

ANOTHER ARTICLE BY CAPT. ECKERSLEY

7

Popular Wireless

Every Thursday
PRICE
3d.

No. 370. Vol. XV.

INCORPORATING "WIRELESS"

[July 6th, 1929.

ORMOND



LISSEN



IGRANIC

*Special
Portable Set
Number*



LOTUS



MULLARD

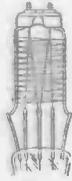


GECOPHONE

SAFE!



1. The double length Cossor filament fanned for its colossal emission. Note the seonite bridge holding it rigidly in position.



2. Around the two stout grid supports is wound the first grid, electrically welded at twenty-five points.

Cossor makes greatest advance in valve design since the introduction of the Dull Emitter

RIGID!



3. Note the enormous strength and rigidity of the screen. Built on four stout supports, capped by a metal bridge-piece anchored to seonite insulator

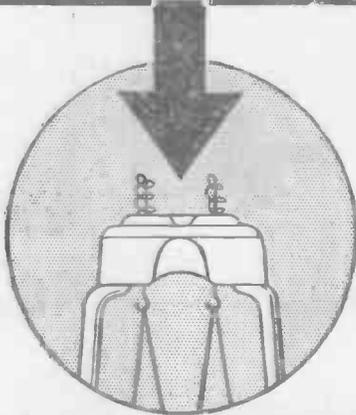


4. Finally, observe the construction of the anode. Actually two rectangular nickel plates are used and for greater rigidity each is diagonally ribbed.

The wonderful new Inter-locked Construction employed in the Cossor Screened Grid Valve eliminates all the inherent weaknesses in valve design. Under this system (illustrated here) each element is firmly braced top and bottom. Every joint is scientifically welded. This girder-like construction ensures absolute rigidity. It positively prevents the slightest individual movement of the elements. Even the hardest blow cannot disturb their perfect alignment.

As a result the Cossor Screened Grid Valve retains life-long uniformity of its characteristics. Its Inter-locked Construction (exclusive to Cossor) makes it the strongest and most robust Screened Grid Valve ever produced. Use Cossor in your Screened Grid Receiver — there is no substitute for the Cossor patented system of Inter-locked Construction.

INTER-LOCKED!



Only Cossor Screened Grid Valves have inter-locked Electrodes

COSSOR Screened Grid

BRITAIN'S STRONGEST AND MOST DEPENDABLE SCREENED GRID VALVE

Made in 3 types for use with 2, 4 and 6-volt Accumulator

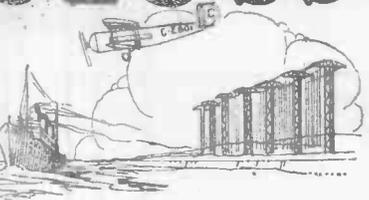
Max Anode Volts 150, Impedance 200,000, Amplification Factor 200, Grid Bias 1.5 volts at max. anode Volts. Price (either type) **22/6**

A. C. Cossor Ltd., Highbury Grove, London, U.S.

Popular Wireless



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NEW HONOUR FOR MARCONI.
PCJ HAS A BROTHER.
THE FIRST BROADCASTER
TELL THE WORLD.

RADIO NOTES & NEWS

TRIALS OF A SCHOOL-BOY.
LECLANCHÉ CHARGING.
THE SUNDAY SAGES.
THREE NEW SETS.

Nature Note.

FOR some weeks every evening about 8 p.m. a blackbird has arrived with determined swoop and perched upon the insulator at the far end of my aerial. At first we thought he had a "date." "Meet you under the clock" sort of business. But no gentle blackbirdette ever comes, so now the household have the theory that he is a dumb nightingale come as a silent reproach for my little "digs" at the broadcasting of that bird's pandemonium. Who knows?

Jays of the Great Open Air.

AFTER much boasting and blowing a friend of mine proudly took his first portable out into the great wide spaces where men are gnat-bitten. And then what? They crushed a custard pie all over the case. That's the sort of car they run! Then they set it up on top of an ants' nest. The ants were only there for the summer but were very busy storing their grub, which they had brought from Oxted, and seemed to think the set was a tophole cupboard. One shift of ants is still at work in the aerial condenser.

New Honour for Marconi.

SENATORE MARCONI has had conferred upon him the Italian title of Marquis, which is to be hereditary. Judged by his services to the world no honour of that kind is too great for him, and "P.W." respectfully offers him its congratulations. It must be immensely gratifying to him to find such honour in his own country. Nevertheless, far above titles of nobility stands the laurels he has won as a scientist, and his niche in the galaxy of immortals is already carved.

PCJ has a Brother.

A NEW short-wave station, erected by Philips, has been undergoing trials. PHI works on a wave-length of 16.88 metres, and is intended for a service with the Dutch Indies. The maximum anode output is 60 kw., the station being said to be the most powerful short-waver in the world. It is situated in Holland, at Huizen.

Wireless Weather Maps.

THE Meteorological Office, the Air Ministry and the B.B.C. in conjunction with Wireless Pictures (1928) Ltd., are issuing as an experiment broadcast radio

weather maps. The transmissions are made at Daventry (5 X X) twice weekly, namely, on Tuesday and Thursday between 2.0 p.m. and 2.25 p.m. In general the maps indicate the conditions prevailing over the British Isles and the neighbouring sea areas.

Chance for a Club!

I SEE that Marconi House is being offered for sale, as in due time the company will move to the new office which is to be built on the site of the old School Board offices on the Victoria Embankment. The price asked is only £300,000, so if some radio club would like some fine historic premises, now is its chance. The lease is 99 years, dating from 1912—enough time in which to make a few big discoveries under the inspiration of the rooms in which Marconi and Captain Round have worked.

Drastic Argentine Law.

I DO not know just what the broadcasting stations have been up to in the Argentine, but evidently they are classed by the authorities amongst dust-destroyers, cemeteries, glue and soap factories and such-like out-cast establishments, for before the end of the year they are to remove outside the city limits. Surely the engineers' tobacco cannot be that bad.

Faux Pas by Radio.

IT isn't often that a radio announcer "drops a brick" as large as the one I have culled from American sources. It appears that the announcer had to stop a musical programme in

order to announce a death. Having done that he went on to say that Mr. — was on his way to visit the sick man but arrived too late. He then added, without a pause, "The next number—'The Wind Blew Through His Whiskers just the Same!'"

The Old Game.

THEY have been making a rare fuss in the U.S.A. about the fiftieth anniversary of the invention of the electric lamp—by Edison. The lamp was invented by the Britisher, Joseph Swan, and Edison improved it. They have issued a special postage stamp to rub in this mistaken idea, just as the Soviet did in order to put Popoff on the map as the inventor of wireless. I am happy to say that a premier English electrical journal has taken up the matter seriously in defence of Swan's pioneer work.

The First Broadcaster.

THE latest claim to be the original broadcaster is now made on behalf of the telephone "hirmondo" (reporter), a system invented by Tivadar Puskas. Thirty years ago the system was installed in Budapest and is still going strong. Music, news, etc., is picked up by a microphone and relayed to subscribers, of whom there are now 8,000. The time is given at 8-0 a.m.; from 9.0 a.m. till 3.0 p.m. news and commercial items are broadcast, and from 3.0 p.m. till midnight music. Loud speakers are used.

The Prize Announcer.

MR. MILTON J. CROSS, announcer of the National Broadcasting Co. (U.S.A.), has won the medal for good diction which was presented by the American Academy of Arts and Letters. Good! I should like to hear a bit of his stuff and to learn how he pronounces "Conduit" and "advertisement." "Conduit" will surprise you. But that by the way. What I

(Continued on next page.)



The first Regional station at Brookman's Park, is nearing completion, and should be heard on the air before very long.

NOTES AND NEWS.

(Continued from previous page.)

set out to report was that on Mr. Cross' own confession he cannot say "Pass the butter, please," without making it sound like an "announcement." I should be tickled to hear an announcer of his class making love.

Testimony from Dublin.

E. T. M. writes generally concerning "double events," sceptics and short-wave work. He has an "All-Wave" Two, and gets a nice all-round sprinkling of stations at good L.S. strength, but it is amongst the short waves he revels and ranges from Paris to Melbourne. His word to sceptics is that whilst one cannot guarantee to receive a given short-wave station at a given time, nevertheless the American stations come over with a "kick" if conditions are good. E. T. M. and the rest of us know that the variability of S.W. work is half the charm of it. "What shall I catch to-night in the net?"

Tell the World.

JUST now Britain contains hosts of foreign visitors, chiefly American. Westminster Abbey is just one large mass of heavily-rimmed spectacles and guide-books. Well, I hope we are glad of it; we ought to be pleased that our country attracts them. Hence it seems to me that for a few months the B.B.C. would do well to recognise our guests by devoting a few items every week to matter likely to please them, for they hear our radio at the hotels. I would go so far as to suggest a "Visitors' Night" once a week, during which a little programme is given for their especial benefit. If not, why not?

Trials of a Schoolboy.

CONTINUING short-wave chatter, with apologies to W. L. S., whose notes are in great demand, meet Mr. A. G. M., of Stoke-on-Trent—who wants to join the H.A.C. Club. By the way, this appears to be a rival to my Ancient Order of Valve Barts. A. G. M. has a cross to bear, and it is that at his school they do not allow the lads to sit up all night and so his "bag" of Americans is flattish. Tyranny, I call it. However, our young man has had the felicity of hearing 6 A G (Perth, Aus.), which is better far than "De Bello Gallico" or Pons Asinorum. May heaven bless you with insomnia when you grow up and make you a demon "fan."

Léclanché Charging.

MR. FLOWERS' letter on page 488 of "P.W." for June 22nd should induce a number of people to try Léclanché charging and we welcome the tip. But when Mr. Flowers advises one never to jest about a thing unless one knows all about it I think we part company, for that would rule out all jests and leave the world the duller. Besides, there's many a true word spoken in jest. Also out of the mouths of babes and sucklings, etc. However—Kamerad!

Amateur Call Signals.

SEEING W.L.S.'s note about the "Radio Amateur Call Book" reminds me that I had a note from A. W. M. (Middlesbrough) to the effect that it is "the goods"

and will open up a large new field to competent "fans." A. W. M. has been in correspondence with the R.S.G.B. and found them so helpful and courteous that he intends to join them. He wants to know who I O P Italy is.

Storage Battery Invention.

MR. JAMES DRUMM is said to have invented a new type of accumulator of such important merits that he has confided it to the Irish Free State Government. It is claimed that this battery can be charged in six minutes and can store sufficient energy to propel a train or motor vehicle for 60 miles. All users of accumulators will await with interest details of this invention and its appearance on the market. I should say that a step of first-rate importance in the evolution of the secondary cell is overdue.

SHORT WAVES.

If we are to have talkie movies; why not silent radio?—"Star."

RANG THE CHANGES.

The office-boy who said last week that one of his wireless-uncles had died.—"Sunday Pictorial."

REASONABLY TRUTHFUL.

Dentist: "Have you an extra false set?" Patient: "Oh, no; mine is a four-valve set."

Wireless without tears. Thanks to the dry batteries?—"Daily Mirror."

AS IN AMERICA.

Of all sad words of radio boobs, The saddest are: "I've blown the tubes."

Binks: "My radio is a wonderful reproducer. Every night, when we turn on the dinner music from the Van Ritz, we seem to be dining right there in the hotel."

Jinks: "Yes, Mrs. Binks told me that you even left fifty cents under your plate the other night."—"Radio News."

"The King has referred to a measure to 'assist the further development of the gas industry,'" we read.

We hope his Majesty is not referring to the B.B.C.

A correspondent writes to say that he had so much trouble with his wireless set that, in desperation, he took it round to the local doctor, who is also an enthusiastic radio fan. The doctor's diagnosis was that the set is suffering from a series of epi-lectric fits!

The latest description of Moving Coils: "Those seen when sitting up for America with a bottle of whisky for company."

The Sunday Sages.

SAYS my Sunday expert, writing of mains L.T. chargers, "Many are excellent, but none will be of any use if a battery has run down. . . . Now that's funny! For years I have charged my accumulator from the mains, when it has run down. If it didn't run down I wouldn't bother to do that. Another paper tells us that the positive strip of a flash-lamp battery is soldered to the zinc case and the negative strip connected to the carbon rod. The only thing wrong about that is that it is not correct. T'other way round, please!"

Africa Also "Thrills."

W. C. S. (Brakpan, Transvaal), tells us that he also heard 2 X A F broadcast "Big Ben" in April. He has an S.G. H.F. Det.-adaptor plugged into the L.F. side of his receiver, and can put "all

the short-wave stations on three L.S. simultaneously in different rooms." The best S.W. station there is 5 S W, followed by K D K A, 2 X A F, 2 X C, C J R X and 2 X A D. Winnipeg comes in at wonderful strength, and P C J and Huizen are good stand-bys. He sends greetings to all of us—which includes all of you.

New Broadcasting Company.

A NEW programme company has been formed in Holland with the avowed object of broadcasting "the humanitarian and idealistic." It has applied to all the existing radio companies there for transmitting time, but if it does not succeed it hopes to erect a station for itself. This is a laudable object, but it is not clear from what sources the company will derive its revenue. However, we wish the venture luck. It will need it.

Three New Sets.

IF you don't know "The Wireless Constructor" I recommend you to get this month's issue. It is a "bargain." Notable amongst its contents are details of the construction of the "Ten-Pound" Five, the "One-Coil" Two, and "A Beginner's Single Valver." This single-valve receiver on test gave 2 L O, 5 G B, Langenberg, and a dozen or more European stations, including Hilversum, Kalundborg, Eiffel Tower, Radio-Paris and Huizen, all at comfortable 'phone strength. The "Ten-Pound" Five is a bit of Mr Harris' work.

New Distribution Idea.

THREE American inventors have devised a new method of distributing broadcast throughout hotels and the like. Instead of receiving the programme on a central receiver and distributing it to the loud speakers by a complicated system of wiring they proceed as follows. Six sets receive six programmes on one aerial. The energy is then passed to a series of oscillators connected to the steel framework of the building. The receivers in the rooms then operate by induction from the framework, receiving their power from the mains.

Report on the "A.A."

NEWS of our "Antipodes Adaptor" continues to flow in. There is no doubt that it is a "winner." W. H. (Southampton) says that he has got D Xcellent results by using it with a two-valver (Det.-L.F.), and I see that his list includes 3 L O and 7 L O, besides a number of Americans which came in at L.S. strength. He finds the "hand capacity" to be nil. The day of the "A. A." is not yet over, and I recommend sceptics (if any) to try it.

"Give Me the 3.15 Up."

THE Canadian National Railways announce that they have perfected a system of "carrier-wave" telephony which will enable passengers on moving trains to telephone to any point served by the ordinary telephone system, and is an improvement on the method used in Germany because it is "two-way" and does not demand switching over from speaking to listening. This process must be of enormous utility to business men, who no longer must be cut off from their offices whilst travelling.

ARIEL.

Distant Listening

BY CAPT. P. P. ECKERSLEY M.I.E.E.

AN idle evening drew me to my many-valved set to see whether I could fish up anything worth while from the ether. I had heard the news from 2 L O, then Sir Walford Davies, delightful as ever, but my anticipations of the opera were not realised and hence my sudden optimism. So I sat in a veranda, the beautiful soft night outside—and twiddled; so does man prove himself irrational, even that man that supposes himself highly individualised.

Noise or Music?

Now I have a good set; too many handles, perhaps, but I think I know what they mean. So I twiddled and never oscillated—well, just once, so as not to feel too out of all the fun. What do people get out of it? I am not holding myself up as superior; I really think I must have some kink somewhere. I do try, like anything, to enjoy the noises that result.

Tell me, dear distant listeners, what is it all about? Why do you keep telling me it's so wonderful? As a noise, yes, but as broadcasting? As listening to music? As enjoying something significant? Surely not! Or am I wrong?

I am always seeking knowledge, always wanting to know about things, always anxious to join in in any party that's going on, to share the joke, but I do think listening to medium-wave foreign stations is a poor sort of pastime, and for the life of me I fail to understand what it's all about.

A cheery article on the subject of DX which is full of sound reasoning and informative facts. Capt. Eckersley describes some of his personal station-searching experiences and brings forward some pointed morals based on them. He is an ardent advocate of "service" and it is, of course, mainly due to him that our B.B.C. stations are today unequalled in the whole world.

Of course, the stations do run into each other a bit and you can justly accuse us in our international committee for not ordering things better. All that is another story, and I think in a few months time we shall have lined up quite a lot of the untidy stations, and then that criticism will fail. I did get a clear station—a German, I think, doing a comic opera, rather more comic when it reached me—so distorted, and one of our dear old ships ensuring every sort of safety at sea by preventing anyone else hearing anything.

"Dreadfully Rough."

