

Cutting Your Running Costs—Some Good Hints

BUILDING ULTRA-SELECTIVE "ONE"

Amateur Wireless

Every
Thursday 3^d

and
Radiovision

Vol. XVIII. No. 457

Saturday, March 14, 1931

The ULTRA-SELECTIVE REGIONAL ONE

**FULL
DETAILS**

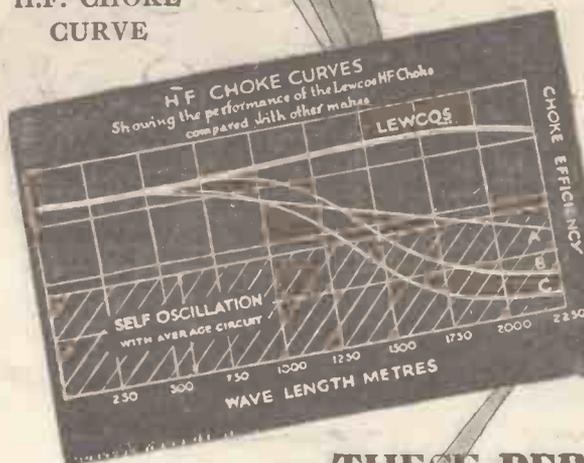
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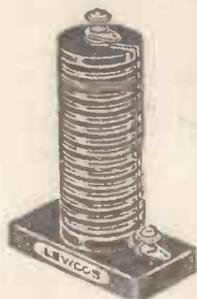
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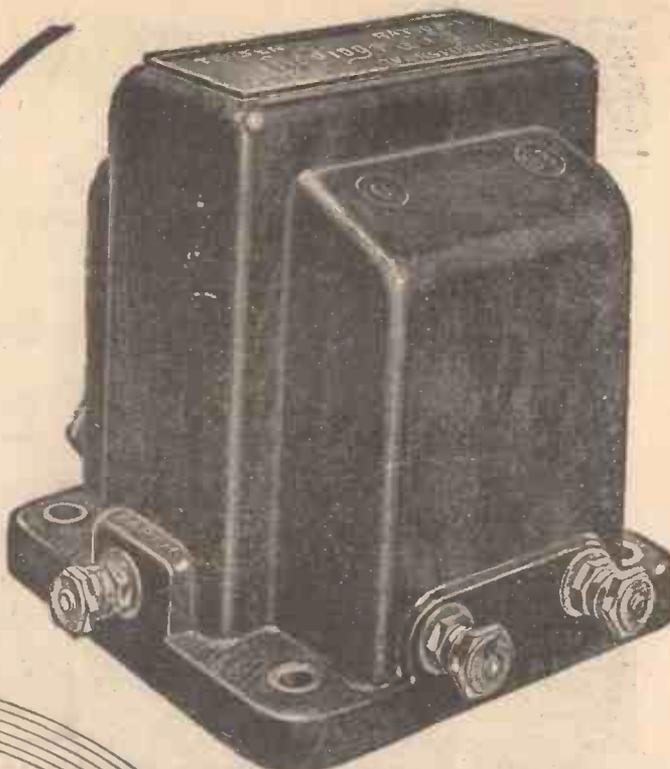
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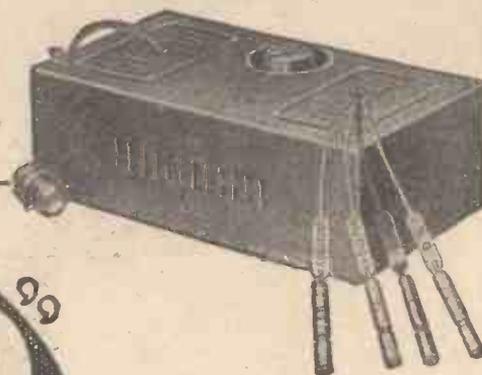
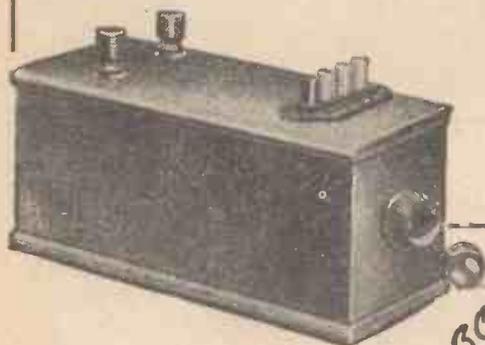
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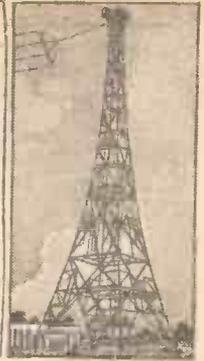
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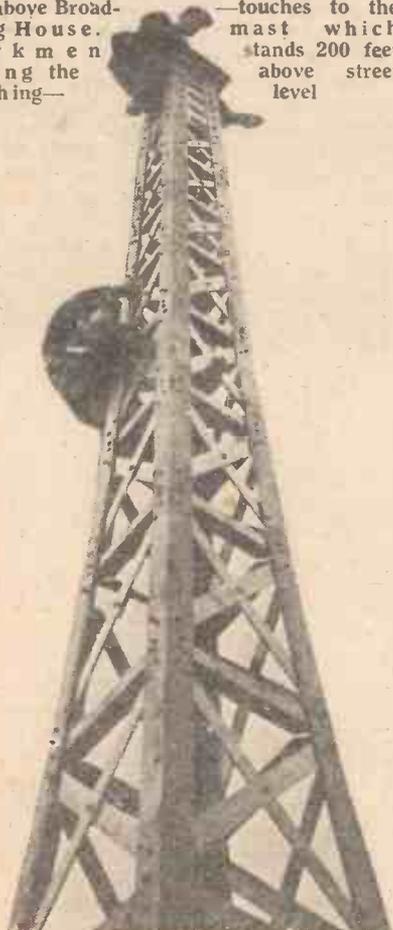
THE LEADING RADIO WEEKLY FOR THE
CONSTRUCTOR, LISTENER & EXPERIMENTER.

NEWS · & · GOSSIP · OF THE · WEEK ·

A 1931 PORTABLE

DON'T forget that it is not too early to begin thinking about portable sets. There are only three weeks before Easter, and you must have your outdoor set quite complete and in working order by the holidays. Portable sets may have been difficult to build in the past, but with the new 1931 components it is the simplest thing to put together a portable set which really will give good results. Anticipating the demand which there is bound to be for a tip-top portable set for the 1931 season, the AMATEUR WIRELESS Technical Staff

High above Broad-casting House. Workmen putting the finishing—



—touches to the mast which stands 200 feet above street level

has been at work for the past few weeks on a really super set.

SIMPLE TO WORK

IN next week's issue, constructional details will be given of this very up-to-date, out-of-door portable. We mustn't give away secrets, but it may be mentioned that, although this set has five valves and therefore has exceptional reaching out possibilities, it is simple to work, economical to run, and reasonably light in weight. This is going to be your portable for this summer's out-of-door radio working. Get next week's copy of "A.W." and see for yourself.

OPERA FROM HALIFAX

THE broadcasts given by the Covent Garden Opera Company during their visit to Halifax are fine. Five microphones are installed in the theatre, three in the footlight trough and one on either side of the proscenium opening. The latter is visible to the audience and is used for taking the music from the orchestra. The control position is on the left-hand or "O.P." side of the stage and the amplifiers are installed on the "O.P." fly floor level. Two telephone lines from the General Post Office to the theatre are coupled by trunk lines direct to the studio at Leeds, from which centre the operas are sent to the other stations of the B.B.C.

OUR COMPETITION

DON'T forget that in order to enable all "Ether Searcher" constructors to participate, the closing date of our £50 Competition, has been postponed until Monday, March 23. This will give you a little extra time in which to complete construction and get a fair idea of the working capabilities of your set. *Then send in your entry!*

THE PRINCE'S BROADCAST

ARRANGEMENTS are being made by the Post Office to broadcast the speech of the Prince of Wales at the opening of the Buenos Aires Exhibition on March 14. If the atmospheric conditions do not permit the clear transmission of the actual ceremony, the Prince's speech at the dinner which is to be given in his honour, or possibly a special speech addressed to

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listeners in this country will be broadcast on the National programme. The opening speech of the Prince will be made in Spanish and it is hoped to relay it by wireless telephone to the Post Office Receiving Station, at Baldock, and thence by trunk line to London and Savoy Hill.

ARTIFICIAL SOUND!

THE B.B.C. has an effects department for creating "fake" sounds, and apparently even the talkie film folk are not above this sort of thing. Gordon Beckles says: "When there is no sound worth recording the news-reel people invent it! This is an actual fact. When Chaplin arrived at Plymouth the other day there were at least a dozen cinema camera men in the ship and another dozen at Paddington. As in that much-discussed film, 'Africa Talks,' there was not much sound-recording apparatus on view. Yet in one of the current releases I have just seen myself getting out of the carriage with Chaplin and indulging in high-spirited (and high-pitched) cheering—which I never did! They had just taken a silent film and fitted it with the noise of a lot of office boys yelling. There are 'effects' men in Wardour Street—the home of the English film industry—quite as ingenious as those at the B.B.C."

NEXT WEEK: A PORTABLE FOR THE 1931 SEASON: UP-TO-DATE IN EVERYWAY

NEWS & GOSSIP OF THE WEEK —Continued

SPONSORED PROGRAMMES

BROADCASTING in the United States, unlike that in England and Australia, where it is taxed, must remain a free institution," says the president of the National Broadcasting Company, America. "It is sponsored programmes which have saved the industry from extinction, by giving to the public that which it desires to hear. Vying with one another to gain the attention of the listener, our broadcasting stations slowly better themselves, for they are as envious of their audiences as publishers are of their circulation."

A TELEVISION SHOW

TELEVISION and talkie-film enthusiasts should make a note of Wednesday, April 15, for on that day from 2.30 p.m. to 9 p.m. an exhibition of television, picture telegraphy and talking films is to be held by the Television Society at University College, London. The Television Society is inviting entries for this exhibition and anyone who has apparatus of interest to exhibit should make a point of getting in touch at once with the society at 4 Duke Street, Adelphi, London, W.C.2. There is a competition for the most interesting exhibit.

radiate two test transmissions, under normal power and modulation conditions. But these radiations will be outside programme hours. One test period will be in the morning, probably between 11.5 a.m. and 11.50 a.m. This will give dealers and others a good chance to see how the season's sets will stand up to the new conditions. As the Midland Regional, Manchester, and other stations close down at 11 p.m. on Mondays, Wednesdays, and Fridays, it has been possible to arrange test periods for North Regional on these nights, starting at 11.15 p.m. and continuing until midnight. On the remaining evenings the new station will do its tests for three-quarters of an hour after midnight.

