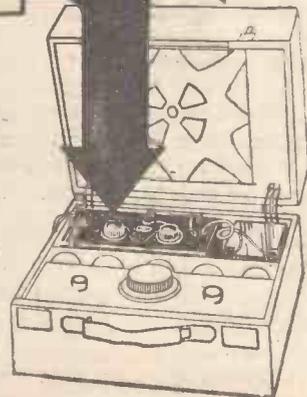
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MY WIRELESS

DEN *By* W. JAMES

Weekly Tips,
Constructional and Theoretical—



For the
Wireless Amateur

Those Wild Claims

OWING, perhaps, to the enthusiasm with which the pentode power valve was received when first issued, all sorts of wild claims were made.

Some said the new valve handled much greater power than existing power valves. Others thought the great advantage was the amount of power which could be dealt with even when the high-tension voltage was relatively low.

Probably the truth is that the pentode valve, as at present issued, actually handles no more power than standard super-power valves passing about an equal anode current. Where the pentode scores is in its ability to provide the full volume with much less input.

From this it follows that normally weak signals will be brought up to good strength. This is true in practice, and is the chief reason for using a pentode. Few would use it because of the quality of the reproduction.

Making Coil Taps

There are several ways of tapping a coil, but some have the disadvantage that the effectiveness of the coil is reduced. I have seen, for example, a twisted part an inch long left for a tap.

This is not good, as the whole of the wire in the loop and twisted part is in the coil. In another coil a long loop was taken to a terminal, this being equally bad.

A good method is to bare the wire at the tapping point whilst making the coil and to place below this portion a piece of tape. Then, when the coil is wound, a short piece of wire can be soldered to the bared length on the coil without injuring the wire.

One should avoid using a coil having too many taps, and if a number have been provided for experimental purposes it is better to wind a new coil when the right tapping positions have been found.

"Mixed" Dielectrics

Tuning condensers of small size having a treated paper dielectric seem to be coming into more general use, particularly for reaction purposes.

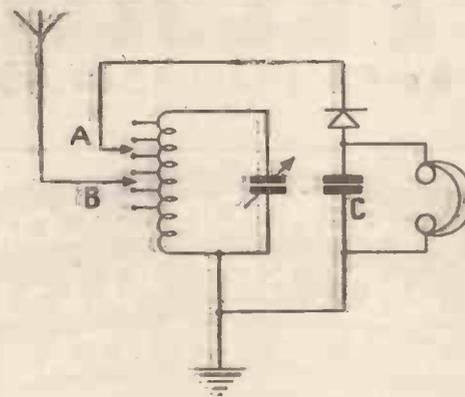
No doubt the type was produced especially for the portable set makers, but they have an advantage over ordinary types which warrants their use in cabinet sets. Most reaction circuits have a coil

and adjustable condenser joined between the anode of the detector and earth, with the result that if the condenser short-circuits something burns out or is damaged.

When a condenser having solid insulation between the vanes is used this cannot happen. This is why the type is being used.

A Good Crystal Set

A crystal set is of use to many amateurs besides those who normally listen



This is the simple crystal circuit referred to by W. James in the accompanying paragraph

with one. The ordinary type, having the aerial and crystal joined to the top of the coil, is, however, not quite selective enough for receiving the Brookmans stations with-

out interference. A tapped coil is needed.

The connections are given in the accompanying diagram. There are two tapped connections to make. First, the aerial is joined to a tap as at B, and then the crystal is taken to tap as at A. By trying various taps, positions will be found where the most suitable combination of selectivity and volume is obtained.

The coil could be of the single-layer type, having 60 turns of No. 22 d.s.c. wire on a tube 3 in. in diameter. Six taps equally spaced will be adequate. A by-pass condenser of .001 microfarad should be used at C, across the phones. With this set much more volume and better tuning will be obtained than from the usual solid coil set.

Remember the Earth

I wonder how many readers make a practice of overhauling their aeri-als and earths occasionally? The earth in particular seems to be overlooked, although it plays an important part in reception.

With a poor earth, a set may not be stable. The signals will be weak and the results as a whole will be below standard. So many people run a wire to a water pipe, make a poor contact and then leave it. A good clip ought to be used and if necessary the pipe cleaned before the clip is fitted.

When an earth tube is used, even more careful maintenance is necessary. The earth wire may corrode or the contact become loose. Also, the tube itself may work loose in the ground.

Bias, or No Bias?

Shielded valves seem to vary so widely in their characteristics that I have come to the conclusion that it is not always advisable to fit a 1.5-volt grid battery for grid bias.

One or two valves that I have tried, have far too high an impedance when biased to negative 1.5 volts, on the other hand, other valves pass 5 or 6 milliamperes without a negative bias. I, therefore suggest that the current be measured and if it is excessive, a grid-bias cell be fitted.

Poor amplification may be due to the use of a valve having an abnormally high value of impedance. This may be reduced, and the magnification increased by raising the shield and H.T. voltages and by cutting out the bias when it is fitted.

When Asking Technical Queries

PLEASE write briefly

A fee of One Shilling (postal order or postage stamps) must accompany each question and also a stamped addressed envelope and the coupon which will be found on the last page.

Rough sketches and circuit diagrams can be provided for the usual query fee. Any drawings submitted should be sent on a separate sheet of paper. Wiring plans and layouts cannot be supplied.

Queries cannot be answered personally or by telephone.

ONE MAN'S MEAT

Jottings from my Log. By Jay Cooté

SOME little time ago in these columns, when referring to the Radio Paris publicity concerts, I inferred that part of them, at least, was composed of canned music. I was wrong, and I stand corrected. The French station during its "Black Cat" and "Grosvenor House" hours on a Sunday puts the lid on the gramophone. For these broadcasts live artistes alone appear before the "mike," and, for the matter of that, most of them visiting the Paris studio have braved the terrors of a rough channel crossing specially for the purpose.

The French View

Without doubt, these special concerts of a thoroughly British character make a strong appeal to listeners on this side of the Channel, especially as these broadcasts provide a bright and pleasing alternative to the somewhat gloomy and cheerless entertainments on tap at our home stations. But what is one man's meat is another man's poison. Apparently, according to the French wireless journals, the Parisian does not take kindly to the foreign invasion. It is not so much, I believe, that both music and artistes are imported, but that announcements are made in our language for the benefit of listeners overseas.

The Frenchman considers this principle unpatriotic, although I believe that it has been explained to him that, failing a complete reorganisation of the broadcasting system in that country, the studios are compelled to seek financial assistance abroad. There would appear to be no commercial firms in France, as in America, desirous of paying worth-while prices for the purchase of time on the air.

Now, if you listen to gramophone transmissions, of which the number is daily on the increase in Continental stations, you will find that in most instances the an-

nouncements are made in both the native and a foreign language. A few nights ago I was misled into believing that a Norwegian broadcast was from England, so perfect was the pronunciation of the English titles. Gradually the foreign studios have realised that their broadcasts are picked up far beyond their frontiers, and for this reason, in order that distant listeners should be enabled to enjoy the programmes, announcements are made in more than one language. It is as it should be, for if "Nation shall speak Peace unto Nation" it is not much good talking in a "lingo" which the average fan notes in his log under the generic term, "foreign-sounded French, might be German," and so on. That the understanding of a broadcast adds considerably to its enjoyment is proved by the fact that on international relay nights, when programmes are fed to foreign countries from, say, one European capital, as is the regular custom abroad, in some instances tri-lingual announcements are made for the benefit of the different nations interested in the transmission.

International

With the advent of the high-power stations the international character of radio is being demonstrated more and more every day. At our elbow we possess home studios to which we may turn for entertainments of a purely local or British character, but our horizon has been considerably widened, and the distant Continentals which a few years ago may have been a casual or lucky capture, to-day have become a matter-of-fact daily addition to the wireless menu. We can rely on such studios as Oslo, Hilversum, Stockholm, Copenhagen, Rome, Milan, Budapest, and others on most nights to provide us with good entertainments.

"WALKING" CRYSTALS

THE frequency of a piezo-electric crystal depends upon its size. Quartz crystals can be cut to practically any frequency, but in ordinary commercial practice the frequencies vary from fifty to six thousand kilocycles. The crystal is held in light contact between a pair of metal plates which form the electrodes.

When in operation, under the influence of an applied oscillatory current, the resonance action is very pronounced. The alternate bodily contraction and expansion is often sufficient to cause the crystal to chatter or "walk" between the electrodes. Sometimes, in fact, the motion becomes so violent that the crystal is shattered to bits by the force of its own molecular vibrations.

FILMS FOR GRAMOPHONES

THE "talkie" method of reproducing speech and music from a film is now being adapted for domestic use as a substitute for the ordinary gramophone record. The sound "trace" consists of a sinuous line printed on a reel of film and reproduced by means of a photo-sensitive cell.

A complete opera, which in the normal way would require at least fifteen 12 in. records, can be recorded on a single film or reel, small enough to be carried in a coat pocket. The film is 400 feet long, with nine separate sound "traces," arranged side by side. In operation the film is unwound from the inside and simultaneously re-wound on the outside, the beam of light being automatically shifted from one "trace" to the other at the end of each traverse.

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(For list of parts see this week's issue)

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Causton



THE vaudeville programme arranged for transmission from London National on Easter Monday is a particularly attractive one; it includes such well-known artistes as Harold Scott, with his own songs; Effie Kalisz, pianist; Vivienne Chatterton, singing to harpsichord accompaniment; George Clarke, from *Darling, I Love You*; Cyril Smith; Ethel Lodge, in monologues; and Constance Wentworth, assisted by Frederick Lake, in a folk-song recital.

Cecil Lewis ("Uncle Caractacus") will produce Bernard Shaw's play, *The Man of Destiny*, on May 15; he was responsible for the microphone version of *Saint Joan*.

On Good Friday the B.B.C. will relay from the Church of St. Thomas, at Leipzig (Germany), a performance of Bach's *St. Matthew Passion*, under the leadership of Dr. Karl Straube. It will be broadcast through London Regional. Cologne and other German stations will also carry out this transmission.

Two short operas will be found in the Regional programme down for broadcast on April 28. The programme opens with an English version of Mascagni's *Cavalleria Rusticana*, with Miriam Licette, Tudor Davies, Gladys Ripley, and Bernard Ross as interpreters. Following this performance, listeners will hear Percy Pitt's English translation of Puccini's *Gianni Schicchi*, in the cast of which are Tudor Davies, Dennis Noble, Lilla Boddam, and Evelyn Arden. The transmission will be repeated through London National and Daventry 5XX on April 30, and on both occasions Percy Pitt will conduct.

According to a recent statement made at Paris by M. Mallarmé, the Secretary for the French Posts and Telegraphs, there is very little likelihood of any change being made in the broadcasting system in that country until 1931.

UOR₂, the official short-wave transmitter at Vienna, has now definitely altered its wavelengths to 25.42 and 49.40 metres. Although the broadcasts are carried out at low power, they are well heard over the greater part of Europe. At irregular dates a relay is carried out of the Vienna studio programmes.

The annual German Radio Exposition is to be held in Berlin from August 22 to 31; it is hoped to have the new broadcasting station and studio of the "Berliner Funkstunde," the largest and most modern in Europe, ready by that time.

Work has been started on the new relay transmitter to be erected at Salzburg (Austria). The station will be fitted with plant which was formerly used at Graz, but which is to be modernised. As the majority of the programmes are supplied from the Austrian capital it is possible that Salzburg, Graz, and Klagenfurt may eventually work on a common wave.

The Isles of Greece are to be linked up with Athens and the mainland by wireless telephone and telegraph services, for which the Greek Government has ordered equipment. Three of the latest type Marconi stations for duplex telephony and high-speed telegraphy are to be erected, one in or near Athens, one on the Island of Crete, and the other on Chios.

The short-wave telegraphy station HBC (Berne-Münchenbuchsee, Switzerland) has now been allotted the wavelength of 34.64 metres, in addition to the other wavelengths already in use for C.W. transmissions.

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“HOW TO DESIGN SCREEN-GRID CIRCUITS”

(Continued from page 561)

Features that matter

It's when you begin to look into J.B. Condensers that you appreciate the skill, the accuracy, the endless patience with which they are designed and made.

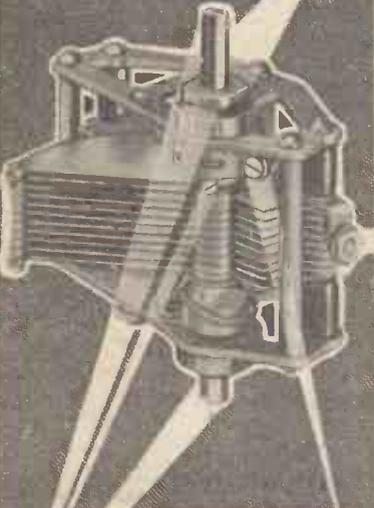
This is the Universal Log—one of the new models. It is the Condenser of the season, and has already featured in many of the Star Circuits. The frame construction is such that complete rigidity is assured.

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This bush is removable, enabling the Condenser to be fixed to Panel either end, left or right hand.



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Steel Centre Spindle, adjustable for length and particularly useful for ganging and attaching to Thumb or Drum Control.

Unfortunately, we have lost some of our amplification because the process works both ways. If we have the full coil in the anode circuit the internal and external resistances are equal, and we shall obtain 50 per cent. of the maximum amplification of the valve (assuming that this is possible without instability). Our effective anode impedance, however, is now reduced to one-quarter, so that we shall actually only obtain one-fifth of the amplification possible. Against this we must offset the step up, if any.

It is quite possible to work out the optimum condition for combining selectivity with amplification, and if this is done it is usually found that with the average screen-grid valve in use to-day a ratio around 1 to 1 is the best. We have seen, however, that we cannot afford this from considerations of selectivity, and therefore we deliberately sacrifice 20 per cent. or 30 per cent. of the amplification in order to obtain the increased selectivity which we desire.

It is not necessary in average practice, therefore, to employ cumbersome formulæ. One can work on quite simple rules combined with common sense, and one may, perhaps, summarise the whole situation in the following manner:—

1. From the known or estimated values of inductance, capacity, and high-frequency resistance of the tuned circuit find the dynamic resistance L/CR .

2. Compare this figure with the internal resistance of the valve. For reasonable selectivity the valve resistance should be three or four times the dynamic resistance. If this is not so, the coil must be tapped or a transformer used giving a ratio such that

Valve resistance $\times n^2 = L/CR$ multiplied by, say, 4.

where n is the step-up ratio.

3. Work out the amplification obtained from the valve from the formula.

$$\text{Amplification} = \frac{Rm}{R+n^2r}$$

where $R=L/CR$.

r =valve resistance

m =amplification factor

n =step-up ratio.

Make sure that this is within the limits of stability for the particular valve, as given in the table last week.

4. The effective amplification of the circuit is n times this value, and one must decide whether this is adequate for the purpose or whether one has made too great a sacrifice in obtaining selectivity.

SPECIFIED FOR THE JAMES 'QUALITY FIVE'!



FOR the JAMES QUALITY FIVE described in this issue, three Brownie DOMINION Vernier Dials have been specified. Only Brownie's huge production enables them to offer this really splendid dial for 2/6. The special non-backlash design makes hair-breadth tuning a matter of delightful ease, while its handsome appearance (black or beautifully grained mahogany bakelite) will add vastly to the good looks of the set that you build.

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Advertisement of Jackson Brothers, 72, St. Thomas Street, London, S.E.1. Telephone: Hop 1837.

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PRODUCED by the Specialists in Selectivity, the Sovereign Station Selector consists of an improved coil, with terminal connections, special former, silk-covered wire, and a "Sovereign" Type J

Compression-type Condenser. Sold complete with straight-forward diagram and wiring plan. From all Radio shops. If your dealer cannot supply "Sovereign" parts, do not accept substitutes.

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THE IDEAL COMBINATION
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Belling-Lee Terminal Type "B" 6d. Type "M" 4 1/2d. Type "A" 3d.
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LETTERS TO THE EDITOR



The Editor does not necessarily agree with the views expressed by correspondents.

Correspondence should be brief and to the point and written on one side of the paper.

Television Reception in Newcastle

SIR,—We are delighted to inform you that at the third attempt we picked up last evening (Friday, April 4) the first television picture ever received in Newcastle and, so far as we know, the first in the northern counties.

Our first attempt had been nullified by faults in our amplifier, the second attempt had been nullified by the fact that the motor in our televisior had not been running at the correct speed.

Last evening we used the "G.E.C. Stabilised Six" set, consisting of two stages of H.F., leaky-grid detector, one stage of L.F., transformer coupled, followed by two stages of choke coupling, with an LS6A in the last stage using 400 volts H.T.

So far as the detection and amplification side is concerned, this is not considered orthodox for the reception of television. Anode-bend detection and three stages of resistance-capacity coupling is considered the most likely to bring satisfactory results. All the more satisfactory, therefore, to receive television on a standard wireless set.

The first picture was that of a lady singing, followed by a gentleman, then a lady and gentleman singing alternately. We cannot claim that the pictures were by any means perfect, but at times the features were clearly distinguishable.

On the 261-metre wavelength fading was our biggest trouble and was the sole cause of our losing the picture completely at times.

Since receiving our televisior we have found that there is a tremendous amount of public interest, and we have had hundreds of inquiries as to when we will be able to demonstrate to the public.

PAYNE & HORNSBY, LTD.

(Newcastle-on-Tyne).

The "World-wide Short-wave Three"

SIR,—In your issues of November 9 and 16 of last year you described the "World-wide Short-wave Three." I have made up the set from your blueprint and instructions; but, unfortunately, up to date, I have had very poor results, and have only received one or two amateur transmitters on the phones.

I would like to get in touch with a reader of AMATEUR WIRELESS who has made up this set, so that we can compare notes. If any of your readers living within an hour or two's journey of Plumstead

would communicate with me, I would be pleased to have a chat to ascertain why I cannot get any results.—Francis J. Roberts, 28 McLeod Road, Plumstead, S.E.18.

The Average Listener

SIR,—I really must crave your indulgence and "have a go" at C.G., Catford. He has the temerity to suggest that that
(Continued on page 573)

THE CHOICE OF EXPERTS AND LISTENERS

SPECIFIED IN THE "Amateur Wireless" "ALL-IN TESTER" SET described in this issue

POCKET TYPE

READINGS:

0-150 Volts;

0-6 Volts;

0-30 Milliamps.

Res.: 5000 Ohms:

PRICE 8/6



The Original Wates "3 in 1" meter is recognised by experts and listeners as the first choice for accuracy, reliability and usefulness. Gives the three essential readings to accurate set handling and is invaluable for all listening purposes. Make sure you get the original "Wates 3 in 1" meter and avoid substitutes.

PANEL MODEL As Illustration 13/9

Write for literature to: STANDARD BATTERY CO. Dept. A.W. 184/188 Shaftesbury Avenue, London, W.C.2 Phone: Tem. Bar. 6195

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*Build it
to-day!*

forox,
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Gentlemen,

I had always wanted a good set, and it was by taking advantage of your easy term system that I was able to build the "Brookman's Four." I have recommended a number of my friends who cannot afford to pay cash to get their sets from you, on your H.P. system.

Thanks for replacing H.F. Choke.

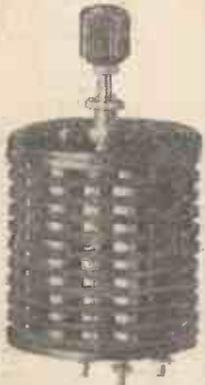
Yours truly,
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Broadcast and High Wave Bands from Centre Tapped ditto, each extra	9d.
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"LETTERS TO THE EDITOR"

(Continued from preceding page)

average listener is one who is satisfied with the B.B.C. alternative programmes and who doesn't worry whether he tunes them over 20 degrees of the scale or not. In addition, he tells "Thermion" bluntly that knob-twiddlers and ether-searchers are not in the majority.

I suggest that C.G. has not made himself acquainted with the average listener—the man who, after long hours at his daily job, turns on his set and finds pure rot being crammed down his throat for four days out of seven. The B.B.C. does put over really decent stuff occasionally, but the man in the street pays his money to be amused, and when he wants it—not as the B.B.C. ordains. W. J. H. L. (Uxbridge).

Results with the "Clarion 3"

SIR,—I have been a reader of AMATEUR WIRELESS for the last two years, during which I have made about a dozen sets, but I find that there is nothing to touch the "New Clarion 3." The results I obtained were absolutely marvellous. The set was rigged up and, using only a 60-volt high-tension battery, a weak L.T. battery, and some old valves, I received nine stations on the long waves and twenty-four stations on the short waves all in half an hour, and on the loud-speaker without the aid of phones for tuning. The valves I used were a Mullard PM12 for the H.F. stage, an old Osram DER, which I have been using for three years now, for the detector, and another Osram DEP215 for the L.F. stage, which has also been going strong for three years. P. (Dublin).

Detector Grid Bias

SIR,—In the March 29 issue there is an article on "Is the Grid-leak Potentiometer Worth While?" by Alan S Hunter. There was one important point which was not referred to in the article, namely, the voltage of the filament battery. For instance, with a 6-volt battery one gets a possible positive variation from the mean filament potential of 3 volts—2 volts from a 4-volt battery and 1 volt from a 2-volt cell. H. F. (Glasgow).

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General Correspondence is to be brief and written on one side of the paper only. All sketches and drawings to be on separate sheets. Contributions are always welcome, will be promptly considered, and if used will be paid for. Queries should be addressed to the Editor, and the conditions printed at the head of "Our Information Bureau" should be closely observed. Communications should be addressed, according to their nature, to The Editor, The Advertisement Manager, or The Publisher, "Amateur Wireless," 58-61, Fetter Lane, London, E.C.4.