Ta-tit-ta-ta went the ship, ho-ho-da went the bass, the quality was dreadfully rough; and then, gently, calmly, quietly, the whole transmission faded right out, and then came back again with a series of ear-splitting sort of croaks, and a very coloratura soprano

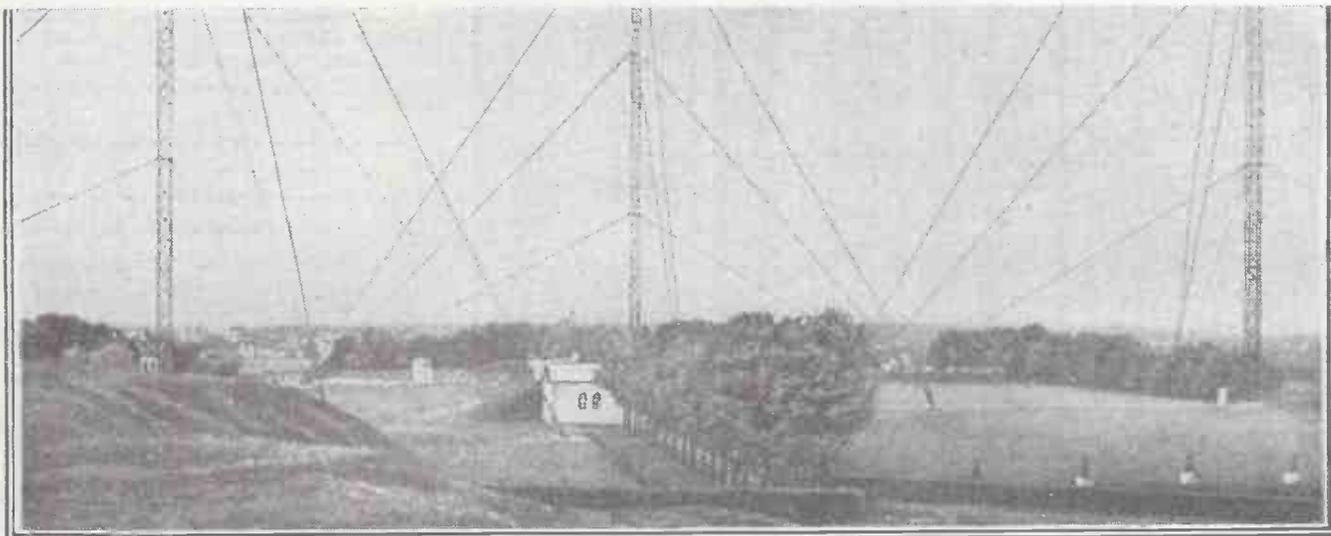
was fairly coloraturating, the ship this time a bad second but still very persistent. I didn't try the long waves because it means changing coils, and that drives me to a fury which makes me lose my habitual self-control and become quite unlike my real self.

Many years ago I gave my mother a set. Her house faces the sea, and they say there is no land the way you can look out until you come to the North Pole. There is sea to Oslo, sea to Hilversum (nearly), sea to Hamburg. I often sit and twiddle and get other European stations and, I must say, they are more worth while because it's only a flick of a switch and I'm up among the long waves—Hilversum, Radio Paris, Motala, Zeeseen (when one can tune out Daventry), the Eiffel Tower (when one doesn't want it), and particularly Kalundborg with its gruff voice and excellent orchestra.

Long Waves Best.

Medium waves can be got—but what is the good of them when they fade away every three minutes? There are plenty of English stations, but they are either fading, doing a Children's Hour, or the same programme as Daventry. No! except for long waves I am no subscriber to distant listening. I don't expect to shake the beliefs of those enthusiasts who "get" so many stations, I am merely recording my views and opinions for what they are worth.

(Continued on next page.)



The Vienna Station is situated in very pleasant surroundings from a scenic point of view. But its transmission is badly placed in the wave-length scale from the distant listener's point of view, and much mush and Morse mars its music.

DISTANT LISTENING.

(Continued from previous page.)

But all this has a moral. I am with you all when you say that foreign stations are "interesting"; they do have a certain "cachet." I do not deny that the listener has a much-needed choice by searching the ether for the type of item, symphony, jazz, whatever it may be, he likes best. My point is that it's only worth while (to me, at any rate) when one is free from a dreadful background of noise, and when one is certain of a continuing signal—when one is free from fading, in fact. One only gets these conditions when the wave is long and the station powerful.

We Want Better Waves.

High power, long wave; high power, long wave—there you have the secret, there lies the true possibility for the distant listener. There are about seven long-wave stations, there are over a hundred medium-wave stations, there are seven possibilities of good distant listening; the rest is a mush and not worthy, in my mind, of serious attention.

Here and there, yes, when one is in the service area, or near it, of a high-power medium-wave station; but, in general, fading and distortion and background noise ruins the reception of distant medium-wave stations.

Why may not we have seventy or a hundred long-wave stations? I personally think and have recently shown by quantitative analysis, that broadcasting does not require more channels, it requires better waves. The millennium of the distant listener will surely arrive when Governments see their way to basing the allocation of waves between the claimant services on the basis of technical considerations, not on the basis of what has gone before.



Capt. P. P. Eckersley at an outdoor fête held in connection with broadcasting.

I have shown in a recent scientific pamphlet that, with the present allocation of waves, it is only possible to cover about eight per cent of Canada, for example, with good broadcasting, whereas, with the same number of waves, but higher up in the band, eighty-five per cent of Canada could be covered day and night.

This is assuming an infinite amount of money in both cases and all known technical skill available. We in Britain have ten waves and we're going for the Regional

Scheme on this basis. We can cover a good quantity of the area, but given the same number of waves higher up in the band we can give ten times as good a service. *Verb. Sap.*

Present Channels Inadequate.

I started this article perhaps frivolously, but I have come to a most serious part when I assure you of the utter inadequacy of the present waves for use by the broadcasting services. We want no more waves, we want to collar some of those suitable for our work, and we've got to try and convince the authorities of the real seriousness of our claims.

The present waves are hopelessly wasteful in power. A 50-kilowatt set, costing perhaps £60,000, taking 400 kilowatts from the mains, has a true range of twenty to thirty miles (in mountainous or coastal country even less), it produces the same interference at 1,000 miles as a long-wave station having a range of several hundreds of miles. The medium waves below 300 metres are bad for Regional stations and doubly wasteful in power, having a small local service area and a large interference at great distances.

I don't say these cannot be used, they have value for "local" as opposed to Regional services—something more can be made of them by using proper aerials; fundamentally, however, they are wrong.

The Coil-changing Bogey.

Now I brushed lightly at the beginning on the question of changing coils. Agree with me, it is a nuisance. Why do we have to do it? Because it's one of the cheap and practical ways of using the facilities available; and we have to, even if our change is only made by switch and not by hand. But given a hundred channels, between 2,000 and 300 metres, we should not have to make the same jumps; and it's not beyond our wit to devise a smooth control right through. More than this, we transmitting people could arrange it so that we shouldn't often have to be jumping.

I began by frivolously describing an idle evening's doings; I end the idle evening on a note of real seriousness by assuring you that I am a convert to distant listening if and when we can listen distantly. I have been saying for years what Mr. Baldwin said recently—that wireless will do much to make us conscious citizens of the world.

That will come quicker when wireless is given a chance. Let those who sincerely desire that nation shall speak peace unto nation see that proper facilities are available so to do.

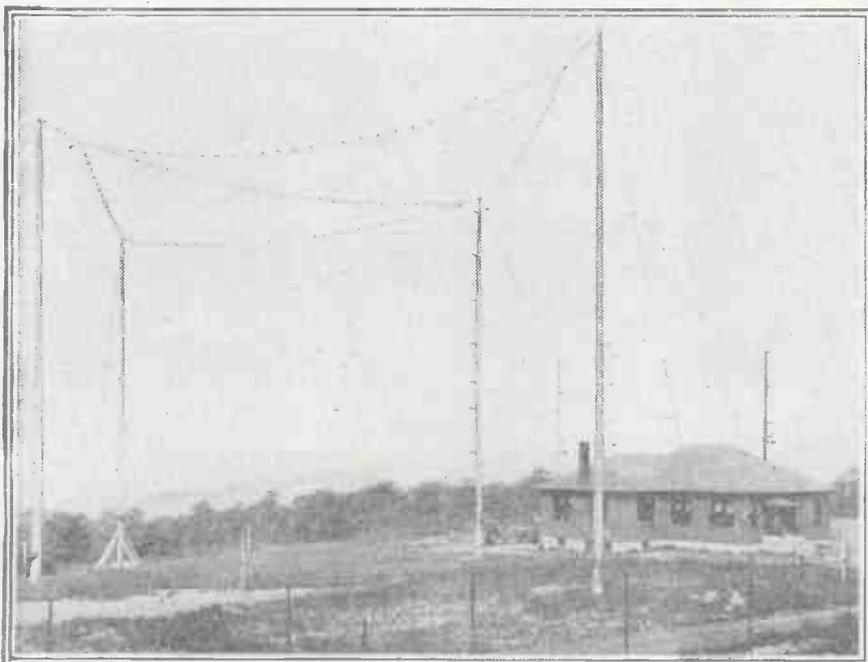
TECHNICAL TIPS.

To calculate the voltage drop across a resistance, multiply the number of ohms by the number of amps flowing through it.

The use of aperiodic aerial coupling is often beneficial in increasing selectivity, and cutting out unwanted noises.

The P.M.G.'s regulations stipulate that no listener shall have an aerial greater in total length than 100 ft.

For most purposes and where a reasonably high mast is available, 75 ft. of single wire makes an ideal aerial.



This is Station KDKA of America, which was the pioneer of short-wave broadcasting. KDKA has been heard in every country in the world, and is still one of the favourites of the high-frequency DX enthusiasts.

PORTABLE SET CIRCUITS

IT is surprising what a variety of circuits and combinations are possible in a portable receiver, and it is almost as surprising to find what a large amount of work is necessary before a really satisfactory instrument can be evolved. It is no exaggeration to say that it is easier to design ten cabinet receivers of the ordinary type, than one satisfactory five-valve portable, for range, quality, and stability all have their peculiar snags in this regard.

As a portable receiver has to work on a small aerial contained in the receiver itself, its suitability to pick up signals is much inferior to the ordinary receiver used with an outside or even indoor aerial. For this reason the high-frequency part of the apparatus is one that needs a good deal of attention, experience having shown that either two ordinary high-frequency stages, or one screened-grid stage, is the minimum for safety working. The methods of coupling these high-frequency stages must be decided with care, and here we are working within certain limitations.

The H.F. Stages.

Obviously the most efficient form of coupling is one which is tuned, but a set with two tuned stages requires, in all, no less than three tuned circuits—one for the first high-frequency valve, one for the second and one for the detector. In view of the restricted space into which it is necessary to build a portable set it would be essential that each of these tuned circuits be carefully screened from the other, and simplicity of control would call for ganging the condensers. Altogether it is not practicable to make a portable set in this form, although its efficiency would be very high.

Two tuned circuits are, however, not impracticable in such a receiver, and in portable sets using screened-grid high-frequency stages it is customary to use a form of tuned coupling, although personally I have had considerable success with untuned choke coupling for such a valve. Where two ordinary high-frequency valves are used, two untuned choke couplings or a combination of one choke coupling and one resistance coupling seems to be the rule. Comparatively few sets, if any, marketed commercially,

A really helpful article for the constructor in which the merits of the various portable hook-ups are outlined.
By T. W. EDE.

have now H.F. resistance coupling, although the magnification obtainable in carefully designed sets using two H.F. resistance stages, is very high—much higher than is generally supposed.

The efficiency of both choke and resistance coupling increases rapidly as frequency goes down, and therefore most receivers are more efficient on the long waves than on the short. It is not always the case, however, and in one portable sold separate aperiodic transformers are used for the two wave-bands, these being changed over simul-

when we come to the low-frequency end there is an increasing tendency to use two transformers, particularly as these have improved so greatly here and we cannot afford to sacrifice much magnification in this part of the circuit. The combination of one transformer and one resistance is, however, still common, and makes it easier to get good quality, although in a properly designed two-transformer receiver, quality can be first class. Resistance coupling, however, has the advantage that it cuts down weight and high-tension consumption.

Reduction in Size.

Limitations in the size of the high-tension battery which can be carried in a portable receiver hinders considerably the development of a highly efficient design, for much as we would like to use a super-power valve in the output, it is only rarely that we can afford the space and weight for the requisite high-capacity battery.

Newcomers to wireless often wonder how it is that a five-valve receiver can be built into the small space of a portable receiver when a five-valve set of the ordinary type is so very much larger. The reason is that almost invariably ordinary types of receivers with five valves adopt the more efficient transformer or tuned-anode coupling in the high-frequency stages, each of which has to be tuned with a variable condenser, which in itself occupies an appreciable space. Again, where it is unnecessary to build into a small space it is generally an advantage to spread the parts far more than is usual in a portable.

The Loud Speaker.

Considerations of space and weight dictate in most cases the use of 2-volt accumulators, but I see that one or two portable sets now have a compact 4-volt type.

It is always wise to exercise a good deal of care in the choice of a loud-speaker unit, and among several which are equal in selectivity and reproduction, choose those which give you most space for your batteries. Again, batteries vary considerably in size, and each maker usually has several different shapes.

The batteries should be chosen last, and the point to bear in mind is to buy them as large as possible.



The Dubilier "Westminster" is a striking example of combined portable set and gramophone. Two of its five valves are of the screened-grid type, and the turntable when not in use is carried in the space behind the frame aerial.

taneously with the change of frame aerial by the wave-length switch:

Leaky grid detection is almost invariably chosen for portable sets owing to its greater sensitivity on weak signals, and

LATEST BROADCASTING NEWS.

H. G. WELLS TO BROADCAST

THE AIR ON THE AIR—SIR FRANK BENSON FOR 5 G B—FUTURE ITEMS—WHAT IS PENILLION?—A MIDLAND BAND.

H. G. Wells to Broadcast.

AN event of supreme importance in broadcasting will be the first appearance before the microphone on Wednesday, July 10th, of Mr. H. G. Wells, the eminent author. Mr. Wells is to talk for half an hour on the subject of "World Peace." He will begin at 9.15 p.m.

This announcement can be taken to indicate, of course, that the attitude of hostility to broadcasting—or shall we say indifference to its progress?—displayed hitherto by Mr. Wells is over. The B.B.C. is to be congratulated in claiming such a notable convert even at this stage. Now let's wait for the fireworks. Mr. Wells has been overheard to remark, with a significant glance, that he will abide no censorship!

The Air on the Air.

What with the Royal Air Force Pageant at Hendon on Saturday, July 13th, the Aeronautical Exhibition in London shortly afterwards, and then, from the beginning of August, the elaborate preparations leading up to the Schneider Cup race off the Isle of Wight, fixed to take place on Saturday, September 7th, aviation is going to have a big place in the sun between now and the autumn.

The new airships, R100 and R101, are also expected to make their trial flights early in September, a fact which in itself is sufficient to create world-wide interest. Next week we shall probably be in a position to give details of some important broadcasts which it is hoped to arrange in connection with the two last-named events.

The B.B.C. is fully alive to great interest in all matters connected with aviation, as is evidenced by the periodical talks by well-known authorities on the subject. The next of these will be by Air Vice-Marshal Sir Sefton Brancker, K.C.B., in the London studio at 9.15 p.m. on Monday, July 15th, when he will give a survey of the present position of civil aviation.

Sir Frank Benson for 5 G B.

Sir Frank Benson, perhaps the greatest of all Shakespearean actors, is one of the very few outstanding members of his profession who have not yet played in radio drama. This does not mean he is unacquainted with the microphone, because some-time ago he gave a talk from 2 L.O.

It is therefore pleasing to learn that he has consented to take part in a feature programme which 5 G B is broadcasting from the Birmingham studio at 7.45 p.m. on Saturday, July 27th. This programme has been written by Walter Pilchford, and consists of a mixture of Shakespearean dialogue and music representative of all types from Shakespeare's time down to the present day, including Elizabethan madrigals, folk songs and, of course, jazz and the

compositions of Bartok and Stravinsky. Listeners will probably hear music played on ancient Elizabethan instruments called recorders. Sir Frank Benson will, of course, take the most important rôle in this exceptional programme. He will portray "The Shade of Shakespeare."

Future Items.

Here are some further items taken from forthcoming arrangements:

July 12.—Speech by Mr. Philip Snowden, Chancellor of the Exchequer, at the dinner given by the Mayor and Corporation of Bournemouth to delegates at the National Savings Assembly at the Town Hall, Bournemouth. (Relayed from 5 G B.)

July 17th.—A revuelette, entitled "Fifty-Fifty," written, composed, and produced by Ernest Longstaffe. (London and other stations.)

July 28th.—Sermon by the Rev. R. J. Campbell, formerly pastor of the City

What is Penillion?

This paragraph is not intended for Welsh people, since it aims at attempting to explain what penillion singing really is. The programmes from Cardiff and Swansea often contain a penillion recital—there is one by Gunstone Jones on Tuesday evening, July 16th—and it is not fair to mystify English listeners any longer about this favourite form of Welsh entertainment.

In penillion singing the air is not sung by the voice, but played on the harp, and no penillion singer is regarded as competent unless he can sing in triple time against double time in the melody. Some people give this as the reason why the Welsh take so kindly to part singing. At any rate, penillion singing has been very popular for generations past, and there should now be no excuse for anybody asking what it is.

A Midland Band.

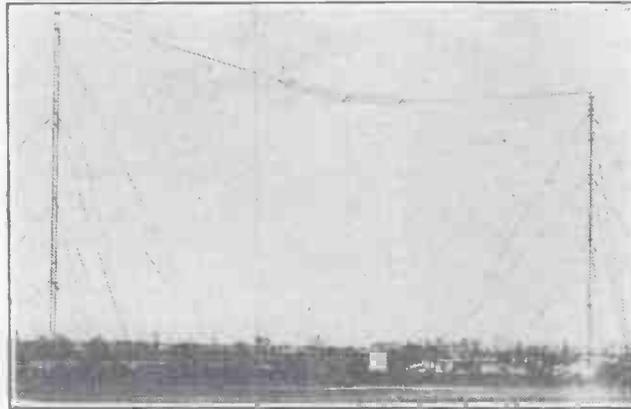
Not all the best bands are in the North of

England, despite the eulogies of Newcastle, Manchester, and other stations in that area on the musical combinations which nearly every week provide some of the most popular programmes from their respective studios. There are good bands in the Midlands, and the Birmingham Station authorities are rather anxious that 5 G B listeners should know they have secured the services of one to give a concert on Wednesday, July 17th.