DURATION OF TESTS

AT present the period of preliminary tests has been fixed at two weeks, but if the radio trade and the listening public appear to need a further week or so to adjust apparatus to meet the new conditions, the B.B.C. will undoubtedly extend the tests. It is thought that the experience gained by listeners in the Brookmans Park area will greatly help in solving the selectivity troubles that are likely to be experienced at Moorside Edge. Man-

Buckinghamshire when the Midland Regional station moves down to 398.9 metres, on relinquishing its present wave of 479.2 metres in favour of the North Regional. The frequency separation between the Midland and London Regionals is at present considerable, namely 216 kilocycles. Under the new order of wavelengths the difference will be only 90 kilocycles. Listeners near either Regional may find a higher order of selectivity needed in their sets in order to avoid the stronger signal swamping the weaker. Another point is that the reduction in the Midland Regional wavelength may reduce the effective service area of the station. To some extent this deterioration in range may be offset by the new aerial arrangement shortly to be introduced at the Midland Regional station.

THE DOG BARKS

I WAS at the rehearsal of *Rich Girl, Poor Girl*" writes our Correspondent, "and I must say I was impressed with the music. Miss Ferry's little terrier kept well out of the way, under the piano, during the rehearsal; but as soon as the announcer gave the signal for an interval the dog positively jumped for joy! Evidently a well-trained terrier." The musical comedy referred to is unique in being introduced into this country through the medium of radio.

RELAY TALK

THEY are considering a relay from Czechoslovakia at Savoy Hill. A tentative date has been fixed, namely March 20. The link would, of course, be the new land-line network. There seems a lot more hope for this sort of relay than for the suggested relay of jungle sounds from Kenya, through the medium of the Nairobi short-wave station. The B.B.C. wants to be assured of programme value these days. Stunts are looked upon with suspicion, unless the engineering side is above reproach. The powers-that-be at Savoy Hill are less inclined than ever before to broadcast items of merely stunt value. We rather gathered the impression that, in the matter of jungle noises, the Effects Department will be pleased to oblige as and when the thirst of listeners for these blood-curdling noises becomes sufficiently marked.

A NEW 21-KILOWATTER



This is the station building of Lvov (Lemberg), a newcomer to the European ether. This has been built by Marconi's to assist the Warsaw station, and you can pick it up any evening on 385.1 metres

NORTH REGIONAL

BEFORE the end of this month the B.B.C. will make a microphone announcement regarding the times of tests for North Regional, which is now radiating at odd times on 479.2 metres. We are informed that very little notice will be given, so tests on a public-participation basis may be expected to follow the announcement within three or four days. Certainly, few stations have had so much preliminary heralding. As a B.B.C. official remarked, "the public is already North-regional conscious."

TEST DETAILS

WE now have details of the tests that are to be carried out after the public announcement that North Regional is "on the air." For two weeks this station will

chester listeners are reminded that the test transmissions are to be done on the present Midland Regional wave of 479.2 metres.

PAMPHLETS FROM SAVOY HILL

THE first pamphlets prepared at Savoy Hill for the North Regional listeners deals with the problem of tuning up to 479.2 metres. Listeners to the 288.8-metre wave may have sets that will not tune up to the other end of the scale. Methods of improving selectivity will also be dealt with in the B.B.C.'s new pamphlet. As the National outlet from North Regional will be on 301 metres, an easy change from 479.2 to 301 metres will be the immediate aim of listeners in the north.

THE MIDLAND MOVE

THE B.B.C. anticipates a little difficulty for listeners in Berkshire and

In view of interference by Wilno on the Genoa transmissions, the Italian station has been seeking another position in the broadcast band. Satisfactory tests were recently made on 524 metres.

At a distance of some 800 miles, the new station at Sottens, Switzerland, has been received at excellent volume at Glasgow.

The main building of the new Scottish Regional Broadcasting Station, which is about to be erected near Falkirk, will be on a site facing the main road between Falkirk and Slamannan. It will contain all the internal transmitting apparatus, and will measure 310 feet by 123 feet, with an altitude of 26 feet. It is expected that the building will take about twelve months to complete.



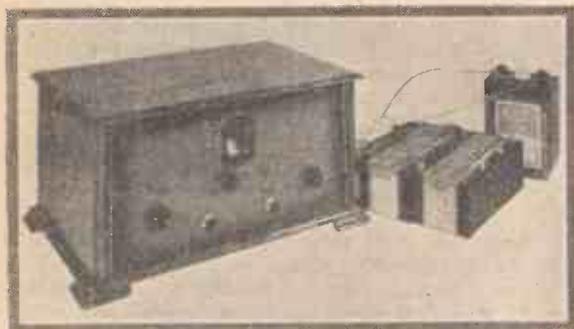
CUTTING YOUR RUNNING COSTS

This article by KENNETH ULLYETT is of interest to every set user because in practically all receivers it is possible to effect an improvement in upkeep expenses and running costs.

ALTHOUGH most motorists keep a careful account of their running costs and, at any time, can tell how much a mile is the expense of running their cars, few

accumulator, which lasts on your set for perhaps a fortnight, it may cost 8d. per charge, whereas a two-volt accumulator of double the capacity may perhaps be charged for the same rate.

"juice" while the larger battery is at the charging station. In certain cases it is, over a period of eighteen months or two years, cheaper to buy a charger or trickle charger and to keep one's batteries in tip-top condition at home, if the mains are available.



Battery-users should have double-capacity or even triple-capacity high-tension batteries—the first step in running-cost economy

I do not say that this is a general practice but if it is the case with your local charging station you should take advantage of it and get as many "amperes" as possible for your money. Even where the standard rate does not apply for any capacity, you will find that the increase in charge is not proportional to the capacity of the accumulator and it is always cheaper so far as running costs go, to have a large battery of a low-voltage.

You must not forget, though, that mains valves can be used, thus doing away with the need for a battery and I will deal with this point later. So far as the H.T. supply goes, it is difficult to give figures because set needs and the performance of H.T. batteries vary accordingly. Bear in mind that if you have no mains available and must use batteries, it is cheaper to buy a large-capacity battery. This point has been so often dealt with that it is necessary only to refer to it. It should be remembered that for H.T. work it is always cheaper to use the mains in preference to dry batteries, and if you have electric light in the house and do not use it for the wireless set you are simply throwing money away. Also, as you will find when you do change over to mains operation, you are missing a great deal of the convenience of all-electric operation.

listeners take the same bother with their wireless sets. The probable reason is that the cost of running a set is negligible in comparison with the upkeep of even the cheapest car, but that is no reason why the opportunity should not be taken to work out the running cost figures and to see whether an economy can be effected.

There is no point in wasting money, and I feel safe in saying that with the possible exception of some of the latest all-electric sets (and even these are not always above improvement) every type of receiver is susceptible to slight alteration not only with a view to getting better results but to cutting out wasteful expenses.



A simple arrangement for D.C. mains users—a cheap mains unit and a lamp-resistance accumulator charger

If you have the mains and are buying or building an entirely new set then, without a doubt, the cheapest method of operation is to make the set all-electric—that is, provided the mains are alternating current. In certain cases the difference is not so marked with direct-current mains.

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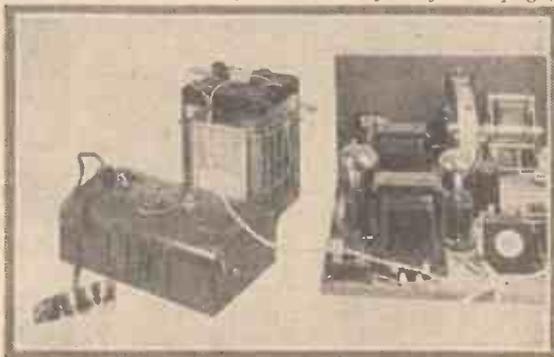
Battery Working

Perhaps your set works only from batteries. Once a month, or perhaps more frequently, you take the accumulator to the charging station. At least every six or seven months you find it necessary to buy a new H.T. Where, you may ask, is it possible to cut down this continual expense?

First, it is the cost of the accumulator charge which most directly affects the pocket, although it is not the greatest expense, and I would point out that many charging stations may have standard charges for two, four, and six-volt accumulators, practically irrespective of capacity. Therefore, if you have a two-volt 30-ampere

ly, it would not be in the interests of economy to scrap these and to use a two-volt accumulator and a new set of valves; it shows, though, that where possible, and unless one wishes to use valves of a type not obtainable in the two-volt range (practically impossible nowadays) it is best to use a two-volt accumulator.

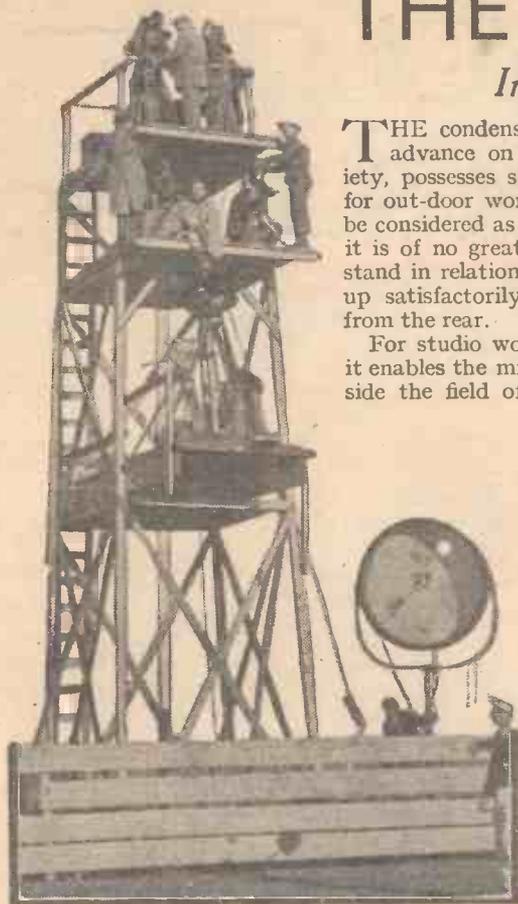
Again, to prevent waste I would not suggest that you scrap or sell your present small accumulator, unless it is very old. Keep it as a reserve so that you will never be without low-tension



For A.C. users—a simple H.T. unit incorporating a trickle-charger

THE BEAM MICROPHONE

Interesting details of a new directional apparatus



The beam microphone in use in a new talkie *Cimarron*: note the four cameras at different levels

THE condenser microphone, though a great advance on the double-button carbon variety, possesses several disadvantages, especially for out-door work. Generally speaking, it may be considered as non-directional. With this type it is of no great importance where the artistes stand in relation to the diaphragm, which picks up satisfactorily even when the sound comes from the rear.

For studio work this gives satisfaction, since it enables the microphone to be hung just outside the field of the camera, thereby allowing both long and short shots to be taken at the same time. For out-door work the use of the ordinary microphone is fraught with many troubles, which the invention of the "beam" microphone ameliorates to a great extent.

As will be seen in the photograph, the beam microphone is nothing more or less than a large metal reflector, some 6 ft. in diameter and of an ellipsoidal form. At the focus of this mirror the ordinary type condenser microphone is suspended by means of wires and springs and with its sensitive face pointed towards the mirror. Sounds are thus collected by the large reflector and then focused upon the small-size diaphragm.

It is stated that the beam microphone will pick up faultlessly dialogue at a distance of 50 or 60 ft., and such incidental sounds as a train whistle at as far away as a quarter of a mile.

The illustration shows the gallery towers and beam microphone used in the taking of the radio picture, *Cimarron*, and when the picture is released in this country the value of the new invention will be fully appreciated.