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3 Types

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NAVA E - - £2 : 17 : 6
NAVA R - - £2 : 17 : 6**



**TUNGSRAM
BARIUM
Valves**

TUNGSRAM ELECTRIC LAMP WORKS (GT. BRITAIN) LTD.
Radio Dept., COMMERCE HOUSE, 72 OXFORD STREET, LONDON, W.1

Factories in Austria, Czechoslovakia, Hungary and Poland
Branches: Belfast, Birmingham, Bristol, Cardiff, Glasgow, Leeds, Manchester, Newcastle, Nottingham.

H. & B.
QUALITY KIT
JAMES QUALITY FIVE

Ebonite panel, 24 in. by 8 in.	8 0
2 Strips, 12 in. by 2 in. and 3 1/2 in. by 2 in.	1 4
1 Twin gang condenser, .0005 (Formo) ...	15 0
2 Variable condensers, .0005 (Formo) ...	9 0
1 Variable condenser, .0003 (Formo) ...	4 6
2 1930 Binowave coils, type C (Wearite) ...	14 0
1 1930 E type coil ...	17 0
1 Variable resistance (Clarostat Standard) ...	8 6
1 7-ohm Varley rheostat ...	3 0
1 Filament switch (Pioneer) ...	1 3
1 Pair panel brackets (H. & B.) ...	1 3
2 Vertical valve holders, with terminals (H. & B.) ...	2 0
3 Valve holders (W.B.) ...	3 9
1 .005 fixed condenser (Dubilier) ...	3 0
2 .0001 fixed condensers (Dubilier) ...	5 0
4 1-mfd. fixed condensers (Dubilier) ...	10 0
1 2-mfd. fixed condenser (Dubilier) ...	3 6
4 600-ohms wire-wound resistances (Wearite) ...	6 0
1 30,000-ohms wire-wound resistance (Ferranti) ...	4 6
1 100,000-ohms wire-wound resistance (Dubilier) ...	5 0
1 1-meg. resistance (Lissen) ...	1 0
1 2-meg. resistance (Lissen) ...	1 0
1 .01-meg. resistance (Lissen) ...	1 0
2 Grid leak holders (Lissen) ...	1 0
1 L.F. transformer (Super Lissen) ...	19 0
3 Special screens (H. & B.) ...	5 6
1 Pre-set type "J" (Formo) ...	2 0
3 Slow-motion dials (Brownie) ...	7 6
16 Belling-Lee terminals, marked ...	8 0
4 Rolls Glazite, wire, and flex ...	2 5

Cash Price **£9 14 0**

The H. & B. Kit contains only the above components and is complete with Full-size Blueprint, Panel and Strips DRILLED, and Five-ply Baseboard.
ANY PARTS SOLD SEPARATELY
Five specially matched Valves, Mullard, Marconi, or Mazda, 54 1s. extra. Hand-polished Oak Cabinet, best finish, 30/- extra.
JAMES QUALITY FIVE, constructed with components as per above list, together with five specially matched Valves, aerial tested and guaranteed. Royalty paid. Cash Price **£16 5s.**
Carriage Paid on all orders. C.O.D. charges paid on orders over £1.

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34, 36, 38 BEAK STREET, REGENT STREET,
LONDON, W.1.
Gerrard 2834.

BROADCAST TELEPHONY

Broadcasting stations classified by country and in order of wavelengths: For the purpose of better comparison, the power indicated is aerial energy.

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.)	
GREAT BRITAIN												
25.53	11,751	Chelmsford (5SW)	15.0	255	1,175	Toulouse (PTT)	1.5	LATVIA				
*200	1,500	Leeds (2LS)	0.13	265	1,132.2	Lille (PTT)	0.7	*825	572	Riga	7.0	
*242	1,238	Belfast (2BE)	1.0	268	1,121	Strasbourg	0.5	LITHUANIA				
*261	1,148	London Nat.	30.0	*272	1,102	Rennes (PTT)	0.5	*1,935	755	Kovno	7.0	
*288.5	1,040	Newcastle (5NO)	1.0	286	1,049	Radio Lyons	0.5	NORTH AFRICA				
288.5	1,040	Swansea (5SX)	0.13	*296	1,049	Montpellier (PTT)	0.3	304	824	Algiers (PTT)	10.0	
288.5	1,040	Stoke-on-Trent (6ST)	0.13	410	721	Radio Maroc (Rabat)	10.0	TUNISIA				
288.5	1,040	Sheffield (6LF)	0.13	1,250	240	Tunis Kasbah	0.5	NORWAY				
288.5	1,040	Plymouth (5PY)	0.13	304	986	Bordeaux (PTT)	1.0	304	824	Bergen	1.0	
288.5	1,040	Liverpool (6LV)	0.13	*316	950	Marseilles (PTT)	0.5	385	779	Frederiksstad	0.7	
288.5	1,040	Hull (6KH)	0.13	328.2	914	Poste Parisien	0.5	445	674	Rjukan	0.13	
288.5	1,040	Edinburgh (2EH)	0.35	328.2	914	Grenoble (PTT)	0.5	448	669.7	Aalesund	0.3	
288.5	1,040	Dundee (2DE)	0.13	369	812	Radio LL (Paris)	0.5	453	662	Tromsø	0.1	
288.5	1,040	Bournemouth (6BM)	1.0	*381	788	Radio Toulouse	8.0	453	662	Porsgrund	0.7	
288.5	1,040	Bradford (2LS)	0.13	447	671	Paris (Etat)	3.0	*453	662	Oslo	60.9	
*301	995	Aberdeen (2BD)	1.0	409	640	Lyons (PTT)	5.0	POLAND				
*310	968	Cardiff (5WA)	1.0	1,444	207.5	Eiffel Tower	12.0	211	1,400	Warsaw (2)	2.0	
*356	842	London Reg.	30.0	*1,725	174	Radio Paris	16.0	231	1,283	Lodz	2.0	
*377	797	Manchester (2ZY)	1.0	GERMANY				*213	959	Cracow	0.5	
*399	753	Glasgow (5SC)	1.0	*215.3	397	Flensburg	0.5	*335	996	Posen	1.2	
*479	626	Midland Reg.	25.0	*227	1,119	Cologne	4.0	385	779	Wilno	0.5	
1,554	193	Davenry (5XX)	25.0	*232.2	1,292	Kiel	0.35	385	779	Lemberg	2.0	
AUSTRIA				*231	1,283	Münster	3.0	*409	734	Kattowitz	10.0	
*246	1,220	Linz	0.5	*239	1,256	Nürnberg	2.0	1,411	712.5	Warsaw	8.0	
*283	1,058	Innsbruck	0.5	240	1,220	Cassel	0.25	ROUMANIA				
*352	851	Graz	7.0	*253	1,184	Gleitwitz	2.0	*191	61	Bucarest	12.0	
*453	666	Klagenfurt	0.5	*259	1,157	Leipzig	2.5	RUSSIA				
*517	581	Vienna	15.0	*270	1,112	Kaiserslautern	0.25	720	416.6	Moscow (PTT)	20.0	
BELGIUM				*276	1,085	Königsberg	2.5	824	364	Sverdlovsk	25.0	
206	1,460	Antwerp	0.2	*283	1,058	Magdeburg	0.5	938	301	Moscow-Stchelkovo (C.C.S.P.)	75.0	
210	1,391	Verviers	0.35	*283	1,058	Berlin (E.)	0.5	1,000	500	Leningrad	20.0	
220	1,364	Charleroy	0.25	*315.3	951	Bremen	0.35	1,060	283	Tiflis	10.0	
244.7	1,225	Ghent	0.25	*320	937.6	Dresden	0.25	1,103	272	Moscow Popoff	40.0	
246	1,225	Schaerbeek	0.25	330	833	Stuttgart	1.5	*1,304	230	Khar'kov	12.0	
337.4	889.2	Forest	8.0	*372	806	Hamburg	1.5	1,380	217.5	Bakou	10.0	
*509	590	Brussels	1.0	*390	770	Frankfurt	1.5	1,481	202.5	Moscow (Kom)	40.0	
CZECHO-SLOVAKIA				*418	716	Berlin	1.5	SPAIN				
*203	1,139	Moravska-Ostrava	10.0	*453	662	Danzig	0.25	250	1,202	Almeria	0.5	
*279	1,076	Bratislava	12.5	*458	657	Aachen	0.35	216.3	1,124	Barcelona (EAJ13)	10.0	
*293	1,022	Kosice	2.0	*473	635	Langenberg	15.0	*343	860	Barcelona (EAJ1)	8.0	
*342	878	Brunn (Brno)	2.4	*539	563	Munich	1.0	368	815	Seville (EAJ5)	1.5	
*487	617	Prague (Praha)	5.0	*560	536	Hanover	0.35	420	703	Madrid (EAJ7)	2.0	
DENMARK				*569	527	Freiburg	0.35	462	649	San Sebastian (EAJ8)	0.5	
*281	1,067	Copenhagen (Kjbenhavn)	0.75	*1,035	783.5	Zeesen	37.0	SWEDEN				
1,153	260	Kalundborg	7.5	1,040	782	Norddeich	10.0	281	1,301	Nalmö	0.4	
ESTHONIA				31 28 9,590	Eindhoven	HOLLAND						
*206	1,013	Reval (Tallinn)	0.7	*208	1,004	Hilversum (until 6.0 p.m. B.S.T.)	0.5	*257	1,160	Hörby	10.0	
FINLAND				*1,071	280	Hilversum	0.5	270	1,112	Trollhättan	0.01	
*221	1,355	Helsingfors	10.0	*1,071	280	Scheveningen-Haven	5.0	290	1,093	Falun	0.5	
1,796	167	Lahti	50.0	(from 10.30 a.m. to 6.0 p.m. B.S.T.)	HUNGARY				*322	932	Göteborg	10.5
FRANCE				*1,875	160	Huizen	6.5	*436	689	Stockholm (tests)	60.0	
29.70	10,180	Radio Experimental (Paris)	1.2	ICELAND				*542	554	Sundsvall	0.6	
175	1,714	St. Quentin	0.1	*1,200	250	Reykjavik	16.0	*770	389	Ostersund	0.6	
187	1,605	Radio Flandres	0.25	(under construction)	IRISH FREE STATE				1,200	250	Boden	0.6
195	1,539	Tourcoing (F8BH)	0.2	*225	1,337	Cork (IFS)	1.0	*1,348	222.5	Motala	30.1	
210	1,410	Radio Savoie	0.3	*413	723	Dublin (2RN)	1.0	SWITZERLAND				
212	1,415	Beziers	0.1	210	1,435	Budapest (Csepel)	7.0	*407	743	Berne	1.0	
212 8	1,410	Pécamp (Radio Normandie)	0.5	550	545	Budapest	20.0	*450	653	Zurich	0.6	
205	1,274	Bordeaux (Radio Sud-Ouest)	1.0	ITALY				680	442	Lausanne	0.8	
240	1,250	Nimes	0.25	*201	1,030	Turin (Torino)	7.0	700	395	Geneva	0.25	
248	1,211	Juan-les-Pins	0.5	*332	905	Naples (Napoli)	1.5	1,010	297	Basle	0.25	
				385	779	Genoa (Genova)	1.0	TURKEY				
				*441	680	Rome (Roma)	50.0	*1,200	250	Stambul	5.0	
				453	662	Bolzano (IBZ)	0.3	1,961	153	Ankara	7.0	
				*501	599	Milan (Milano)	7.0	YUGOSLAVIA				
								306.7	978	Zagreb (Agram)	0.7	
								431	695	Belgrade	2.5	
								674.7	522	Ljubljana	2.5	

All wavelengths marked with an asterisk have been allotted according to the Plan de Prague.

SELF-CENTRE

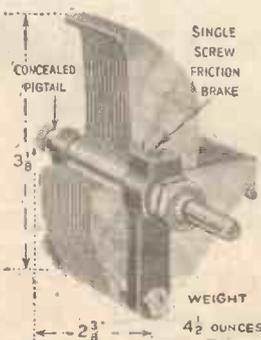
(Prov. Pat. App. For)

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Fit the "SELF CENTRE" device to your cone unit and you will be surprised at the improvement in the tone of your speaker. The "SELF CENTRE" will relieve driving-rod of side stress and chatter, positively centring driving rod, giving finer adjustment. No other device will fill this purpose and does away with all other forms of extension rods and chucks. This ingenious device will fit any unit. Tested and approved by A.W. Price 2/9. Post Free. C.O.D. Terms available.

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"1930" LOG (MID-LINE) CONDENSER



In four Capacities:
.0005
.00035
.00025
*.00015

4/6
each

WEIGHT 4 1/2 OUNCES
*Double spacing of vanes for Ultra Short-wave work.

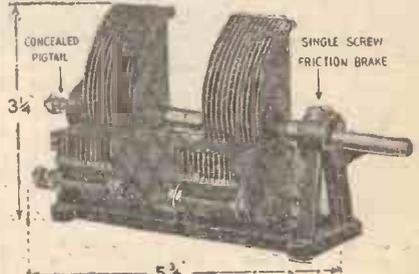
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SELF-OILING BEARINGS
ELECTRICALLY PERFECT
VELVET ACTION



GOLDEN SQUARE,
PICCADILLY CIRCUS,
LONDON, W.1

DUAL GANG CONDENSER



CAPACITY .0005 MFD.
15/6



Gentleman:

"Excuse me Madam would you mind if I smoked a . . ."

Player's Please

Lady:

Certainly not, I'll have one with you."



N.C.O.821

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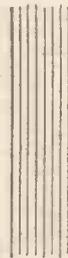
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9/6

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FOR REALISTIC RECEPTION AND LONG LIFE!



The station you want, when you want it! —Get it with a Lowden Valve—the valve with the special spiral wound anode that gives you greater volume and richer tone. Double strength Barium-coated filament specially made to withstand hard knocks. A British-made valve that gives you the perfect reception you've always hoped for.



NOTE THE PRICES!

Screened Grid	Each 17/6
2, 4 and 6 Volts, General Purpose, L.F. & H.F.	6/6
Power Valves	8/6
Super Power Valves	10/6

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Lowden Valve Works
Southall; Middlesex

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SPEECH AND MUSIC
TO ANY DISTANCE.**

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'SPRINGSCREW'**

WANDER PLUG IS BETTER

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Self-cleaning contact surface.

Simple and sure wiring device.

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Red and Black.
Engraved 1d.
extra.

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All Repairs. Re-magnetised Free. Tested.
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THE IDEAL GLUE FOR MAKING SETS & SPEAKERS

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Hyper-selective Two (D, Trans) AW198
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Clipper Two (D, Trans) WM135
Ether Ranger (D, Trans) WM156
Brookman's Two (D, Trans) WM168
A.C. Two (D, Trans) WM175
Programme Two (D, Trans) WM177
New Crusader (D, Trans) WM182
Radio-Record Two (SG, D) WM187

THREE-VALVE SETS (1s. each)

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All-wave High-mag. Three (D, 2 Trans) AW199
Knife-edge Three (D, RC, Trans) AW201
Talisman Two-three (D, RC, Trans) AW203A
Wide World short-wave Three (HF, D, Trans) AW207
Everybody's Three (SG, D, Trans) AW209
1930 Ether Searcher (SG, D, Trans) AW211
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Everybody's all-electric Three (SG, D, Trans)
-A.C. AW221
1930 Clarion Three (SG, D, Trans) AW223
Auto-coupler Three (D, 2LF) AW225
Standard Coil Three (HF, D, Trans) WM117
Short-wave Link (D, RC, Trans) WM142
Fanfare (D, 2 Trans) WM157
Brookman's Three (SG, D, Trans) WM161
Community Three (D, RC, Trans) WM164
New Q3 (SG, D, Pentode) WM167
Brookman's Push-Pull Three (HF, D, Trans) 1/6 WM170
Celerity Three (SG, D, Trans) WM173
All-nations Three (D, 2 Trans) WM178
Inceptodyne (SG, D, Pentode) WM179
Brookman's A.C. Three (SG, D, Trans) 1/6 WM184
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Outpost Four (SG, D, 2 Trans) WM165
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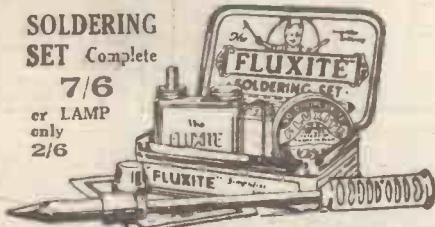
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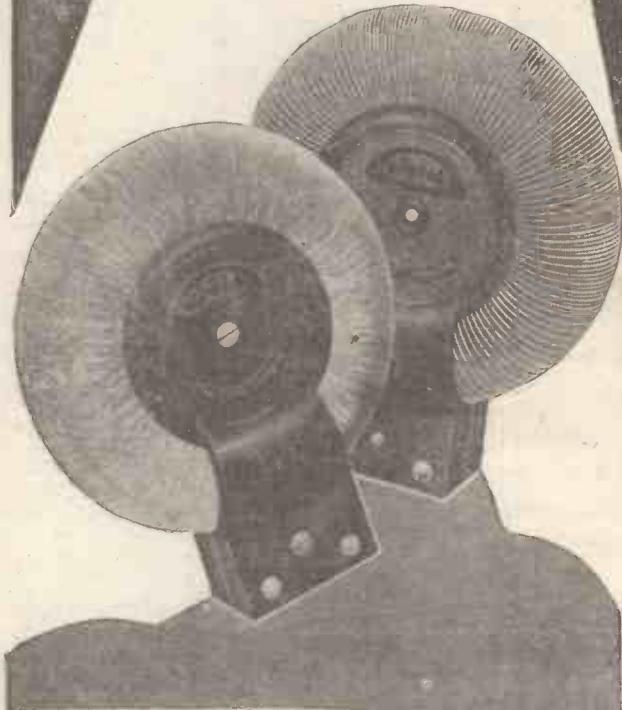
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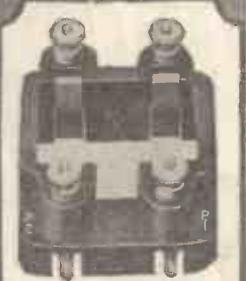
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No screening is necessary with the Dubilier Toroid Transformer. By the ingenious method of winding, the field is totally confined within the limits of the Coils. There being thus no external electro-magnetic field, there is no inter-action. The Toroid obviates unwanted "pick-up" from a near-by powerful station, and improves selectivity.

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Have you got the Booklet — "A bit about the Battery"? If not, ask your local dealer for a copy.



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BRITAIN'S BEST BATTERIES

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Amateur Wireless,
April 26, 1930

AN EASILY-MADE LOUD-SPEAKER

THE "MERRY-MAKER PORTABLE"—PRACTICAL DETAILS

Amateur Wireless

Every
Thursday 3^d

and
Radiovision

Vol. XVI. No. 411

Saturday, April 26, 1930

EASY-BUILT CONE SPEAKER

CHEAP TO MAKE



ALSO IN THIS ISSUE
The MERRY-MAKER PORTABLE

T.C.C.

**Condensers
cost no more
than ordinary
condensers
and are**

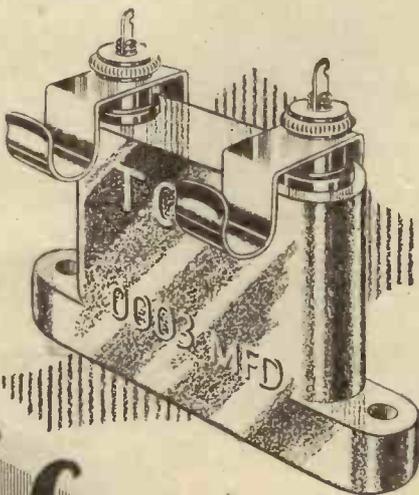
GUARANTEED

WHEN next you want a condenser be sure of its accuracy—be sure that it is dependable—that it will stand up to its job, in other words be sure it is a T.C.C. On this rests the efficient working of your Receiver. Remember that with the new prices you can now get a genuine T.C.C. condenser for the same cost as an ordinary condenser. Give your next Set a fair chance by fitting the “condenser in the green case”—made by the company that has made nothing but condensers for nearly a quarter of a century. Here is the upright mica type—one from the vast range of T.C.C. Condensers.

**T. C. C. MICA
CONDENSERS**
Upright Type

mfd.	s. d.
.0001 to .0009	1 6
.001 to .004	1 10
.005 & .006	2 6
.01	3 0
.02	3 6
.05	5 0
.1	8 0
.2	14 6
.25	18 0

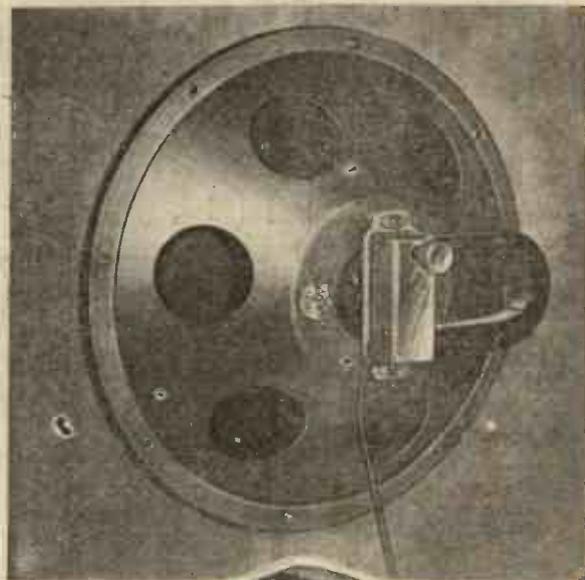
Tested to 500v. D.C.
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FOR THE 66K UNIT

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Everyone knows the unit; soon everyone will know the Chassis.