This band comes from Amington, a small mining village near

Tamworth, in the north of Warwickshire. Although it was only formed in 1918, its record as a village band is extremely enviable.

BROADCASTING IN BUDAPEST.



A general view of the Budapest Station, which is often heard by British listeners.

Temple, from Holy Trinity Church, Brighton. (London and other stations.)

August 3rd.—Broadcast of the Tidworth Tattoo. (London and other stations.)

TECHNICAL NOTES.

By Dr. J. H. T. ROBERTS, F.Inst.P.

PORTABLE SETS.

COMPLETELY SELF-CONTAINED—EXTERNAL CONNECTIONS—ACCESSIBILITY—SIMPLE CONTROL—H.F. AMPLIFICATION.

NOW that the holiday season is upon us, the attention of experimenters naturally turns towards receivers—and gramophones—for outdoor use. Not that the popularity of the portable receiver is confined entirely to the summer-time; there are advantages in compactness and portability even in a receiver intended for indoor use, since it can be carried about from room to room, and can be closed up and put away very conveniently when not required. At the same time, where it is desired to take the set in the car, or out on minor excursions, portability is obviously essential.

Portable radio receivers have now been reduced to such extremely small dimensions that they compare very favourably with portable gramophones. In fact, as you know, there are actually combined portable

gramophone and radio receivers which are very little larger than an average size portable gramophone.

Completely Self-contained.

It is clearly desirable in a portable receiver—that is, if it is "portable" in the strict sense of the word—that it should be, in the first place, entirely self-contained as regards battery power, and, in the second place, that it should not require any external aerial or any earth connection. The truly portable receiver has the batteries enclosed in the cabinet, and the aerial in the form of a loop or "frame."

Comparing this with a portable gramophone, it is about equivalent to having the records stored inside the gramophone case.

(Continued on page 556.)



PORTABLE POINTERS

A Few Hints on the Maintenance of Portable Sets.

By G. W. EVANS.

WHAT may be termed the portable season is now in full swing, and a few hints as to the upkeep and treatment of portable receivers may be of interest to readers.

Having built a portable set the only upkeep is the normal upkeep of the batteries in the same way as in the ordinary set, but for some reason or other it is often found that the portable-set batteries are inclined to be far more neglected than the ordinary set batteries.

Whether they are forgotten because they are boxed up and out of sight, or whether it is the reluctance of the owner to disturb the set, it is difficult to say, but the fact remains that a great number of portable batteries do not get the attention that they should.

Especially is this the case with the L.T. battery, which, because the accumulator is of the unspillable type, is quite often tucked away inside the set and allowed to run right down before having anything done to it.

A portable L.T. battery is usually of the small variety and therefore usually has quite a big enough drain upon it without the ill-treatment of being allowed to stand "run down" for some time before it is recharged.

It is assumed, of course, that in this case the portable set is not being used as an everyday set, but is being taken out periodically at picnics and week-end trips, and being left fairly well alone during the week-days. If used every day the run-down state of the battery is easily noticed and things are remedied.

The H.T. Battery.

It is best therefore after any trip, or after any time when the set has been used for more than a few moments, to examine the batteries carefully and to see if they are in need of recharging. Waiting until signals are poor, or practically non-existent, is a bad way of testing the "fullness" of the battery.

The same applies to the H.T. battery, because it is most annoying to take a portable set out into the country, or on a week-end trip, only to find that soon after one has tuned in severe crackling appears, showing that the battery is nearly run down, and the taking of any current from it so drops its voltage and increases its internal resistance that it is practically useless.

One should watch those portable H.T. batteries very carefully because, here again, as they are tucked well away in the set one is liable not to disturb things in order to test them, and they are therefore likely to be neglected until they are in such a condition that they are really of very little use. Often, too, they are badly overrun due to the use of a pentode or super-power

valve in the last stage. So keep an eye on those batteries!

Small Sets.

The large portable with its frame aerial and loud speaker has many advantages, but there is also a considerable amount of pleasure to be obtained with even a two-valve portable set together with a small portable aerial. In such cases when you are out for a picnic or radio ramble, do not forget the earth pin. It is so easily left behind if there is no place for it in the set, and after all the earth pin does make a tremendous lot of difference to results.

Similarly the aerial wire can be of an easy and light form, rubber covered wire is not really necessary and the writer has found that No. 22 gauge D.C.C. is remarkably good for slinging an aerial up to the branch of a tree. A smooth weight of not too heavy a description or, better still, a spring clip should be employed for fixing the aerial.

Very often the valves travel better packed in their boxes, and stowed away neatly, than when left in the set, unless the set is a well-made affair with anti-vibration valve holders and no possible chance of anything

DON'T FORGET THE EARTH PIN!



Inserting the earth pin before commencing to listen-in. An earth makes all the difference to a small set.

working loose and knocking in and out amongst the valves.

And, talking about things working loose, do be careful to wedge in the accumulator and H.T. battery carefully so that they cannot start moving about amongst

the connections, or work the wander plugs loose so that they start shorting and causing trouble that way.

As a matter of fact, in some cases it is best to remove the wander plugs completely and to wrap them up in a piece of paper and stow them away in some safe place inside the set. I do not mean take them off their wires, but stow the wires away with them and put them somewhere where they cannot possibly get into contact with any vital portion of the receiver.

This, of course, refers to the smaller sets such as those which are built into attaché cases and which may not be as rigid as some of the bought sets, or the bigger models on which more time and care are expended.

Reducing Anode Current.

Incidentally one should make sure that the grid-bias plugs fit properly and do not come out without your knowing. A loose or non-existent bias connection will quickly run down the H.T. battery and probably ruin one or more of the valves—all the biased valves if the connection happens to be the positive bias to L.T.—connection.

Another point of interest is that it frequently pays to use a super-power valve well biased down to keep the H.T. current to a reasonable value even if the valve is operating below the centre of the straight portion of its curve. A pentode valve, too, can often be successfully biased until it takes little more than 5-6 ma., though this procedure wants to be done with care, otherwise distortion due to the partial rectification of the L.F. impulses will occur.

If you take your portable out in a car or on a motor-cycle or side-car, be careful how you carry it. Excessive vibration may not result in "breaking" anything, but it may quite likely loosen some of the connections, whether they be soldered or merely terminal screw connections. Vibration is not good for valves or for batteries either, so be sure to pad the set well and to carry it as carefully as possible.

Remember the Programmes.

If you can carry a couple of spare valves they may save you from disappointment, but modern valves are pretty robust and are not likely to let you down if reasonable care is taken with them.

Finally, having looked over the batteries, having seen that the connections are all tight and nothing can work loose, valves are all right, and the aerial and earth are all in order, do not forget your copy of the programmes.

It is most aggravating to get away well into the country, fix up the set and be ready to listen in only to find that you do not know what station to listen to, or whether any particular station you wish to hear is on or not.

THE ROYALTY QUESTION.

The appeals of the Marconi Co. have been upheld so that the radio industry has now got to adjust itself to a definite reversion to the "old" royalty rates.

By THE EDITOR.

THE two appeals made by Marconis against decisions of the Comptroller-General of the Patent Office were, as we reported in last week's issue, upheld in the Chancery Division by Mr. Justice Luxmoore. The decisions had been eagerly awaited by the radio trade and, in many quarters, Mr. Justice Luxmoore's considered judgments were received with surprise, and certainly with disappointment.

Our readers will remember that the Comptroller-General of the Patent Office had granted applications by the Brownie Wireless Co. and the Loewe Radio Co. for licences to manufacture valve sets at certain reduced royalties and, as a result of this judgment, the Marconi Co. appealed.

Sets Will Be Dearer.

There is no need to review the case in detail again, as our Legal Correspondent has already placed before our readers a short but comprehensive summary of the facts. The result, however, is of considerable importance. To begin with, it is a set-back to the "days of cheaper wireless" and, as an inevitable result of Mr. Justice Luxmoore's decision, complete receiving sets will cost more in future, for the simple reason that the Marconi Co. is now legally entitled to claim the old valve royalties which were in force before the Comptroller-General of the Patent Office authorised reduced charges.

But this decision must be regarded impartially. After all, the Marconi Company do hold the Master Patents. Many of them expire very shortly, and whether one thinks the royalties charged excessive or not, the fact remains that the Marconi Company in past years have spent thousands and thousands of pounds on research work and in encouraging radio development in such a way that many of these Master Patents have been a direct result due to the inventive genius of the research staff at Marconi House.

Consequently, the Marconi Company is fully entitled to reap the benefit of the outlay, and although there may be more than one opinion as to whether the royalty of 12s. 6d. a valve holder is a high price, the fact remains that the Marconi Company is legally entitled to charge it.

The Judge's Views.

An interesting part of Mr. Justice Luxmoore's judgment was when he dealt with the case of the Brownie Company. It will be remembered that the Brownie Company asked the Comptroller-General for a compulsory licence, stating also that the Marconi Company refused to grant them a licence on reasonable terms.

Mr. Justice Luxmoore pointed out that 2,300 other licensees had accepted the Marconi Company's terms, and he then analysed the Brownie Company's submissions in detail. On the question of the royalty of 12s. 6d., said to be too high, the Judge pointed out that there was no

evidence to prove that a reduction would stimulate trade and bring into existence a new class of purchaser.

The only result that seemed certain would be that if the Brownie Co. were granted a lower rate, they would be able to enter successfully into competition with other licensees. Further, as the manufacturer could not subsequently control the use of a set, it was only reasonable to insist that the royalty be paid at the only time it could presumably be accounted for.

The other licensees had, despite the amount of the royalty, continued to work under their licences, and it was impossible, on the evidence, to say that the royalty was an unreasonable one.

The Judge further held that by withholding the licence, the general trade would not be prejudiced, nor would the Brownie Co's trade, as existing at the time of the application for a compulsory licence, be prejudiced.

MODERN WIRELESS.

The July issue of "M. W." contains articles by Sir Oliver Lodge, Capt. P. P. Eckersley, A. Corbett-Smith, Miss Rosita Forbes, as well as full descriptions of Four First-class Sets.

BUY YOUR COPY NOW.

However, there is no getting away from the fact that this year, for example, portable sets have been enjoying a far better sale than hitherto, and a good many manufacturers with whom we have discussed this question are definitely of the opinion that the lower royalties in force before the Appeal was allowed by Mr. Justice Luxmoore did have a very beneficial effect on the sale of portable sets, and quite considerably on the sale of other forms of complete receiving outfits.

But now prices will have to be put up, and it will be interesting to see whether any definite set-back is received by the trade in consequence. Some of the papers express the view that this Chancery Division result may check the development of the radio industry, which has been going on so satisfactorily recently, and hope is expressed that means will soon be found to reduce royalties again, so that the movement towards cheaper prices may continue.

Undoubtedly cheaper prices are to be desired in the radio industry, as in every other industry, and it is true that one of

the great essentials of modern progress is that the educative facilities which science and invention have made possible should be available to the greatest number of people; especially is this true in connection with wireless.

On the other hand, however, if inventors and people who spend enormous sums of money on research work and who, therefore, are definitely entitled to a certain amount of monopoly on the fruits of their work, are going to be denied their reward, the effect will be to discourage invention and research; and that is a thing that nobody wants to happen in this country.

Mr. Denis von Mihaly, the Hungarian Television expert, who claims to be the first man to invent a perfect television apparatus, was in London the other day to meet and discuss with experts of the G.P.O. the question of obtaining permission to demonstrate his television system before officials in this country.

Cheap Television Sets.

Mr. Mihaly believes that if the General Post Office and the B.B.C. give him their co-operation, he can put on the market in England, in the near future, receiving sets which will enable every listener to have talkies in the home. These sets are already being used in Germany and, if permission is granted and facilities given in this country, we understand that they will be on sale at a cost of about 50s. for small sets and £5 for larger ones.

In an interview, Mr. Mihaly said he had negotiated with a big English company, whose directors were willing to form an All-British concern to manufacture and sell his sets to the public.

It is also interesting to note in connection with television that, according to the "Financial Times," a member of the Baird Television Company recently returned to London from Berlin and stated that, at the request of the German Government, a Company had been formed with a nominal capital, the Company to be the medium through which four other companies can work together on the German television enterprise.

It is understood that the arrangements already arrived at provide for the interchange of developments and ideas between this country and Germany. Interest is gradually growing in view of the fact that when the experimental transmissions from the new Brookman's Park station begin, it is understood the B.B.C. will arrange for the Baird Company to have facilities for experimental broadcasts.

The Baird System.

The result of these experiments will probably decide whether the great public interest in television will be satisfied, or whether the public will definitely come to the conclusion that the day of satisfactory television has not yet arrived.

We, ourselves, have in the past expressed certain candid criticisms of the Baird system, but to-day we understand certain developments have taken place which have considerably improved the system, and we, for our part, again express the hope that when these transmissions are given in September, they will be of such a nature as to show that the Baird system has really been improved sufficiently to warrant its adoption by the B.B.C.

THE "NO-TUNE" ONE



A novel little receiver which brings in either of two alternative stations at will, without the need for any alteration in tuning.

Designed and Described by H. BRAMFORD.

THE "No-tune" receiver has been designed for reception from the local station and 5 G B. Once the instrument is correctly set, no further tuning operations are necessary at any time to pick up either of these two stations. One switch only is incorporated, which automatically brings in either of the stations, while at the same time it switches on the

desired; but as a single-valve set, ample 'phone strength will be obtained at good range.

The construction of this receiver is very simple, but before proceeding with the set itself, we should prepare the D.P.D.T. switch and the coil. The switch is made as shown in the diagram, drilling dimensions being given. All parts are assembled in the usual manner, with the exception of the bottom right-hand clip. This clip is mounted by cutting one of the existing clips in half, and reversing them in the manner shown.

Thus, the knife arms of the switch itself make contact in the usual manner with the remaining 5 clips, while at the sixth clip contact is made by connection with two independent points. Care should be taken to see that the two halves of the clip are so positioned as to make firm contact on the switch arm in each case.

Making the Coil.

For the construction of the coil we shall need the low-loss ebonite former, and a reel of No. 24 D.C.C. wire. First equip the former with four terminals as shown, A, E, R, R₁. Secure the beginning of the winding to E, wind 5 turns and make a tapping. This may be done by twisting the wire into a loop and baring the end by burning the covering off with a lighted match.

Do not twist the wire too tightly, otherwise it may break. Wind a further 5 turns, and make another tapping. Repeat this four times, then wind 30 turns, making 60 in all, and taking the end of the wire to terminal A. For the reaction winding start from terminal R, wind close to the first turn of the aerial coil, taking care to wind in the same direction for 10 turns, and finish off at terminal R₁.

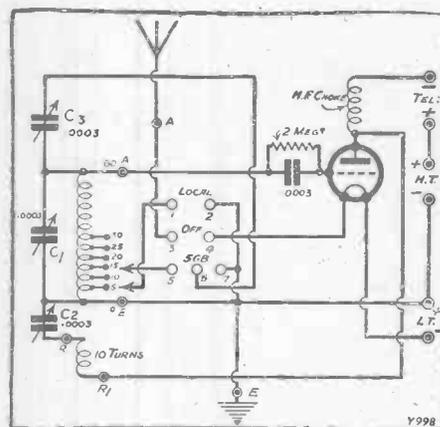
The set may now be assembled. First of all secure the terminal strip to the back of the baseboard. Remove the centre terminal which will not be required, and make a large hole at this point. The other components which comprise the switch,

grid leak and condenser, valve holder, choke and three Formodensors, are mounted upon the baseboard, as indicated.

No panel is used, as this is not necessary, the receiver being installed in an entirely enclosed cabinet, there being no dials to operate once it is set.

Wiring up is extremely simple, as shown in the drawing. Care should be taken to see that the points of connection to the switch are accurately carried out. To ensure this, these points are numbered in the diagram, and are also numbered correspondingly in

the circuit diagram, in addition to being numbered on the details of the switch. All the flexible battery wires are taken straight from the baseboard, through



the centre hole of the terminal strip direct to the batteries.

The flexible leads, R, R₁, A and E, all connect to the coil, which is secured inside
(Continued on next page.)

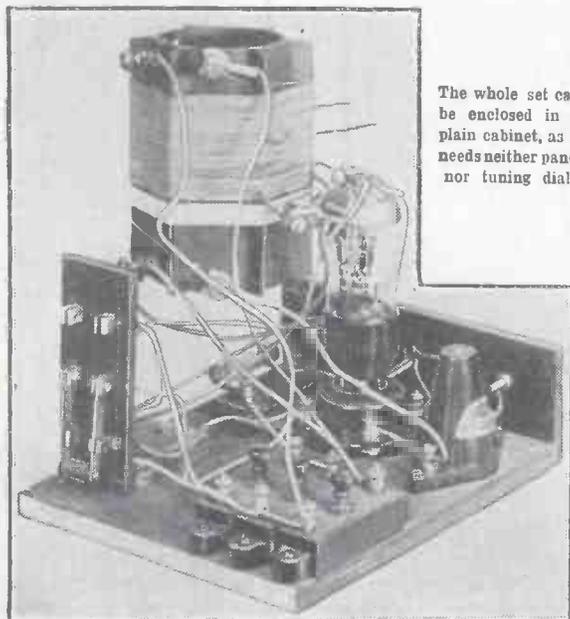
COMPONENTS AND MATERIALS.