As a matter of interest, it may be mentioned that the ellipsoidal form of the mirror was adopted after much experimental work, by which it was proved that no other curve would give satisfactory results. Another useful feature of the arrangement lies in the fact that if the microphone proper is not placed at the vocal point of the mirror a slight over-emphasis of high and low frequencies results. Exact positioning at the vocal point emphasises the bass.

For O.B. Broadcasts

While from a first consideration the above-described device may not appear to have great influence on radio, yet we must not be too sure about it. For a long time we have listened patiently to studio work, but in the future it is quite possible that representatives of the B.B.C. may from some suitable vantage point be able to "beam in" addresses to crowds and such-like out-door shots, which are usually out of the question, due to the fact that at the moment they necessitate the special erection of microphones before the speakers.

Again, when television takes its long-hoped-for leap, we shall soon tire of studio work and attempt out-door scenes or "location work," as our American friends have it, but how can this be a success when most people have little time for listening, except after office hours? Well, the direction of rotation of the earth will help in this matter and so we in this country may be able to listen and "see in" to out-door dramas taking place in the American afternoon.—B.B.

'CUTTING YOUR RUNNING COSTS'

(Continued from preceding page)

I have checked up the performance and running cost of several popular mains sets and find that the average uses between 30-50 watts and can be run for under $\frac{1}{4}$ d. an hour. The average three-valve mains set, taking all its current from the mains, and having a dial-illuminating bulb costs about 6s. per thousand hours of working. A corresponding type working off direct current mains may cost as much as 15s. per 1,000 hours of working. In both these examples which I have worked out from average popular receivers, I have estimated the cost of current as 6d. a unit.

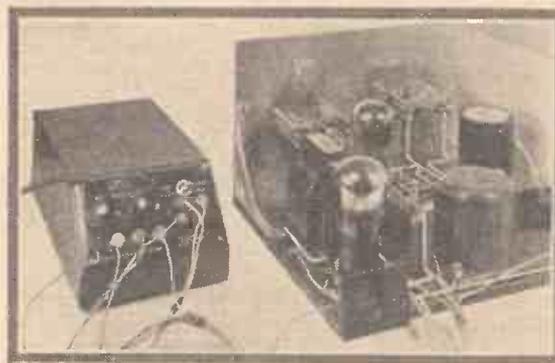
Initial cost is the only drawback, because reliable mains apparatus cannot be made cheaply. At the same time a home-built all-mains driven set is often cheaper than a commercial battery-driven set. The cost is not so great if you intend using the mains only for H.T. and want to carry on using accumulators for L.T. You will find that a suitable direct-current unit for H.T. only costs about 30s. or £2. As an H.T. battery for the same type of set costs between 10s. and 30s. you will see that the price is soon saved, because with the average set two dry battery replacements will be needed every year.

Another problem which often crops up is whether it is cheaper, with an A.C. supply, to use mains valves or to continue with battery valves and a trickle charger. Quite apart from any question of cost, it is safe to say that mains valves nowadays give a noticeably better performance. This is particularly the case with low-frequency

accumulator is not overcharged nor is allowed to drop so that the "juice" will give out at an awkward moment.

It is probable that the current actually taken from the mains is slightly greater when mains valves are used than when a trickle-charger is used. At the same time there is so much wastage of power with any accumulator charging device that in the long run it is bound to be cheaper to use mains valves.

Where any expensive alteration is contemplated such as changing over from battery to mains valves, the cost of the conversion must be considered in relation to the number of years over which the apparatus will be used. It seems safe to assume now that A.C. mains supplies are being standardised, at voltages between 200 to 250, and nobody who already has such an A.C. supply will regret buying mains apparatus, for it is in the nature of an



The last stage in economy—an all-electric mains unit working with mains valves

and power valves, the characteristics of which are often much better in the case of mains-heated types than equivalent battery valves. There is also the trouble of arranging the trickle-charging times so that the

investment. D.C. mains users, though, will find that the greatest economy is not to be obtained by the use of too much expensive mains apparatus, for conversion of some kind, is bound to be needed.



BAND-PASS TUNING V. HIGH-POWER STATIONS

How present-day broadcasting conditions are likely to affect the design of receiving apparatus is indicated in this topical article by ALAN HUNTER

WHETHER we like it or not, high-power broadcasting has come to stay. One by one the modest transmitters of France, Italy, Germany, and Scandinavia, not forgetting Great Britain, are being scrapped for high power. I suppose the B.B.C. started the craze with its Regional scheme. Germany has equally ambitious plans. In such stations as Stockholm, Rome,

Trend of Valve Design

For reasons best known to themselves, our valve-makers have competed with one another in a race for amplification factors. To-day British valves are more efficient than any others in the world. One gets tremendous amplification per valve stage, so much so, that the ratio of selectivity to sensitivity is not enough with ordinary tuning arrangements.

Take for example, a set with one stage of high-frequency amplification and two tuned circuits. This is found to provide inadequate selectivity, so a further tuned circuit is added. Sensitivity then drops, so a further high-frequency valve is added. The great increase in amplification is then found to counteract the selective advantage of the extra tuned circuit. Such a sequence of events is by no means uncommon. One can hardly blame the seeker after selectivity for scrapping the extra valve and tuned circuit, relying on his one-high-frequency stage.

During this season I have tested nearly every commercial set on the market. While I can congratulate the makers on the sensitivity per valve stage and upon the quality of reproduction, I can only sorrow silently at the inadequate selectivity. That the makers realise this shortcoming is evident from certain signs and portents regarding next season's set designs.

Let us hope they will take a leaf from the amateur's book. In the latest amateur-built sets I see a great advance in selec-

usual way by the interposition of a high-frequency amplifying valve.

The overall resonance curve of this arrangement is the product of two separate curves. At B is shown how an incoming signal causes a rise of current. It will be seen that the maximum current is restricted to a narrow frequency band. This means that music and speech frequencies modu-

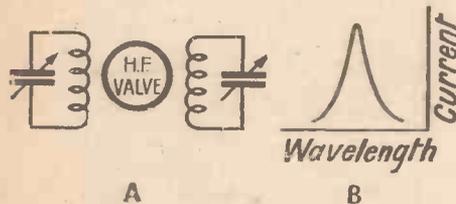


Fig. 1. Normal sequence of two tuning circuits

Heilsberg, Strasbourg and Mühlacker we have the new order of things.

High power means more signals of entertainment value. Will any listener with a modern set deny that, in spite of selectivity troubles, we are getting more really worth-while foreign programmes to-day than two years ago, when high power meant five or ten kilowatts?

Some writers object to high power, contending that ten or fifteen kilowatts is quite enough for a reasonable service area. These objectors are, I suggest, overlooking the fact that a limited service area implies a great number of stations and, therefore, a great number of frequency channels.

The Problem of Selectivity

However enthusiastic one may wax over high-power broadcasting, the problem of selectivity must be faced. Our simple ideas on tuning suffered a rude shock when high-power broadcasting began. Southerners had a taste of troubles to come when Brookmans Park started up. Northerners are in for the same education with Moorside Edge.

Theory teaches us that for complete separation of signals we need four tuned circuits, although three are considered a fair compromise. The trouble about handing on a signal from one tuned circuit to another is, that energy is lost in the process. To make up for this loss we usually insert a high-frequency amplifying valve between the two tuned circuits.

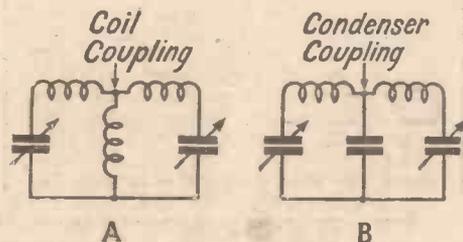


Fig. 3. Alternative ways of using band-pass coils

tivity. I am thinking of the band-pass tuner, as incorporated in that excellent set, the "1931 Ether Searcher." Without going into all the conflicting factors of band passing, let me give a simple explanation of its advantages. Look for a moment at Fig. 1A, where two entirely separate tuned circuits are coupled together in the

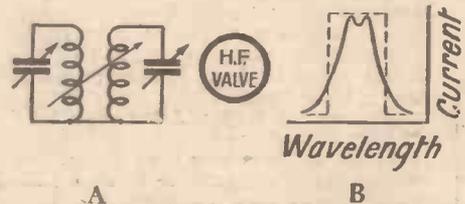


Fig. 2. Band-pass tuning sequence

lated near the carrier frequency will cause more current to flow than the outlying frequencies, that is to say the highest frequencies of the audible range.

Now look at Fig. 2A, where instead of the sequence tune-amplifier-tune we have tune-tune-amplifier. And then at Fig. 2B, where the curve is seen to be quite different from Fig. 1B. The two tuning curves have been drawn on the same base. So although an incoming signal with the tuning arrangement of Fig. 2B causes current to flow over approximately the same frequency band, this current is more evenly distributed. More of the outlying frequencies are reproduced. There is not nearly so much high-note loss.

The double-hump effect of the Fig. 2B curve is due to the coupling together of the coils as shown by Fig. 2A. The advantage of the Fig. 2 sequence as compared with the Fig. 1 sequence is more readily understood when it is realised that an incoming signal consists not merely of the carrier frequency, but of frequencies extending as much as five kilocycles each side.

In practice a band-pass filter is used in conjunction with a normal inter-valve coupling, which if sharply tuned, has the effect of filling in the dip between the two humps of the curve shown by Fig. 2B. In this way an approach to the ideal form of tuning curve shown by the dotted lines at Fig. 2B is obtained.

In designing band-pass circuits, it is not convenient to use the mutual inductance of the two coils for coupling as shown by (Continued at foot of next page)

A GREAT COMPETITION FOR AMATEUR CONSTRUCTORS

£50 IN CASH PRIZES

EVERY "1931 ETHER SEARCHER" BUILDER MUST COMPETE

SPECIAL NOTICE.—POSTPONEMENT OF CLOSING DATE

Readers have pointed out to us that the proposed closing date, March 9, as announced in previous issues, operates very unfairly in some cases. It appears that in certain parts of the provinces there was at one time some delay in obtaining all the parts for the "1931 Ether Searcher" and that many readers who would like to compete find that but very little time has been left after building for the purpose of gaining experience with the set.

Further, our announcement that the battery-operated model would be followed

by a mains-operated one left them in a position of uncertainty as to which they would build.

We appreciate some of the points that have been put forward, and in any case we do not wish to insist upon a closing date which may be regarded as operating unfairly to any section of would-be competitors, with which object in mind, we have postponed the closing date until MONDAY, MARCH 23.

Our correspondence shows that a great number of readers are building the set. We trust that a large proportion of

them will enter for this competition.

On just one point we may say a word: the arrangement by which we shall ask selected competitors to send their sets to us is apparently a difficulty in some cases, readers not wishing to be without their sets for any length of time. We have already said that we will not retain any set for more than six days, and now state that we shall even improve on this if at all possible. It is not our wish that the selected competitors should be without their sets for anything more than a minimum of time.