In five minutes you can build yourself a speaker which for quality and sensitivity is unexcelled. Screw the unit to the chassis—the cone is already in position—connect up to your set and you will hear Blue Spot at its best.

66K Unit costs 25/- and is sold under guarantee.

The Chassis is sold in two sizes; The Minor, with 9½" Cone (as illustrated), costs 12/6; the Major, with 13" Cone, costs 15/-.

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The Leading Radio Weekly for the Constructor, Listener and Experimenter

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A New Short-waver—Trouble in Spain—Eliminators in Court—A Damper on Portables—For the Ladies!—A Question for Sir Thomas!

A New Short-waver—"I have logged the new Vienna short-waver, UOR2, which you referred to in AMATEUR WIRELESS for April 9," writes H. C. (Kingston). "I know it was Vienna because it was relaying the same programme as the broadcast-band station. The wavelength was about 50 metres and the strength was quite good—nearly loud-speaker volume on the 'World-wide Short-wave 3.'"

Incidentally we have had many readers agreeing with the correspondent who said, recently, that he was annoyed at the number of short-wave "stations" which, on resolving the carriers, proved to be only B.B.C. harmonics! Still, it all adds to the fun of working on the wavelets.

Trouble in Spain—Microphones and radio have played their part in the political squabbles which are now going on in Madrid. When Sanchez Guerra, a prominent political anti-monarchist leader, made an important speech in a Madrid theatre, King Alfonso was able to listen in in safety to the bitter attack on himself. It is understood that microphones were hidden in the wings of the theatre and a land-line link was made with the Royal palace.

Eliminators in Court—Many districts are now changing over from A.C. to D.C.,

and the question of responsibility for changing over eliminators is worrying many mains users. A case of considerable interest in this connection was recently decided by Judge Cluer at Shoreditch County Court. An eliminator was bought from a dealer to be used with a set in Bethnal Green district, which is supplied with A.C. The purchaser subsequently moved to Southampton Row district, which is supplied with D.C. The eliminator wouldn't work at Southampton Row, of course, so the purchaser, who was quite ignorant of the technical reasons for this, returned the eliminator to the dealer and sued for the return of his money.

Judge Cluer Says—Judge Cluer held that the dealer was under a legal obligation to provide components which would function in the district for which they were supplied. In this case the eliminator was supplied for Bethnal Green, and the fact that it failed to work at Southampton Row did not entitle the buyer to the return of his money. What happens when the local suppliers of current themselves change the supply from A.C. to D.C. is, of course, quite another matter.

A Damper on Portables—America, where radio-equipped cars are going strong,

has now taken a sudden turn. In the States of Massachusetts and New Jersey official recommendations have been made that car wireless shall be banned. It is believed that the distraction caused might interfere with driving, and in one or two recent road accidents questions have been raised as to the part liability of wireless. While the politicians are talking about the new road-radio regulations several large car manufacturers who had intended fitting radio sets as standard in some models—the General Motors Corporation, for example—are having to mark time.

For the Ladies!—A women's prison in Barcelona has had installed an A.C. receiver to which is connected a large number of loud-speaker points. Those prisoners with a certain number of good conduct marks are allowed to have a loud-speaker in their cells. This raises the old silly-season topic of "Should we be Kind to Convicts!" And why only the women's prison, anyway? Is the male criminal in Barcelona too tough a nut?

A Question for Sir Thomas!—Should modern conductors be radio "fans"? Leopold Stokowski, the famous conductor, evidently thinks so! He is taking a three-months course of radio engineering with a view to advising on the broadcasting of large orchestras. He hopes that this will lead to a vast improvement in the technique of concert broadcasts. Ask Sir Thomas Beecham, Sir Henry Wood, or Sir Landon Ronald what they think about this—if you dare!

Glowing Loud-speakers—"Why are loud-speakers always 'dead' looking?" asks a reader in Newcastle. "I like the appearance of the new cabinet moving-coils marketed by a well-known company and which have a pilot light glowing inside, facing the cone. I've copied the idea in my speaker—not a moving coil—and the lamp is actually a pilot light in the L.T. circuit. It is a handy reminder, and there is a psychological effect caused by the glowing bulb which compels one to direct attention to the speaker." A good idea, we think.



TELEVISION DEMONSTRATED
A fair spectator being televised during the course of a television demonstration held last week at the Television Society's Exhibition in London. The photo cells are in the box above the subject's head, and the cell amplifier is in the foreground.

NEXT WEEK: Full Constructional Details of the "Merry-maker" Portable

HOW LISTENERS MIGHT CHOOSE THE PROGRAMMES

In Denmark listeners are asked to ballot for programmes when renewing their licences. Here are the details of this novel scheme, which with advantage could be copied by the B.B.C.



Kalundborg, the chief station in Denmark, in the Zealand district.

DENMARK has given a thorough test to a novel scheme for choosing radio programmes to suit listeners, and it certainly might be copied by England. It is virtually a compulsory ballot.

particularly biased in one direction. In other words, the results of the ballots show the opinions of the "extremists," and the average man is neglected.

What an effective idea it would be if the B.B.C. and the G.P.O. were to copy the scheme which has now been worked in Denmark for just over a year; namely, that a programme ballot is requested with the taking-out of a licence.

To see just how the idea is carried out, AMATEUR WIRELESS communicated with the officials in Copenhagen and obtained specimens of the ballot and radio-licence application forms. The ballot form is reproduced herewith.

This *spørge-skema* (questionnaire) has to be filled in by listeners, a cross being put in one of the three columns headed "more,"

tory and literature, talks on politics and social questions, talks on research and technical matters, special talks on agriculture, horticulture, and domestic economy, discussions, topical events, education (languages), church services, children's hour, boys' hour, communications for listeners, and news.

Unusual Features

There are several items in this list which seem strange to British listeners—the special classification of mandolins, balalaika, and harmonicas, for example. But much solo instrumental music of this kind is given by Continental stations. The *drengetimer* (boys' hour) is a good feature, and is more educational than the ordinary children's hour. *Lyttermeddelelser* which literally means "listeners' letters," is a feature which the B.B.C. might copy, and is the equivalent of the correspondence columns of printed papers. The *Pressens Radio-Avis* is really more than a news bulletin. It is somewhat similar to the *journal parlé* of the French stations, and is virtually a radio edition of a miniature daily paper.

A very critical analysis is made, and a sheet is published showing the number of replies received and the "more," "no change," "less" verdicts in each case. There are sixteen districts, including Copenhagen itself, Zealand (near the Kalundborg station), Jutland, provincial towns, country areas, etc.

Individual Tastes

Those filling in the questionnaire are requested to give particulars about themselves, and statistics are available showing the voting by farmers, traders, fishermen, workmen, Civil Servants, married women, and so on. The figures are rather formidable, but it really does seem that according to this scheme programmes can be chosen to suit various classes.

If, for instance, a workman objects to the Copenhagen programmes, he can be shown the statistics proving that he has been catered for in the programmes in the proportion of the voting given by his class!

Is such a scheme beneficial to Denmark? Undoubtedly, for this little country has a greater percentage of radio listeners than any other. The percentage of listeners to population is 87.95, whereas in England it is only 67.16, in Germany 49.1, and in Italy only 2.06!

SPØRGE-SKEMA

(Udfyldes af Lytterne).

NB. Besvarelse sker ved for hver Linie at sætte x i een af de tre Kolonner.

1. Højere Musik, derunder Symfoni- og Kirkeemusik
2. Lettere Orkestermusik
3. Blæseorkester (herunder Militærmusik)
4. Kammermusik, Piano og Violinsolo
5. Opera, herunder Transmission fra Det kgl. Teater
6. Operetter og Sangspil
7. Kor- og Kvartetsang
8. Solosang
9. Gammel Dansemusik
10. Moderne Dansemusik (herunder Transmission fra Restauranter)
11. Mandolin, Balalaika, Harmonika og specielle Instrumenter
12. Skuespil, Smastykker og Sketch fra Studiet ell. Teatret
13. Oplæsning af Digterværker, Poesi og Prosa
14. Let Underholdning, Kabaret, brogede Aftener o. lign.
15. Foredrag om historiske, literære, kunstneriske o. lign.
16. Foredr. o. naturvidenskab, geografiske, hygiejn., tekn.
17. Foredrag om sociale, økonomiske, politiske o. lign.
18. Spec. Foredr. (f. Eks. for Landbrugere, Havedyrk., Husdyr)
19. Diskussioner
20. Transmissioner af aktuelle Begivenheder, Møder o. l.
21. Undervisning (Sprog etc.)
22. Gudstjenester, religiøse Udsendelser
23. Børnetimer
24. Drengetimer
25. Lyttermeddelelser
26. Pressens Radio-Avis

	Der ønskes.			
	Mere	Som nu	Mindre	
.....				1
.....				2
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.....				26

Særlige Ønsker, se Bagsiden.

The Questionnaire which has to be filled in by Danish listeners when renewing their licences. A translation is given in the text

Ordinary programme ballots have not proved to be very helpful in England. Several daily papers have from time to time tried to get readers' opinions for the doubtful benefit of the B.B.C., but it has not helped towards better programmes, for one very good reason.

Unless there is some compulsion or special inducement about the ballot it is probable that 50 per cent. of those giving opinions will do so only because they are

"no change," "less." Thus a reasonably close analysis is obtained.

The subjects suggested are, in the order given; classical music, light music, brass bands, chamber music, opera (relayed from the Theatre Royal in the capital), light opera, choirs, songs, old dance music, modern dance music, "mandolins, balalaika, harmonica, and special instruments," plays and sketches, poetry recitals, light entertainment (*cabaret*), talks on his-

An introduction to the first "A.W." portable for this season—

—a simple all-enclosed three-valver with two L.F. stages



The MERRY-MAKER PORTABLE

Great strides have been made in portable set construction in the last twelve months. What really will make the 1930 portable better than its predecessors, though, are first, the new components now available, and second, the regional scheme. Here are preliminary details of the first of the "A.W." 1930 portables

SO many bricks, metaphorically speaking, have been thrown at the regional scheme that it is gladdening to come in the summer time to a phase of it which will enable thousands of listeners to reap some benefit. As though to counteract for the jamming and wipe-out experienced in some quarters during the winter months with home sets, there comes in the portable-set season the great advantages of having, over a large area in this country, two very powerful medium-wave stations giving alternative programmes.

This affects the portable-set user in several ways. For one thing he has not necessarily to bother about building a set with wave-change switches. Though this does not matter very much in the larger home-use receivers, wave changing is often



The external appearance is quite pleasing. Note the convenient thumb control

difficult to arrange in a portable set—particularly if an H.F. stage is included, and the high-frequency coil and the frame aerial have simultaneously to be switched on to the long and short waves.

The next point of importance is that

high-frequency stages will not be necessary, except where very great range is required, or where local conditions are extremely poor. In 1929 a portable-set user in, say, the London district could get 2LO, 5GB, 5XX and Radio Paris as the main stay of his outdoor radio.

There was a good deal of difference, usually, between the strengths of 5GB and 2LO, and this meant difficult searching. 5XX was not worth while worrying about, because it gave the same programme as London, and the reception of Radio Paris involved wave-changing. To get really good strength, both from 2LO and 5GB a high-frequency stage was needed, although the plain detector and two L.F. arrangement would work well provided one relied mainly on the local station.

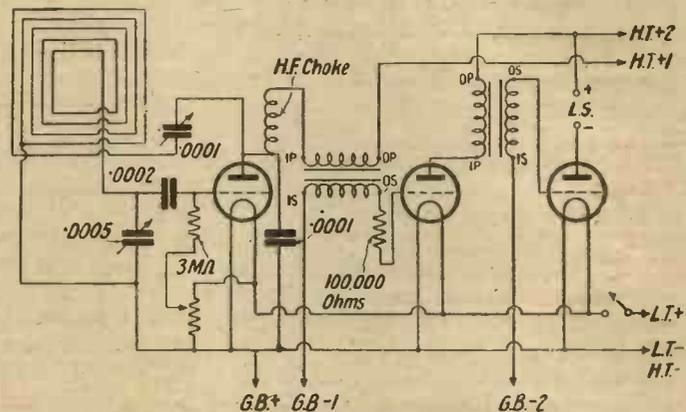
Now, with the Brookmans Park stations working and with the Midland regional station available for listeners in the centre of England, a detector and two L.F. portable should be in its element. The power of the two London stations having been so greatly increased, a good detector arrangement with an efficient frame aerial, and followed by two good low-frequency stages should certainly give all the punch that is needed.

It is because the AMATEUR WIRELESS designers are confident that portable users will experience these benefits from the regional scheme that they have designed the present receiver, which is of the type mentioned, namely, a plain detector with two transformer-coupled low-frequency stages.

The design of the set, and the manipulation, have been very largely simplified by

the fact that no wave-changing switch is incorporated, the purpose of the receiver being to work only on the medium-wave national and regional stations.

It should not be overlooked, of course, that many of the Continental broadcasters on the medium waveband oft-times come in at about the same strength as the B.B.C. stations, and even without a high-frequency stage, there are always two or three foreigners which can be relied upon to give



The circuit of the "Merry-maker Portable" is straightforward

alternative programmes to the Brookmans Parks and the Midland regional.

A set such as this present portable will certainly not quickly go out of date, and by the time the regional scheme is in full working order, there will be a wide gamut of stations all on the medium waveband which can be received.

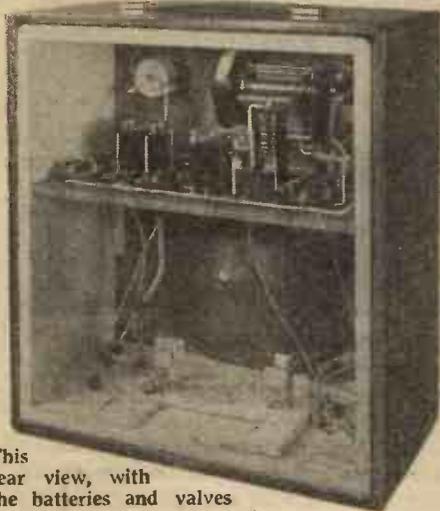
Components

Low cost is a great feature of this new receiver, thanks to skilful design and attention to such matters as component layout and current consumption. The following is a list of the parts required:—

- Portable cabinet (Camco "Carrier").
- .0005-microfarad variable drum-control condenser (Burton, Dubilier, Lotus, Polar, Ormond, Keystone).

"THE MERRY-MAKER PORTABLE" (Continued from preceding page)

0001-microfarad reaction condenser (Keystone, Bulgin, Lissen, J.B., Lotus, Burton, Formo, Polar, Ready-Radio).



This rear view, with the batteries and valves removed, clearly shows the simplicity of construction

Filament switch (Bulgin, Benjamin, Lissen, Junit, Lotus, Igranic, Claude Lyons).

Three valve holders (Lotus, Benjamin, Formo, Burton, Brownie, Wearite, W.B., Trix, Junit).

0002-microfarad fixed condenser with series-parallel clips (T.C.C., Dubilier, Graham-Farish, Lissen, Watmel, Atlas).

0001-microfarad fixed condenser (T.C.C., Dubilier, Graham-Farish, Lissen, Watmel, Atlas).

Two spade terminals, marked L.T. +, L.T. - (Belling-Lee, Clix, Eelex, Igranic).

Six wander-plugs, marked: G.B. +, G.B. -1, G.B. -2, H.T. -, H.T. +1, H.T. +2 (Belling-Lee, Clix, Eelex, Igranic).

Four-pole balanced armature loud-speaker unit (Lissen, Blue Spot, Watmel, Tunewell).

Piece of cone-paper (Six-Sixty, small size).

10-in. square of brown silk for fret.

Grid-bias battery clip (Bulgin).

High-frequency choke (Lewcos, Lissen, Ready-Radio, Tunewell, Keystone, Igranic, Bulgin, Wearite, Varley, Polar, Sovereign).

Two low-frequency transformers, ratios 3 to 1 and 6 to 1 (Igranic type J, Lissen, Telsen, Brownie, Lotus, Varley, Burton, Bulgin).

100,000-ohm fixed resistance (Graham-Farish, Ready-Radio, Lissen, Dubilier, Varley, Ediswan).

3-megohm grid leak (Lissen, Dubilier, Watmel, Graham-Farish, Igranic).

Fixed potentiometer (Polar, Lewcos).

Panel brackets (Lissen, Bulgin, Keystone).

4 oz. No. 22 d.c.c. wire (Lewcos, Keystone).

2 yards of thin flex (Lewcoflex, Keystone).
Connecting wire (Glazite, Keystone, Konekterkit).

This portable is a portable in the strict sense of the word, for it can easily be carried by hand. It is built in a most attractive wooden case, with a front combined with a loud-speaker fret having a very pleasing appearance. The portable can thus be used indoors as a transportable, and is an excellent piece of furniture. By careful arrangement of the components, the resulting battery space available is very generous (the actual batteries recommended will be dealt with later) and in spite of the fact that the set is entirely self-contained, including the loud-speaker, it is possible to incorporate batteries large enough for prolonged use in the house.

Alternatively, an eliminator or suitable dry batteries can be used for indoor working, the portable batteries being used when the set is taken out of doors.

The Controls

The photographs show that the front of the set is very artistically arranged. The loud-speaker fret occupies the lower part of the set front. Immediately above it and in the centre is the thumb control for the frame aerial tuning condenser. Thumb control is very convenient for portable sets. It provides a very sturdy and easily-manipulated adjustment of what is virtually the only control in the set, except for the reaction condenser: and the type of drum dial used in the present portable has an additional drum control slow-motion device which is very convenient.

To the left of the drum dial is the push-pull on-off switch, and to the right is the reaction condenser knob. The adjusting screw head of the loud-speaker unit is accessible from the front of the set, but is virtually hidden by the fancy fret, and is not at all in the way or unsightly.

The frame aerial box is made in one, as it were, with the front of the set. The cabinet details are clearly shown.

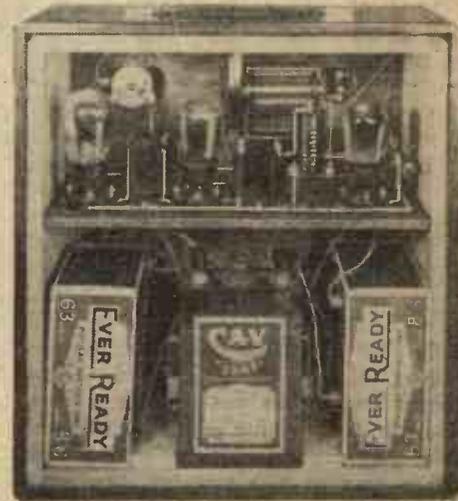
The Components Shelf

The main components of the set are mounted on little baseboard at right angles to the set front, and supported by two L brackets. The loud-speaker employed is of the cone type and is extremely easy to construct. In a simple receiver of this type, it was not considered advisable to incorporate a loud-speaker of, say, the linen-diaphragm type. Although this would give very good results, it would involve constructional work which beginners, impressed by the otherwise straightforward layout of this set might not care to undertake.

At this point it is opportune to mention that the blueprint of the receiver should be studied in conjunction with these notes, by all who want to build the set. A small reproduction of the blueprint will be given and this in conjunction with the list of

parts required and the circuit diagram, will be an aid to construction. All constructors are advised, however, to get a full-size constructional blueprint which can be obtained price 1s., post free, from the Blueprint Dept., 58-61 Fetter Lane, London, E.C.4. The set can be seen, as is the case with all AMATEUR WIRELESS receivers, in the windows of the radio department of Messrs. Selfridge & Co., Ltd.

In next week's issue, constructional notes and full operating details will be given.



The "Merry-maker" ready to work, with the back of the cabinet open to show how the H.T., L.T. and bias batteries are carried

G.B. for S.G.

ONLY those who keep a milliammeter continually in circuit with the negative high-tension lead really know what kind of load is being placed on their high-tension source of supply. I am open to wager that many a user of a multi-valve set would be simply horrified were he to measure his current consumption with the H.T. voltage right up to the mark. One point that probably would surprise him is the amount of current taken by screen-grid valves unless the control grid is biased. Recently I fitted one of the oldest patterns into the set and tried it out first of all before I had had time to install a biasing cell. With 150 volts on the plate and 75 on the screen-grid the total H.T. consumption for this valve alone was over 8 milliamperes, or as much as many output valves take. The introduction of a biasing cell made a considerable economy, and a little juggling with the H.T. voltages produced a condition of affairs in which the valve was giving first-rate amplification and not drawing, all told, more than about 4 milliamperes. For battery users every milliamperes counts, and the same is true of many sets run off the mains. If the eliminator is a small one a big current drain means a heavy drop in the voltage.

THERMION.

BROADCAST ARTISTES IN PICTURE



GLWADYS NAISH.—The "Welsh Nightingale." As a coloratura singer and exponent of oratorio, she has long excelled.



BERT COPLEY.—A popular entertainer and humorist of the provinces, Mr. Copley has been heard on many occasions through 5GB. He has a wide repertoire and a capacity for quiet humour and inimitable characterisation.



ISOBEL BAILLIE.—Miss Baillie is heard perhaps to best advantage in the Bach cantatas in the National Sunday programmes; she is equally at home in concert or operatic scores.



HARRY DYSON.—A member of the Belfast station orchestra, Mr. Dyson is one of the best-known flautists in the provinces. He has made a deep study of his instrument, both for solo and orchestral work.



BARBARA FREWING.—A singer possessed of an exceptionally sympathetic contralto voice, Miss Frewing has had wide experience in every class of vocal art.



WALTER GLYNNE.—Mr. Walter Glynn has a repertoire for every type of music; his rendering of the modern British songs of Coates and Quilter are always most artistic.