- 1 Cabinet with door, inside dimensions of front 6 in. wide x 7 in. high, depth 7 1/2 in., and baseboard (Pickett, etc.).
- 3 .0003-mfd. (maximum) compression type adjustable condensers (Formo).
- 6-in. length of 3-in. diameter insulating tube (Becol 6-ribbed former used in original. Plain tube—e.g., Pirtoid, Radion, Paxolin, etc., can be used if desired).
- 1 Terminal strip, 6 in. x 2 in. x 1/4 in., and 4 terminals.
- 1 H.F. choke (Magnum, Lissen, Dubilier, Lewcos, Raymond, Igranic, Cosmos, Varley, Climax, Bowyer-Lowe, etc.).
- 1 Sprung valve holder (W.B., Lotus, Benjamin, Igranic, Magnum, Wearite, Marconiphone, Bowyer-Lowe, Pye, B.T.-H., Formo, Precision, etc.).
- 2 Spring tapping clips.
- 2 Spade tags (black and red) and 2 H.T. plugs (Lisenin, Eelex, Clix, Burton, Igranic, etc.).
- Set of parts for double-pole double-throw switch.
 - 1 .0003-mfd. fixed condenser and grid-leak clips (or separate holder). (Lissen, T.C.C., Mullard, Dubilier, Clarke, Igranic, Goltone, Magnum, etc.)
 - 1 2-meg. grid leak (Lissen, Igranic, Dubilier, Pye, Ediswan, Mullard, Metro-Vick, etc.).
 - 1 lb. reel of No. 24 or 26 D.C.C. wire. Flex, Glazite, screws, etc.

valve in each case. Therefore, when the switch is off, the valve is out, thus eliminating the necessity for a separate on-off switch.

Very Simple Construction.

The receiver may be constructed with one or more stages of low-frequency amplification of the resistance or transformer-coupled types for loud-speaker work, if

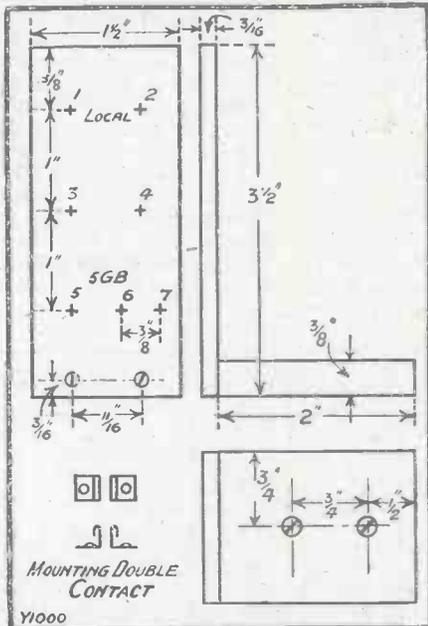


The whole set can be enclosed in a plain cabinet, as it needs neither panel nor tuning dial.

THE "NO-TUNE" ONE.

(Continued from previous page.)

the cabinet, as shown in the photograph. The final two flexible leads, the ends of which are equipped in each case with clips Y and X, act as aerial tappings to the coil.



Dimensions of switch support, etc., are shown above.

In wiring up, first connect the lead from the grid leak to terminal A, and the lead from the earth to terminal E upon the coil former, then connect the lead from C₂ to

terminal R and the lead from the plate of the valve to terminal R₁.

This order is necessary, as if the coil has been wound correctly this will ensure uniform direction of winding. The aerial is connected to terminal A, and the earth to terminal E upon the terminal strip at the back of the baseboard, while the 'phones are connected to the terminals on the other side of the strip.

Setting The Receiver.

Once the idea is grasped, the operation, or I should say the adjustment of this set, is a comparatively simple and easy matter. First have the adjusting screws of all three condensers C₁, C₂ and C₃ full out. Place clip X on, say, tap 10 of the coil, and clip Y on, say, tap 20 of the coil.

Clip X is the tap used for local reception, and clip Y, a separate tap used for reception from 5 G B. In any case, clip Y should practically always be above clip X, that is to say, nearer the aerial end of the coil.

First tune in the local station by throwing the switch on to points 1-2.

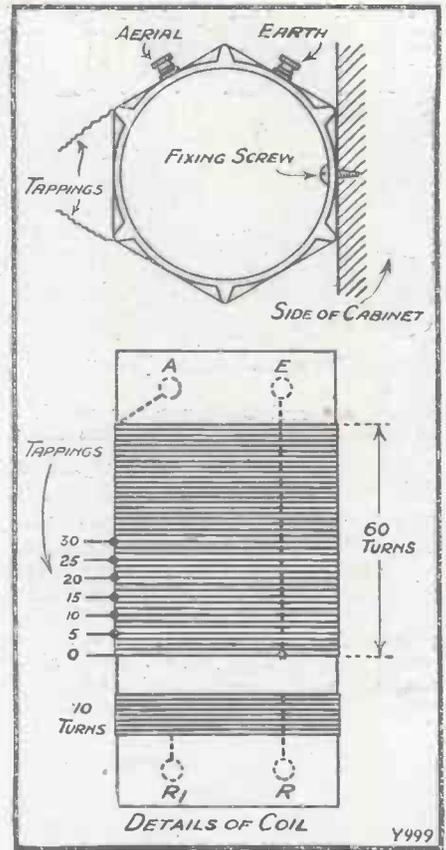
This connection automatically lights the valve filament at the same time. Tune in on condenser C₁ by adjusting the screw, until signals are heard. Introduce reaction by adjusting the screw of C₂, making a final adjustment on C₁. Try this with various aerial tappings, using clip X until the very best results are obtained. Condenser C₃ and clip Y in this instance is ignored.

The Final Adjustments.

Now prepare to set the receiver for 5 G B. To do this, throw the switch over to points 5, 6 and 7. Leave clip X where it is, but work with clip Y. Do not touch condenser C₁, which is already set, or condenser C₂, which may be left and considered adjusted to a suitable degree of reaction for both stations.

All that we have to do, therefore, is to experiment with clip Y, at some point above clip X, carrying out our tuning on condenser C₂, until 5 G B is brought in at its best. To ensure that you have successfully achieved the object in view with the set in this condition, switch over to the local, and then back to 5 G B, when the two stations will be distinctly heard at separate ends of the switch without any interference of the one from the other, and both at good strength.

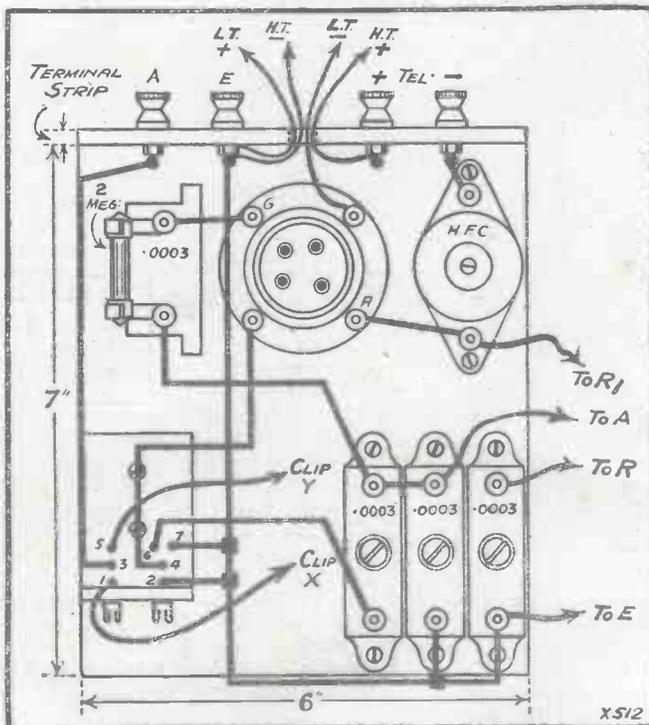
It is essential to point out that much depends upon the adjustments of clips X and Y, which afford the necessary degree of selectivity just as their positions will provide



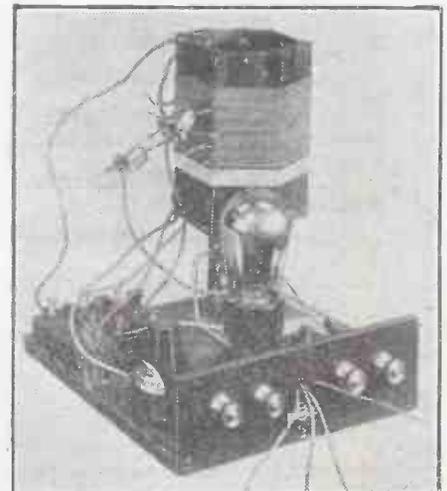
How to make and mount the coil.

a maximum degree of volume in each case. When the set has been adjusted, some improvements may be obtained by making further minute adjustments on three condensers, so that C₂, the reaction condenser, may give the best possible degree of reaction for both instances.

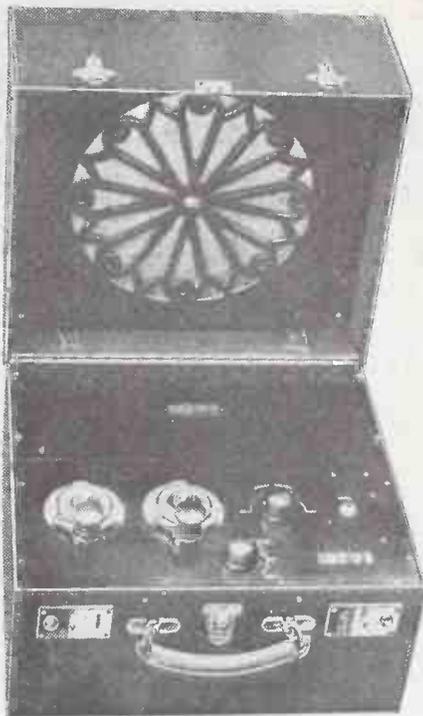
Testing the receiver some nine miles east of 2 L O on an average outdoor aerial but in a bad locality, results were all that could be desired from both stations, and adjustments proved to be remarkably easy. For high tension, 40-60 volts may be used, while for low tension, 4-volt glass cells were used, with a 4-volt valve. Those who prefer, however, may, of course, use 2- or 6-volt cells with a suitable valve, which should be of the H.F. or special detector type.



The wiring diagram of this unique one-valver.



A general view of the "No-Tune" One.



A good example of modern suitcase design, the famous "Lotus" portable.

THE question of what kind of musical instrument we should take on our trip was almost as important as deciding upon the number of tins of preserved fruit which six people could reasonably be expected to eat in one week.

After due consideration we decided that wireless should provide our entertainment. Not knowing previously how far our prospective cruising would remove us from newspapers, we put a premium on the facility of wireless for giving us news and weather forecasts.

Powers of Persuasion !

The next step in the matter presented us with a problem. Our boat, being a motor cruiser, had no masts to which we could affix an aerial, and in any case, the nature of our home sets did not suggest easy transportation. The obvious need was for a portable receiver. Could we somehow acquire one ?

Powers of persuasion worked wonders. A week before we were due to start one of our party

modestly advised the coming of a five-valve portable set from a source that had been regarded as having definite possibilities. In appropriate form, suitable thanks were recorded.

On the eve of our departure for Oulton Broad the set was given a thorough preliminary



The Mullard is a neat little portable receiver.

A
**PORTABLE
ON THE
BROADS.**

Some interesting experiences with
Radio on the waters of Norfolk.

By C. G. GIBBONS.

test, and the simplicity and efficiency of it gave us good cause for pleasant anticipation.

A few hours later we were waving adieu to the yacht station and the engineer, who for thirty minutes had initiated us into the working of a Thorneycroft Marine Engine.

Our first mooring was made at St. Olaves, a typical hamlet of the fen country. The run from Oulton Broad had been largely taken up with "getting the hang of things," but at last, with everything stowed away and preparations for dinner well advanced, we turned our attention to the wireless.

"What Station Is It ?"

Unwrapping the set from the copious folds of the blanket which had protected it during the road journey from London, we switched on.

A few seconds with the controls and we were rewarded with the faint sounds of a dance band. An alteration to the position of the set brought it directionally in line with the transmitting station, and then—well, it was perfection itself.

The ladies of the party, up till then busy in the kitchen quarters, made a desertion en masse to the saloon as the music reached its maximum strength.

"What station is it ?" This was the general query. Not until the music ceased and a voice began was the answer forthcoming. And then it had to be left to the linguists. The voice spoke in French !

London, 5 G B and 5 X X were in turn quickly discovered, the latter giving the greatest volume.

The Nightingale Sings.

A call to dinner put an end to our experimenting. Later that night, when the male members of the party had returned from a sojourn at the village inn (getting the Yarmouth tide-table was one reason for the visit), the dance band at 2 L O was interrupted to allow the nightingale to be heard. In the pronounced quietude of our surroundings the bird music seemed to achieve a remarkable clarity.

Then happened an incident of an unexpected kind. One of our party appeared to be concentrating his attention upon a belt of trees away in the distance, and just visible against the starry sky. Suddenly he jerked out :

A Local Bird Answers.

"Listen ! There's a nightingale over yonder answering this chap on the wireless." We switched off and listened.



The Peto-Scott "Rover" Five-Valve Receiver.

Yes, there it was ; a full-throated songster giving of its very best. When it stopped we again returned to 2 L O. The B.B.C. nightingale was still contributing to the programme, and almost immediately our near neighbour answered in response.

After this something in the nature of a debating society seemed to spring up in the cabin, with "Birds and Their Ways" as the subject for discussion.

The ensuing days called for hard service from the portable set. Whenever we were moored, the ether was searched for entertainment, and never was it lacking. At 6.30 one morning our Morse enthusiast, who at other times found it difficult to satisfy his desire for dots and dashes, was observed to be surreptitiously engaged with a pencil and paper, when his duties should have seen him busy with the brasswork. But who would rebuke enthusiasm ?

Reception Consistently Good.

In the open fen country, or between the wooded banks that distinguish other parts of the Broads, our reception was consistently good. Occasionally the set was tried out when the boat was under way, but the induction from the magneto was amplified to such a degree that we were compelled to acknowledge its temporary superiority.



The "Meloset" five-valver—a product of Truphonic Radio, Ltd.

FROM THE TECHNICAL EDITOR'S NOTE BOOK

Tested and Found—?



COSSOR PENTODE VALVES.

SOMEbody asked me the other day why it was that the pentode had not achieved the popularity of the screened-grid valve. And although it is a fact that there are a far greater number of the latter in use, it is not fair to make comparison with regard to popularity, for the screened-grid valve has been on the market in quantity far longer than the pentode.

At the last exhibition the Cossor screened-grid valve was well into its stride, but it

was not until a few weeks ago that I received Cossor pentode valves for test. The pentode is really a development of the screened-grid valve, it is in fact an L.F. version.

The screened-grid valve has been adapted to low-frequency characteristics, and the result is yet another grid, and this makes the pentode. In the pentode it is not so much a matter of inter-electrode screen-

ing that plays a part as in the H.F. screened-grid type, but the high amplification properties of this latter are brought forward for great magnification on the L.F. side.

It is decidedly not the case that the screened-grid valve is able to amplify so greatly because stabilisation is achieved without neutralising. This is quite a fallacy. You must regard the screened-grid valve as having two distinct qualities, that of negligible internal capacity and high amplifying qualities.

On the low-frequency side inter-electrode capacities are, comparatively speaking, of small moment, but great magnification with respectable power output are factors of considerable importance.

At the moment of writing there are two Cossor pentodes available, the one being for 2 volts and the other for 4 volts filament supplies. The 2-volter has a filament consumption of .3 amperes and the

4-volter .15, and by this one variation the other characteristics of the valve are equalised.

This is what they are: Impedance, 20,000 ohms; amplification factor, 40; mutual conductance 2 m.a. volt. The maximum anode voltage is 180, and recommended grid bias for this is 9 volts. In these conditions the anode current is 14 milliamps.

The recommended working anode voltage is 120 with 100 to 120 positive voltage for the extra grid.

I was very glad to note the following remarks in the leaflet accompanying the Cossor pentode valves: "Owing to its comparatively small grid swing the signal input to the pentode valve must not be so great as to cause overloading, and it is usual to specify this valve to follow immediately after the detector stage. As stated, however, owing to the special characteristics of the Cossor pentode valve extraordinary amplification is obtained for a given input."

"The impedance of the output circuit should match, as nearly as possible, that of the pentode valve itself, and one of the special output transformers made for the purpose is suggested to obtain maximum purity and even amplification of high and low musical tones. Adequate high tension must be provided to ensure the maximum results obtained, care being taken to see that the H.T. supply will meet the anode current required."

Worth-While Attractions.

These are courageous words and just what one would expect from a firm whose every endeavour seems to be conscientiously to see that their customers get real service. Messrs. Cossors would, of course, easily resist the temptation not to say anything about overloading, H.T. or special transformers, when talking about pentodes.

Providing you use a pentode properly you will consider that it has worth-while attractions which counterbalance its 25s. initial cost and so on.

By the way, I must not forget to mention that the Cossor pentode has a special design of internal construction which safeguards it against developing the fault of electrode shorting. A patent interlocking system ensures that the three grids are as

tightly fixed in their respective positions as is the Rock of Gibraltar.

While one of the Cossor pentodes was under test I deliberately banged it about in order to see whether I could do some damage. My efforts were unrewarded, and short of actually breaking the glass of the bulb, I do not think you can do the Cossor pentode much harm. This is very excellent, for some of the earlier pentodes were rather prone to develop internal short circuits, and unless precautionary measures were taken (fuses and so on arranged), unpleasant things could happen to the H.T.