WE offer Fifty Pounds in cash prizes, as well as a number of consolation awards, in a competition for amateur builders of the "1931 Ether Searcher." The competition is open to every reader who either has built this remarkable three-valver or will be doing so during the next two or three weeks.

We ask all "1931 Ether Searcher" builders to send us an account of how they built the set, how they used it, and how they found its performance. Just a short account—not exceeding 300 words, please.

WHAT THE READER IS TO DO

Readers can comment, for example, on the ease or the difficulty with which they built the set; on the time taken to build the set; on their experiences after they had built it; the number of stations actually logged and any particular successes obtained, especially in relation to the conditions of reception in their own district. They should state where they bought the components.

As a guarantee of good faith, we should like every reader to get a friend or neighbour to add a few words to the account, saying that he has seen the "1931 Ether Searcher" built by Mr. —, and has every reason to believe that the account is true. Get the friend or neighbour to sign his statement and give his address.

If you can manage to send us a good photograph of yourself with your set, so much the better. A "good" photograph, you will understand, is not a tiny under-

exposed "snap" which could not be satisfactorily reproduced.

We reserve the right to publish all, or any, of the entries, wholly or in part.

COMPETITION CLOSES MONDAY, MARCH 23

All entries must reach us not later than Monday, March 23. After considering them in detail, we shall choose from among

and award points for workmanship and general appearance, and will then test each set and award points for performance. The Editor will act as Chairman of the Judges, and his decision will be final.

CELEBRATING SUCCESS

We have arranged this competition, firstly, to prove our own great faith in the "1931 Ether Searcher" and to celebrate the tremendous success that it has won, and, secondly, to give the amateur constructor the pleasure of competing with his fellows for a number of cash prizes each thoroughly worth having.

We want an entry from every reader who has made the "1931 Ether Searcher" or who intends to make it during the next fortnight or so. All you need do is to send us the short account asked for. We repeat, all accounts must reach us by Monday, March 23.

Any set sent us, except at our own special invitation, will not be considered. Competitors must wait to hear from us before sending their sets. Their job is to post us their 300-word account in good time.

The next step is ours.

In making our selection of readers whose sets are to be sent us for examination and test, we shall be guided by our special experience and by ordinary common sense, and readers must rely on our good faith in this and in all other matters relating to the competition.

We pledge ourselves to award the full prize money.

THE EDITOR.

FIFTEEN CASH PRIZES TOTTALLING £50 WILL BE AWARDED

1st Prize—
Cheque for Twenty Pounds
2nd Prize—
Cheque for Ten Pounds
3rd Prize—
Cheque for Five Pounds
4th Prize—
Cheque for Three Pounds
5th Prize—
Cheque for Two Pounds

There will be Ten other Prizes, each of a cheque for One Pound.

In addition we shall award a number of small "commendation" prizes.

the competitors some such number as twenty or thirty who will be specially invited to submit their actual sets for a brief period. We shall send each of the selected competitors special packing instructions and addressed labels, and we shall pay for both packing and carriage.

Further, we shall give each of these selected competitors an undertaking not to retain his set for more than six days. The Editor, with his Technical and Constructional Staff, will examine each set

"BAND-PASS TUNING"

(Continued from preceding page)

Fig. 2. The compromise between high-note loss, selectivity and sensitivity is best achieved by inductive coupling, as shown by Fig. 3A, or capacity coupling, as shown by Fig. 3B. In these arrangements the two tuned circuits are kept quite separate (usually screened) and the coupling between them is determined by a common coil or condenser.

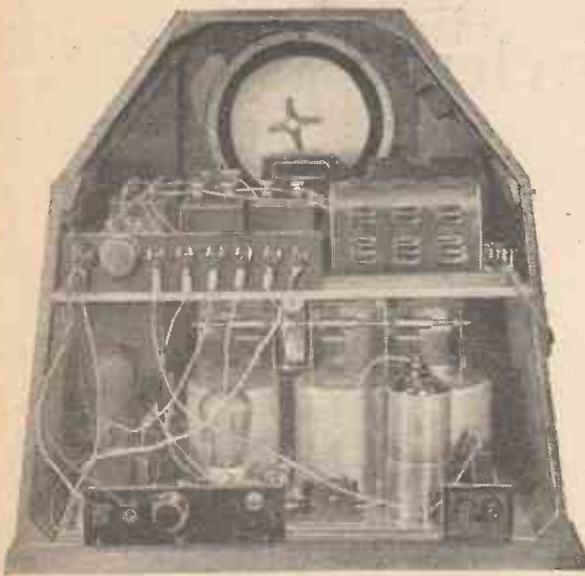
Band passing is not as simple as it looks. In the Fig. 3A arrangement the selectivity, and therefore the high-note loss, is greater at the top end of the wavelength scale than at the bottom end, whereas the reverse is true of the Fig. 3B circuit. In spite of the complications in arriving at the right form of coupling for the band-pass coils, the practical result has proved to be good quality combined with good selectivity.

The double-tuning variation of the band-

pass coils does not, in practice, involve complicated operation, for it is quite simple to "gang" the two condensers associated with the two band-pass coils. Band-pass tuning, pre-selection or whatever you may call it, is the set-designers answer to the problem raised by high-power broadcasting. It is only fitting that transmission and reception technique should progress together; transmitters are now leading by a long way; it is up to us to catch up.

OPERATING THE "ALL-ELECTRIC ETHER SEARCHER"

Although the instructions detailed below apply particularly to the "All-Electric 1931 Ether Searcher," described in the two preceding issues, the information will be of value to all users of mains-driven sets



A rear view of the "Ether Searcher" with the home-made mains unit installed

THE "1931 Ether Searcher" is in two sections, one being the receiver itself, and the other the mains unit. Constructional details of the receiver itself were given in "A.W." No. 455, while a suitable mains unit to work with it was described last week in "A.W." No. 456.

As has been explained, however, the receiver will work with any standard A.C. mains eliminator which also incorporates a transformer giving four-volt supply for the heaters of the valves. Or, if desired, a standard commercial H.T. unit without this form of filament supply may be used and the filament-transformer may be connected to the mains supply, and to the heater circuit of the valves.

The "A.W." eliminator, it will be seen, has four output tappings, and care should be taken to see that these are connected correctly, with H.T.+1 of the unit to terminal H.T.+1 on the set, H.T.+2 to H.T.+2, and so on.

There is no special point to note in the placing of the eliminator unit with regard to the set, and, provided it is kept at least 6 in. away, there is no danger of interaction.

In any case it is advisable to have the unit enclosed or protected in some way so that the hands cannot accidentally be placed on any "live" metal parts, for this of course, would cause shocks.

H.T. Supply

You will see that of the four high-tension output terminals H.T.+4 gives the greatest voltage for the power valve. H.T.+2 is the detector tapping and H.T.+3 is for the anode of the screen-grid valve.

All these tappings are fixed, and the variable tapping H.T.+1 is for the screening grid of the screen-grid valve. Variation of this voltage is possible by means of the 120,000-ohms potentiometer on the terminal strip of the H.T. unit and, generally speaking, the best voltage for working with the "Ether Searcher" is obtained when the arm of this resistance is about half-way round the winding.

With practically every A.C. mains supply (of course, the "All-Electric 1931 Ether Searcher" will work only on an A.C. supply) it does not matter which way round the mains plug is inserted. It is occasionally found, however, that in one direction, owing to the better earth provided, there is less background noise and you might care to try this experiment. The set can be switched off either by pulling the mains plug out of its socket or, alternatively, a flex-type switch can be fitted in the lead to the unit. A good earth to the set is needed to stabilize the set.

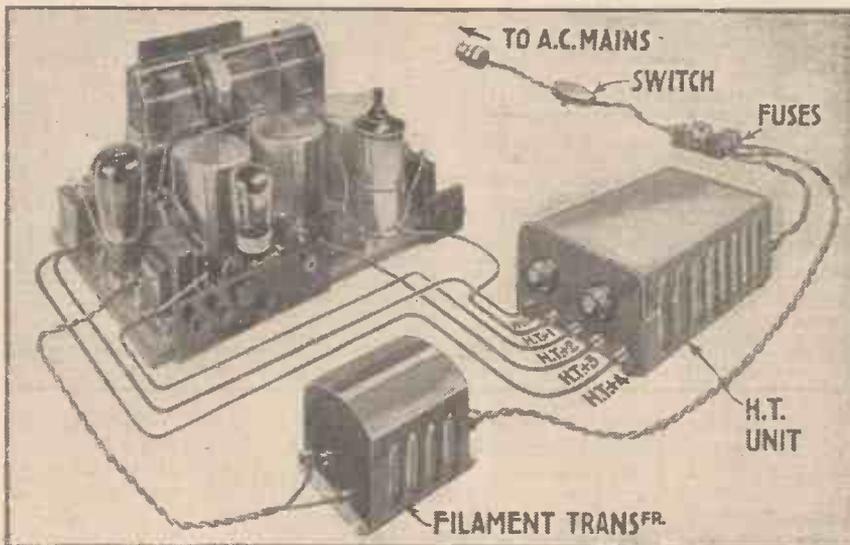
These instructions with regard to mains safety and earthing apply also to any commercial eliminator which may be used with the "Searcher." There is just a point to

note, however, in that all commercial units do not have the four H.T. tappings which are provided on the home-built unit for the "Searcher," and if you intend using a commercial unit which has, say, only three tappings, then leads H.T.+3 and H.T.+4 on the set (that is, the screen-grid H.T. connection and the power valve H.T. connection) should be joined together and taken to the point of greatest voltage on the eliminator.

Lead H.T.+2 of the set should be taken to the detector tapping and H.T.+1 to the variable screen-grid tapping. Among the commercial eliminators which are available as in standard types with a four-volt filament winding, are the Regentone W1A, the Junit, Clarke's Atlas A.C. 220, and Tannoy. A good eliminator which, however, does not incorporate a four-volt three-ampere output winding is the Philips H.T. unit, type 3009, and in bench tests of the mains driven "Ether Searcher," this unit has been used with great success in conjunction with a Regentone type ACV filament transformer.

Mains valves must be used in the mains-driven "Ether Searcher" and although it is possible to use certain types of four-volt battery valve in the power stage, this is not recommended. General operation of this set with the mains drive is very similar to that of the battery-driven model and, most important of all, it is necessary to get the tuning circuits ganged before good reception can be obtained.

For the initial ganging tests it is advisable to use the automatic tuning scale which was given with "A.W." No. 449. Select a good local station and tune this in with the main condenser of the "Ether Searcher" according to the reading given on the station log. That is, if the station should come in at 60 degrees, then for a first test, set the main control at this reading and then (Cont'd. foot of next page)



These are the connections for any standard commercial high-tension unit, not fitted with a 4-volt filament transformer, which may be used with the "All-Electric 1931 Ether Searcher." The filament transformer is connected to the mains supply and the receiver as shown, and a fuse block and switch are provided in the input leads to all the mains apparatus

For the Newcomer to Wireless : SLOW-MOTION DIALS

I DON'T find that the slow-motion dials that I recently bought make fine tuning quite so easy as you led me to expect that they would.

How's that?

Well, suppose that I am coming on to a station by increasing the reading. It builds up to good strength, but I think that I may be able to get it just a little better. I make a further small increase, but find that I have gone too far. When I turn the knobs backwards nothing happens until I have gone rather a long way.