DAISY KENNEDY.—One of the very earliest of the famous artistes to broadcast. Her exceptional power and technique are particularly suitable for broadcasting.



DE GROOT.—For so many months in the early programmes of broadcast music, with his orchestra at the Piccadilly Hotel, De Groot evidenced still further his reputation gained both here and on the Continent, for musical values.



GLADYS ANCRUM.—Few operatic artistes have had more difficult rôles than Miss Ancrum, late of the B.N.O.C. Her special rôle is that of Venus in "Tannhauser."

Winding Your Own

"TALISMAN"

COILS

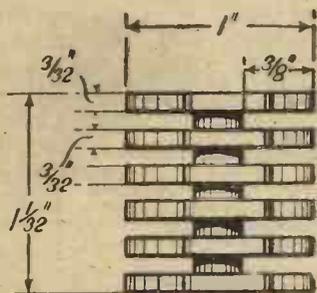
By
L. A. CHAPMAN

IN response to a large number of requests from readers, we give below the constructional features of the "Talisman" coil as originally published in our issue dated May 25, 1929.

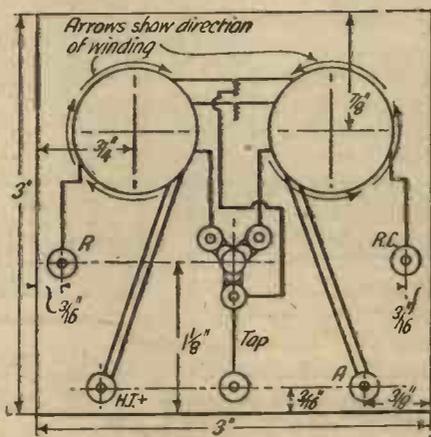
For the construction of the coils, proceed as follows. Having prepared or obtained the grooved formers and the base, mark each former with some distinguishing mark, and then proceed with the actual winding.

Begin with the medium-wave winding, which is at the lower end of each former. Looking at the plan drawing of the complete coil, take the left-hand former and wind on 80 turns of No. 32 d.s.c. copper wire in a clockwise direction in the lowest slot.

In the other former wind a similar number of turns of the same wire in the lowest slot in an opposite direction.



Details of grooved former



Plan of coils on base showing directions of windings

160 TURNS EACH NO. 36 D.S.C.

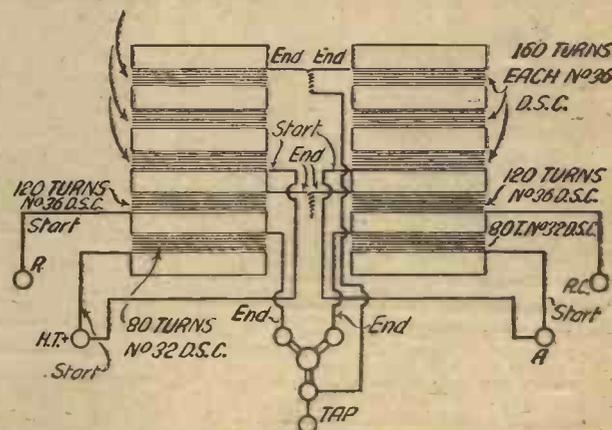
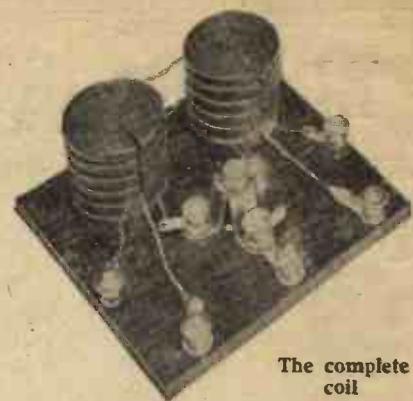


Diagram showing coil connections



The complete coil

The remainder of the coil is wound with No. 36 d.s.c. wire. Returning to the former first wound, wind on in the second slot from the bottom 120 turns of the No. 36 in a clockwise direction, and take care not to get the beginning and ends of each winding mixed up. Now wind on in each of the remaining slots 160 turns of wire without breaking the wire between the third, fourth, and fifth slots.

Mark the beginning and end of this winding.

Attention can now be directed to the winding of the other former. In the second slot are to be 120 turns as a complete

winding for the reaction, and in the remaining third, fourth, and fifth slots 160 turns each, this winding being continuous.

This second former is wound entirely anti-clockwise.

Connections

All that now remains is to connect up the beginning and end of each individual winding according to the drawing showing the detailed connections.

With this particular coil it is possible to tune from as low as 200 metres right up to 600 metres, on the medium waves, and from 1,000 metres or less up to 2,000 metres on the long waves.

OSCILLATIONS THAT LAST FOR DAYS

IF one sets up an oscillation in a tuned circuit consisting of an inductance with a condenser connected across it, the oscillations very rapidly die away, due to the presence of resistance. The current, we say, is "damped out."

Now, one of the things which one learns on first entering the realms of electricity is that the resistance of wire varies with temperature. As one increases the temperature, the resistance goes up, whereas when one reduces the temperature the resistance goes down.

It is quite easy to find the relationship between the resistance of a wire or coil and the temperature, and if this is done

a curious fact is brought to light. The variation is directly proportional to the temperature, and there is a critical temperature at which the resistance theoretically vanishes. This temperature is very low indeed, namely, -273 degrees. Modern science, however, is able to produce extraordinarily low temperatures by liquefying gasses like helium, or even ordinary air, so reaching temperatures within a very few degrees of this absolute zero, as it is called. When this is done it is found that the resistance of the wire really does become extraordinarily low.

The phenomenon is known as "superconductivity," and the resistance of the wire becomes so very small that it can hardly be measured. If one sets up an oscillating circuit consisting of a coil of

wire with a small condenser across it, oscillations, once started, will persist for days and days before they finally die out.

One cannot make much practical use of this, because the expense of maintaining the very low temperature of over -250 degrees is high, but it is an interesting commentary on the condition that is obtained with these low voltages. One often finds laws connecting certain properties, which indicate that at a certain point some apparently very desirable result will take place. Usually, however, before one gets within measurable distance of this point an entire change takes place in the character of the phenomena.

In this instance this is not the case to any appreciable extent. The resistance really does get lower and lower. J.H.R.

On Your Wavelength!

Getting America

HERE is a hint or two on receiving the medium-band American stations, such as WEA, WLW, WGN, WBZ, WBBM, KDKA, WGY, and WJZ. It is best to use one station as what we may call a "reference" transmission. What I mean is this. Choose a powerful station on a suitable wavelength and try it as soon as the closing down of stations on this side of the Atlantic has cleared the ether in that neighbourhood. If you can't hear anything of it, then it is most likely not worth while going for anything else. If, on the other hand, it comes in even faintly, then it is probable that you will hear something of other U.S.A. stations. The best reference station is WGY, which works on 380 metres. The power of this station is 50 kilowatts, and when conditions are good he is usually by no means difficult to tune in. Now, 380 metres is only one metre less than the easiest of all European stations, Toulouse Midi. Make a very careful note, therefore, of the exact settings required for Toulouse, and you won't have far to search in order to find WGY, if he is coming through.

Keep in Step

It is most important to have the tuned circuits exactly in step when you are searching, and here is a method that I find best myself. Assume that the second dial gives the more selective tuning. Set this at a point, tighten up the reaction a little and move the less selective dial until a slight rushing sound is heard, which means that the set is on the verge of oscillation, or in its most sensitive condition. If no transmission is picked up, advance the second dial a quarter of a degree, and move the first a little, first one way and then the other. Continue the process, advancing the more selective dial a quarter of a degree at a time, keeping the reaction coupling close and twiddling the first dial slowly to and fro. Don't try to pick up carriers with the set in oscillation and then to find the silent point. Silent-point tuning is always a hopeless business.

Don't Forget This

If you contemplate installing a battery eliminator or a mains receiving set and your local current supply is not A.C., don't forget to inform the powers that be that you are doing so. As I understand the position, electrical apparatus has to be altered or replaced free of charge if a change in the nature of the supply is made which renders it useless. If, however, notice of the installation is not given, then the authorities are under no obligation whatever to do anything in the matter. This hint is particularly important for those who at

present have direct-current supplies. All of these will eventually be converted to A.C., and you can safeguard yourself against future expense by taking the simple precaution mentioned. In the case of A.C. sets or eliminators it is not quite so necessary to give notice, for these are, as a rule, fairly easily and cheaply adaptable to changed conditions.

Few Valves or Many?

The ancient controversy between the few-valvers and the multi-valvers is being revived just now, and it is exceedingly interesting in the present state of affairs. Valves are, of course, far more efficient than they were in the early days of wireless, and we have components that will enable us, if we want to, to get an enormous amount of amplification out of them. With a screen-grid valve, for example, carefully picked and used with just the right components, one can probably obtain as much over-all amplification as from two neutralised triodes in cascade. The pentode, again, can do about as much in the way of amplification as a resistance-coupled L.F. stage plus a low-impedance output valve. One can therefore make to-day a three-valve set which is in every way as good in the matter of over-all amplification as the five-valver of yesteryear. We have made big advances, too, in the matter of selectivity, and I have been astonished to find lately what knife-edge selectivity is possible with only one high-frequency stage. Even if we discard the pentode and use a low-impedance output valve in the three-valver, we still have plenty of volume from both home and foreign stations.

Will the Three-valver Triumph?

The three-valver is certainly the most popular set to-day, and I think that it may remain so for a long while. The two-valver, however, is making a distinct bid for the favour of the wireless public. And very wonderful are the performances of some of these little sets. I tried out one recently which gave all the volume that one could possibly require from the local and one or two other stations. Its selectivity was remarkable, considering that it had no high-frequency stage, and it was, of course, an exceedingly economical set to use. The reader may say "Well, now that we have the regional scheme with high-power stations, the two-valver will probably come into its own." At first sight there would seem to be a good deal in this, but there is an unsuspected snag which provides the manufacturer with a really difficult problem.

A Queer Problem

Here it is. Within what I call the swamp

area—that is to say, at a range of from fifteen to twenty miles of a regional—there is ample volume to play with, even when an indoor aerial is in use. If you have not an H.F. stage you can increase selectivity only at the expense of a certain amount of signal strength. This does not matter within the swamp area, where there is an ample margin to play with. But if you make your set selective enough for this area it may be too selective and give too little volume in places outside it. Makers cannot afford to neglect the swamp areas, since each of these includes from 700 to 1,200 square miles of thickly-populated country, and to make two models would be unsatisfactory, for a purchaser would be justly annoyed if a set that he had bought when living close to a regional station became of little use if he moved further out and vice versa. The problem is being tackled, but its solution calls for some hard thinking. To my mind, one of the most curious results of the present regional scheme is that it makes necessary not a smaller, but a larger set for good all-round reception.

Radio and the Talkers

I find that all wireless men are interested in the technical side of talkies, particularly those who use gramophone pick-ups a great deal. After all, the problems that the radio-gramophone man has to overcome with his set for reproduction in small rooms are the same as those which, on a larger scale, confront the talking-picture man in the reproduction of sound in large halls. I am particularly taking an interest in the present contest for favour between the disc and film methods of reproducing talking pictures. Readers are already aware of the fact that there are two main systems: one in which the sound is picked up from a disc running in synchronisation with the film, and the other in which the sound is in photographic form on a track at the side of the film picture, and which uses a photo-electric cell for making the transfer of sound impressions from variations of light to electric impulses.

Sound Film Gains Ground

At the commencement of the talking-picture boom, there was no doubt that the disc method gave by far the better quality and more reliable results. Recently, however, the sound-on-film method has gained ground, and the results heard in current releases indicate that the disc is now left far behind, so far as quality is concerned. Two pictures recently released all over the country, *Honky Tonk* and *Fashions in Love*, are interesting demonstrations of the present state of affairs. Both films were recorded with the Western Electric system.

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On Your Wavelength! (continued)

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but *Honky Tonk* used discs and *Fashions in Love* had the sound on the film. So far as quality was concerned, the results obtained in the direct reproduction of sound from film were vastly superior to those from the discs.

Alternatives

I said "direct" reproduction from film, you notice. It is not generally realised that nearly all disc talking pictures have the sound recorded on film in the first place, and that the sound is transferred to disc before releasing the pictures to the cinemas. Picturegoers will find that, as a general rule, the shape of the picture on the screen when a sound-on-film system is being used is almost square, whereas the proportions of height and width of picture for discs is usually the same as for the old silent pictures. In short, disc talking pictures are usually *wider* than sound-on-film pictures. Many pictures are released with film and disc editions of sound, the latter being made, of course, by transfer. In the case of nearly all so-called "natural colour" pictures, discs have to be used on account of the special colour film base affecting the sound track of sound-on-film and giving crackling noises and distortion. Thus, the coloured sections of *The Great Gabbo* use discs, but the remainder of the picture, which is in black and white, has a sound track on the film. Nearly all cinemas can reproduce from both film and disc.

"A.W." in the Studios

I am occasionally a very privileged person and am permitted to see talking pictures made in one or other of the British studios. The other day, down at Twickenham, I watched some thrilling scenes being shot inside a *Zeppelin* gondola, in which there was a fight for the plans of a new "death-ray." Imagine my embarrassment when I discovered that the "plans" were actually a blueprint of the *Wireless Magazine* "Binowave Four," one of the most popular sets of last season, and still one of the very best! When you see and hear *The Last Hour*, try to spot it!

The Same with a Difference

Broadcasting is said to be a leveller. Certainly on many occasions homage does not appear to be paid to the extent to which we are, perhaps, accustomed. A curious example of this occurred only the other day, and such is the B.B.C.'s mentality on these matters that I have not been able to decide whether the matter was a slip on the part of the typist who prepares the agenda for the announcer or whether it is a deliberate piece of B.B.C.-ism or not.

Now, I think most people have heard of Coleridge-Taylor. His musical setting to Longfellow's *Hiawatha* is a classic, added to which he composed a number of other works

which are popular to a greater or less extent. I have always referred to the gentleman as Coleridge-Taylor and have always heard him spoken of in this manner. That being so, it took me quite a time before I was able to realise what this meant when the announcer the other day said that the band would now play several waltzes by C. Taylor. Can you beat it?

A Curious Fault

By the way, I came across an amusing little fault the other day. It took me nearly an hour to find it, and I laughed heartily when I did find it.

I had hooked up a perfectly simple valve amplifying circuit with which to try out a pick-up. I tried it out, and could get nothing whatever through. I tested the circuit piece by piece and found that the first valve was faulty. I replaced it, and found that the new valve was also faulty. Having done this three times, I began to grow suspicious and tested all the valves in another circuit. They were quite all right! I returned to the attack and made a few further investigations into the circuit. It was not until I did what I should have done right at the start, test the circuit through with a voltmeter, that I discovered no contact between the anode socket of the valve holder and the anode terminal. I therefore yanked out the valve holder and examined it, but could find no fault. The spring was quite in order and everything seemed to be O.K. In fact, when I tested the continuity between the valve socket and the soldering tag I found everything quite satisfactory.

Quite by accident I stumbled upon it. For some unexplained reason, a small washer had been inserted between the soldering tag which was in one piece with the spring and the screw running through the centre which carried the terminal nut. The hole in the soldering tag happened to give a good clearance, with the result that there was simply no contact whatever between the screw and the valve spring itself.

Photo-electric Cell Sensitivity

Television has given a wonderful impetus to the development of photo-electric cells. The activity and sensitivity of a photo-electric cell depend mainly upon the material with which the inner surface of the bulb is coated. All materials are photo-electrically active to a greater or less degree, but the most active ones have been found to be those which chemists call "rare earths," such as caesium, rubidium, uranium, etc.

Now no known photo-electrically active substances are sensitive indiscriminately to all wavelengths of light. Each such substance is affected by a definite band of light waves only, and has its point of maximum

sensitivity at some wavelength within the band. Speaking in general terms, the more active substances have their point of maximum sensitivity within the visible portion of the spectrum, while the less active substances respond best to light in the extreme violet or ultra-violet portion of the spectrum.

Sundry Applications

In the course of some investigations I was making recently, I was struck very forcibly by the multitude of applications to which photo-electric cells have been placed. It would astonish you if I just barely stated the number and diversity of objects in which they play their part; but I will content myself with mentioning a few of the most outstanding. We have talking films, telephotography, detection of dust and smoke in air and gases, optical alarm systems, control of printing and textile machines by means of stencils, control of chemical reactions, of smoke production and colour changes. As time progresses, the applications will extend farther and undoubtedly there will be a marked progress in television itself when the exact working of the cell becomes more perfectly understood and its manufacture thereby improved.

Amateur Television Apparatus

In order to gain a first-hand impression of the efforts made by amateurs in making up television receiving apparatus I paid a visit to the second annual exhibition of the Television Society. Amongst other things, the Society forms a common meeting ground for professional and other workers interested in current research relating to television and other allied subjects. The enthusiasm of the people I came in contact with was unbounded and some of the models which had been made at home displayed great ingenuity. There was a complete transmitter working under the control of three members and this supplied land line signals to those receivers which were capable of showing results. Obviously one did not expect to see as good images as obtained from the commercial product, but since necessity is the mother of invention, the schemes adopted to keep costs within the scope of the average purse were very creditable.

One associate showed what he claimed to be a new television system dispensing with mechanical parts, while there were several working exhibits which emphasised various television principles. Another associate displayed a piece of apparatus of his own invention which he had called the "Televidascope." It was a compact form of television receiver using drum exploring, and steps had been taken to enable more than one observer to see the image at the same time.

THERMION.

THE ADVANTAGES OF MASS-PRODUCTION RADIO

Discussed by the "Set Tester" in reviewing the Kolster Brandes K.B. 163 three-valve battery-operated set

A PAGE FOR THE SET BUYER

COMPARISONS are often made between the radio of this country and of America. Because the broadcasting conditions are so different, the sets also are different. One of the big differences between American and British sets is that in America mass-production by a few big firms is the rule, whereas in England there are dozens of small firms turning out limited quantities of sets. Whether the ultimate performance, valve for valve, of British sets is inferior to the American sets is debatable.

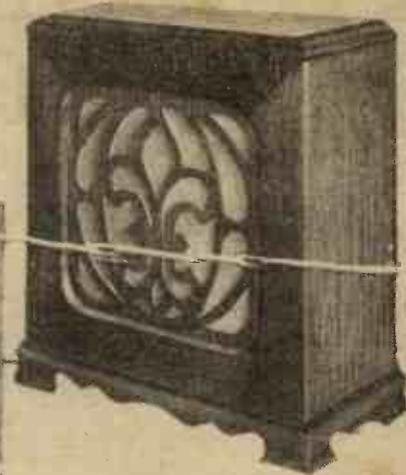
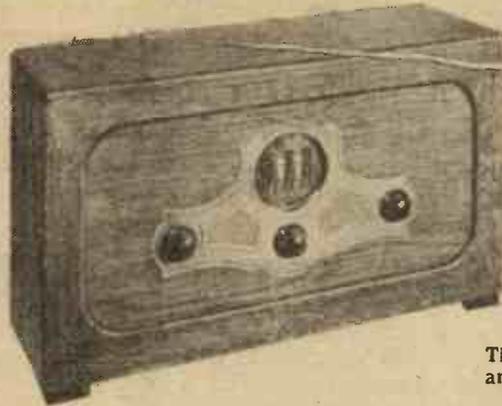
One obvious effect of mass-production in radio is the lowering of the retail price. Many British sets are expensive simply because they are mere assemblies of component parts. An exception is provided by the Kolster Brandes K.B.163 screen-grid battery-operated three-valver.

Simplicity of Assembly

The absence of unnecessary moulding material is notable. The set assembly consists of a metal chassis, stamped out to take the various components. From my tests, I can say that the low retail price of this set is not due to any sacrifice in performance. It is due to the more direct method of achieving the required result. There is much evidence of simplicity of assembly, which goes hand in hand with mass-production. The low-frequency transformer, terminal strips and other parts are either riveted or bolted to the metal chassis. As a result, the whole structure is unusually rigid.

Instead of a control panel on the front of the set, the makers have provided a large oxidised escutcheon plate, on which are mounted the controls. The general arrangement of the controls is good. There are three knobs and three drum-dials. Between the two main drum-dials, one of which is for aerial tuning and the other for the high-frequency coupling tuning, is a vernier drum-dial. This gives a useful auxiliary control of the more selective coupling tuning. In tests, I found this system of tuning very effective.

A clearly-worded instruction booklet is issued with the K.B.163 set. The function of the three knobs below the tuning controls is well explained. These knobs are for the usual wave-range changing, control of volume and control of reaction. I think the volume control would be improved by



The K.B.163 and K.B.72 loud-speaker make an excellent combination. K.B.72 costs five guineas

increasing its resistance, so that loud signals could be reduced more nearly to the point of inaudibility.

Model K.B.163 is designed for modern broadcasting conditions. Judging by the number of stations logged, it is sensitive on the high-frequency side. The tuning is sharp, but not critical. Most of the well-known Continental stations were brought in at good loud-speaker strength, using a 70-ft. aerial in south London. Rome, Oslo and Toulouse were particularly good. The last-named station was received clear of interference from the London Regional.