Now, in regard to that word "overloading," which I have mentioned above. Both the Cossor pentodes can handle quite tidy inputs, certainly as much as the average detector will pass through. It should be remembered that the pentode

Traders and manufacturers are invited to submit radio sets, components and accessories to the "P.W." Technical Department for test. All tests are carried out with strict impartiality, under the personal supervision of the Technical Editor, and readers are asked to note that this weekly feature is intended as a reliable and unbiased guide as to what to buy and what to avoid.

is essentially a home receiver accessory. Instead of using two low-frequency stages, as most listeners who require decent loud-speaker reproduction do, you can employ just the one pentode. And in conclusion, I must say that I like the Cossor pentode. It is an excellent representative of a wonderful new type of radio accessory.

"TANGENT" COILS.

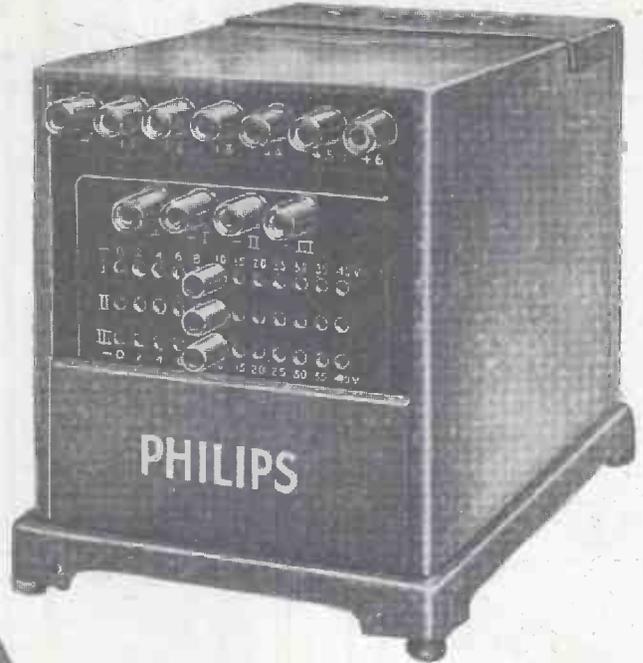
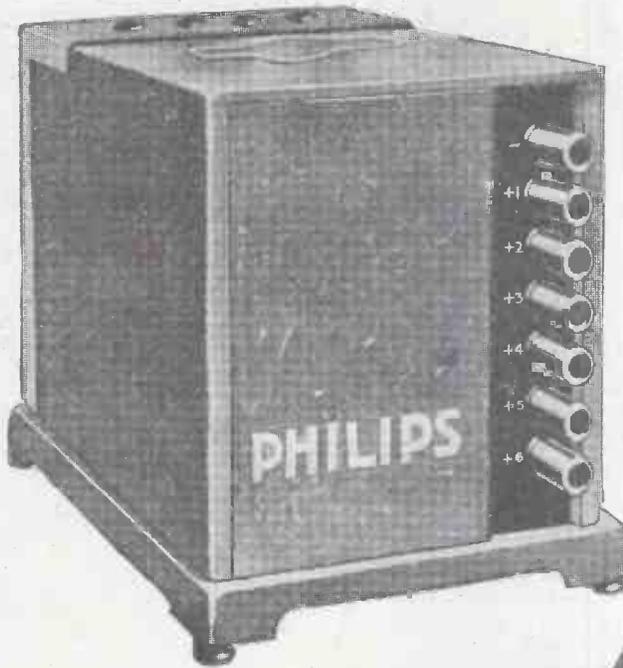
Messrs. Gent & Co., Ltd., recently sent us a range of their coils. Included in this was a "Tangent" S.G.P. coil, which is wound on an open space bakelite former. The ordinary wave-band kit is priced at 9s. 6d. and the long-wave coils at 10s. 6d. These S.G.P. coils are, of course, specified for the Mullard S.G.P. receiver.

The "Tangent" C.W. coils are specified for the "Mullard Master Three Star" in particular, and these incorporate long- and short-wave windings controlled by a switch.



A radio picture being received in London from Los Angeles, over seven thousand miles distant. The picture shows Henri Didot, the French Consul, Betty Compson, Bebe Daniels, and Henry Bancroft Livingston, the British Vice-Consul.

PHILIPS H.T. UNITS



Save money and improve your reception by using a PHILIPS High Tension Supply Unit. Made by the manufacturers of the famous Philips Receiving Sets and Loud Speakers.

No battery renewal problems, but a constant and powerful current direct from the mains sufficient for any type of receiver. Built to last.

Ask your dealer for further particulars.

TYPE 3002 FOR A.C. MAINS.

6 different positive anode voltages. Price complete £7-0-0.

TYPE 3003 FOR A.C. MAINS.

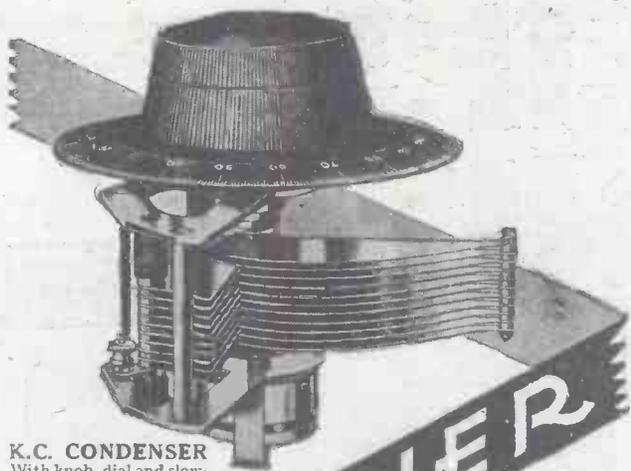
For H.T. and Grid Bias Supply. Similar in design to Type 3002 with the addition of 3 different variable tappings, giving voltages between 0 and 40 Grid Bias. Price complete £8-15-0.

TYPE 3005 FOR D.C. MAINS.

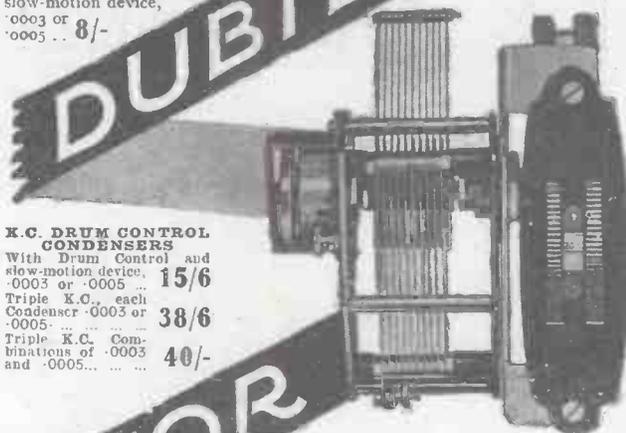
2 variable positive anode voltages. Fitted with isolating condensers and safety resistances so that it can be used on all D.C. mains. Price complete £3-17-6.

PHILIPS

for Radio



K.C. CONDENSER
With knob, dial and slow-motion device, '0003 or '0005... **12/-**
Without knob, dial or slow-motion device, '0003 or '0005... **8/-**



K.C. DRUM CONTROL CONDENSERS
With Drum Control and slow-motion device, '0003 or '0005... **15/6**
Triple K.C., each Condenser '0003 or '0005... **38/6**
Triple K.C. Combinations of '0003 and '0005... **40/-**



MIDGET CONDENSER
A small variable condenser for panel mounting '00005, '0001 or '0002... **5/6**

DUBILIER
VARIABLE CONDENSERS

If unobtainable from your dealer, write direct to us giving his name and address.



Dubilier Condenser Co. (1925), Ltd., Ducon Works, Victoria Road, N. Acton, London, W.3. **©249/V**

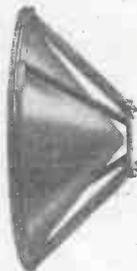
THE SECRET OUT



Here is the Wonderful **NEW**

Brown
"VEE" UNIT

HERE it is! A wonderful new loud speaker unit that sets an entirely new standard of Radio reproduction. Though it only costs 25/-, it will re create the living artiste in your home as no other loud speaker unit has ever done. But then . . . it's made by BROWN! See it at your dealer's soon



PRICE 25/-

(Chassis: 15/-).

"AS BRITISH AS BRITANNIA"

Adv. S. G. Brown, Ltd., Western Avenue, North Acton, W.3

ALL TYPES and MAKES of BRITISH PORTABLES



"I'd like to buy a good wireless set," remarked Mr. Smith on the way to the city, "but none of us wants to be indoors these fine evenings, so I suppose I'll put it off till the winter!"

"Why not buy a portable?" replies Mr. Brown. "You can take it into the garden or out in the car whenever you like, and the one set will do for both summer and winter."

"No, dear, I did *not* hear that opera broadcast last night!" says Mrs. Kensington-Gore to her intimate friend. "We have a service flat where there are no facilities for an aerial, so we shall have to wait until we move!"

"But we have a flat, too!" exclaims her companion. "We use a set called a 'transportable' something or other, which has everything in one neat cabinet—*aerial, batteries and all.*"

"We don't want *our* dining-room all littered up with boxes, and batteries and messy accumulators, and wires all over the place," exclaimed Mrs. Jones when her husband came home with a collection of

In this article the chief features of representative "portables" are discussed, and the many thousands of readers who, while not caring to build their own sets, are yet thoroughly interested in out-of-doors radio, will find much helpful guidance in these fascinating details of "ready-made" receivers.

By PERCY W. HARRIS, M.I.R.E.

catalogues. "I don't mind one in the boys' room, but not here."

"Why can't we have a set like Nora's father bought last week?" interrupts the daughter of the house. "It's no bigger than that canteen on the sideboard, and it can be taken from the dining-room into the drawing-room or even the bedroom just whenever they like!"

Here, then, are three typical cases where modern requirements are successfully met by a portable or transportable set—a type of receiver which has grown in popularity with amazing rapidity. Readers of POPULAR WIRELESS who have made a local reputation by the excellence of the sets they have built from designs published in this journal, should remember that this fact alone may make them the local authority on sets, so they should make themselves fully acquainted with the many excellent products now sold.

Entirely Self-Contained.

Portable sets can be divided into a number of classes, but all possess the important feature of being entirely self-contained, thus requiring no exterior aerial or earth. Many of the sets, however, have provision for the connection of an exterior aerial and earth if desired, thus enabling the range to be greatly extended.

The two main classes of portable sets are, firstly, what is generally called the "suitcase" type, generally covered in leather or leather cloth and designed to be carried about with the same facility as a week-end

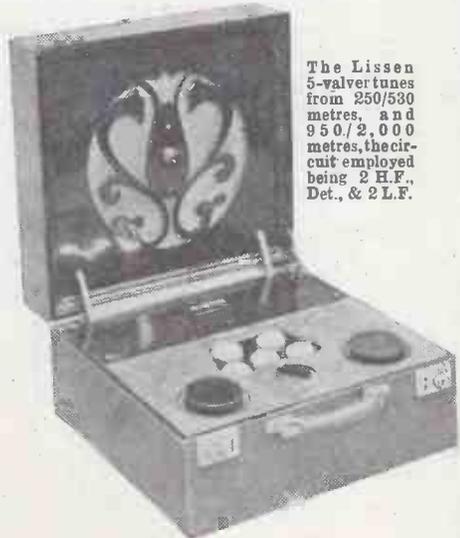
bag. The lid usually contains the loud speaker and the set is operated in an open position. The second type, known generally as the "transportable," while being equally self-contained with a handle for carrying about, is slightly larger, with a loud-speaker grille on the front of the cabinet and the controls usually above it.

While there is nothing to prevent one taking such a set into the country by train, bus or car, it is not so convenient for transport as the suitcase type, and is primarily designed for indoor use, where it will generally be kept in one room, but can be easily moved from one part of the house to another or even to a neighbour's or friend's.

Number of Valves.

The majority of portables have five valves, although a number use only four, the reduction in the total number being due in some cases to the use in the high-frequency portion of the apparatus of a modern screened-grid valve instead of the two ordinary types of H.F. valve.

(Continued on next page.)



The Lissen 5-valve tunes from 250/530 metres, and 950/2,000 metres, the circuit employed being 2 H.F., Det., & 2 L.F.



The Marconiphone 5-valve is a fine example of straightforward British portable-set design.

CHOOSE YOUR SET FROM THIS FINE

A number of quite excellent sets have only three valves, but naturally the power and range of such sets is restricted, save where the first valve is a screened-grid and the last a pentode—a combination which in a well-designed set will give equal results to those obtained with most five-valvers when these are of the ordinary type. Furthermore, the type of receiver which covers only one wave-band is practically obsolete, all modern portables changing from one band to the other in a moment.

Let us examine some typical modern sets representing this remarkably successful branch of radio. There are so many excellent examples obtainable at reasonable prices that it is most difficult to know where to start. Perhaps the best way is to deal with them in alphabetical order.

Good Quality Reproduction.

The Bedford Electrical and Radio Co., Ltd., make both suitcase and transportable types under the name of the "Peerless" portables. Their suitcase receiver, a handsome instrument obtainable at 15 guineas cloth covered, or 16 guineas in dark brown hide, has a single tuning control, variable reaction, and an ingenious method of construction by which panel and chassis are pressed in one piece of metal, giving a form of shielding which certainly helps the design.

The "Peerless" four-valve screened receiver, which is the transportable type, is of the upright form with two-dial tuning and a number of interesting refinements. Obtainable in oak or highly-finished mahogany

called, is one of the few which uses a super-power valve in the output, thus ensuring an excellent quality for the battery power used. High-tension and low-tension batteries have ample capacities for economical running, and the makers claim that although a super-power valve is used, the useful life of the high tension is at least 150 to 200 working hours.

While not in the cheapest class—an examination of the instrument revealed



This handsome set is a C. S. Dunham product.

that only the best material is used throughout—the price charged for the complete instrument in imitation or crocodile leather case, or as an alternative a mahogany case, is £25 12s. 6d., and the purchaser certainly gets his money's worth.

The Chakophone portable sets are by no means newcomers to the market, the "Warwick" portable five-valve receiver being a good specimen of these portables made by the Eagle Engineering Co. The Chakophone portable five is quite distinctive in appearance, and indeed much more closely resembles a suitcase in proportion than almost any portable we have seen.

Tuning is effected by rotating a drum, the edge of which projects slightly through a handsome escutcheon plate, and reaction is controlled by a small knob. The cabinet, which is in dull polished walnut, measures 17 in. by 13 in. high and only 7 in. thick, and the care that has been taken with regard to adequate performance of the batteries is indicated by the fact that a 108-volt double-capacity high-tension battery is used while the 2-volt accumulator has a capacity of 38 actual-ampere hours. The price complete is only 16 guineas.

A Unique Set.

The Dubilier "Westminster" portable is unique in many features. It contains two screened-grid high-frequency valves, and a pentode output valve, while not only is provision made for playing gramophone records, but the actual turntable, pick-up, and driving motor are included! There is even a double-capacity high-tension battery of 120 volts, while when the set is switched on a miniature clock in the tower of Big Ben is illuminated.

All who have examined this instrument have remarked that it is of most ingenious construction, for not only can one listen to broadcasting on a number of stations, but in those intervals when the programme does not appeal gramophone records can be played on the same loud-speaker which

brings in the broadcast. Naturally, with all these fittings and facilities the receiver does not come in the sixteen-guinea class, but is certainly very good value for the £30 9s. charged for the complete apparatus.

Mr. C. S. Dunham, one of the pioneers of the manufacture of wireless equipment for broadcast reception, has naturally not overlooked the great possibilities of the portable receiver, and the Dunham portable, which shows much evidence of originality in design, must certainly be considered by those who are examining portable sets.

Separate H.F. Transformers.

One Dunham portable is of the five-valve suitcase type, provided with a leather case and single-dial tuning. The interesting feature technically in the receiver is the use of separate high-frequency transformers for each wave-length range, it being claimed that by adopting these the sensitivity of one band is not sacrificed for the benefit of the other. The wave-length change-over switch automatically effects change of the high-frequency transformers and frame aerial, thus the set is no more difficult to operate than one without this feature. The price of this receiver is £17 11s., while the transportable type which Mr. Dunham also makes is £18 12s. in oak, or in mahogany two guineas extra. It is worth pointing out that each instrument is individually calibrated, and that a balanced-armature type of loud speaker is incorporated.

The General Electric Co., Ltd., have already achieved a considerable reputation for their screened-grid Geophone portable. This is a "de luxe" receiver of the highest quality with a performance which places it in the very front rank. The price is £21 9s., two-dial tuning is used, and the instrument is bound to appeal to those who want first-class performance and are prepared to pay extra to get it. The finish is normally in antique red, but for the same price it can be obtained finished in Cambridge blue.

With Separate Battery Case.

Another firm whose products are distinctive in this class is The Igranic Electric Co., Ltd., of Bedford, who make a Universal portable with two screened-grid valves, a detector and two low-frequency valves. The apparatus is of the suitcase type, extra



Four valves are employed in the Burndept Screened Portable, and the set is adaptable for external aerial and earth when required.

gany cabinet, special pains have been taken to ensure the very best quality of reproduction. The price is £21.

The Burndept portable receivers have already acquired an excellent reputation all over the country and are typical examples of the best class of British workmanship and performance.

This firm was one of the first to pay careful attention to the possibilities of the screened-grid valve in portable receivers. The Burndept screened portable, as it is



The Igranic Universal is a 5-valver employing two screened-grid H.F. stages. Below it can be seen the separate battery case.

SECTION OF BRITISH-MADE PORTABLES.