Your dials have a good deal of backlash in their action. The ideal dial would have an absolutely positive drive, the slightest movement of the knob in either direction producing an immediate corresponding response in the position of the scale and the moving plates.

As a matter of fact I did get my dials as rather a bargain.

You mean that you were offered something cheap and that you fell! From what you say I expect that must be the case.

A slow-motion dial can be both cheap

and good; in fact many excellent firms turn out dials at remarkably low prices. You won't go wrong if you purchase these, but it is the height of folly to spend money on cheap foreign-made dials, which are simply thrown together. I expect that you have another fault to find with your dials.

As a matter of fact, I have. In certain parts of the scale you can turn the knob without moving the plates at all.

That's what we call free-wheeling, very common in cheap-jack dials.

Is there no way of testing out a dial in the shop and without actually fitting it to a receiving set?

Yes. Whenever you are examining a slow-motion dial with a view to purchase, get hold of it in your left hand, holding the rim between the thumb and the third and fourth fingers. Here's a dial. Just take it up as I suggest.

Now you will see that your first and second fingers come naturally at the back. Place them on the driving disc (that is the metal or celluloid part to which the moving scale is fixed) and

press pretty firmly upon it. If you do that your first and second fingers act as a brake and give the dial just about as much work as it would have to do in operating the moving vanes of a variable condenser.

I follow. And now I suppose I rotate the knob?

Yes. Remove the pressure of the fingers for a moment and turn it rapidly to zero. Now put on the brake and move slowly from zero to maximum, watching the scale meanwhile to see if any slip takes place. When you get to the maximum go back again, watching as before.

And about backlash?

Lift your fingers off the driving disc; turn to, say, the 70 mark, setting the hair line exactly on this. Now apply the pressure again and see whether you can turn the knob to and fro a little without seeing or feeling any response from the driving disc. You can see by watching the hair line; you can feel whether the disc tries to turn against the pressure of your fingers.

adjust the ganging trimming condensers.

Each small trimming knob should be adjusted in turn with a screwdriver. First, deal with the trimming condenser screw at the top of the main condenser which is on the right of the tuning dial, looking at the set from the front. Turn the reaction knob so that the receiver is just on the oscillation point and tune to the silent point of the carrier wave. Decrease reaction immediately so that the set is just off the

the panel at its minimum setting.

Make good use of this pre set aerial condenser on the panel when searching for foreign stations. It is probable that you will get best results when this is occasionally varied as the set is tuned over its whole scale. Often a slight readjustment of this pre-set control turns a faint signal into one at strong speaker strength. This is particularly the case at the extreme ends of the tuning scale where the ganging of the band-

the terminal strip of the set. When the plug is pushed home the grid of the detector valve is disconnected from the preceding H.F. stage and is connected to the pick-up. A small amount of negative bias is automatically provided then to this valve so that it is not overloaded by big voltages of the pick-up. There is no gramophone volume control in the set, and if such a control is needed it should be placed across the pick-up terminals.

COMPONENTS REQUIRED FOR THE "ALL-ELECTRIC ETHER SEARCHER"

Baseboard, 16 in. by 10 in. (Camco, Pickett, Clarion, Peto-Scott).
Panel, 8 in. by 6 in. (Trelleborg, Becol, Peto-Scott).

Three-gang, .0005-mfd. variable condenser with drum dial (J.B. Chassimount, Polar, Lotus, Formo).

.0003-mfd. variable series aerial condenser (Readi-Rad, Polar, Lotus).

.0001-mfd. variable reaction condenser (Readi-Rad, Lissen, Bulgin, Polar, Peto-Scott, Lotus, Burton).

Set of three matched coils with ganging switch (two Colvern type TGSC and one TGSR).

Low-frequency transformer (Telsen Ace, ratio, 5-1, Lissen, Varley, Lotus, R.L., Voltron, Ferranti).

.01-mfd. fixed condenser (T.C.C. flat type, Lissen, Dubilier, Telsen).

.0002-mfd. fixed condenser with grid leak clips (T.C.C., Dubilier, Lissen, Telsen, Watmel).

.0002-mfd. and .0003-mfd. fixed condenser (Lissen, T.C.C., Dubilier, Telsen).

Three 1-mfd. fixed condensers (Lissen, T.C.C., Dubilier, Filta).

2-mfd. fixed condenser (T.C.C., Dubilier, Lissen, Filta).

Three 5-pin valve holders (Telsen, Junit, Lotus, W.B., Benjamin).

High-frequency choke (Telsen, Lewcos, Readi-Rad, Bulgin, Tunewell, Peto-Scott, R.L.).

Two 2-megohm grid leaks (Dubilier, Lissen, Watmel, Graham-Farish).

Grid-leak holder (Bulgin, Wearite, Graham-Farish).

Three coil screens (H. & B., Readi-Rad, Colvern, Peto-Scott).

S.G. valve screen (H. & B., Colvern).

Aluminium foil sheet, 15 in. by 9 in. (Readi-Rad, H. & B., Peto-Scott).

Terminal block (Junit).

Ebonite strip, 7 in. by 2 in. (Becol, Trelleborg, Peto-Scott).

Four terminals, marked: A, E, L.S.(2) (Belling-Lee, Clix, Burton).

Pick-up jack (Lotus J.K.3).

15-ohm potentiometer for panel mounting (Wearite, Clarostat).

One 600-ohm, one 1,000-ohm, and one 100,000-ohm spaghetti resistance (Lewcos, Bulgin, Readi-Rad, Peto-Scott).

1,000-ohm wire-wound resistance (Watmel, Claude Lyons).

Low-frequency choke, 20 henries (R.L., Lissen, Varley).

Two yd. thin flex (Lewcoflex, Peto-Scott).

Seven spade terminals, marked: H.T.—, H.T.+1, H.T.+2, H.T.+3, H.T.+4, L.T. (2) (Clix, Belling-Lee).

Connecting wire and sleeving (Lewcos)

COMPONENTS FOR THE A.C. UNIT

Baseboard, 16 in. by 17 in. (Camco, Clarion, Peto-Scott).

Mains transformer, with secondary windings for 4-volt filament (Regentone, type WR7).

Westinghouse metal rectifier, type H.T.7.

20-henry smoothing choke (Varley, Lissen, R.L., Wearite).

Three 4 mfd. fixed condensers (400 volt working) (T.C.C., Dubilier, Lissen, Filta, Formo).

Three 2-mfd. fixed condensers (T.C.C., Dubilier, Lissen, Filta, Formo).

120,000-ohm variable wire-wound resistance (Regentstat).

20,000-ohm spaghetti resistance (Lewcos, Bulgin, Readi-Rad, Peto-Scott).

30,000-ohm spaghetti resistance (Lewcos, Bulgin, Readi-Rad, Peto-Scott).

Ebonite strip, 9 in. by 2 in. (Becol, Trelleborg, Peto-Scott).

Seven terminals, marked: H.T.—, H.T.+1, H.T.+2, H.T.+3, H.T.+4, L.T. (2) (Belling-Lee, Clix, Burton).

Length of mains flex (Lewcos).

Thin connecting wire and sleeving (Lewcos).

Flex type mains switch (Bulgin).

Baseboard-mounting twin fuse (Bulgin).

OR—

Philips high-tension unit, type 3009 and 4-volt 3-amp. mains transformer (Regentone type ACV).

OR—

Mains unit with 4-volt 3-amp. output Regentone WIA, Junit, Clarke's "Atlas" AC220, Tannoy).

oscillation point. When this adjustment has been made, correct in the same way the trimming condenser screw on the left of the dial.

As very many "Ether Searchers" will be used within the swamp area of a main station it should be noted that in such a case the trimming condenser of the main aerial tuning condenser (on the left looking from the front) should be screwed in so that it will be necessary to have the aerial condenser on

pass coils may not be quite correct. Alterations of the pre-set condenser bring the circuits back to proper tuning. This adjustment is not at all critical but must be done slowly so that the correct tuning point is found.

A gramophone pick-up can be used, of course, with the "All-Electric 1931 Ether Searcher," and to do this it is necessary only to connect the ends of the pick-up lead to a plug which fits in the jack provided on

Finally, it should be noted that if there is too much mains ripple then slight readjustment of the 15-ohm potentiometer on the terminal strip of the set will correct this.

The "All-Electric 1931 Ether Searcher" is quite safe to work because it is adequately protected by fuses on the mains side, and, furthermore, an output choke in the power valve circuit insulates the speaker from any dangerous mains voltage.

EVERYTHING **The G.E.C. your guarantee** ELECTRICAL
GECOPHONE

REGD TRADE MARK

**THE FAMOUS
 20 GUINEA
 PORTABLE
 NOW
 £15.15.0**

**4
 VALVE
 SCREEN
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**THE BEST
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 IN PORTABLES
 JUDGED ON
 PERFORMANCE
 JUDGED ON
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Sold by all
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THE POINTS THAT COUNT—

- 1 Screen grid circuit gives great sensitivity which allows many Home and Foreign stations to be received.
- 2 Selectivity is such that separation of powerful stations is complete.
- 3 The GECOPHONE "Stork" Loud Speaker fitted into the lid is capable of handling immense power. Thus you are certain of pure reproduction at any volume.
- 4 Equipment includes the latest OSRAM VALVES (with the OSRAM P.2 Output Valve) MAGNET Batteries and MAGNET unspillable Accumulator. A turntable for directional tuning is provided.
- 5 Low current consumption of 11 milliamps.
- 6 The case is waterproof leather finish, very distinctive and very robust. Choice of brown or maroon colours. Also table model of solid polished mahogany.
- 7 Simplicity of operation.

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You can either buy the GECOPHONE Portable for Cash (£15.15.0) or Hire Purchase—deposit £1.11.0, 12 monthly payments of £1.4.10 Complete with OSRAM Valves, MAGNET Batteries, MAGNET Unspillable Accumulator and Turntable, and including Royalty.

FILL IN AND POST THIS COUPON TO-DAY

Portables have come and portables have gone, but during the three years the GECOPHONE has been in the highest-class market it has established an unassailable reputation for performance and reliability. Today you pay 5 guineas less than last year, and 8 guineas less than the year before for exactly the same set, with the addition of constant improvements to keep pace with broadcasting developments. You cannot possibly buy a set which offers such good value.

Fill in the coupon below for leaflet which reproduces the models in actual colours. This will be sent POST FREE. Your local dealer will demonstrate the set in your own home without placing you under any obligation. We have arranged this with the trade.

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AC/HL	4	1.0 "	200	35	11700	3.0	15/6
AC/P	4	1.0 "	200	10	2650	3.75	17/6
AC/P 1	4	1.0 "	200	9	2000	2.5	17/6
AC/Pen	4	1.0 "	250	—	—	2.2	27/6



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Oh Your Waverell!