On the long-waves, model K.B.163 did well. Hilversum and Radio Paris offered good loud-speaker alternatives to Daventry 5XX. The sensitivity is about the same

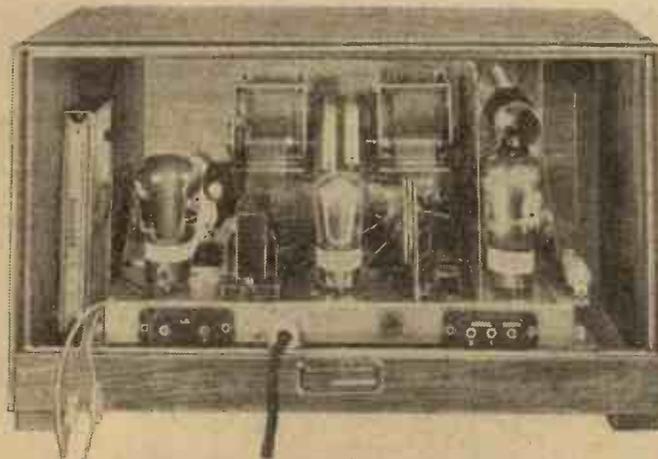
question whether the gramophone amplifying properties are worth while, unless a 150-volt H.T. supply can be provided.

I used three of the 45-volt Columbia super-capacity blocks for the test of reproduction quality. With the Kolster Brandes K.B.72 loud-speaker, quality was quite good. Better results were obtained than from an inexpensive mechanical gramophone. For one thing, the volume was controllable and for another the presence of some bass notes in the reproduction imparted a pleasing roundness of tone.

The makers point out in their booklet the need for large-capacity high-tension batteries for model K.B.163. I found that with the H.T. supply mentioned, the total anode-current consumption was just over 20 milliamperes. This rather high figure is due to the use of a pentode output valve. Double-capacity or super-capacity high-tension batteries are essential.

A Good Set

Provided that the set-buyer is prepared to use such batteries, I consider model K.B.163 is an excellent proposition. We need more of these straightforward three-valve sets for battery operation. After all, there are more listeners without electric light than with it. Further particulars of the set can be obtained direct from Messrs. Kolster Brandes, Limited, of Cray Works, Sidcup, Kent.



Model K.B.163 in the Kolster Brandes range is a good battery-operated three-valver, price £10 15s., including valves

on long and medium waves.

This set is also useful as a gramophone amplifier, provided that sufficient high-tension current is available. As a gramophone amplifier, the detector and pentode valves are brought into circuit by insertion of the pick-up plug. This act also provides the detector with negative grid bias. It is a

A lowbrow who dislikes the Sunday afternoon transmissions of church cantatas has suggested that they should be confined to some place like Heligoland. We suspect, however, that his Bach is worse than his Bight.

IT is a curious fact that, whenever a British radio expert visits America, he comes back either violently for or against everything connected with American radio. America has that effect on most people. Candidly, I came back hating the thought of my country's radio; but a sufficient lapse of time has brought things into a better perspective. In a prominent New York newspaper I made the following somewhat rash statement: "We are left with a feeling of profound regret that our own radio conditions are so remotely different from those prevailing in America." I must have been impressed at the time.

About American sets—are they really better than ours? I still think they are; mass-production, a public with a large purchasing power, and the fact that radio in America is not an institution but really "big business," are contributory causes.

They use electricity more freely in America than we do. All-electric sets naturally predominate because Americans do not have to worry about the total anode-current consumption, the number of valves need not be limited. The average American set has six or seven valves. Two or three of these are high-frequency amplifiers. There is a general assumption that America needs greater selectivity than England. But is this really so? The European ether is just as congested as the American ether.



Money is spent lavishly on American broadcasting; this studio is typical

Our set-makers often seem to overlook the fact that it is quite easy to tap the European ether for broadcast reception, quite apart from the B.B.C. transmissions.

One obvious reason for using more stages of amplification in American sets is that their valves are not so efficient. We cer-



Some Impressions by Alan S. Hunter, obtained during a tour of the States

tainly lead the world in valve manufacture. But more than one American set-manufacturer pointed out to me that the big drawback of making their high-frequency valves more efficient was the resulting deterioration of apparent selectivity

We have a lot to learn about ease of control. The curse of British sets is their reliance on reaction to bring in distant stations. Foolproof operation of a set is quite impossible under such conditions. Three high-frequency stages, as in American sets, get rid of reaction in the only possible way, by increasing the high-frequency sensitivity. One-knob control is insisted upon in America, and set-buyers get it. What is more, the knob is a control, not a fiddling gadget. Large and easy to grip, the tuning control of an American set has an easy-to-read illuminated dial calibrated in wavelengths.

Portable Sets

One consolation about the British set market is the portable. This type of set is rare in America, except on the dashboards of cars. The necessity for using batteries, and the fact that we have very efficient valves probably explains why we have developed portables so considerably.

One might imagine that with so many people living in apartments, the portable would be much in demand in America. But nearly all the big sets I saw required an external aerial connection. Admittedly a small indoor aerial was quite sufficient. One American set manufacturer told me that portables had been found quite useless

in the big cities, owing to the screening effect of the steel skyscrapers.

Captain Round mentioned, some weeks ago in AMATEUR WIRELESS, that he thought British portables would have "rather a thick time" if worked in the neighbourhood of New York. The portable I took to the U.S.A. had the time of its life! Readers will remember that the basic circuit was later embodied in a very popular set, the "Music Leader." With its two stages of tuning and frame aerial, this British portable had no trouble in separating New York's dozen odd stations. Personally, I think the American set manufacturers have missed a big chance with portables.

On that vexed question of quality, I am still convinced that America has us beaten and will continue to beat us until we have considerably extended our use of electricity. The almost universal use of large power valves in push-pull, with three or four hundred volts on the anodes, accounts for the superior quality of American sets. How can we hope to cope with them when our 120-volt battery has dropped to about 100 volts through hopelessly over-running it?

American Programmes

The average American set is housed in a fine cabinet, which accommodates both the set and the loud-speaker, the latter nearly always a moving coil.

But with all their superior sets American listeners have less scope in reception. No matter where one is located in the North American continent, one is at the mercy of either the N.B.C. or the Columbia chain system. Rival advertising interests have remarkably similar ideas on what the radio public want. I hope they want a high percentage of jazz, because that is what they get!

Those who compare the B.B.C. programmes with American programmes sometimes overlook the fact that their comparison is incomplete. To get a fair idea, we ought to compare American programmes with those of the whole of Europe, including the B.B.C.'s. With a modern British set, by which I mean a recent one, I have been able to get far more varied entertainment from the ether of Europe than could possibly be conceived by an American listener.

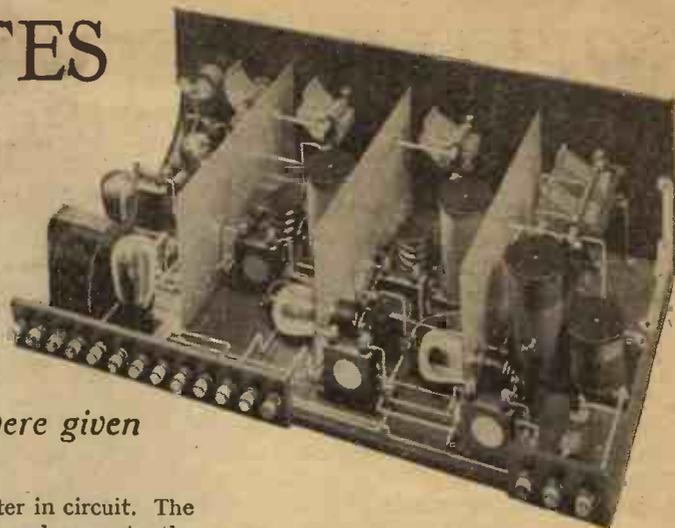
Tom, Dick, and Harry have been writing to the B.B.C. protesting against the dance orchestras playing while the announcer introduces the various artistes in the vaudeville programmes. We trust that this has not caused Jack pain.

OPERATING NOTES

on *The JAMES*

'QUALITY' FIVE

Full constructional details of this receiver were given in our two preceding issues



THE selectivity of a receiver depends not only upon the number of tuned circuits, but upon their arrangement. Thus, when the coils have too low a resistance, the tuning is very sharp and the higher notes are lost.

Stray couplings in the set may also produce this effect. They have the effect of lowering the apparent losses in the circuits and, therefore, tend to produce instability.

It is therefore necessary so to arrange the coils and other parts of the circuit that stray couplings are the minimum, and the coils ought not to be so low-loss that high notes are lost. If, on the other hand, the coils are made of too high a resistance, the combined tuning may be broad, although distortion will be the minimum.

The magnification also depends to an extent upon the design of the coils, for if they are of high resistance we obtain but little amplification as well as broad tuning.

Detector Anode Current

It is a difficult matter to obtain the best results by using single tuning circuits. The selectivity and magnification may naturally be so balanced that very good results are obtained, as with many three-valve sets having a shielded valve stage. But with an aerial filter circuit, as used in this set, the tuning is not only much better, but the quality is preserved.

I have tried to show this below. Here are three sets of curves. They show how the anode current of the detector varies with the aerial tuning. A milliammeter was connected in the anode circuit of the detector. This is of the leaky-grid type; therefore the current falls as a signal is received. The extent of the reduction is an indication of the strength of the signal applied to the detector, but the output from the set depends upon the degree of modulation.

The change in the current is a good indication of relative strengths. Sets of readings were taken for the London National, Regional, and 5GB stations, first with the tuned aerial coil connected to the first valve, and then

with both coils of the filter in circuit. The only other adjustment made was to the high-frequency volume control, the initial strengths of the signals being set, as shown by the current passing through the detector at equal values.

If this had not been carried out, the detector would have been overloaded. The current was noted for various settings of the dial of the aerial-tuning condenser, a large 180-degree dial being used.

You will see that the curves are peaky and have wide bases when only the single tuned aerial coil was used. London Regional and National interfere, and the Regional can also be heard when tuned to 5GB.

Very different results are obtained when the filter is connected. The tuning is much better. The curves show a flatter top with steep sides.

Interference is prevented and the quality is much better. Actually, the curves dip at their tops, but this cannot be shown with the scale used.

There is a marked difference in the results when the filter is connected. Distant stations are heard more clearly and little volume is lost. Tuning is not very different when the filter is used and is, if anything, rather easier.

The tuning of the set, as a whole, is soon mastered. There are the three tuning condensers, the volume controls, and the reaction. First put the two volume controls full on. This means that the filament

resistance must be turned on, and the compression type resistance used in the low-frequency circuit adjusted to have its greatest resistance.

Tune in a station in the usual way, and then adjust the H.F. volume control. Notice that the tuning appears to be a little sharper as this control is turned down. The H.F. amplification is, of course, reduced, but, owing to the fact that the impedance of the valves is increased, their damping effect is decreased. By operating the reaction condenser and the H.F. control you will find that the selectivity and magnification can be varied over a wide range.

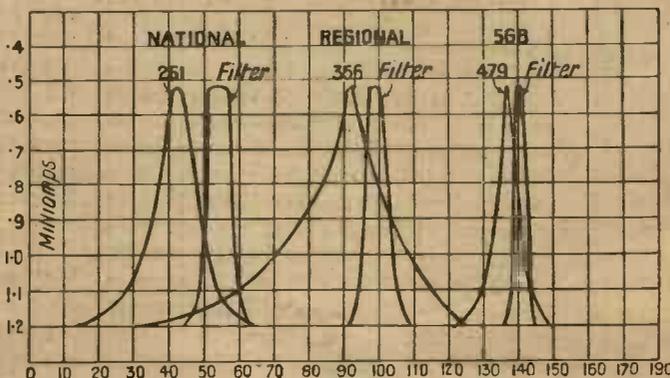
L.F. Volume Control

The low-frequency control does not distort in any way, as it comprises a resistance connected across the primary of the L.F. transformer and its effect is to vary the amount of the L.F. magnification. With a little practice, both controls will be found of great value not only for the purpose of regulating the signal strength, but for adjusting the apparent selectivity.

I have explained that a reasonably high anode voltage is advisable in the interests of good quality of reproduction and adequate volume. As separate terminals are provided, a mains unit may easily be fitted, but those having batteries will be able to connect the terminals for high-tension to the shielded valves as well as the first L.F. and power valves.

H.T. Values

The performance of some shielded valves is so greatly affected by the voltage of the shield that it is advisable to adjust this voltage with care. Commence with the value suggested by the makers and then try others about this value. The valves used in my tests were Cossor and Osram. Both function very well, and no doubt the other makes do as well, although I have not tried them.



Curves showing how detector anode current varies with tuning

WITHOUT FEAR OR FAVOUR



The Dance Bands Again Chamber Music

THE old but ever-fresh controversy of dance bands. Several listeners have raised the question with me, and foremost among them has been "Harold," who has been researching. Apparently he has sacrificed his much-needed beauty sleep and stayed up late at nights listening to dance bands and studying their different technique.

I am afraid I cannot deal with his pages of comments. I should require a volume. But apparently he agrees with a member of one of the biggest bands which used to broadcast, whose opinion—rather piquant in the circumstances—is that the bands which have succeeded his are too small.

"They don't do enough of their own orchestration," he said, "but play from the standard band parts, which makes them all sound alike."

Another plaint of his is that the style of the average broadcasting dance band to-day is about four years old. They still have the "oom-pah oompah" rhythm, which died long ago. Up-to-date "hot" bands don't seem to be popular with the B.B.C.

His opinion of Jack Payne's ensemble was almost blasphemous. "It isn't a dance band at all!" he declared. "It's a stunt band, fit for a (censored!). They haven't a ha'porth of rhythm and they make every foxtrot sound like a barn dance."

One usually does not take much heed of the views of a band that has been "ousted," but others of my friends seem to endorse what this ex-broadcaster says.

As for me, even if Jack Payne's is a "show band," I should like to know what dance bands are not. Incidentally, compliments are offered to the West Endians, of Birmingham. "Although a little old-fashioned in style, they have plenty of pep and go."

"Antipo," of Hove, writes a charming letter stating that he always agrees with most of my views, but supports a correspondent who rather "went" for chamber music. As a sort of "middleman listener"

A Weekly Programme Criticism by Sydney A. Moseley

of seven years' experience, who has sat still under considerable pressure, chamber music has at last broken his resolve: "and I am writing to you."

"Melody and rhythm," he writes, "whether in high-brow or low-brow music, is delightful; but in chamber music the concatenation of caterwauls, which generally characterises these pieces, accompanied by such ear-splitting shrieks and wailings all out of tune with each other, renders the whole an inharmonious caricature of true music. To many of us it sounds like the individual members of an orchestra 'tuning up' their instruments, each regardless of what notes the others are playing."



An impression of Miss Dorothy Black

Herbert Blair (South Shields) tells me that he thought of the suggestion of the referendum over three years ago. He is not expecting a knighthood, but thinks we ought to know.

Any counter claims?

Mr. Duff Cooper's talk on Egypt was interesting, although I am not prepared to follow him all the way in his arguments. Egypt is a land of paradoxes.

Admitting Mr. Duff Cooper's argument that people would rather be badly governed by themselves than well governed by

A Referendum? Programme Timing

foreigners, the fact remains that a good many friends of Egypt (who would agree to evacuate) are afraid that if we do so some other big power will step in, thereby threatening our gateway to the East.

Generally speaking, the B.B.C. programmes keep very well to time. Occasionally, however, the items have to be chopped off, and it is naturally irritating to find that often these items are just what you have been waiting to hear.

Frederick A. Dudley, of Twickenham, for instance, complains that Marcel Dupre was cut off at 10.10 p.m. on Saturday evening without concluding his recital, "which seems rather strange, in view of the fact that only the news and closing down were to follow."

My correspondent goes on to point out other instances, and finished up by saying: "It is disappointing in the extreme to have this frequently happening, and if the Programmes Department were to exercise greater care it would surely not be so exceedingly difficult to time items more successfully."

I listened to Phillip Ridgeway's "music-hall" series with interest. First of all, the effort to recall the good old songs is commendable. It is thrilling to hear again those rousing choruses. But the effects were not good. Our music-halls were never the uproarious places Ridgeway would have us believe. Hearty applause, yes; and an audience-join-in chorus once every while; but surely it wasn't done on such a scale as portrayed by Ridgeway!

Then, the talking between the acts; if anything ever maddened me it was those silly women! One gets them, sometimes, but surely never so raucous and so inane. To sum up, the old-time songs were welcome, and I hope we haven't heard the last of them; but the effects needed toning down badly—they were sadly overdone.

Savoy Hill perseveres in giving us modern music, and although we have got to like some of it, I fear that the majority is pretty well hopeless. Schönberg brought forth a protest from one of the daily newspapers. As if the B.B.C. didn't know before.

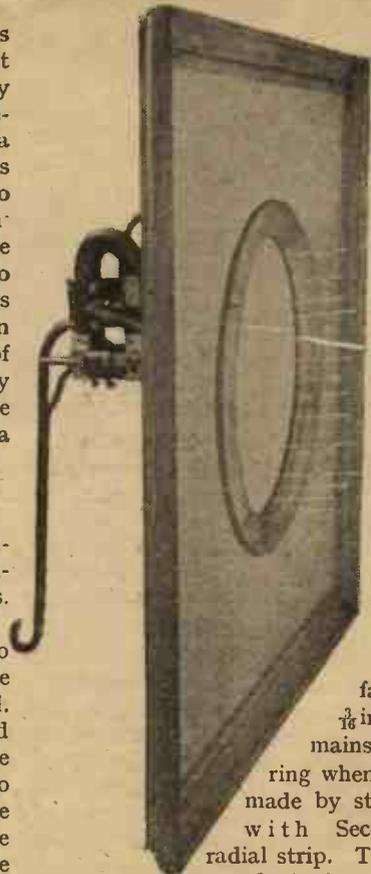
THE loud-speaker described in this article is not new in style, but represents the development of very simple construction. The majority of home-constructed loud-speakers consist of a baffle-board or a cabinet, a cone, a chassis and a driving unit. These are assembled to form the complete speaker. These components may all be purchased but, with the exception of the driving unit, it is by no means essential to success that these parts be bought. From the following description it will be clear that with the exception of the unit a loud-speaker can be entirely home built which will have a very wide frequency response and will handle quite a large power.

The Cone

The cone is best constructed out of good-quality, stiff drawing paper. The rough-surfaced variety gives the best results. Glazed paper is not so good.

A suitable angle for the cone is 120 degrees, and this forms the basis of the calculation of the size of paper required. An average size of hole in the baffle-board for the cone is 10 in. in diameter. Too large a cone gives a boomy bass tone, while too small a cone means that the low notes are practically lost. The size chosen therefore represents a working compromise. The diagram shows the size of paper required. The sizes given can readily be calculated by the mathematically-minded.

Having cut out the development of the cone the next operation is carefully to crease it around the dotted line shown $\frac{3}{16}$ in. inside the edge. This should be carried



The EAS CONE

You can build this speaker in an trifling and it will

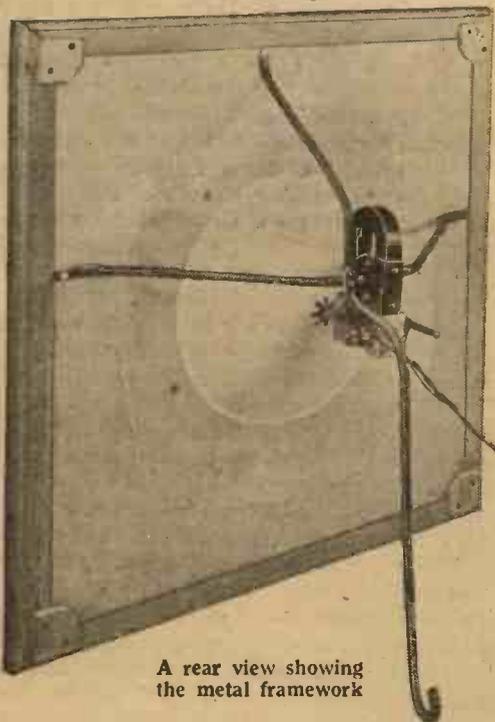
out only so far that the $\frac{3}{16}$ in. margin remains as a flat ring when the cone is made by sticking down with Secotine the radial strip. The flat ring so made is for the purpose of a glueing strip for the support of the cone.

Cone Mounting

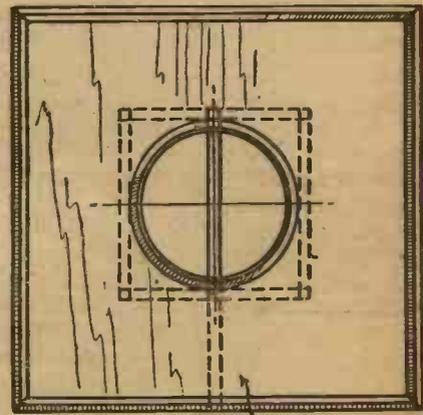
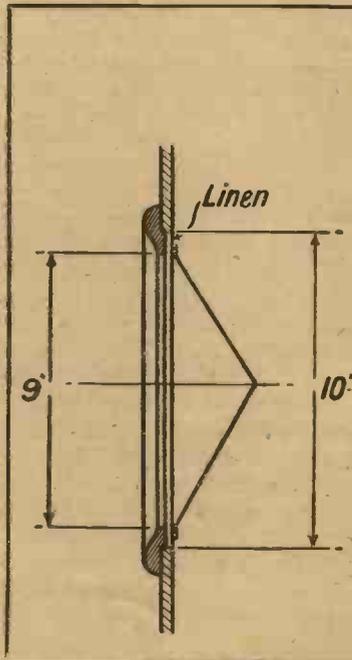
While the cone is being left to set the cone surround can be proceeded with. This consists of ordinary thin linen. Tracing linen, washed out, makes an excellent supporting cloth. The linen should be cut to a 13-in. circle. That is, an overlap of

$1\frac{1}{2}$ -in. is allowed. The baffle-board dimensions are given in the diagram and here a little latitude is allowable. A large size is preferable, as the larger the baffle the deeper becomes the tone of the speaker and the better its response to the low notes. Plywood is quite satisfactory as the material, and if of the mahogany- or oak-faced variety, it will have a fine appearance when polished.