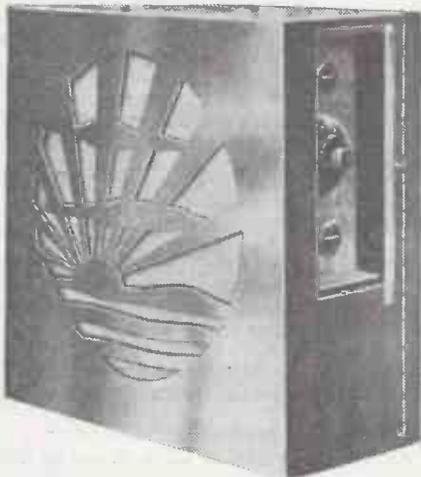
large high-tension battery being used which is capable of giving adequate current for long periods, while provision is made for the use of a gramophone pick-up if required.

While two tuned circuits are used, the controls are ganged, and are thus operated from a single knob. A feature of this receiver is the very high sensitivity and quality of reproduction. The price is £33 4s. 6d., and is certainly not unreasonable for a five-valve set using two screened-grid valves in this manner.

Messrs. Eric J. Lever make several portables under the name "Trix," their portable five being of what we have termed the transportable type, the price being just under £19 in walnut or mahogany, and under £20 in solid leather. The set is made up with two H.F. valves of the ordinary type, detector and two low-frequency valves.

Can be Used With Mains Unit.

It is interesting to note that arrangements are made so that either a mains unit or the internal battery can be used at will. This, of course, affects considerable economy in the case of the user who has a good mains unit at home and who desires occasionally



One of the best-known 5-valve sets is the Pye Portable, shown above. Both long and medium wave-lengths are covered.

to carry the set about, the interior high-tension battery being used "on the road" and the mains unit at home.

Messrs. Lissen, Ltd., as might be expected from such an enterprising firm, have also turned their attention to the production of a portable set, their five-valve portable being of the suitcase type, very neatly arranged and laid out, and supplied in either oak, mahogany, or real hide container. Exterior aerial and earth can be used if desired. One tuning control is used, and variable reaction is provided.

Low H.T. Consumption.

The low-frequency stages are both transformer coupled, giving very good volume. The price of this instrument is 19 guineas, this firm also making what they term a "competition" five-valve portable, with very similar specification, but with a cheaper kind of case covered with red leatherette. The price of this latter is 16 guineas.

The Magnum portable made by Messrs.

Burne Jones & Co., Ltd., is obtainable either as the Transportable Five, or the suitcase portable five, both being sold for 18 guineas. A feature is made of the low high-tension consumption of these receivers which is stated to be only seven milliamperes. A station chart is supplied with both models. The transportable cabinet is in polished mahogany while the suitcase portable has a covering of blue leatherette.

The Marconiphone Company, Ltd., feature a high-grade portable in both the suitcase and transportable types. These receivers are quite distinctive in appearance, the transportable having the well-known Marconi cone speaker incorporated and edgewise drum control, one drum controlling the tuning and the other reaction.

Here again we have a receiver into which the very best technique and workmanship have been incorporated, and no attempt has been made to reduce price by using low-grade material. At £29 8s. the price is not too high for a first-grade instrument.

Home-Constructor's Portable.

A large number of home constructors have successfully built the Mullard portable receiver on the design published by that firm, and good reports have been received of the range obtainable and of the quality of reproduction. Full particulars of how to build this set can be obtained on application to The Mullard Radio Service Co., Ltd., publishers of "Radio for the Million."

The Ormond Engineering Co., Ltd., also make several portables, the Ormond transportable five being a good example of their products. Here we have a handsome oak or mahogany cabinet of the vertical type (the price is £15 in oak, or £15 15s. in mahogany). A turntable can be fitted if required, and single-dial tuning with the excellent Ormond vernier dial is provided. Although this is one of the cheapest transportables on the market its appearance and performance give it nothing to fear from a number of its expensive rivals.

The "Pandona" five-valver is distinguished by a particularly handsome and symmetrical appearance, the grille of the loud speaker showing the figure of Pan, while two thumb control dials placed symmetrically, one on each side of the speaker, control respectively tuning and reaction, a slow-motion drive being fitted in each case, a refinement which will be much appreciated by the user. The price is only 16 guineas, and this instrument is one of the most pleasing in appearance we have seen.

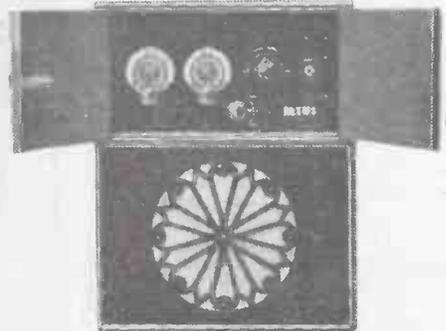
Messrs. Peto Scott & Co., Ltd., in their "Rover" portable which is of the five-valve type, sold at 16 guineas in oak or 17 guineas in mahogany, have provided a turntable as a standard fitting, while a jack is provided for the use of a gramophone pick-up when desired.

Very Fine Instrument.

Messrs. Pye, of Cambridge, one of the first of the portables to achieve popularity, still maintain their position by the excellence of their products, and benefiting by their long experience, they have been able to produce this year a particularly fine instrument. Either a Pye Senior or a

Celestion cone loud speaker can be fitted optionally.

The Ridged Cone Company, Ltd., comparative newcomers to the portable field, claim an excellent performance for their set in comparative tests, while the Ready Radio Supply Co., Ltd., are specialising in "The New Roadside Four," and are marketing as a finished article this four-valve portable including a screened-grid



In the Lotus Portable, shown above, the doors can be swung open wide when it is desired to alter the controls, which are thus very accessible.

valve, designed for and described in THE WIRELESS CONSTRUCTOR recently.

Output Filter Employed.

The Rolls Caydon "Regional" portable is one of the few using two screened-grid high-frequency valves, and a pentode output, and it is one of those sets designed to give that additional sensitivity which is so much prized. It is also noteworthy that the Celestion loud speaker used in this receiver is fed through an output filter, the advantages of which are well known but which, owing to cost, is rarely incorporated in a portable receiver.

This instrument is of particularly fine appearance and while the three controls

(Continued on next page.)



Another portable with a famous name—the Ormond

ALL TYPES AND MAKES OF BRITISH PORTABLES.

(Continued from previous page.)

make the tuning slightly more difficult than with some types of instrument, the results obtained well repay the additional trouble. The price here is £44 2s., and the reader who is out for high quality and exceptional performance would do well to study this carefully before he makes a choice.

The Sifam Electrical Instrument Co., Ltd., market a portable which incorporates a special form of super-heterodyne circuit, with special valves, while Stratton & Co., Ltd., in their Eddystone scientific "Portable Three," incorporate a screened-grid valve and a pentode, with two tuning controls and reaction.

Special "DX" Receiver.

A receiver of this type is strictly comparable with many five-valve sets, owing to the additional sensitivity of the screened-grid valve and the high magnification given by the pentode.

Another set on our alphabetical list of typical receivers is the "Truphonic Melo-Set," a five-valve receiver with one dial tuning and provision for the insertion of a gramophone pick-up if desired.



The Pandora is distinguished by a particularly handsome and symmetrical appearance.

The set also allows, as do many others, for the connection of an outside aerial and earth, although normally, of course, it is used with the frame built into the cabinet. A suitcase model is also made at 15 guineas in leather, the same price standing for the transportable to which we have just referred, while for £21, a special "Disto-Set," including a screened-grid valve, and a full-sized loud speaker, will meet the needs of many.

A Novel Super-het.

As I pen these lines, particulars reach me of a set known as the "Metropolis," manufactured by the Empire Electro Company, and differing very considerably from most of the portables so far described in being a five-valve super-heterodyne. "Supers," as our readers know, have generally six or seven valves—even nine is not unknown in this form of construction. By using two screened-grid valves in a modified super-heterodyne circuit, the "Metropolis" has managed to cut the

number down to five, while both weight and size have been reduced to a minimum, the weight ready for work being only 22½ lb. and the overall measurements 13 in. × 12 in. × 8 in., a very creditable achievement.

The high-tension consumption, which must always be carefully watched, is reduced in this set to the remarkably low figure of five and a half milliamperes, enabling a standard size of 100-volt high-tension battery to be used economically. An accumulator of 15 actual-ampere-hours capacity provides the necessary L.T. current, and the set is provided with a second accumulator so that one can be used while the other is being charged—a scheme which commends itself strongly to me as being eminently sensible and practical.



An excellent example of simplicity and symmetry—the Magnum Transportable Five.

The price complete and including all royalties is but 30 guineas, certainly not a high figure for this type of instrument.

Here we are then, with a remarkably wide choice of portable receivers, ranging from what may be termed the "telephone headpiece" receiver to the screened-grid super-heterodyne. How are we to make a choice? Price, of course, will be an important factor with most of us, but many will not grudge paying a few pounds more—even double that of the cheapest set—if commensurate advantages are obtained. And here I may say that of all the sets I have examined, none, even the most expensive, can be called dear; they all represent good value for money.

How to Decide.

The best way to tackle the problem is to decide first of all whether extreme portability is an important point. If you, personally, are called upon to carry the set frequently—as on picnics and motor-car excursions—it certainly will be, and you can then pick out the lightest sets and choose among them. I always recommend an actual test in home conditions—your dealer will be pleased to arrange this for you—or if you have no dealer locally, the makers will send you particulars of weight on request.

If, as is the case with many potential users of portable sets, it is merely the self-contained feature of a portable set that appeals to you, then forget weight and choose among the sets one which suits your particular taste in style and performance. A few pounds additional here may mean a bigger and better high-tension battery, a larger accumulator which will not require recharging so often, and a better loud speaker.

Surroundings and the distance of the nearest station are also important points. If you are situated in a particularly "dead" spot then you will need all the sensitivity you can get, and the same applies if your nearest station is some considerable distance

away. In such cases the cheapest sets may be scarcely good enough and you will be well advised to spend a few more pounds for additional sensitivity.

If your home is practically in the shadow of a broadcasting station—within two or three miles, for example—then selectivity immediately becomes important. It is no good buying a set which is sensitive enough to bring in a number of distant stations if the signals from the local come in all over the dial and swamp everything else. Most portable sets are quite selective, but a number are not quite equal to the peculiar conditions existing in the immediate vicinity of a station, and here a practical test is the only way of finding out whether a set will suit you.

Don't Forget the L.T.

Do not make the mistake of forgetting your accumulator until you next require the set. If you have taken it away for a week-end and given it a good "towsing," remove the accumulator immediately on returning and have it charged. It will then serve you well next time. A second accumulator is always a good investment and will save you a lot of trouble.

GRID BIAS

If you are using a grid-bias battery of 18 volts or more, do not forget that with careless handling this may burn out one or more of your filaments.

Never adjust the grid bias on a powerful set unless the H.T. has been switched off.

Long grid-bias leads are liable to cause trouble if carried close to H.F. chokes, L.F. transformers, etc.

For a large receiver, it is generally better to have separate grid-bias batteries for the H.F. and L.F. stages, to obviate the necessity for long leads trailing across the set.

Generally speaking, a grid-bias battery should not be expected to last for more than six months.

A common cause of crackling noises is bad contact at the plug or socket of the battery.



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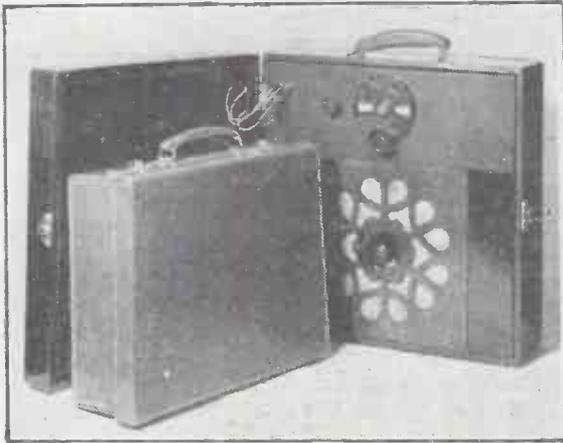


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ACCESSORIES FOR PORTABLES

Some practical hints and tips on the selection of batteries, etc., for out-of-doors receivers.

By G. V. DOWDING, Grad.I.E.E.

THE accessories account for most of the weight of a portable set, and the batteries are easily the greatest offenders. And it is waste of time and trouble to pare fractions of ounces away from the components when pounds are added by the careless choice of batteries.

H.T. is the greatest problem. The only satisfactory source of supply is dry batteries. The ordinary small-cell type of H.T. battery is fairly heavy, but the double- and treble-capacity varieties are much more weighty volt for volt.

Obviously, then, you must arrange things so that there will not be a too large current drain from the H.T., and endeavour to use the smallest size. One hundred or so volts even in these conditions means quite a few pounds.

False Economy.

Thus it would seem that the super-power type of valve is out of the question, as this requires too much H.T. current. A small power valve or a Pentode well biased down is indicated.

And here is a point to note. Do not economise in weight by using a very small G.B. battery or by trying to dispense with it altogether. That way lies distortion, heavy H.T. consumption and a generally unhappy state of affairs.

You cannot cut down H.T. volts by putting in plenty of G.B.; you can only decrease the anode current.

No doubt if your portable is of the multi-valve variety you will have to draw slightly more from the H.T. battery than, in normal circumstances, it would be asked to give. At home with a similar set you



No aerial or earth need be used with the "Chakophone," though provision is made for these connections if the owner prefers to use the set in this way.

of the set and use high-capacity batteries. Very often there is not room for any but the small standard cells.

However, there is this to be said, a portable is seldom used for as lengthy periods, or even as frequently, as a household set, so that the problem of H.T. does not loom as largely as it might. Still it is a point you must give consideration.

The L.T. is a simple matter. Here you will certainly use an accumulator; a weighty

device but not quite so weighty as a large H.T. battery. You generally use 2-volt valves with a portable, so that a 2-volt accumulator having a capacity of even 20 actual ampere hours is a distinct possibility.

One of 10 hours' capacity will suffice in the majority of instances. With as many as five valves (taking each .1 amp.) such a cell will give up to twenty hours of use per charge.

There are quite a number of portable-set accumulators available. You must have one that is unspillable, as otherwise the acid will get out and do damage, however carefully you handle the outfit.

Some of these unspillable cells are designed on the lines of the old-fashioned unspillable ink bottle, while others contain a semi-solid electrolyte. A combination of these two schemes would be ideal, although, generally, either is by itself quite satisfactory.

But even though you use an unspillable accumulator, do not leave it longer than is absolutely necessary boxed up in the set, for acid has an uncanny knack of "creeping" and of tarnishing and corroding all metal that is near it.

Look After the Accumulator.

Leave the cell in while the set is on active service by all means, but when you put the receiver away for a week or two, take out the accumulator.

A glass-cased cell is generally heavier than one built into a celluloid casing, while lead is the heaviest casing material

of all. Therefore, a celluloid cell is advisable and, indeed, most portable-set accumulators have cases made of this material.

As portables are very "seasonal" in their working they are apt to be somewhat neglected. Neglect to polish the case and even dust the interior if you must, but please look after the batteries. The accumulator in a portable requires just as much attention as an ordinary accumulator. It should be charged at regular intervals, and its terminals should be kept clean and greased.

Don't Use One Earpiece.

The other outstanding portable-set accessory is the sound reproducer. This might be a loud speaker or a pair of telephone



These happy holiday-makers find that with a portable set singing in the wilderness "the wilderness is Paradise now!"

receivers. If the latter, then my advice is make it a pair, and do not endeavour to make one earpiece do the duty. It is not a comfortable procedure to listen with an earpiece pressed to one ear and fingers to the other to exclude bucolic interference.

The Loud Speaker.

Regarding loud speakers for portables, you can build up one with a unit and a home-made diaphragm, or purchase a complete instrument of the type especially designed for fitting into such sets.

Either procedure can prove successful providing you remember that a portable-set loud speaker needs to be just as good as a speaker as one for any ordinary set and a little better if possible. It will have to handle more volume under worse conditions than those met with in the home, so let the music have the benefit of at least one good factor.

In conclusion, don't forget that grid bias to which I have already referred. It really is an important item.

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The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the technique of wireless receivers. As much of the information given in the columns of this paper concerns the most recent developments in the radio world, some of the arrangements and specialities described may be the subject of Letters Patent, the amateur and the trader would be well advised to obtain permission of the patentees to use the patents before doing so.

QUESTIONS AND ANSWERS.

FRAME AERIAL FOR PORTABLE.

W. E. R. (Winchester, Hants).—"I want to make a flat frame aerial (for a Rice circuit) in the lid of a case measuring 14 in. by 18 in. Can you give me details for an aerial wound on a frame of three-ply wood, with the number of turns to cover the ordinary broadcasting band?"

In addition to the sheet of three-ply wood which supports the aerial, you will require a small quantity of No. 24 D.C.C. wire or a hank of special frame aerial wire, and four pieces of ebonite measuring 4 1/2 in. by 1/2 in. by 1/2 in., for supporting the wire on the frame.

To support the winding the four pieces of ebonite are secured to the four corners of the ply wood, being screwed down at the corners so that each point diagonally across the ply wood to its "opposite number." Before the strips are screwed down to the ply wood a series of saw-cuts is made in each, spaced a quarter of an inch apart, one cut for each of the 16 turns of which the winding will be composed.

The saw-cuts should be thin and deep, and you will find it quite easy to slip the wire into these cuts turn by turn as the winding proceeds. Terminals or plugs and sockets can be supplied for the end of the windings, and these can be passed through the ply wood

and anchored there, as this will be found to give ample insulation so long as the wood is kept dry. Sockets should also be fitted, and to these a centre tap on the frame winding should be connected.