WIRELESS "BENEFITS"

IN this country we look upon broadcasting as a national institution, but in Germany they seem to regard it as one of the necessities of life. At least, this seems to be the effect of a recent decision whereby any German listener who has been unemployed for over six months is exempted from paying what is the equivalent of our B.B.C. licence until he again becomes a wage-earner. The German licence is collected at the rate of two shillings a month, as compared with our ten shillings a year, so that the unemployed "benefit" is fairly substantial. Incidentally, the same privilege is accorded to any listener suffering from severe war injuries, as well as to those who are blind. Altogether, I should say there must be a fairly large official "free list" over there, which may perhaps account to some extent for the higher rate charged to those who can afford to pay.

PENNY WISE . . .

IT is extraordinary how many people who ought to know better will insist upon spoiling the ship for a ha'porth of tar. The other evening I was called in to listen to a set which I knew to be a good one, because, in the first place, it was purchased on my own recommendation, and in the second place, it was not by any means what you would call a cheap outfit. I should, perhaps, explain that it had been in use for roughly two years, and was battery driven. When switched on, it produced a perfectly appalling background of crackles and sizzles. The noise was so bad that I thought it could be due to nothing less than a burnt-out transformer. However, I did casually enquire how long the H.T. battery had been in use, and to my amazement was told seven months! I informed my friend that for two pins I would report him to the Society for the Prevention of Cruelty to Tired and Worn-out Batteries, and departed pondering on the futility of false economy.

TRANSFORMER TROUBLE

IT is very seldom that anything goes wrong with the modern transformer, though some of the older models used to be a fertile source of trouble. Of course, now and again things will happen. If they do, you can be practically certain that the primary winding is the one at fault. Break-down is nearly always due to the wire being burnt out by excessive current, and since the circuit of the secondary winding of an intervalve transformer is broken by the grid-filament path of the next valve, only a very small amount of grid current can flow on that side of the core. Certainly not enough to cause a burn-out unless, of course, the grid and filament collapse and "short" inside the valve. In very rare cases electrolytic action may occur between the two windings, set up by moisture or some other impurity in the insulation, and in this case corrosion may lead to the wire

breaking either on the primary or secondary side.

A MODERN "TOWER OF BABEL"

A SYNDICATE is at present negotiating with the Luxembourg Government for the erection of a new high-powered station, which, when completed will broadcast regularly in every European tongue. This is a development I have been expecting for some time. It helps one to realise what a drawback it is—from the broadcast listeners' point of view—to belong to a polyglot Continent. In the United States, for instance, every single item that goes into the ether is open to the understanding of any listener who has a set capable of receiving it; whilst here we are shut out from so much that is of interest by the language barrier.

The new venture is not, of course, to be run on philanthropic lines. There is immense publicity value in a station which can make itself heard and understood throughout the entire European market, and the syndicate will look to the advertisement revenue for their profit. The idea has already been exploited to some extent by the special "publicity" programmes transmitted in English by Radio Paris—and by our old friend, Hilversum. If the newcomer provides equally good fare, we shall be glad to hear it occasionally, even if there is a small publicity "pill" to swallow with the programme.

A GOOD IDEA

UNLIKE ourselves, the Germans are not rushing haphazard into their regional scheme. Their broadcasting authorities quite realise that, though high power and heavy modulation enormously increase the crystal range of broadcasting stations, they make it exceedingly difficult for valve users to obtain decent quality. Before, therefore, they settle definitely the power and the degree of modulation to be used by their new stations they are engaged in taking a census of listeners to ascertain what kinds of receiving sets are most generally employed. Now, this is the right way of going about it—find out what receiving gear your listeners have and then fit your transmissions to it. The wrong method, surely, is to put up, without any previous inquiry, gigantic transmitters and then to tell people that they must scrap their old sets if they want to be able to receive under the new conditions.

EVERY PICTURE TELLS A STORY

I AM referring to the circuits of the control receivers used by the B.B.C. which have recently been published. In order to check the quality of the transmissions of super-power stations it is necessary that listening-in should be done in the control-room. At super-power stations such as Brookmans Park, one receiving set is used right under the aerials. It might be expected that something very much out of

the way in the matter of circuits would be needed owing to the enormous field strength, and it is not surprising that the Kirkifier has been used. Though it gives a beautifully level response, this kind of detector is so insensitive that even at Brookmans Park itself a pentode amplifier is necessary.

A SUGGESTION

BUT it is when we come to the control receiver used in London for checking the doings of Brookmans Park that we find the fullest confirmation of all that I have written in these columns about the difficulty of obtaining good quality from a high-power station with a simple receiving set. The set under discussion is intended to receive regional transmissions at a range of twenty miles or so. In order to avoid distortion it has been found necessary to employ push-pull grid detection with a plate voltage of 300. At twenty miles, mark you! This is surely a plain admission of the effects of a heavy modulation upon sets such as the man in the street must use. *Would it not be far better if the B.B.C. employed as its control receiver a simple set of commonly used type and then arranged its transmissions so that at twenty miles this set could receive them without distortion?* I merely throw out the suggestion.

COMIC OPERA

HAD he been alive, W. S. Gilbert would, I am sure, have written a comic opera round the doings of the B.B.C. I suppose that one of the most screamingly funny things for years is the way in which their scheme for cheapening wireless by means of high power is working out. Those who live anywhere within twenty miles of Brookmans Park have already discovered that a greater number of valves is necessary if reproduction is to be of good quality, and further that a very low impedance output valve using a large amount of current and needing a high plate voltage is required. Push-pull detection means, of course, the addition of another valve and the use of a great deal of plate current. Expenses, then, have increased in the number and class of valves required and in the amount of high-tension current consumed by the set as a whole. Considerably less than 40 per cent. of houses in this country have electric light, and it follows that a big majority of wireless sets in use must be battery-operated. High-tension current has always been about the most expensive item in the battery man's budget, and he now finds himself faced with increasing costs if he does not want to sacrifice quality. A set consuming from 25 to 40 milliamperes at 300 volts is not going to be run on twopence a week!

A TRAGEDY

I AM going to give you the story of an unfortunate little experience of my own

On Your Wavelength! (continued)

so that you may be duly forewarned and therefore, I hope, forearmed. Feeling, for some queer reason, a little less hard up than usual the other day, I ordered a new super-capacity H.T. accumulator to replace an old friend of smaller size, which is not quite up to the demands made by my big sets. It duly came along, and very nice it looked when I unpacked it. Pushing it into Rattling Rupert—the ancient thing on four wheels which I call a car, though my friends have other names for it—I took it down to the charging station and impressed upon the chappie there the importance of filling it with electrolyte of the correct Sp. G. and of charging it only just long enough to bring it up to the makers' figure of 1.256. I also drew his attention to the fact that the cells were dry charged and that they would not require very long. That was on the Saturday. On the Monday morning, when I was lying in bed stricken with the fashionable 'flu, the telephone bell rang. It was my friend of the charging station, and a sad tale he had to tell. According to him, the batteries were thoroughly bad ones, for their positives had simply fallen to pieces the moment they were put on charge.

WORSE AND WORSE

LARGE chunks had detached themselves from its plates, and had formed short-circuiting bridges between positives and negatives. The cells had heated up and the whole battery was distinctly bent. What, of course, had actually happened was this. The man looking after the charging apparatus had not realised that the batteries were dry charged. He had connected them up on the Saturday evening and had gaily gone off for the week-end, leaving them to drink in the juice poured into them by the mains. There is no surer way of blowing up the best of batteries than to charge its head off, and this was precisely what had happened to about £8 worth of mine. Oh, charging, what crimes are committed in thy name!

ANOTHER ADVENTURE

A FURTHER sad experience befell a friend of mine at another charging station. He sent in for a refill a nice fat L.T. battery of glass-cased cells. When it came back he was rather surprised to find that the over-all E.M.F., instead of being something over six, was only just above two. Testing through cell by cell he found that No. 1 and No. 2 had apparently been connected up in opposition, for though the voltmeter read all right on No. 1 it did its best to go backwards on No. 2. On taking No. 2 out of its case he was surprised to find that this cell had apparently gone mad. It would give a decent reading only if the voltmeter was connected up the wrong way round. Somewhat puzzled, he consulted me, and I came round to have a look at the cell. An examination of its plates showed that they had received a pretty nasty knock of some kind, and one needed to be no Sherlock Holmes to deduce that it had been placed on charge with its positive connected to the generator negative and vice versa.

It had, in fact, been charged backwards, with disastrous results.

POOR SERVICE

I COME across quite a number of people nowadays who complain that accumulators, either H.T. or L.T., which have every appearance of being in excellent condition, fail to hold their charge as they originally did. Here is an example. The battery is a 4-volter consisting of two 60-actual ampere glass-cased cells of first-rate make. It is used to operate a four-valve set drawing but .4 ampere of filament current. In theory this should mean 150 service hours and in practice one would look for at least 120 to 140. The battery used to last as long as this on one charge, but recently it has begun to go "phut" at the end of a fortnight with an average of four hours a day working—or say, between 50 and 60 actual hours. The plates, when I came to examine them, were in pretty good condition, though they had not their pristine perfection. Still there was no reason at all why the battery should not be able to furnish well over 100 working hours at a charge.

A USEFUL HINT

Here is the solution of the mystery. It is the kind of thing which occurs very frequently and readers would do well to make a note of it. In the handbooks it is laid down that losses of electrolyte due to evaporation should be made good by the addition of distilled water only, and not of acid. Now, when a battery is under charge, gassing causes always a certain amount of spluttering, when acid as well as water is ejected from the cells. Some charging stations, misunderstanding the instructions about topping up, make up the deficiency with distilled water only, with the result that as time goes on the electrolyte becomes weaker and weaker, and the specific gravity falls to a dangerously low level. The battery then becomes a worse and worse performer, and its owner is lucky if the plates are not badly damaged. It is a good precaution to have all cells emptied and the electrolyte renewed at least once a year. It doesn't cost much, and you can then be

sure that your battery is being given a fair chance.

ANOTHER GROUSE

THE idea of the regional scheme was, if I remember aright, that we should have definite alternative programmes from the twin transmitters. I admit that on any given night the Brookmans Park twins and the Daventry ditto are usually putting genuine alternatives into the ether—though there was an astonishing occasion during last autumn when both "Raucous Reg" and "Noisy Nat" were giving a simultaneous rendering of the same "chune," one being a few bars behind the other. But what is biting me at the present time is that a large chunk of "Raucous Reg's" programme on one night is often repeated in that of "Noisy Nat" on another. I don't think that this is quite playing the game. Few people ever want to hear the same programme twice in the same week, and it is distinctly annoying when you switch on to find that your loud-speaker is giving out precisely what it produced a couple of nights previously.

—AND SYMPATHY

AS readers know, I don't mind criticising the B.B.C. pretty freely when it does something more than usually stupid, but I do sympathise with it when quite unmerited knocks come its way. One of the lay papers has recently been attacking it good and hearty on the score of its political sympathies. I am not one of those who grow very heated over politics and I am all for free speech. To me, it seems that the B.B.C. performs with amazing skill the extraordinarily difficult feat of preserving an attitude without political or religious bias. I don't think that the present attack is merited, and I am quite sure that it does the most case-hardened Tory no harm to hear an occasional talk on Socialism or a died-in-the-wool Communist any harm to listen now and then to an ultra-Tory discussion. Myself, I have found little that can be classed as offensive in any talks or speeches that have been broadcast; but perhaps the reason for this is that, like a pretty large number of listeners, I glide immediately from "Raucous Reg" to Rome, or from "Noisy Nat" to Nürnberg if a politician takes his stand before the microphone.