The hole in the centre requires careful cutting, but it will be found that the majority of shops which sell plywood boards are also able to supply them with a 10-in. hole cut. The approximate position of the linen mounting should be marked with pencil on the back of the baffle-board and then the area marked out should be covered



A rear view showing the metal framework



Minimum size 16x16
Preferable size 26x26

Y-BUILT SPEAKER

hour or so. No special materials are required, its cost is give exceedingly good quality and volume.

with Seccotine. This material forms an excellent adhesive for jobs of this type, because it is dry within a few minutes and the whole process of mounting can be carried out and finished in quite a short time. As soon as the Seccotine is on, the linen should be pressed and stretched. As far as possible the linen should be pulled equally in all directions so that no creases remain. When this shows signs of being set, the glueing surface of the cone should be covered with Seccotine and then pushed on to the linen mounting. No difficulty should be experienced in centring the cone; a few pencil marks placed $\frac{1}{4}$ in. in from the 10-in. circle will serve as a guide to correct positioning.

When the cone has dried on to the linen,

the central circle of linen covering up the cone can be cut away with a razor blade or sharp knife. Owing to the fact that the linen is under tension a clean cut is easily made.

The Chassis

The cone is now in position and all that is required is to mount the driving unit. The photographs show a bent metal construction—copper tubing in fact, $\frac{1}{4}$ in. external diameter which is quite easy to bend and drill. As an alternative for those who do not care for working in metal, a wooden construction is shown by the drawings. Either may be varied to suit your own circumstances. The exact position of the driving unit is best found by trial and error. After

the unit has been mounted it is a simple matter to secure the cone to the driving rod.

The Unit

The unit used in the construction of this speaker and shown in the photographs is a Hegra, but there are many makes on the market such as the Blue Spot, Triotron, etc., from which a selection can be made. The performance of the speaker depends on the unit and the care taken. Make sure that the driving rod is not strained or bent. The moulding round the edge of the speaker is merely for ornament and may be omitted, but the central ring is very desirable.

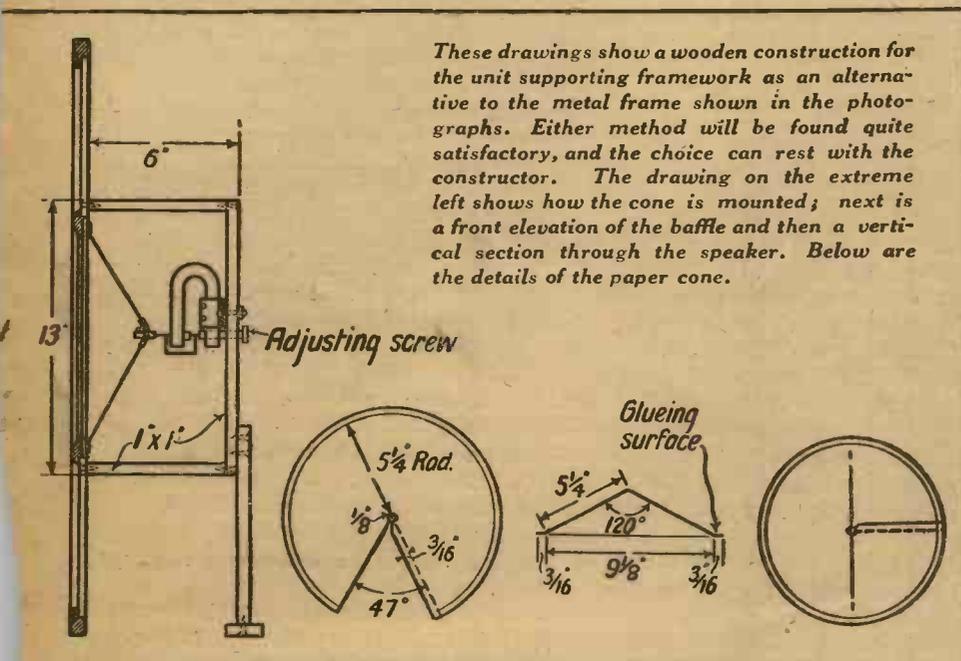
Such rings are usually available at shops that supply plywood.

Suggestions for Improvements

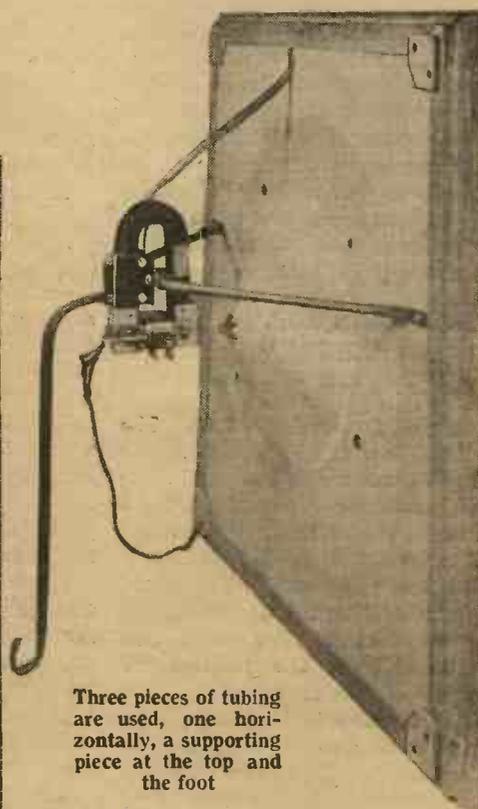
The speaker described is thoroughly satisfactory and as stated earlier will handle considerable volume. Those who wish to try to make improvements should experiment on the lines of making the cone more rigid and yet not substantially heavier. The more a loud-speaker diaphragm acts as a true plunger the better becomes the reproduction. Additional stiffening rings of paper on the inside, and radial stiffeners on the back are therefore suggestions which may be tried out.

The central hole in the baffle may, of course, be covered in with some ornamental gauze.

A. McDONALD.



These drawings show a wooden construction for the unit supporting framework as an alternative to the metal frame shown in the photographs. Either method will be found quite satisfactory, and the choice can rest with the constructor. The drawing on the extreme left shows how the cone is mounted; next is a front elevation of the baffle and then a vertical section through the speaker. Below are the details of the paper cone.



Three pieces of tubing are used, one horizontally, a supporting piece at the top and the foot

MY WIRELESS

DEN *By* W. JAMES

Weekly Tips,
Constructional and Theoretical—

"Slow-motion" Troubles

LATELY I seem to have had an amount of trouble with slow-motion dials. The dials used have been new ones and are, no doubt, of average finish. But a proportion seem to be faulty.

Some are harsh and others slip. Dials having faults of this nature are of no great value, and it is, therefore, as well to examine with care a new dial that is being purchased. The scales of some types are very poor, being small and not easily read.

I feel that a proportion of the slow-motion dials issued are poor amateurish affairs, not worth fitting to a good set. It is time, surely, for manufacturers to attend to this all-important component.

Mains H.T. for Portables!

I note with interest that a firm is manufacturing mains units for portable sets. Not long ago many people would have said that operation from a mains unit was not possible, yet to-day excellent results are being obtained.

There is no hum and no noise. Results are, as a rule, better than when dry batteries are fitted, because of the higher and more uniform voltages available. It seems to me that a mains-driven portable set is a satisfactory arrangement, which is more than I would say of most dry-battery-operated portables. At the same time, when the set is needed out of doors the H.T. battery may be fitted.



The mains unit is a very compact job, being smaller than many dry batteries, but I believe there is absolutely no room to spare inside the case. To obtain hum-free working without using an earth is something of an achievement.

When it Whistles

Have you ever heard a high-pitched whistle from the loud-speaker when the detector valve has been pulled out?

I had this experience only a day or two ago. The set was of the S.G., detector, power type with a transformer low-frequency coupling. Reproduction was a little high-pitched, but was not really faulty, and the batteries were in good order.

To what, then, was the high-pitched whistle due? I found it could be stopped by placing the fingers across the secondary terminals, and therefore concluded the transformer had a peaked characteristic. The whistle was produced by the feed-back through the power valve, which had a loud-speaker in its anode circuit and the transformer connected to its grid.

It was not produced when another loud-

speaker was tried, which seems to show that the loud-speaker itself had a strong resonance point. The whistle stops when the detector valve is fitted, because of its damping effect, it being equivalent to a resistance, equal to the impedance of the valve, connected across the primary.

A Good Resistance-feed Idea

A question often asked is whether it is worth while to resistance-feed a transformer from a detector valve. The method has been described before in these notes, and consists of connecting a resistance between H.T. and the anode of the detector, and joining a condenser between the anode and the primary coil of the transformer.

By this means the steady anode current passes through the resistance, and not through the transformer. Only speech-frequency currents pass through the windings of the transformer and are stepped up in the usual way.

The advantages of the method are, first, that the quality of the reproduction can, to an extent, be adjusted by proportioning the values of the coupling condenser, resistance, and transformer, and, secondly, the transformer may be of a type which will not deal with a large primary current. For most purposes the method is more expensive than the results would justify, and for this reason the scheme is not greatly used in the detector circuit.

"A.W." Solves your Wireless Problems

"DESIGNING A D.C. POWER AMPLIFIER"

(Continued from page 586)

may also be used for further valves. The complete circuit is shown by Fig. 3. Across the 6-volt point is connected a 4-volt valve in series with a resistance, which is adjusted to drop 2 volts, at the particular filament current taken by the valve. This is usually either .1 or .075 of an amp. The 2-volt resistance is included on the negative side of the valve so that it gives us a bias of -2 volts which is the position for normal purposes. The anode voltage supplied to this first valve, is obtained through a smoothing circuit and then a resistance feed to the anode. The low-frequency currents are passed through a condenser on to the primary of the transformer using the customary parallel-feed circuit.

The smoothing is necessary because a

small amount of ripple, which may be tolerable in the last stage, is quite sufficient to give trouble in the earlier stages, but here it does not matter if we lose a certain voltage because we have to reduce the voltage on the anode of the valve anyhow. Actually the choke shown is an H.T.4 having an inductance of 130 henries, while a 50,000-ohm resistance serves to provide the necessary impedance for the parallel feed.

Parallel feed is not essential; one could arrange the circuit in a conventional manner, merely using a resistance to reduce the voltage on the first valve to some 60 or 70 volts.

The only other point in the circuit requiring comment is the use of a pick-up transformer. This is desirable in order to boost the strength of the input to a value great enough to load the amplifier fully. It is usually found that a pick-up alone does not apply sufficient voltage, and a

step-up of 2 or 3 to 1 makes a considerable difference. It will be remembered that a pick-up transformer was shown in the original amplifier for the same purpose.

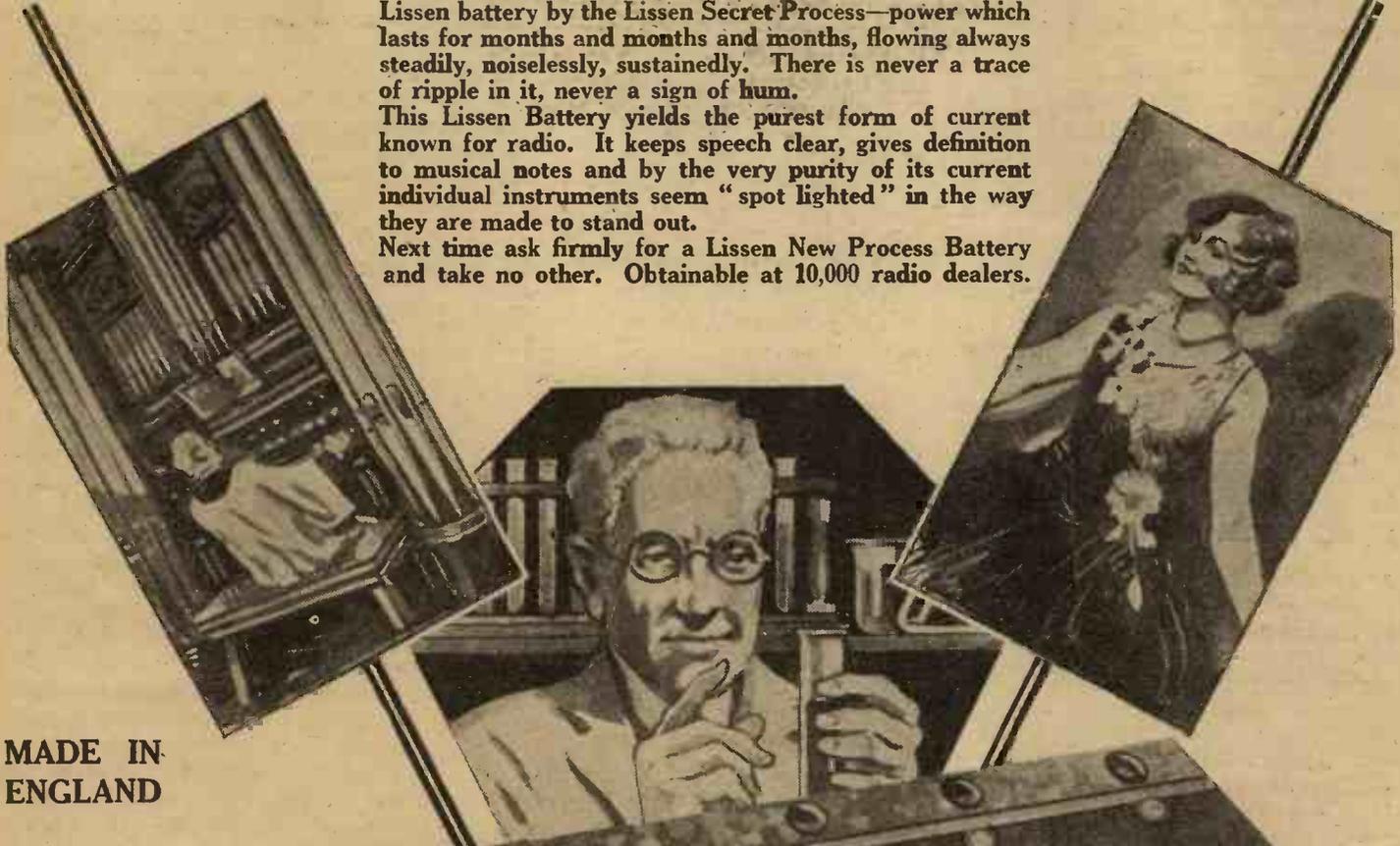
The arrangement shown can be altered in several particulars. It merely serves to indicate a possible method of using push-pull satisfactorily with D.C. working. Provided one has from 220 to 250 volts on the mains, one can obtain good results. For example, with 250 volts we can afford to drop 10 volts in the smoothing circuit prior to the amplifier, leaving 200 volts on the anode and 40 volts grid bias. The smoothing system used in actual practice was a Wearite L.T. 2 choke which only caused a voltage drop of about 1 volt with 1/2 ampere flowing, although the inductance is relatively small, being only 0.25 Henries. A 4-microfarad smoothing condenser followed. The arrangement was satisfactorily silent even during the quiet passages.

PURE LISSEN POWER

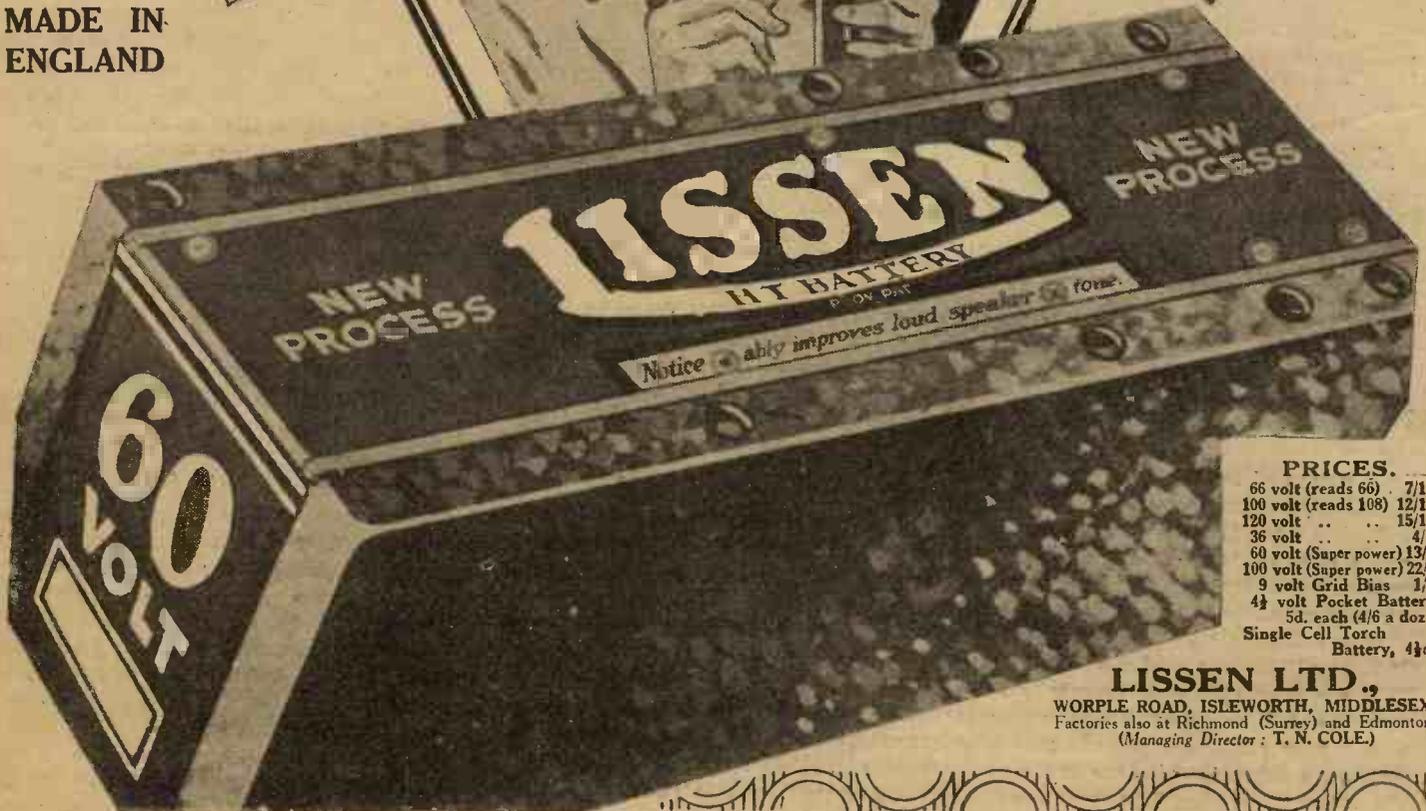
There is preserved power put into the big cells of the Lissen battery by the Lissen Secret Process—power which lasts for months and months and months, flowing always steadily, noiselessly, sustainedly. There is never a trace of ripple in it, never a sign of hum.

This Lissen Battery yields the purest form of current known for radio. It keeps speech clear, gives definition to musical notes and by the very purity of its current individual instruments seem "spot lighted" in the way they are made to stand out.

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36 volt	4/6
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CONCERNING GRID BIAS

THE grid-bias battery has for long become a recognised part of the wireless receiving equipment, and by now its functions may be generally considered to be understood as

loudest signals are being received, that is, when most grid bias is needed to prevent grid current, the resistance will be greater and the grid bias therefore increased.

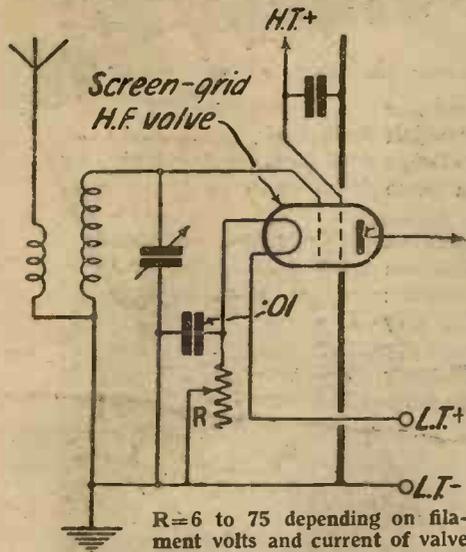
In mains screen-grid valves, such as the MS4, a negative grid bias becomes advisable from the point of view of reduction of hum, and essential from the life preservation point of view. When operated at maximum anode and screen voltages, a negative grid bias of from 1½ to 3 volts is very necessary if the normal emission life is to be maintained.

In detector valves, it is usual to apply a small positive bias in the case of leaky-grid detectors, but with those valves which show grid current at zero volts, this positive bias may be omitted, e.g., MH4, MHL4, etc.

With anode-bend detectors, negative grid bias should be applied to prevent the flow of grid current, even on the strongest input, and as the anode-bend detector operates best with a strong input, the type of valve best suited for this purpose is one with a moderately low value of "amplification factor" (i.e., large grid swing for a given anode voltage), and a steep slope. The actual negative grid bias applied here depends upon the strength of the input signal, the best value usually being such that rectified signals produce a rise of about one milliamp in the anode circuit (assuming moderate impedance valves and fairly low anode resistances are used).

percentage variation in anode current produced by the former case of fixed grid volts.

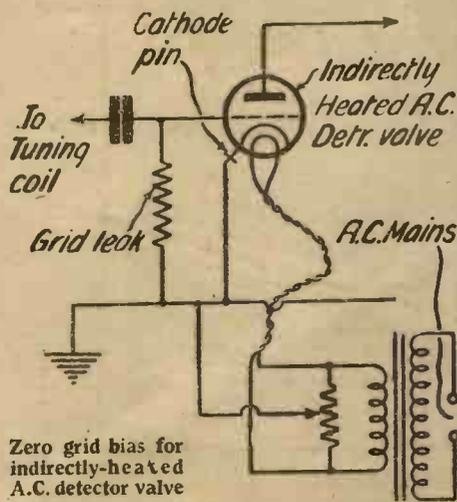
It is particularly important to bear this in mind when two or more of these large power valves are to be used in parallel circuits.