The aerial is wound continuously in spiral form, and if you intend to use the set with an outside aerial you should also make a tapping at a point two turns away from the centre tap (either way) and connect the aerial lead to this. The earth will then be joined to the negative terminal or to the low-tension battery, as is usual in such cases. When used with the Rice circuit one of the outer ends of the frame aerial goes to the grid condenser and to the variable tuning condenser, and the other end of the frame aerial goes to the remaining side of the tuning condenser and to the reaction condenser. The centre tap is joined to the filaments of the valves, to earth, etc. When used with an outdoor aerial, this connection is made as stated above.

PORTABLE AERIAL AND EARTH.

E. P. T. (Walton-on-the-Naze).—"The idea is to use the set in a hut on a cliff, but both aerial and earth should be portable as it will be impossible to leave them up all the time. Do you think that ordinary wire would do, or must it be special insulated wire as sold for frame aerials?"

Generally, quite good results can be obtained with insulated wire such as No. 24 D.C.C., and if you can suspend a 30 or 35-ft. length of this from the top of the hut to some high point such as a tree, we expect you will get ample signal strength with any set employing high-frequency amplification.

For the earth you can use a similar piece of wire along the ground to act as a counterpoise, or if damp soil is available you may use an earth pin which is simply a piece of 1/2-in. brass rod of a convenient length, provided at one end with a terminal to which the earth wire of the set can be connected.

ANOTHER EARTH INQUIRY.

OUT-OF-DOORS (Worksop, Notts).—"What is the best way of fitting a really good earth connection with a portable set?"

Much depends upon circumstances, but if you are situated near to a stream an excellent earth is obtainable by connecting a lead to any fair-sized piece of metal and throwing it into the water. A tin can, or similar utensil, will serve excellently for the purpose.

(Continued on page 552.)

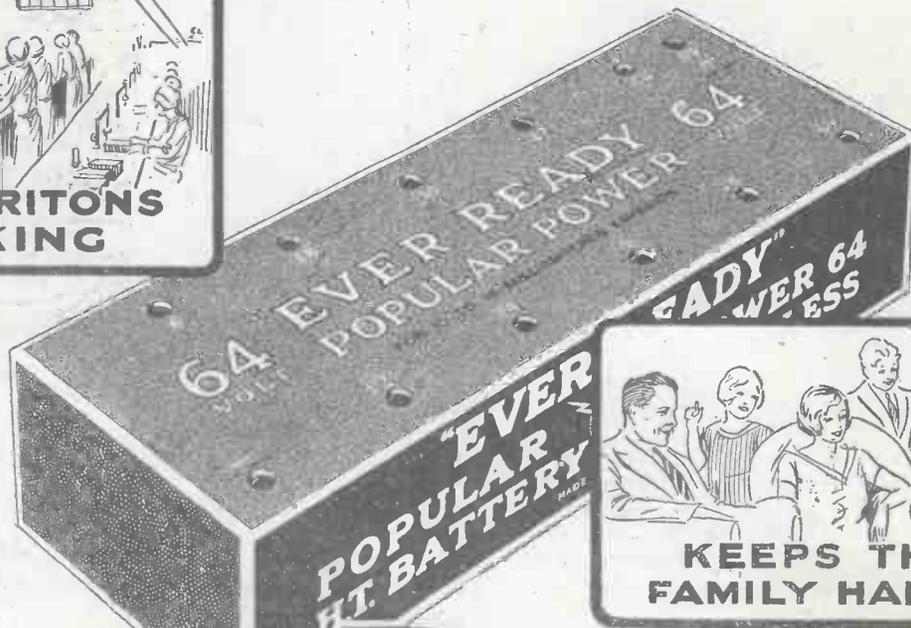


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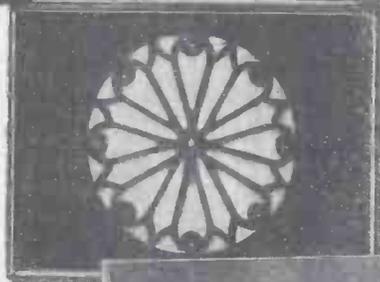
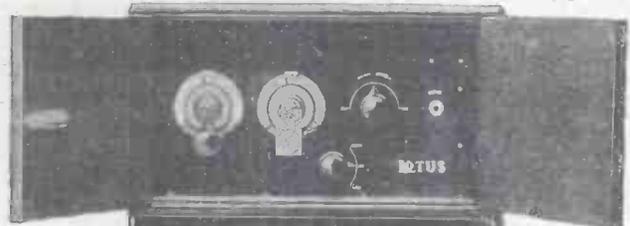
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RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 559.)

Another handy portable earth is provided by a metal rod, such as a stair rod. This should be pointed at one end so that it can be pushed into the damp soil, and the earth wire can either be soldered to the other end, or it can be provided with a terminal to which it can be attached.

Do not forget that with any such earth it is important to make a good joint, preferably soldered, between the flexible lead and the earth pin, and soil as damp as possible should be chosen, for not only does the earth pin drive in more easily there, but the contact is a much better one.

WEAK AND WON'T OSCILLATE.

B. M. R. (Blackpool).—"All the parts appear to be in order and the wiring seems O.K., but the set will not oscillate. I hate to be beaten by a simple one-valver but, try as I will, I cannot find out why the set will not oscillate. Where is the fault likely to be?"

There is so little to go wrong in a one-valve set that (providing the circuit is O.K.) there is no doubt that one of your components, or else the wiring, is causing trouble. There are numbers of factors that affect oscillation, one of the likeliest of them being the connections to the reaction coil. We should try the effect of reversing these and then, if necessary, try another reaction coil, for the one that you have in use may be faulty or may have an insufficient number of turns.

Another point that should be watched carefully is the contacts at the coil holder and at the valve sockets, and if none of these seem defective, probably you have a faulty grid condenser. The easiest way to ascertain if this is the case is to borrow another fixed condenser and try it in place of the one you have in use.

Among other likely causes is the use of a dud grid leak. Sometimes the use of too low a value here will prevent the set from oscillating, and the grid leak, like most of the other components and accessories, is best tested under working conditions by comparison with a similar component which is known to be O.K. in action.

CUTTING OUT THE LOCAL.

M. G. L. (Cardiff).—"At first I thought the set would be no good for foreign stations when 5 W A was on, because of interference from there; but a friend persuaded me to try a centre-tapped aerial instead of the kind I was using, attaching the aerial to the terminal in the middle of the coil. This certainly made a very great improvement, but the interference was still too great to get half the stations of which the set is capable, and I am wondering if I could tap it down a little closer than half-way so as to increase the selectivity of the set, even if it means losing some of the strength on Cardiff?"

"I do not want to have to buy another coil, but do you think it would be O.K. to undo it carefully and twist a good connection in at another point on the coil, say, three-quarters of the way down. Unfortunately, I am no good at soldering, so it would have to be a twisted connection."

We do not recommend this method, as it will probably prove quite unsatisfactory after a time, however well it might go at first; but there is a much simpler method which you can try easily, and without loss of efficiency.

The idea is that, instead of tapping the aerial into part of the coil as at present, you should disconnect the aerial from the grid coil altogether and provide a special home-wound coil, one end of which is joined to earth and the other to aerial. When this is placed close up against the grid coil, there will be a variable magnetic connection between the two, and the strength of Cardiff signals will depend, among other things, upon the number of turns on the extra coil and its distance from the grid coil.

All you require is a small quantity of No. 24 or similar gauge D.C.C. wire. Wind it round a bottle, or something of the same diameter as the coil to which it is to be coupled, with about 25 or 30 turns in a plain coil or hank of wire, tying it afterwards with string to keep the turns in position. One end of this new coil goes to the earth terminal and the other end is slipped under the aerial terminal, the centre tap of the grid coil being ignored.

The best plan to get the required selectivity effects is to vary the number of turns in the hank-wound aerial coil until the desired degree of sharpness has been obtained, and then to bind this home-made aerial-earth coil with string (not wire) round the grid coil to which it has to be coupled.

If firmly fixed in this way, it is always ready for use when desired, yet it is but the work of a moment to undo the end which is taken to the aerial terminal.

leave this "in the air," and then revert to your present connections—i.e. aerial lead to centre tap on the grid coil. But if the coil is properly made and the number of turns is carefully chosen you will probably find that you need never connect up, as at present, the exact degree of selectivity required being obtainable without appreciable loss of strength on any station. In these circumstances there will be no necessity to alter the connections to the aerial lead (either for the local or foreign stations) when once the new coil has been added.

A LEAKY ACCUMULATOR CASE.

"DEALER" (Dublin).—"I recently went to a great deal of trouble trying to rectify a fault in an accumulator, but being unable to tackle it properly it was eventually sent to the makers to be repaired. They discovered that the trouble was due to a leaky case. Is there a method by which I could have found the fault?"

An accumulator case can be tested for imperfect insulation by standing it in a vessel containing water and then filling it up to the normal level with more water, allowing it to stand for several hours so that any leak which may be present will be surrounded on both sides by the liquid. After this has been done two electrical testing leads from the mains are brought into service, one having a test lamp in series with it.

One lead is placed in the water inside the case and the other in the water outside the case, and if there is any leakage through the container a current will pass through this and will be detected by the test lamp in one of the leads.

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This method is a very sensitive one and is frequently used, but a difficulty sometimes occurs because even when the lamp shows that a small current is flowing it is often extremely difficult to see any trace of the leak or to find out just where it is.

The best method of determining this is slowly to empty the water inside the accumulator until the point is reached when the test lamp goes out. This of course indicates that the continuity has been broken because the connecting water has fallen to a level below that of the leak, and thus gives some indication of the height of the leak from the bottom of the container.

CALCULATING KILOHERTZ.

"SHORT-WAVER" (Rhyll, North Wales).—"What is the method of finding out the frequency of a station when its wave-length is known, and also why are frequencies now given in 'kilohertz' instead of kilocycles?"

In order to convert wave-length into frequency or vice versa all that is necessary is to divide the number of kilocycles or the number of metres into 300,000.

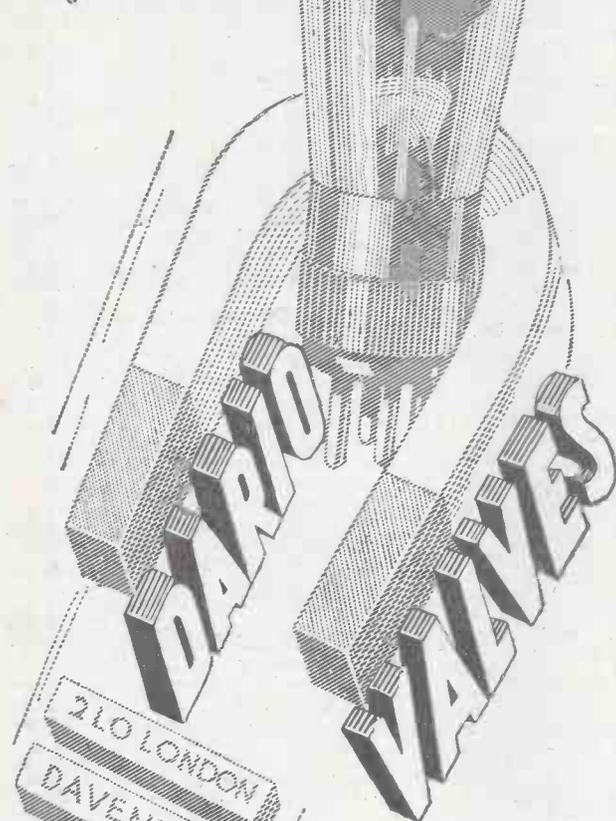
It will be seen that in the above statement the words "number of kilocycles" have been used, but what was really implied was the number of kilocycles per second.

In radio we are always concerned with the number of kilocycles per second, and in order to express this inclusive term shortly and scientifically, the word "kilohertz" has been coined.

Hertz was the name of a German scientist who demonstrated the theories of the British scientist Clerk-Maxwell, and whose name is thus perpetuated

(Continued on page 554.)

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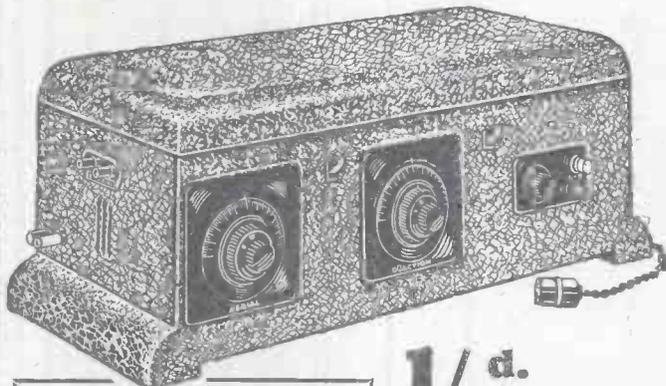
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RADIOTORIAL
QUESTIONS AND ANSWERS

(Continued from page 552.)

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necessary you can quickly arrange for a suitable position for the switch on the baseboard or panel, and it should not be difficult to connect up with this reasonably short wiring.

The connections from the plate of the detector valve to reaction and to the high-frequency choke remain unaltered. The other side of the high-frequency choke is detached from the .25 meg. coupling resistance and coupling condenser, and is taken instead to one of the centre terminals on the D.P.D.T. switch. The opposite centre terminal is then taken to a break in one of the filament leads on this valve.

When the switch is thrown over into what will be the three-valve position, these two centre contacts will be making contact with two of the outer terminals. That outer terminal which is thus joined to the filament lead is now connected direct to the L.T. wiring by means of the lead which was previously broken. Similarly on the other side of the switch the lead from the high-frequency choke is now brought along to an outer terminal on the D.P.D.T. switch, which must be joined to the junction between the grid resistance and coupling condenser, thus completing the circuit as it was previously.

There is only one extra wire to fit to the switch, and this goes from the plate of the second valve (that valve which is to be cut out of circuit) to that outer terminal on the other end of the switch which, when the latter is placed in the two-valve position, will join up to the plate of the second valve to the high-frequency choke. (At the switch end of the choke, not at its plate end.)

The remaining outer contact on this side of the switch is not joined anywhere, because when the switch is turned over to the two-valve position it is required to break the filament of the second valve and this is done by connecting its filament lead to a stud which has no further external connection.

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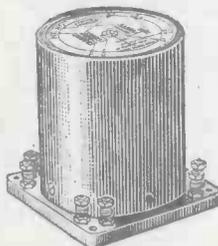
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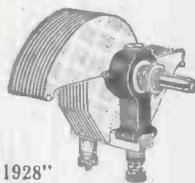
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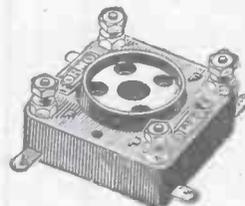
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TECHNICAL NOTES.

(Continued from page 534.)

Before going further, it is perhaps interesting to discuss just for a moment a question which has often been raised by correspondents, and that is whether the portable receiver need necessarily be designed to contain the batteries. As you know, this condition imposes serious limitations upon the design, as the batteries not only occupy a good deal of the interior space, but also account for quite a large proportion of the total weight.

External Connections.

Personally, I should still be prepared to regard a portable radio receiver as well-designed even though the batteries had to be connected externally. If matters are arranged in this way, it gives you the option of using batteries of perhaps greater capacity, and you are free from other restrictions, such as, for instance, the need for using unspillable accumulators.

Another point which does not always occur to the constructor, but which is quite important in its way, is that if the cabinet of the portable receiver is adapted to contain a certain size and type of H.T. dry battery it is necessary to replace this, as occasion arises, by one of the same kind, which may not always be convenient.

Accessibility.

There is also a further point—quite an important one—with regard to the tappings of the H.T. battery (and, for that matter, the connections to the L.F. battery). My experience has been that, owing to the need for reducing everything to the smallest possible space, it is very difficult to "get at" the tappings to the H.T. battery; and if these require to be changed as the battery voltage begins to fall, it is sometimes a great strain on one's good temper. By having the batteries entirely separate, these difficulties are avoided.

Of course, on the other hand, there are some constructors who would feel that they had failed entirely in their main object if they had not included within the one single carrying case everything appertaining to the receiver, and for this point of view there is certainly a good deal to be said.

Simple Control.

Coming to the question of components and internal design of portable receivers, there are several important points to be noted wherein the portable receiver differs radically from others; these differences being, of course, due to the need for economising both space and components, and also for simplifying control.

The introduction of the screen-grid valve has been a great advantage to designers of portable sets, inasmuch as it enables a considerable amount of high-frequency amplification to be obtained with the minimum of components.

H.F. Amplification.

Inasmuch as the portable set is equipped only with a small frame aerial, and can, therefore, only pick up a very small amount of signal energy, it is clear that the circuit must rely largely upon high-frequency amplification in order to ensure the detector operating efficiently.

(Continued on page 558.)

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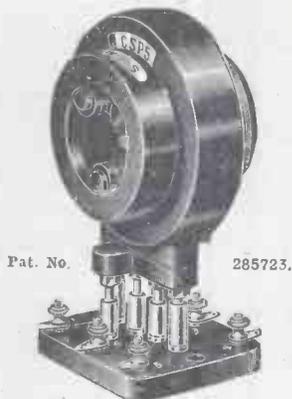
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TECHNICAL NOTES.

(Continued from page 536.)

Attempts have been made in the past to bolster up, as it were, the small incoming energy by excessive low-frequency amplification, but, in my opinion, there are serious objections to this method, not the least of which is the large amount of reaction which has to be used, and the consequent great liability to distortion.

Those of my readers who have experimented with circuits for portable receivers based on this principle will, I think, agree with me as to the difficulty of controlling the excessive reaction, and as to the atrocious results frequently obtained.