A GEM

I FORGOT to tell you, by the way, of a little gem that came through from Moscow some weeks ago. After some extraordinarily dreary talks to which I listened, because I happened to be making some experiments in speech reproduction, the announcer told us that a musical programme would follow. "You will now hear," he said "Russian melodies played by the Przmxlwrtmski (at any rate, it sounded like that) trio on three harmoniums." Three harmoniums! Ye gods! As a matter of fact, they turned out to be accordions.

THERMION.

AN EMERGENCY COIL

Don't worry if you are at a loss for a makeshift coil of a special size. One of the old basket type can, in an



emergency, be easily wound on a circular piece of card having an uneven number of slots. Silk or cotton-covered wire of about No. 24 gauge is suitable for the winding.

BROADCAST ARTISTES IN PICTURE



EDITH ASHBY.—The pianist of the well-known broadcasters, "Old Time Singers," Miss Ashby was the pianist of the Bournemouth Orchestra



GILBERT BAILEY.—The founder of "The Old Time Singers," recently heard relayed from Cardiff.



WISH WYNNE.—An actress of character parts, noted for her Cockney studies,



GODFREY BROWNE.—The director of Belfast Station from its initiation. He is the conductor of the Belfast Symphony Orchestra.



BILLY MASON.—Conductor of the Cafe de Paris Band, at Coventry Street Restaurant



JESSIE FURZE.—A clever pianist, who has established herself as an artiste of good taste and unimpeachable technique.



CHARLES WREFORD.—A clever artiste who has a special forte for country dialect stories and impersonations.



WYNNE AJELLO.—A well-known soprano who broadcasts frequently.



ANGUS MORRISON.—One of the finest Scottish pianists, he has broadcast from nearly all stations.



LINDA SEYMOUR.—A contralto who has figured in most of the important studio concerts.



ISOBEL ARMOUR.—Heard through Glasgow, recently, Miss Armour is a well-known northern cellist.



JOSEPH SZGETI.—A world-famous violinist, he broadcast in February from the Queen's Hall, playing the great Mendelssohn Concerto.



ANN PENN.—An imitator of well-known comedy stars; since her first broadcast she has appeared on the variety halls with great success.

THE HOW AND WHY OF RADIO

XXVII—GRID BIAS IN MAINS WORKING

If you are a beginner in wireless, now is your chance to gain a clear conception of its theory and practice. In this series of articles, specially prepared for the beginner, no previous knowledge of wireless is assumed. It is intended to deal with every aspect of the subject and the whole series will endow the beginner with sufficient knowledge to enable him to derive the greatest possible interest from the fascinating hobby of wireless

TO complete the mains-working portion of this series I propose briefly to explain the most common ways of obtaining grid bias.

We have already seen that the high-tension supply is derived from a rectifier and that the low-tension supply is eliminated by using valves designed for A.C. heating. It is quite feasible to use a rectifier for the grid-bias voltage as shown by Fig. 1. Here a Westinghouse half-wave metal rectifier provides an entirely separate source of D.C. potential. For this system a transformer providing an input to the rectifier of 45 volts is needed, the rectified

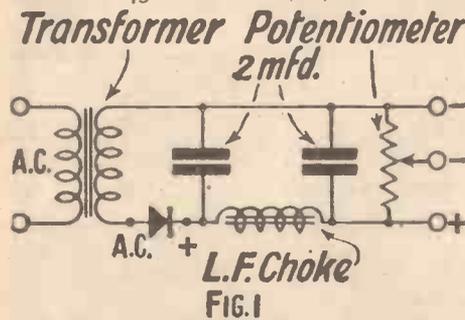


Fig. 1. Separate grid bias with metal rectifier

output then being about 40 volts. This voltage is suitable for biasing most of the super-power valves on the market, such as the PX₄. For lower bias values a potentiometer across the output can be fitted; a tapping half-way along would then provide 20 volts bias. For bias voltages greater than 40 volts either a valve or metal rectifier can be utilised with the usual smoothing devices.

An examination of the commercial three- and four-valve A.C. sets now on the market shows that grid bias for the valves is obtained by making use of part of the rectified high-tension supply.

Before we can understand how this is done, I think a brief explanation of grid bias in battery sets is essential. Look at Fig. 2, where the skeleton connections for grid biasing a low-frequency-amplifying valve are shown. Remember that when we say the grid is 6 volts negatively biased we mean 6 volts negative with respect to the negative end of the filament. Likewise, the anode in Fig. 2 is 60 volts positive with respect to the negative end of the filament.

If we consider the grid-bias battery as an extension of the high-tension battery it is clear that the grid is 6 plus 60 volts negative with respect to the anode. And the negative end of the filament is 6 volts more positive

than the grid. In other words the grid is the most negative point of potential with respect to the positive end of the high-tension battery.

Knowing this, it should be easy to see that a tapped high-tension battery can be used as a combined high-tension and grid-bias unit. If we connect the grid to the negative terminal of the high-tension battery, the connection of the filament to a more positive point on the battery will automatically apply bias to the grid. The number of volts negative grid bias will be the number of volts between the high-tension-negative connection and the tap on the battery to which the filament is taken.

Comparing Figs. 2 and 3, readers will see that the same relative arrangement of potentials is obtained; but since the Fig. 3 bias is part of the high-tension battery it follows that the total positive bias on the anode with respect to the negative end of the filament is 60 - 6 volts.

We say the grid is biased negatively, but if the filament is biased positively as in Fig. 3 the same effect is achieved with, of course, a sacrifice in anode volts.

Now we can get back to mains working, where, except under the Fig. 1 condition, grid bias is achieved at the expense of the high-tension supply. Fig. 4 shows how grid bias can be applied to the power valve of an all-electric set. Between the centre tap of the filament transformer and the high-tension-negative point is inserted a resis-

tance. The current flowing through this resistance is, of course, the anode current.

Since high-tension negative is the most negative point it follows that there is a progressive increase in potential towards H.T. positive. And the intervening resistance R will cause a certain drop in voltage across it. The end A of the resistance R will therefore, be so many volts positive with respect to the end B, which is connected to the grid and high-tension negative.

Now it will be seen why I first referred

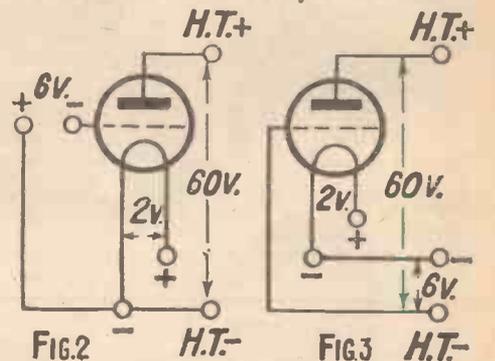


Fig. 2. Shows grid bias from separate battery. Fig. 3. Grid bias from the H.T. battery

to Figs. 2 and 3 for battery bias; for the grid of Fig. 4 is made negative with respect to the filament only by making the filament positive with respect to the grid, as in Fig. 3. Instead of voltage tapings we use a resistance, making use of the fact that the current flowing through it will cause a voltage drop, pre-determined by the value of the resistance and current flow. But just as the volts gained for negative grid bias in Fig. 3 are volts lost for positive anode bias, so in Fig. 4 the anode volts are reduced by the amount dropped across the resistance R.

Knowing the grid-bias volts required and the mean anode current of the valve, the value of the resistance R can be readily worked out from Ohm's law. Suppose the anode current were 30 milliamperes and the bias wanted were 30 volts; then since $R = \frac{E}{I}$, when R equals resistance in ohms, E equals potential drop in volts and I equals current in amperes, it follows that $R = \frac{30}{.030} \times 1,000 = 1,000$ ohms.

Bias for an indirectly-heated valve, the action of which was explained last week, can be obtained by the insertion of a resistance between the cathode (electron emitter) and the filament (heater element) as shown by Fig. 5.

HOTSPOT.

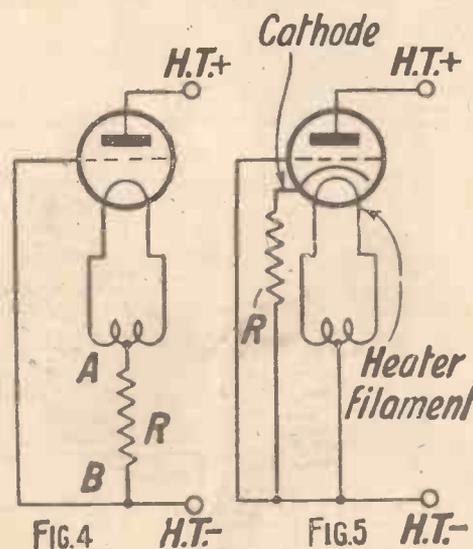


Fig. 4. Grid bias for power valve in A.C.-mains set. Fig. 5. Grid bias for indirectly-heated A.C. valves

A Weekly Programme Criticism—By SYDNEY MOSELEY.

Without Fear or Favour



"DON'T DO IT"

SIGHT AND SOUND

I NOTICED the other evening that when trying to convey an impression of a wireless set being tuned in, the Effects Department accomplished this by oscillating. This is surely a bad way of accustoming listeners to a nuisance that we all want to forget. By doing this the B.B.C. gives the impression that oscillation is necessary when tuning-in. Why not put on the sound of morse?

Dame Ethel Smyth is popular, not only as a composer but as a feminist, and with characteristic vigour came on to the Queen's Hall stage and took several "curtains." But the fact is, as every listener knows, the production of *The Prison* was a failure. It was so dismal and so lacked continuity that I murmured to my friend: "I am selling out after this." Talk about a depression over Iceland; it was all over the Queen's Hall that night.

Harry Tate, in my view, like many other eminent vaudeville artistes, must be seen as well as heard. Therefore, with my new set, which gives me foreign stations in a bad part of London, I switched on to Rome, and heard *La Tosca*; and a first-rate performance it was.

I think Mr. C. Denis Freeman, who was responsible for the books and lyrics of "From Montmartre to Montparnasse," is responsible for effects at the B.B.C., and this was his first production. As such it was quite good, but there were one or two lines—one in particular—which I thought ought to have been cut, as it erred on the side of doubt. I therefore wrote to Mr. Freeman, and since his letter is of interest to all listeners I give the salient points.

"I am very pleased you have raised this query, because I do feel that it is most important to know how an outside listener reacts to a programme, and, in addition, how extremely careful one has to be in writing for the microphone.

"I can assure you that I had not the slightest intention of conveying any sort of suggestion of *double entendre*.

"To prove how I regard the feelings of all radio listeners, I feel I must point out to you that, contrary to all tradition of



THE OPERAS

POLITICAL BIAS

musical comedy, operetta, or Ruritanian romance, I did marry my hero and heroine long before the play began!

"Forgive this rather long explanation, which I hope I have made clear, and believe me when I say how I appreciate your raising questions of this nature, because I realise how one is apt to lose perspective here."

Incidentally, there is far too much love stuff in these B.B.C. productions. They are usually by young men of modern ideas who seem to think that life is made up of love and no work!