R=6 to 75 depending on filament volts and current of valve used.
e.g. R for S625 type=6 ohms approx.
R for S215 type=6 ohms approx.
R for S610 type=75 ohms approx.

Negative grid bias for H.F. valve

(1) a means of keeping the anode current of a valve down to safe operating conditions and



Zero grid bias for indirectly-heated A.C. detector valve

(2) a means of avoiding grid current and subsequent distortion.

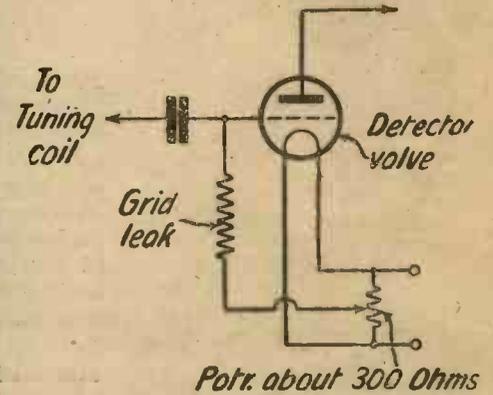
In H.F. amplifying valves a negative grid bias is very advisable and may even become necessary with certain valves. As we may now take the screen-grid valve as almost universally employed for modern H.F. amplifiers, a negative grid bias of a little less than 1½ volts is generally to be recommended and, in battery-operated valves, may conveniently be obtained by inserting a filament resistance in the negative filament lead. This resistance, if variable, also acts as a convenient volume control and has the advantage that when

Power Values

With power amplifying valves, the question of negative grid bias attains first importance; here, it should be carefully noted that, although figures are published for the approximate values of negative grid bias to obtain given anode currents, these values of bias must be taken as only approximate.

With valves of low amplification factor dealing with high anode voltages, it is very difficult from the manufacturing point of view to ensure that they are as consistent as the smaller classes. Moreover, such big valves have usually a watts dissipation limit on which depends the maximum permissible anode current.

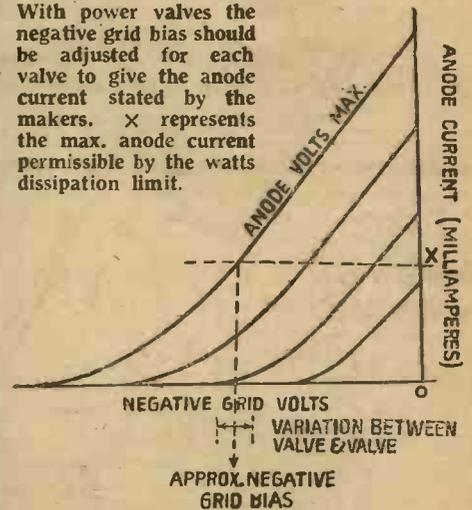
The negative grid-bias values given for such valves (e.g., LS5A, LS6A, etc.), are usually given by the makers merely as a guide and should be adjusted for each individual valve, so as to provide the required anode current and to limit this to the maximum permitted. Although almost universally adopted, it is really incorrect practice to fix the grid bias and expect all valves to conform exactly in anode current. The correct method is to decide on the anode current from the maker's published figures and then vary the grid bias for each valve to produce this. In the latter case, the percentage variation in grid volts required is very much smaller than the per-



Positive bias for detector valve

To do this, obviously requires a milliammeter and the advantages of the possession of one of these extremely useful little instruments cannot be over-estimated.

With power valves the negative grid bias should be adjusted for each valve to give the anode current stated by the makers. X represents the max. anode current permissible by the watts dissipation limit.



A good milliammeter, intelligently used, can be made to serve many most useful functions, and when adjusting grid bias for power valves, becomes a necessity, if we are to get the most out of the valve.

F. E. H.

"Things advertised in the B.B.C. timetables do not start to time," is the burden of yet another complaint. No worse than those advertised in the A.B.C. timetables.

Which of the Uncles was it who suggested that Big Ben should broadcast at half-past kissing-time? Warning: don't oscillate when you osculate.

A gramophone record of the *Anvil Chorus* is announced as being sung by the *Apollo Choir*. Mythologically inexact, surely? It should have been the *Vulcan Choir*.

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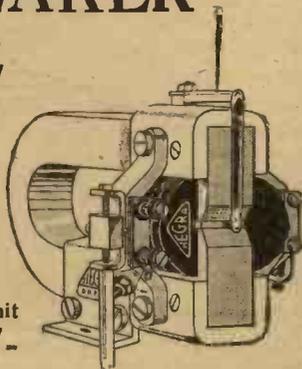


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It will handle considerable volume without chatter and the reproduction on all frequencies is truly wonderful. The Hegra has passed every test with flying colours. If you want the best results you *must* use a Hegra Unit.

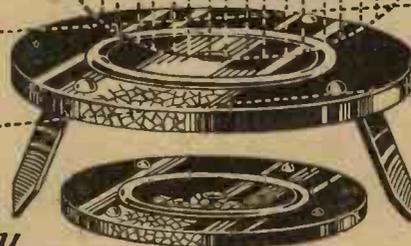
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M.C. 3

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"A.W." TESTS OF APPARATUS

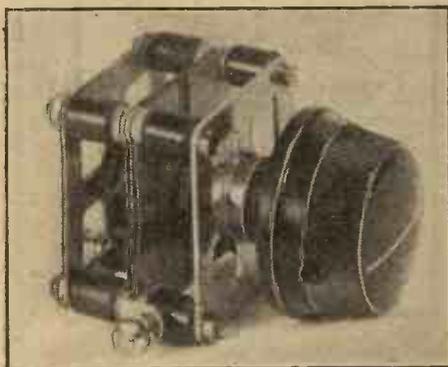
Conducted by our Technical Editor, J. H. REYNER, B.Sc.(Hons.), A.M.I.E.E.

A Differential Reaction Condenser

MAGNUM components, made by Messrs. Burne-Jones, are well known to readers, and have now held for many years a reputation for reliability and efficiency of design.

This week we have received for test a Magnum variable reaction condenser, having a rated maximum capacity of .0001 microfarad. It is a neat little component and due to the simplicity of design sells at the reasonable price of 4s. The fixed aluminium plates are mounted on a single ebonite end plate to which the metal bush for the rotating spindle is fixed. The length of this bush is sufficient to prevent rock in the operating spindle, a matter of some importance when a single bearing only is used. The motion is suitably damped by a spring washer, which also affords good electrical contact between the terminal and the moving plates.

Some idea of the compactness of the component may be gathered from the fact that it occupies a total panel space of 2 in. square and a depth of 1½ in.; it may, therefore, be fitted with ease into every type of set. A single hole only is required for fixing and the condenser is supplied complete with black moulded knob and three terminals.



This differential reaction condenser, the Burne-Jones, will simplify reaction control

An Efficient L.S. Gadget

ONE of the small, but by no means unimportant parts in a linen-diaphragm speaker assembly is the chuck adaptor and spindle for connecting the unit to the diaphragm. Those who have made these speakers will realise the importance of having a convenient arrangement for holding the apexes of the cones together and transmitting the drive from the unit.

Messrs. Moore & Co., Liverpool, the makers of Aptus parts for linen diaphragms, have submitted for test an Aptus centre

combining a four-inch spindle with adjustable chuck for connecting to the operating unit; and in addition two sets of cone washers held together by adjustable chucks. Each pair of washers includes a celluloid and a brass washer. The object of using different materials is to prevent rattle.

Fitting together this assembly is quite simple, the washers placed each side of the diaphragm are locked together by screwing one of the central chucks into the other. Then by rotating the ends of the chucks they may be fixed at any required portion of the spindle.

This gadget sells at 2s. 6d., and may be recommended.

Brownie Wavetrap

AN interesting and practical selectivity device has been submitted for test by The Brownie Wireless Co., Ltd. Its application is dual, since it may be used as a wavetrap or coupled selectivity circuit, according to the method of connection.

In this component the inductance is placed on two separate formers, one of which is tuned by a small paper dielectric variable condenser. Two extra tappings are taken on the other coil, and these together with the ends of the windings are connected to six metal sockets. When used as a normal wavetrap the aerial and aerial terminal of the set are connected to the tapped coil, whilst the second coil, which is closely coupled to the first, is tuned to the station to be rejected. It is, therefore, a modified version of the well-known series-rejector, and according to the number of turns used in the aerial circuit, so the trapping effect is increased.

It is also possible to use this device as a tuned coupled circuit, thereby increasing the steepness of the overall tuning characteristic, and considerably improving the selectivity. When used in this capacity, the two windings are connected together in the form of an auto-transformer, the transformation ratio and, therefore, the selectivity being controlled by the additional tapping points provided. The tuned winding is placed across aerial and earth, but on test did not appear to have any appreciable effect on the normal tuning of the circuit.

With a single-circuit tuner, the selectivity was greatly improved; under these conditions, however, it is necessary to adjust the control simultaneously with the main tuning condenser. Using the device as a wavetrap, we were able to cut out either Brookmans Park station completely with the largest number of turns in the aerial circuit. Those who are a greater

distance from Brookmans Park will find advantage in using a smaller number of turns.

This device is quite neat in appearance, the inductances and condenser being housed in a brown moulded case with a scale for setting the condenser knob. The six tapping points are arranged towards the base of the instrument.

We can recommend the Brownie trap to those who are suffering from lack of selectivity.



A useful aid to selectivity—the Brownie wavetrap

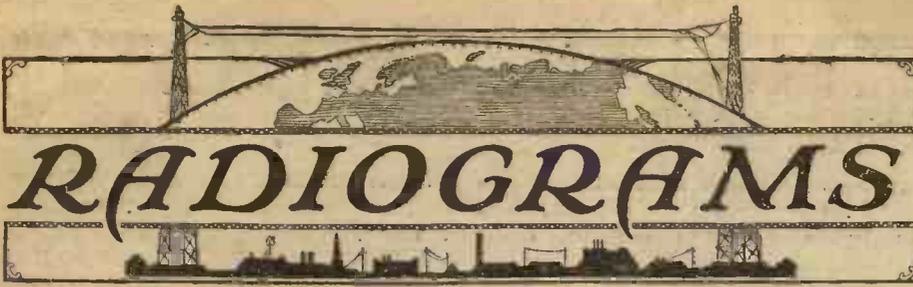
THE NEW DETECTORS

SOME of the new detector valves, having an impedance of about 10,000 ohms, pass a very heavy anode current, and should therefore be used with care. I can quite understand a listener replacing his present detector with one of these and wondering why the results are so different.

If the same value of high tension is used the current will be much greater. Reaction will probably be fierce and the volume may be a little less. Many people use an R.C. type valve for detection, and if they fitted one of the new detector valves the results would be quite different.

The new valves will deal with a strong signal with little distortion if the grid condenser and leak values are suitable, and make good anode-bend detectors. W. J.

Riding the Air Waves—"Horace Live-right, N.Y. City" is an interesting account of a youthful experimenter's experiences in world-wide amateur short-wave transmission. We find interest in the book because members of the "A.W." Staff, when in New York last summer, visited the station of the author, Eric Palmer, Jnr., and proved his DX claims. It is a brightly-written, typically American book. The price is two dollars.



ON April 24 Mr. Lloyd George will celebrate the fortieth anniversary of his election to Parliament and a presentation in commemoration of this event is to be made to him at the Pavilion, Carnarvon. The ceremony including the Liberal leader's speech will be relayed to Daventry 5XX.

H. A. Harding and Denis Arundell have prepared a special dramatic version of *Robin Hood* for broadcast on May 1 by the National transmitters.

During the Grand Opera Season at the Royal Theatre, Covent Garden, the B.B.C. will effect weekly relays of performances beginning with the opening night on April 28.

The National vaudeville programme for broadcast on April 28 will give listeners an opportunity of hearing Greta Keller, the Berlin studio radio star who sings in English, French, and German. Ann Penn, in impersonations, makes a welcome re-appearance before the microphone on her return from the United States, and other turns include George Doshier, one of the Four Harmony Kings, the Stanley Holt Quintet, and a musical poem entitled *Six Little Ballet Girls*, with words by Harold Simpson.

Mozart's *Requiem*, as performed at the Battle Church, Battle Abbey, under the direction of John R. Shernan-Dare, will be relayed to London Regional on April 29.

In celebration of Empire Day, on May 24, and as part of the special programme to be broadcast to the United Kingdom and overseas, community singing will be relayed from Hyde Park, London.

Relays of international sporting events are assuming greater importance in the European programmes. A German running commentary on the German-English tennis matches for the Davis Cup will be taken by the Rhineland and other transmitters on April 24 and 26. Langenberg, Cologne, and the associated stations will also relay from Amsterdam the Germany v. Holland hockey match on April 27.

A special short-wave transmitter to be operated by the League of Nations has now been authorised and tenders are to be put forward for its construction at Prangins, in Switzerland. It is not expected that it can be finished before the spring of 1931, and in the meantime, should the necessity arise, the existing transmitter at Prangins, working on the broadcast band, would be placed at the disposal of the authorities for official communications.

For the new Scottish headquarters the B.B.C. has acquired a building in Queen Street, Edinburgh, which was formerly the Queen's Hall, and has since been occupied as the Embassy Dancing Club. The Queen's Hall was formerly one of Edinburgh's concert-halls, and was also used for public meetings. After the necessary structural alterations are made the administrative staff at present in Glasgow will be transferred to Edinburgh.

Mr. M. H. Aylesworth, president of the National Broadcasting Company in America, in his annual report stated that President Hoover spoke thirteen times over the N.B.C. networks last year.

Thousands of listeners throughout the United States complain that the B.B.C. announcers lack loquacity. Recently the National Broadcasting Company of America picked up and rebroadcast a service from Westminster Abbey, but the radio audience was left to guess the identity of the speaker. Another example

of the "cold mike" was when King George addressed the opening session of the Naval Arms Limitation Conference. On that occasion a voice described what was to take place, and then there was silence for a few moments. Then a voice was heard, and it was several minutes before it was realised that the King had started speaking.

According to a recent report of the Federal Radio Commission, the yearly total broadcasting time for all radio stations in the United States is 1,252,802 hours.

Broadcasting stations WJZ and WEAJ, both in New York, have contracted to pay £7,400 each for the use of copyright songs of the American Society of Composers, Authors, and Publishers during 1931.

Station WKRC (Cincinnati) is shortly to commence television broadcasts. It is to operate in conjunction with a new short-wave station of the Ohio Television Corporation and will synchronise its sound programmes with the sight programmes of the short-wave station.

Broadcasting station WJR (Detroit) claims to have only two rivals in the United States as regards time on the air. It operates continuously from 6 a.m. to 1 a.m., with an additional hour on Sundays.

A German scientific society, Aéroartic, suggest that wireless stations be placed in remote regions and made automatically to transmit weather information in all parts of the world.

SPECIFIED FOR THE JAMES 'QUALITY FIVE'!



FOR the JAMES QUALITY FIVE described in this issue, three Brownie DOMINION Vernier Dials have been specified. Only Brownie's huge production enables them to offer this really splendid dial for 2/6. The special non-backlash design makes hair-breadth tuning a matter of delightful ease, while its handsome appearance (black or beautifully grained mahogany bakelite) will add vastly to the good looks of the set that you build.

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THE CUP FINAL BROADCAST

THE F.A.'S POINT OF VIEW—By FRANK ROGERS

AFTER the threatened ban on broadcasting the Cup Final, the B.B.C.'s attack on the Football Association and the latter's subsequent offer to the B.B.C., I think most listeners will appreciate an explanation of the position.

The F.A. is incorporated under the Joint Stock Companies' Acts with a capital of £100, upon which no dividend may be paid. That is to say, no shareholder can derive profit from his holding. It is clear, then, that whatever fee might be charged for this broadcast would bring no private gain to any individual member.

The function of the F.A. is to govern the game, both the amateur and the professional sections, and to protect their interests. It also helps to spread the game all round the world by sending representative teams abroad. Its attitude on any vexed question, such as the recent one, is parental.

Now consider this broadcast. There are two professional clubs taking one-third each of the receipts, and the F.A. the remainder. It is definitely a money-making game. Broadcasting cannot harm these receipts, because the tickets are over-applied for regularly every year. Thousands of pounds are, in fact, returned annually to disappointed applicants. On the surface, then, it seems as though all three parties are giving nothing away when they permit the B.B.C. the same privileges as the Press.

The F.A. Constitution

But as soon as we examine the position we find a different situation. The F.A. does not represent one club only, but all clubs, and its fear is not that spectators will stay away from Wembley, but from grounds in Bournemouth, Bristol, and Accrington Stanley.

Speaking personally, I know the fear is justified. I, for one, stayed at home last year to listen-in to the Cup Final, and

there were thousands more like me. To the F.A. we absentees are represented as so many shillings lost to the game. Clubs all over England were all down in their gate money, and they will be again this year. Who has not promised himself all this week the thrill of hearing the cheering as Jackson, of Huddersfield, or Lambert, of Arsenal, crashes an unstoppable shot into the "box"?

League Clubs

It is plain that practically every professional club in the land will be sacrificed for our pleasure, and that, therefore, the F.A. had to consider whether it could afford it and whether the publicity given to the game as a whole would ultimately balance things.

There is now the position of professional league clubs to be considered before we can appreciate their financial strength. First of all, they are not allowed to declare an annual dividend in advance of $7\frac{1}{2}$ per cent.; so that they can scarcely be called a paying investment. Directors are not allowed any payment for their services, and when a manager was offered a thousand a year, a little while back, everyone gasped.

Of course, £10,000 transfer fees which are noised about from time to time do convey an impression of wealth, but it must be remembered that this money stays in the game. It cannot go into anyone's private purse. Further, the impression of wealth is a false one. The average professional club goes closer to making a loss than it does to declaring $7\frac{1}{2}$ per cent.

There are plenty of clubs working on an overdraft at the bank. Clubs are continually offering their players for sale because they need the money. The wealthy ones are in a decided minority, and we can see that, speaking generally they need every penny they can get. Their difficulty is not to satisfy dividend-seeking share-

holders, but to try somehow to balance their accounts and keep their teams together.

I think it is plain that many of them cannot afford the sacrifice of the Cup Final broadcast unless they can be sure the publicity it gives to football as a whole will bring more patrons to their turnstiles. They certainly cannot afford to be generous and invite the public to share their big show of the year out of kindness.

It boils down, then, to the publicity value of this broadcast, and here we are on slippery soil. Will non-footballers start to visit the less prosperous grounds because of what they hear? Will their resolution to become regular patrons of the game retain their strength until next season starts, because there is not a great deal of this one left?

Publicity Value

Presumably the B.B.C. says the publicity will do this. We know that the microphone is extremely persuasive. Theatrical managers said so very definitely some months ago when they objected to one critic having a monopoly. But many football clubs still remain to be converted to this view. They say the public already knows of the thrills and fascination of the game.

This is the crux of the whole matter. The F.A. has now withdrawn its ban. In fact, it has invited the B.B.C. to Wembley unconditionally. This decision has every appearance of a splendidly generous gesture. It followed very closely upon an appeal from the Bishop of Buckingham, who was concerned for the unfortunate people whose disablements prevent them from going out to watch football matches.

The West of Scotland is not pleased at the forthcoming transfer of the B.B.C. Scottish headquarters from Glasgow to Edinburgh.



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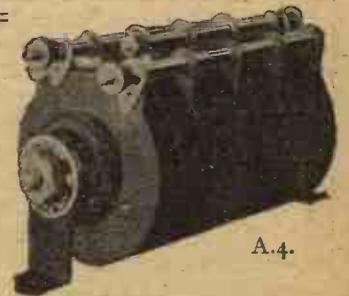
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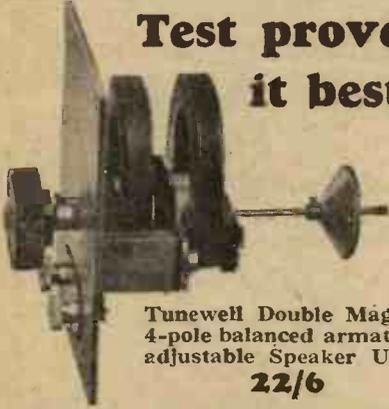
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AMERICAN TELEVISION PESSIMISTS

At a time when we, in England, are hoping that television is now getting into its stride, by the co-operation of the Baird Company and the B.B.C., a pessimistic statement has been received from the Bell Telephone Laboratories of New York. Dr. F. B. Jewett, president of these laboratories, says: "The question whether, after a period of further development, television will take its place with the telephone, telegraph, and radio broadcasting, as public necessities, will depend on its ability to render services that will warrant the inherently large expenses."

"For the transmission of the television images so far demonstrated, facilities are required equivalent to approximately one thousand telegraph channels, or thirty commercial telephone channels or ten adjacent channels of radio broadcasting."

Commercial Aspects

Dr. Jewett points out that new communication channels, whether wire or radio, have a money value, a fact often overlooked by television experimenters not familiar with the communication industry. These transmission requirements, the doctor points out, coupled with the inevitable expense of apparatus, constitute a severe limitation to ultimate commercial use. He goes on to make a statement that will be contested by many readers.

"Those who look forward to a time when television will displace the stage and screen theatre, by bringing their offering direct to the home, must recognise that television would then have as its competitor the home sound-motion-picture projector."

It should be explained that home "talkie" machines are already available in small quantities in America, giving good results. This machine bears a somewhat similar relationship to television, as does the gramophone to ordinary broadcasting.