Balancing.

It is much better to rely less upon low-frequency amplification and more upon some degree of H.F. amplification, as this balancing arrangement gives much better control, and also much better reproduction. Following these lines, it has become more and more the practice to introduce a fair amount of high-frequency amplification so as to feed signals of reasonable strength to the detector, often two and in some cases three stages of high-frequency amplification being used.

But here, again, the use of H.F. amplification introduces complications in the controls of the set, and this is a further reason why the use of the screen-grid H.F. amplifier is so convenient.

L.F. Amplification.

On the low-frequency side, of course, a good deal of amplification must still be used, but with reasonably strong signals coming from the detector, two stages of low-frequency amplification should be ample. If limited to four valves, for example, I should prefer to use one screen-grid H.F. amplifier and two low-frequency amplifiers rather than two stages of straight H.F. amplification and one L.F. amplifier.

L.F. Couplings.

As to the coupling of the low-frequency amplifiers, this is largely a matter of taste, some experimenters preferring transformer-coupling throughout and others resistance-coupling. I should like to mention here that it is sometimes advantageous to use one stage of transformer-coupling and one of resistance-coupling and, whereas, in this arrangement, the resistance-coupling is generally put first and the transformer-coupling last, it may in some cases be better to reverse the order, putting the transformer coupling first and the resistance coupling second.

This arrangement helps to overcome one of the causes of poor quality in a portable receiver, namely, the leakage of high-frequency currents into the low-frequency side of the set. It is a feature adopted in a set recently described by Mr. P. W. Harris.

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THE majority of H.T. units designed for use on direct-current mains, and also complete all-mains receivers produced for the same type of supply, are arranged to give satisfactory working when employed on mains of an average degree of "smoothness."

Used under these conditions, they give a quiet background

in the loud speaker, while to make them adequate for even the worst of mains would involve increasing their cost considerably by providing extra chokes and smoothing condensers, and hence designers usually make a compromise. Occasionally one comes across mains of a particularly noisy variety, and here the ordinary type of H.T. unit or all-mains set is not, as a rule, entirely satisfactory, since it does not possess quite sufficient smoothing to meet these arduous conditions.

Quickly Connected.

One way of meeting the difficulty is to take the design from which one is working and elaborate it somewhat, increasing its effective smoothing, but this is not a very easy matter for anyone except the really experienced constructor. Moreover, very often one does not know that the mains are of the noisy variety until the design is completed, and it is only when one finds that a bad hum is being obtained that it is realised that a good deal more smoothing is needed.

A very satisfactory way of meeting the difficulty is to be found in the use of such an extra smoothing unit as that which forms the subject of this week's White Print. The unit is not an elaborate one, and in use it is simplicity itself. It is simply inserted in series between the mains and the existing H.T. unit, or between the mains and the all-mains receiver, according to the type of apparatus you are employing.

Stopping H.F. Currents.

The unit is made up in the usual self-contained cabinet, with a small panel forming the front, and emerging from the back there is a twin flex lead bearing upon its end an adaptor or plug for connection to the mains. On the small front panel there is the ordinary standard batten type lamp-holder, in which you plug the adaptor from your mains unit which was previously placed straight in a mains point. This simple method of inserting the unit between your mains unit and the mains themselves has the effect of bringing into operation an extra smoothing circuit which can be depended upon to cope with even the very worst of mains.

The unit contains both H.F. and L.F. smoothing and filtering arrangements, which may come as something of a surprise to the reader who has imagined that the smoothing of noisy mains is entirely a matter of getting rid

THE "P.W." "WHITE PRINTS."

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White Print No. 31 :: :: An Auxiliary Smoothing Unit

This week we publish the thirty-first of our White Prints. This page may be easily and safely torn out—along the dotted line overleaf—and the "White Print" filed. In due course you will thus have available an encyclopaedic collection of the best circuits used in modern radio practice. A "White Print" will be published on the last page every week in "P.W." until further notice.—THE EDITOR.

The various fixed condensers must, of course, be of the high voltage type, a rating of 250 working volts being the minimum for safety. The low-frequency choke should definitely be of the heavy duty type, a low resistance being very desirable here. Suitable chokes can be obtained with an inductance of about 20 henries and a resistance of

perhaps 200 or 300 ohms.

By the way, if your mains are of a comparatively low voltage—say, 200 volts or less—you should certainly choose the special heavy-duty H.F. chokes, regardless of whether you are running an all-mains set or merely an H.T. unit. The reason for this is that these special chokes have a quite low resistance, and so there is only a small drop of voltage across them. The ordinary common or garden high-frequency type may, in some cases, have quite a high resistance, and would drop the voltage available on the H.T. unit considerably.

How to Use It.

There is little to be said about the use of this unit, since it is just a matter of fitting it up and carrying on. Do not forget, of course, that if your set does not appear to work when you first join up the unit, it is possible that you have got the polarity wrong on the set, in which case you should reverse the adaptor from the set or mains unit in the lamp-holder in the front of the H.T. unit.

Again, it is worth noting that it is sometimes better to have the unit connected up one way round to the mains, rather than the alternative arrangement. Therefore, when you are first testing it, place the adaptor from the back of the unit in the mains one way round, join up the set or H.T. unit, and see what degree of smoothness you get. Then reverse the adaptor from the back of the unit in its mains point, and also reverse the adaptor from the mains unit in the holder in the front of the unit. You will quite possibly find that one way is better than the other.

Exceptional Cases.

There is just one special case of unusual mains interference which deserves mention in dealing with a unit of this type. The one in question is the case where electrical machines such as motors and electric signs are fairly close to the receiving set or to the aerial.

In such a situation you may find a lot of noise is being picked up direct, and is not coming in over the mains at all. This simply means that the sparking at the bushes, "flasher" contacts, or what not, of the machinery is radiating actual wireless waves which act directly upon the receiver, and hence an extra filtering unit will not stop the trouble.

Much of the noise, however, often arrives via the mains, so the unit is worth trying and often reduces the interference.

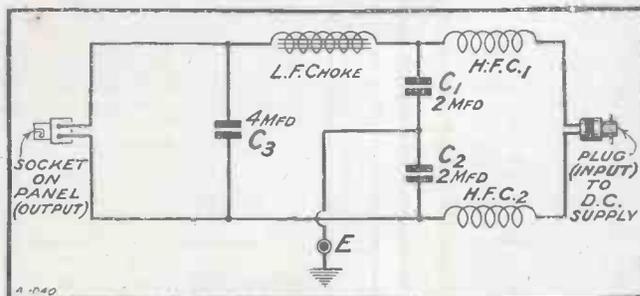
of low-frequency ripples. As a matter of fact, direct-current mains can carry a certain amount of high-frequency fluctuations, produced by sparking at the commutator of the generator, motors, and other apparatus in the neighbourhood, and so on. To stop these high-frequency impulses from coming through and reaching the set, you will see that there are first of all a pair of H.F. chokes in the unit, and shunted across them from positive to negative of the filter circuit there are two 2-mfd. condensers, these being joined in series and their centre points being brought out to a terminal on the front panel, which is connected straight to earth. Next, there is some additional low-frequency smoothing, consisting of the usual heavy-duty smoothing choke and a 4 mfd. reservoir condenser

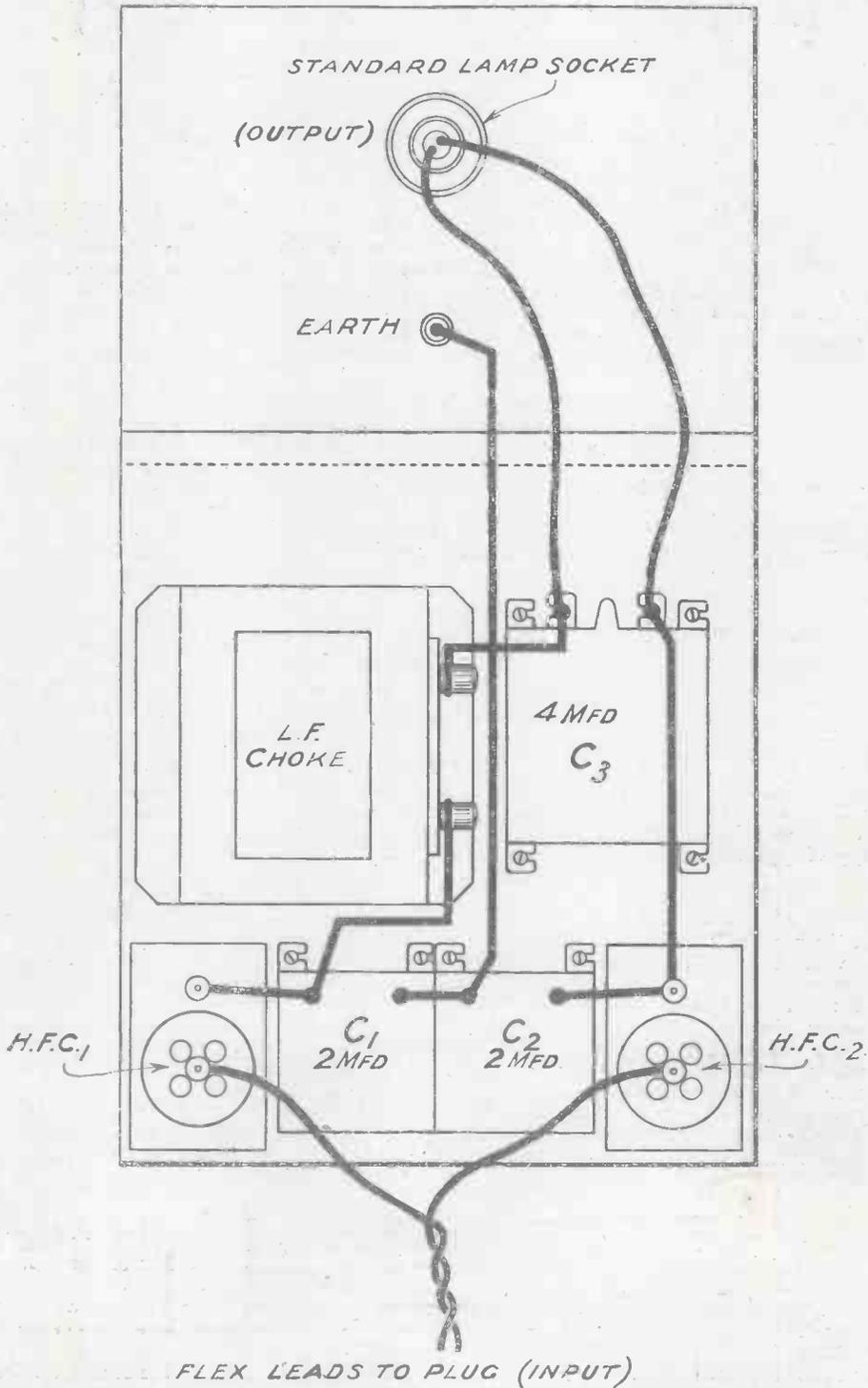
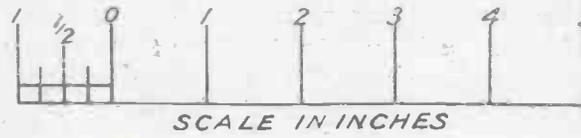
That is all that the unit contains, and you will see that it is very simple and not unduly expensive. A few notes on the

COMPONENTS.

- 1 Panel, 5 in. by 7 in. or 7 in. by 7 in.
- 1 Cabinet to suit, with baseboard 8 in. deep.
- 1 Smoothing choke.
- 1 4-mfd. condenser, working voltage not less than 250.
- 2 2-mfd. condensers, same working voltage.
- 2 H.F. Chokes (see text).
- 1 Insulated terminal.
- 1 Lamp-holder.
- 1 adaptor plug or two-pin plug, flex, wire, screws, etc.

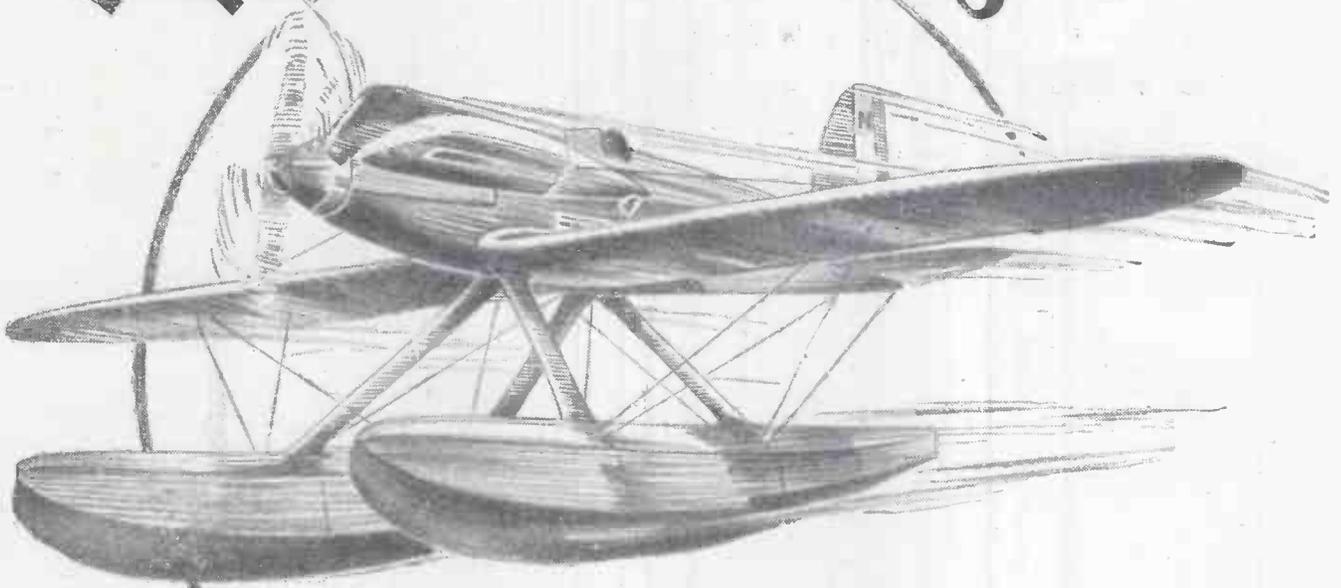
various components required may be helpful. If you are intending to use this extra smoothing unit with an H.T. mains unit only, the H.F. chokes can be of the ordinary standard variety, but if you have an all-mains receiver in which the filaments also are run from the mains, you must use special heavy-duty chokes here. Suitable heavy-duty H.F. chokes are produced as a standard line, and these can be obtained quite easily.





CUT ALONG THIS DOTTED LINE

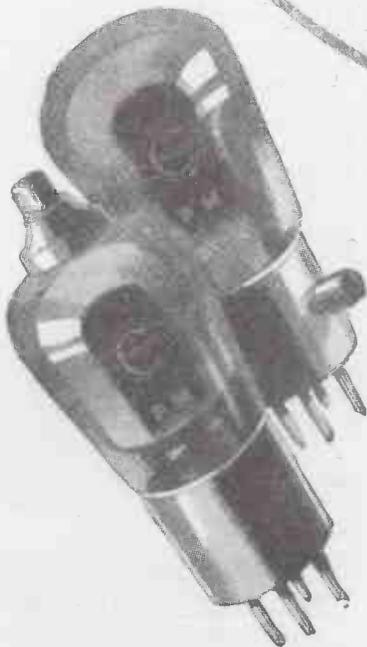
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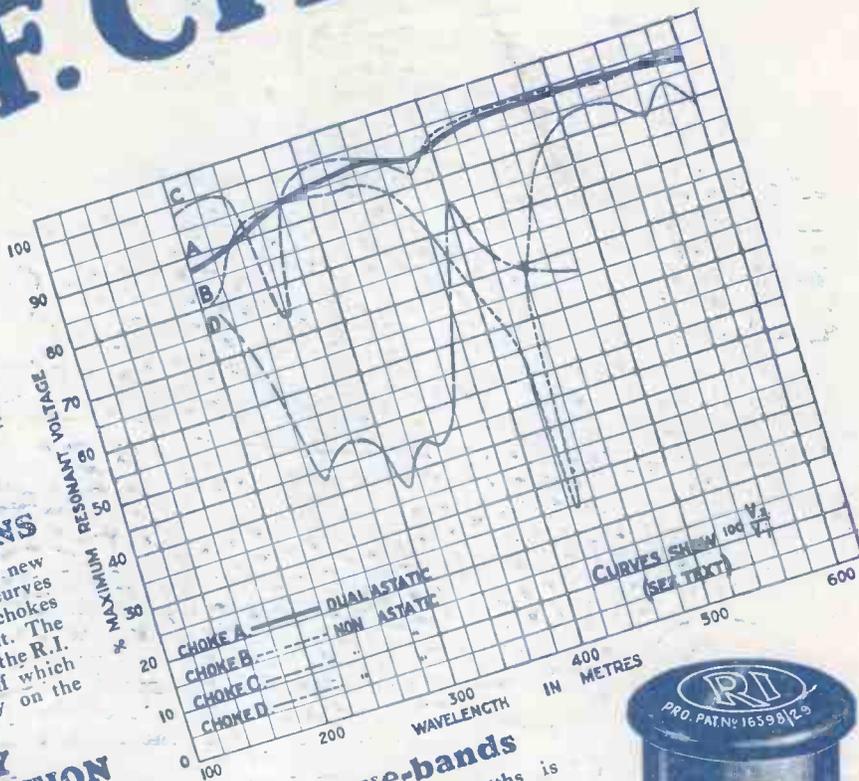
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