"At present," says Dr. Jewett, "the apparatus and transmission facilities required for television appear appalling, both as to complexity and as to cost. The ultimate verdict must come from the public."

When Asking Technical Queries

PLEASE write briefly

A Fee of One Shilling (postal order or postage stamps) must accompany each question and also a stamped addressed envelope and the coupon which will be found on the last page. Rough sketches and circuit diagrams can be provided for the usual query fee. Any drawings submitted should be sent on a separate sheet of paper. Wiring plans and layouts cannot be supplied.

Queries cannot be answered personally or by telephone.

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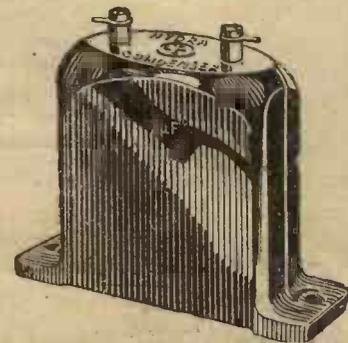
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For the Newcomer to Wireless : VOLUME CONTROLS

I AM in rather a difficulty. You see, I am within comparatively short-range of Brookmans Park, and when only one transmission was taking place I got all that I wanted with my "quality" set without any high-frequency amplification. Then the shorter-wave transmission started and I saw it stated that a high-frequency stage was the best means of separating them.

That is, of course, owing to its filtering effect.

Yes, but what now happens is that I get far too much strength.

I see; and you don't find detuning satisfactory?

No. It doesn't improve the quality, and if I detune a good deal, I may find that I am getting both transmissions.

It is a problem that quite a number of others are faced with. Naturally, you don't get proper selectivity and therefore no chance of separating stations unless your set is so arranged that you can tune in either fairly sharply.

How can that be done without overloading the set?

What you need is a volume control.

As a matter of fact, I've bought one and I'm thinking of fitting it into the grid circuit of the first note-magnifying valve.

That valve is transformer-coupled, if I remember rightly. You intend, I suppose, to connect the sliding contact of the control to the grid of the valve and the other two terminals to I.S. and O.S. of the transformer?

Yes, that's what I thought of.

If I were you, I wouldn't.

Why not?

If you think it out you will see that what the control does in that position is to regulate the voltages applied to the first low-frequency valve.

Yes, I see that.

But how about the detector?

What do you mean, exactly?

If signal strength is very great the odds are that you are overloading your detector valve, and a volume control placed *after* this valve won't help.

I hadn't thought of that; but, now you mention it, I do see that there's a good deal in it.

A great deal more than many people

suspect! The volume control in a set designed for the regional scheme should certainly be so arranged that it regulates the voltage swings reaching the grid of the detector valve. Obviously, you can't expect good reception if your detector is overloaded.

How can one arrange it in this way?

With the grid-leak detector, wire the volume control in this way. Connect the slider to the grid side of the grid condenser, one of the other terminals to the grid and the other to low-tension positive, you don't need any grid leak.

Just what happens?

When the knob is turned so that the slider is at the end of the resistance connected to the terminal attached to the grid, then the grid is, so to speak, straight through to the condenser and the whole of the resistance is connected as a leak. Move the slider away from this point, and more and more resistance is brought into play between the grid condenser and the grid. The result is to reduce the voltage swings.

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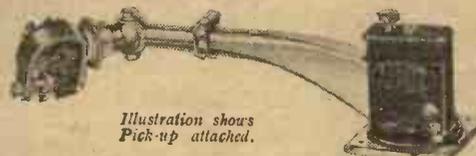


Illustration shows Pick-up attached.

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GREAT BRITAIN											
25.53	11,751	Chelmsford (5SW)	15.0	255	1,175	Toulouse (PTT)	1.5	525	572	Riga	7.0
*200	1,500	Leeds (2LS)	0.13	265	1,132.2	Lille (PTT)	0.7	*1,935	155	Kovno	7.0
*242	1,238	Belfast (2BE)	1.0	293	1,121	Strasbourg	0.5	304	825	Algiers (PTT)	16.0
*261	1,143	London Nat.	30.0	286	1,049	Radio Lyons	0.5	410	720	Radio Maroc (Rabat)	10.0
*288.5	1,040	Newcastle (5NC)	1.0	*280	1,049	Montpellier (PTT)	0.3	1,250	240	Tunis Kasbah	0.5
288.5	1,040	Swansea (5SX)	0.13	293	1,022	Limoges (PTT)	0.5	304	824	Bergen	1.0
288.5	1,040	Stoke-on-Trent (6ST)	0.13	304	986	Bordeaux (PTT)	1.0	385	779	Frederiksstad	0.7
288.5	1,040	Sheffield (6LF)	0.13	309	970	Radio Vitus	1.0	445	674	Rjukan	0.18
288.5	1,040	Plymouth (5PY)	0.13	*316	950	Marseilles (PTT)	0.5	448	669.7	Aalesund	0.3
288.5	1,040	Liverpool (6LV)	0.13	328.2	924	Poste Parisien	0.5	453	662	Tromsø	0.1
288.5	1,040	Hull (6KH)	0.13	328.2	924	Grenoble (PTT)	0.5	453	663	Porsgrund	0.7
288.5	1,040	Edinburgh (2EH)	0.13	360	812	Radio LL (Paris)	0.5	*493	668	Oslo	00.0
288.5	1,040	Dundee (2DE)	0.35	*381	788	Radio Toulouse	8.0	214	1,400	Warsaw (2)	2.0
288.5	1,040	Bournemouth (6BM)	1.0	447	671	Paris (Etat)	3.0	234	1,283	Lodz	2.0
288.5	1,040	Bradford (2LS)	0.13	468	640	Lyons (PTT)	5.0	*313	959	Cracow	0.5
*301	995	Aberdeen (2BD)	1.0	1,446	207	Eiffel Tower	12.0	*335	896	Pesnan	1.2
*310	968	Cardiff (5WA)	1.0	*1,725	174	Radio Paris	10.0	385	779	Wilno	0.5
*350	842	London Reg.	30.0	GERMANY							
*377	797	Manchester (2ZX)	1.0	*215.3	393	Flensburg	0.5	385	779	Lemberg	2.0
*399	753	Glasgow (5SC)	1.0	*227	1,319	Cologne	4.0	*408	734	Katowice	10.0
*479	626	Midland Reg.	25.0	*232.2	1,292	Kiel	0.35	1,411	212.5	Warsaw	8.0
1,554	293	Daventry (5XX)	25.0	*234	1,283	Münster	3.0	ROUMANIA			
AUSTRIA											
*244	1,220	Linz	0.5	*239	1,256	Nürnberg	2.0	*591	661	Bucarest	12.0
*283	1,058	Innsbruck	0.5	*246	1,220	Cassel	0.25	720	176.6	Moscow (PTT)	20.0
*352	851	Graz	7.0	*253	1,184	Gleitwitz	2.0	824	364	Sverdlovsk	25.0
*453	666	Klagenfurt	0.5	*259	1,157	Leipzig	2.5	933	300	Moscow-Stchelkovo (C.C.S.P.)	100
*517	581	Vienna	15.0	*270	1,112	Kaiserslautern	0.25	1,000	320	Leningrad	20.0
BELGIUM											
206	1,460	Antwerp	0.2	*278	1,085	Königsberg	2.5	1,060	283	Tiflis	10.0
216	1,391	Verviers	0.25	*283	1,058	Magdeburg	0.5	1,103	272	Moscow Popoff	40.0
220	1,364	Charleroy	0.25	*283	1,058	Berlin (E)	0.5	*1,304	230	Kharkov	25.0
244.7	1,226	Ghent	0.25	*283	1,058	Stettin	0.5	1,380	277.5	Bakou	10.0
250.0	1,197	Schaerbeek	0.25	*315.8	951	Bremen	0.35	1,481	202.5	Moscow (Kom)	40.0
338	837	Forest	8.0	*320	927.6	Dresden	0.25	SPAIN			
*509	590	Brussels	1.0	*325	923	Breslau	1.5	250	1,202	Almeria	0.5
CZECHO-SLOVAKIA											
*203	1,139	Moravska-Ostrava	10.0	*360	833	Stuttgart	1.5	260.5	1,125	Barcelona (EAJ13)	10.0
*279	1,076	Bratislava	12.5	*372	806	Hamburg	1.5	*341	860	Barcelona (EAJ1)	8.0
*293	1,022	Kosice	2.0	*390	770	Frankfurt	1.5	308	815	Seville (EAJ5)	1.5
*342	878	Brunn (Brno)	2.4	*418	716	Berlin	1.5	424	707	Madrid (EAJ7)	2.0
*487	617	Prague (Prah)	5.0	*453	662	Danzig	0.25	462	649	San Sebastian (EAJ3)	0.5
DENMARK											
*281	1,067	Copenhagen (Kjobenhavn)	0.75	*453	657	Aachen	0.35	SWEDEN			
1,153	260	Kalundborg	7.5	*473	635	Langenberg	15.0	231	1,301	Malmö	0.8
ESTHONIA											
*296	1,013	Reval (Tallinn)	1.5	*533	563	Munich	1.5	*257	1,160	Hörby	10.0
FINLAND											
*221	1,355	Helsingfors	10.0	560	536	Augsburg	0.25	290	1,003	Falun	0.5
*1,798	107	Lathi	50.0	*560	536	Hanover	0.35	*322	993	Göteborg	10.3
FRANCE											
20.70	10,180	Radio Experimental (Paris)	1.2	569	527	Freiburg	0.35	*436	639	Stockholm (tests)	60.0
175	1,774	St. Quentin	0.1	*1,635	183.5	Zeeseen	37.0	*542	554	Sundsvall	0.8
187	1,605	Radio Flandres	0.25	1,649	182	Norddeich	10.0	*770	389	Ostersund	0.8
195	1,539	Tourcoing (F5BII)	0.2	HOLLAND							
210	1,410	Radio Savoie	0.3	31.28	9,590	Eindhoven (PCJ)	30.0	1,200	250	Boden	0.8
212	1,415	Beziens	0.1	*293	1,004	Hilversum (until 6.0 p.m. B.S.T.)	0.5	*1,348	222.5	Motala	30.0
212.8	1,410	Fécamp (Radio Normandie)	0.5	*1,071	280	Hilversum	0.5	SWITZERLAND			
235	1,274	Bordeaux (Radio Sud-Ouest)	1.0	*1,071	280	Scheveningen-Haven	5.0	*403	743	Berne	1.0
240	1,250	Nimes	0.25	(from 11.10 a.m. to 0.0 p.m. B.S.T.)				*450	653	Zurich	0.63
249	1,204	Juan-les-Pins	0.5	*1,873	100	Huizen	6.5	069	454.6	Lausanne	0.6
GERMANY											
210	1,430	Budapest (Csepel)	1.0	HUNGARY							
550	545	Budapest	20.0	210	1,430	Budapest (Csepel)	1.0	674.7	522	Ljubljana	2.5
ICELAND											
*1,200	250	Reykjavik	10.0 (under construction)	550	545	Budapest	20.0	TURKEY			
IRISH FREE STATE											
*225	1,337	Cork (IFS)	1.0	YUGOSLAVIA							
*413	725	Dublin (2RN)	1.0	306.7	978	Zagreb (Agram)	0.7				
ITALY											
291	1,030	Turin (Torino)	7.0	431	695	Belgrade	2.5				
*332	905	Naples (Napoli)	1.5	574.7	522	Ljubljana	2.5				
385	779	Genoa (Genova)	1.0	ALL WAVELENGTHS MARKED WITH AN ASTERISK HAVE BEEN ALLOTTED ACCORDING TO THE PLAN DE PRAGUE.							
*441	680	Rome (Roma)	50.0								
453	662	Bolzano (IBZ)	0.3								
*501	599	Milan (Milano)	7.0								

Reputation

Manchester, 2/4/30

Dear Sirs,
I have been recommended to you by a friend of mine, who has always purchased his Wireless parts from you and who is very pleased with your service. Will you kindly send immediately, by return if possible, your Kit C for the 1930 Clarion receiver, for which I enclose cash.

Yours faithfully,
G.H.P.

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Deluded Dad: "I'm spending a lot of money on my daughter's singing lessons."

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A little boy had a troublesome, but not serious, cough; and the doctor called and tested him with a stethoscope.

When father came home, the little boy said:—

"Daddy, the doctor put the wireless on my tummy and listened in!"

American, boarding bus at St. Paul's Cathedral: "I want your 2LO studios."

Conductor ignores him while taking another's fare.

American (snappily): "Yep. I want your 2LO, and I want it quick!"

Conductor: "All right, guv'nor. Half a mo'. I'm just having it wrapped up for you."

Salesman: "Police station?"

Voice (on phone): "Yes. What's wrong?"

Salesman: "Got a suspicious character here. Wants to pay cash on a wireless set!"

LETTERS TO THE EDITOR



The Editor does not necessarily agree with the views expressed by correspondents.

Correspondence should be brief and to the point and written on one side of the paper.

Short-wave Sets and Screening

SIR,—In your issue of April 5, your correspondent "K" (Evesham), attempts to dispel the idea that metal and similar materials in a short-waver are useful.

I entirely disagree with the views of your correspondent. I have working at present a three-valve short-waver of my own design. Besides having the detector and tuning portion screened from the L.F. side, I have a sheet of copper covering the baseboard, which acts as a common earth, and so eliminates much of the usual wiring. Your correspondent also asserts that a well-spaced layout is an advantage in a short-wave set. I disagree here also. I have built the set referred to above eighteen times, before arriving at what I think is as-near-to-perfect construction as is possible. The outstanding points now, as the set stands,

are, short wiring, elaborate shielding, and compactness.

Every inch of wire in a short-wave set means extra capacity, and surely this is a thing to avoid whenever possible. The most important points in a short-wave set are, I believe, the incorporation of good condensers with thick vanes, a smooth-working choke, and a transformer with a good high primary inductance.

H. L. W. (Hillsborough, Co. Down).

Is Mr. Moseley High-brow?

SIR,—I am a regular reader of AMATEUR WIRELESS, and when reading Mr. Moseley's page I notice how plainly he shows his "high-brow" views (though he has "without favour" on top), and seems only too ready to condemn anything that is light and cheerful. Now we have the two programmes there is plenty of serious matter (music and talks) being broadcast. Therefore, I respectfully suggest that he confines his criticism to these, they being more suitable for him.

S. O. B. (Battersea).

Is the Regional Scheme Wasting the Ether?

SIR,—May I be permitted to make one or two comments on the article by Mr. Alan Hunter, "Is the Regional Scheme Wasting the Ether?" As Daventry 5XX is so well received throughout the country generally, why not raise its power to some 50 or 100 kilowatts? Why use a chain of low-powered transmitters for the National programme as he suggests and thus waste the available ether further?

When the Regional scheme was first contemplated, I understood that the programmes would be given by local artistes from each of the Regional transmitters,

and thus we should have a good choice. The curse of simultaneous broadcasting is the long land-line distortion. Now anyone who has a real quality receiver with a moving coil speaker can test the difference by tuning in the station nearest the studio and then the others, as at present it means constant knob-twiddling to receive the best.

One other point which is not the least which your contributor has not mentioned, is that Daventry 5XX does not transmit from 11 to 12 in the morning now; thus it is impossible for the trade to give demonstrations to prospective customers. The Regionals are off the air from 3 p.m. till 5.15, and then we have no alternative to the dance music at night. The truth is that it is only a partial alternative programme as at present. "ZODIAC" (Brighton).

Linen-speaker Excellence

SIR,—I have a linen-diaphragm loudspeaker, AMATEUR WIRELESS design, 22-inch, and, like your reader V. D. (Sidcup), am delighted with the results which it gives. The reproduction of the bass notes and the rolling of the drums being particularly fine.

The first linen split, so I bought a better quality, and after it was tacked on the frame, I button-holed it twice round, the second time a little longer stitch than the first. Since then it has been quite all right.

A. M. H. (Coventry).

Cinema Orchestras

SIR,—While having the greatest admiration for "Thermion's" technical knowledge in the realm of wireless, I cannot allow his remarks re cinema orchestras to pass by without comment. They are a gross libel on a body from whose ranks some of our finest orchestras have been recruited. How long has "Thermion" been qualified to act as musical critic? Does he realise that at least 50 per cent. of our wireless programmes are made up of "alleged orchestras" and that the "hideous noises" he refers to give pleasure to millions of listeners? The majority of cinema orchestras were really excellent, and their loss is to be deplored by all music-lovers. "Thermion" is obviously not one of the above. S. W. (Preston).

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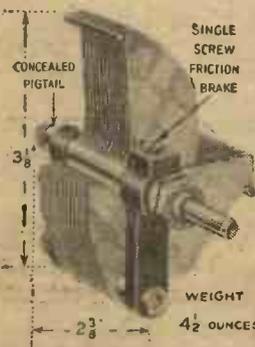
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WEIGHT 4 1/2 OUNCES

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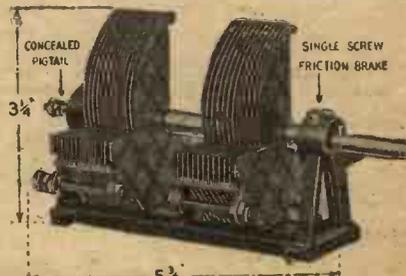
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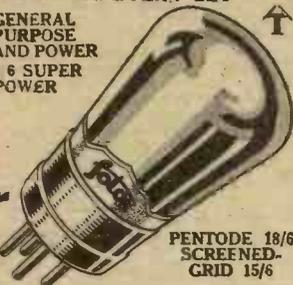
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Mains Units

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"A.W." Solves your Wire'less Problems

IN PASSING

Jottings From My Log
By JAY COOTE

APPARENTLY it is not only the difficulty of separating the Brookmans Park Twins which has given listeners trouble during the last week or so, but also the minor accidents and mishaps which beset wireless receivers during the Spring cleaning period when the "char." with the full authority of the housewife is let loose to sweep, dust, and generally clear up to her heart's content.

All kinds of things happen. Aerials are disconnected, earth leads broken, wander plugs taken out of H.T. and G.B. batteries and replaced in a haphazard way with dire results, upset accumulators in portables and many other minor annoyances which might be avoided with care and a little attention.

Small troubles? Yes, to the man who knows, but I have been struck with the remarkable ignorance displayed by the majority of many of my acquaintances in all matters wireless. So far as I could see, their entire knowledge consisted in pulling out a switch and in turning the condenser dials to two different positions for the National and Regional programmes. Prior to the advent of the Twins, this ignorance did not matter to the same extent as it does to-day; all was plain sailing and nobody worried. Now, some care must be taken if the programmes are to be received in a way to be enjoyed, and the average possessor of the purchased receiver finds that a complication has been added to his daily worries.

In this, the eighth year of broadcasting such a lack of knowledge should not exist; yet, to whom is the general public to turn? From experience we know that in most instances the local electrician or the suburban dealer in radio components are of very little assistance where a breakdown—however slight—has occurred. As a matter

of fact, where the ignorance of listeners is flagrantly patent, advantage is often taken of their gullibility.

Now, the man who is interested in wireless reads the technical papers and is not misled in this manner, but there exist thousands who evince no interest in radio matters apart from actually listening to the programmes. You will continually hear your friends say: "I know nothing about this radio business and it cost me so much to get the thing put right." These are the people who suffer.

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SITTING ROOM
BED ROOM
KITCHEN

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Nev, made on the latest principle, a vast improvement over all other types; will pick up whispered words from a distance of several yards, also strongly amplify and transmit speech and music over a distance, through Loud-speaker or Headphones. Splendid instruments for making Detachphone, DEAF-AID, LOUD-SPEAKING TELEPHONE, Announcements through Loud-speaker, Amplifier for Crystal or Valve Sets, Electric Sound Detector, BABY ALARM or INVALID CALL from bedroom through distant Loud-speaker, Experiments, etc.

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Everybody's Three (SG, D, Trans) AW209
1930 Ether Searcher (SG, D, Trans) AW211
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AMATEUR WIRELESS 58-61 FETTER LANE LONDON, E.C.4

MORE RADIOGRAMS

RADIO programmes in Spain are said to be of such poor quality that public interest is falling fast. This is shown in the small number of receivers operated there -roughly, only 310,000.

Figures of the U.S. Department of Commerce show that the exports of radio receivers and equipment last year were £4,600,000, as compared with about £2,000,000 in 1928.

At Skidmore College, New York, a loud-speaker is installed at the swimming bath. The music that is tuned in makes for a rhythmical swing in swimming.

A demand is being voiced in Scotland for a local transmission of television. Home-made apparatus is already in use by a number of enthusiasts. Transmissions from Berlin have been picked up in Glasgow, in addition to those sent out from London.

A sequel to the series of broadcast talks on "What is Wrong with Scotland," which attracted so much attention last year, has been arranged. It is entitled "Putting it Right."

"Amateur Wireless and Radiovision." Price

Three pence. Published on Thursdays and bearing the date of Saturday immediately following. Post free to any part of the world: 3 months, 4s. 6d.; 6 months, 8s. 9d.; 12 months, 17s. 6d. Postal Orders, Post Office Orders, or Cheques should be made payable to "Bernard Jones Publications, Ltd."

General Correspondence is to be brief and written on one side of the paper only. All sketches and drawings to be on separate sheets. Contributions are always welcome, will be promptly considered, and if used will be paid for. Queries should be addressed to the Editor, and the conditions printed at the head of "Our Information Bureau" should be closely observed. Communications should be addressed, according to their nature, to The Editor, The Advertisement Manager, or The Publisher, "Amateur Wireless," 58-61 Fetter Lane, London, E.C.4.

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