The operas are going strong. I admit that a good many of them must be seen to be thoroughly enjoyed; certainly one should know the stories to follow them.

I listened to *Pagliacci* relayed from Halifax, and thought the singing was extremely good; but, to tell the truth, even the best of English singing is a trifle thin in expression in comparison to foreign production.

A good deal of fuss has been made by political opponents of Mr Maurice A. Dobb's talk "Russia in the Melting Pot." It is extraordinary the number of people who hate to hear the Other Side. They are so accustomed to reading the stuff they like in their own newspaper that anything in the nature of an opposite view drives them to paroxysms of rage.

"Grandmother" is undoubtedly Mabel Constanduros' best character, as I have always maintained, and "Grannie in the Studio" was excellent. This is a stunt that is well worth repeating.

I have mixed views about *Matinée*, the farcical fantasy, but before passing definite judgment I would prefer to have one more hearing.

The most popular of violinists is certainly Albert Sammons, who not only had an ovation after his playing, but before. I don't know whether it was his nerves or sang-froid that made him look challengingly round the stage and at the audience. Still, a great violinist.

I thought the "Music of Machines," by Mossoloff, good stuff, the first performance of which was given the other day. It was rather short, and the abruptness of it took the audience by surprise. Like Ravel's "Bolero," its very originality was a drawback, but after a second and third hearing I am sure we will all take it to our hearts. The musical reproduction of a factory in full swing was most realistically done. It certainly should be done again.

Jack Mackintosh, cornet soloist, is worth hearing for the clarity of his production.

I switched on for part of the time to "All the Fun of the Fair" from Midland Regional, and I thought it quite good fun.

One man's joke makes another man weep. A comedian the other night said, "Very nice city, Berlin—but very German," and the claque laughed uproariously. As I say, one man's joke, etc.



An impression of Miss Paddy Prior

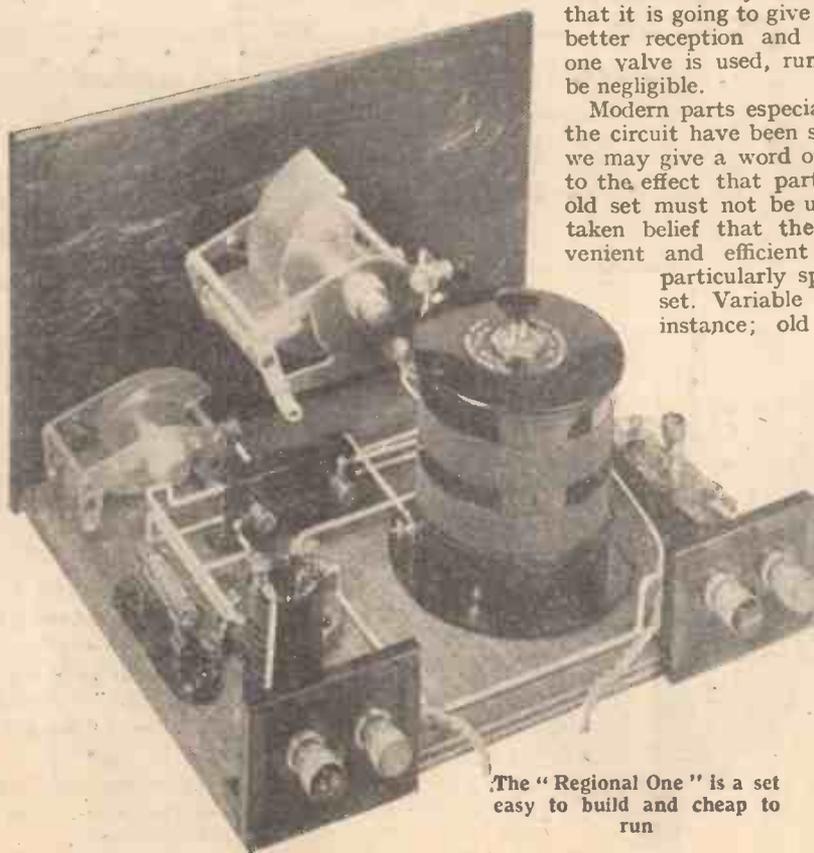
DO you want a really cheap, simple, and very selective set which will give good head-phone reception? If so then this is just the one-valve receiver you have been needing.

It is appropriately called the "Ultra-selective Regional One," and it is bound to make a big appeal to readers who are at present using crystal sets or old-fashioned one-valve sets and who are beginning to feel that they want something a little more up to date for reception of the Regional programmes, and yet who do not want to plunge into any great expense either in construction or running costs.

Really Selective

If you are already getting tolerably satisfactory results with a one-valver, then perhaps you do not feel induced to go to the extra cost entailed in the construction of a two-valver which, of course, will give you loud-speaker reproduction, but which is naturally a little dearer to build and a little more expensive to run.

The purpose of this "Ultra-selective Regional One" is to give good reproduction in the neighbourhood of regional stations, where both the local National and Regional programmes can be well received and have a large entertainment value with listeners who still favour headphones.



The "Regional One" is a set easy to build and cheap to run

The ULTRA-SELECTIVE REGIONAL ONE

In these districts selectivity is of paramount importance, and with many ordinary circuits it is not, frankly, easy to get one high-power programme free from any interference of the other. Even a slight amount of background jamming is intolerable and in any modern efficient circuit which claims to be suitable for regional-station reception there must be careful precautions taken against lack of selectivity.

Simple to Build

The set described here and illustrated by the accompanying photograph is, perhaps, a little more ambitious than your present old-fashioned one-valver and certainly contains more parts than a crystal set, but at the same time you must remember that it is going to give you very much better reception and that, as only one valve is used, running costs will be negligible.

Modern parts especially suitable for the circuit have been specified and, if we may give a word of warning, it is to the effect that parts from a very old set must not be used in the mistaken belief that they are as convenient and efficient as the parts particularly specified for this set. Variable condensers, for instance; old pattern con-

densers are not, obviously, so good as the improved new types. Adhere as closely as possible to the components specified.

Construction is easy, particularly if you take advantage of the full-size blueprint which is available, price 1s., post free, from the Blueprint Department, AMATEUR WIRELESS, 58-61 Fetter Lane, London, E.C.4. You can, of course, work with the small reproduction of the full-size blueprint given here, which shows all the connections, but the novice will find it very handy to have the full-size chart, which can be used as a drilling and mounting template.

Panel drilling is simple. The only holes which have to be drilled are for the tuning condenser, reaction condenser, on-off switch, and panel and dial condenser screws. It is a good plan to fix the panel at right angles to the baseboard before you mount these three panel parts. No panel brackets are specified, nor are any really necessary.

The high-tension and low-tension leads to the set are lengths of flex, and this does away with the necessity for a long row of

Components for the "Regional One"

Ebonite panel, 9 in. by 6 in. (Becol, Trelleborg, Peto-Scott, Lissen).

Baseboard, 9 in. by 7 in. (Camco, Pickett, Clarion).

.0005-mfd. variable condenser (Polar, Formo, Lotus, I.B., Utility, Burton, Ormond).

.0001-mfd. variable reaction condenser (Polar, Readi-Rad, Bulgin, Lotus, Formo, Peto-Scott).

Filament switch (Readi-Rad, Bulgin, Benjamin, Peto-Scott, Lotus).

.0002-mfd. fixed condenser (Lissen, Dubilier, T.C.C., Graham-Farish, Ormond, Formo, Read-Rad).

Grid-leak holder (Bulgin, Lissen, Graham-Farish).

Four-pin valve holder (Telsen, Lissen, Burton, Lotus, Benjamin, Wearite, Clix).

Dual-range coil (Bulgin, type A; Tunewell "Clarion").

High-frequency choke (Peto-Scott, Lissen, Lewcos, Tunewell, Lissen, Readi-Rad, Varley, Wearite, Formo, R.I., Bulgin).

Pre-set series aerial condenser, .001 mfd. maximum (Sovereign, Formo, Polar, Ormond, R.I., Lissen).

Two terminal blocks (Junit, Sovereign, Belling-Lee).

Four terminals marked: Aerial, Earth, Phones +, Phones - (Belling-Lee, E.C. Clix, Burton).

3-megohm grid leak (Lissen, Tel. Dubilier, Graham-Farish, Readi-Rad).

Three yards of thin single rubber covered flex (Lewcoflex, Peto-Scott).

Two spade terminals marked: L.T., L.T.- (Belling-Lee, Ealex, Clix, Burton).

Two wander plugs marked: H.T., H.T.+ (Belling-Lee, Ealex, Clix, Burton).

Connecting wire (Glazite).

Slow-motion dial (Lotus, Brown, Formo, Astra, Ormond, Burton).

SELECTIVE REGIONAL ONE

THE IDEAL SET FOR LOCAL PROGRAMMES INCORPORATING THE VERY LATEST CIRCUIT

give greater strength.

The knob on the top of the coil is pulled out for medium-band reception and pushed in for the long wavelengths. The pre-set condenser in the aerial lead is slackened off (that is, the knob is rotated in an anti-clockwise direction) in order to sharpen up the tuning. This will slightly alter the correct tuning setting on the main dial and may also decrease signal strength slightly. The best position for the knob of the pre-set condenser should be found by trial.

Reaction Control

You will not get good results if the reaction control is not smooth, and, although any troubles in this respect are unlikely to arise, advantage may be taken of the advice given with regard to the reaction control in the article "Distance Getting and How to do it," in last week's issue. Correct choice of high tension in conjunction with the valve and grid condenser and leak is the secret. Never force reaction on the local stations.

London readers will be interested to note that the "Ultra-selective Regional One" is on view in the Radio Department windows of Messrs. Selfridge & Co., Ltd., Oxford Street, London, W.1.

terminals at the back. As you will see, terminals are used only for the aerial and earth and the headphone connections. These terminals are mounted on ready-drilled strips provided with right-angle fixings.

There are only six parts to be mounted on the baseboard and the positions of these can quite easily be gauged. The aerial pre-set condenser is placed close to the aerial terminal, the coil close to its tuning condenser, the grid condenser, leak, and valve holder in the spare space at the side of the coil, and the high-frequency choke down near the loud-speaker output. Wood screws are used for fixing all these parts.

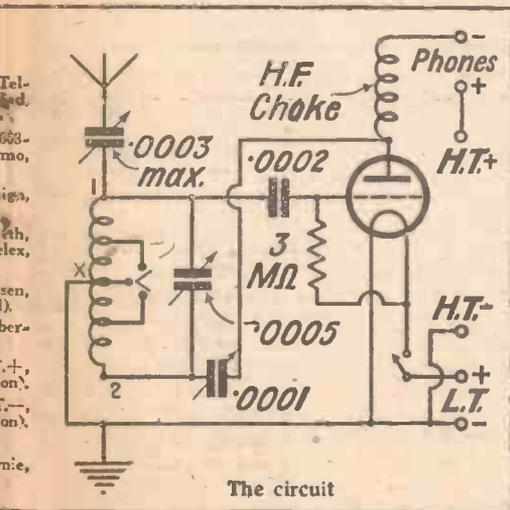
wired up. Use rigid insulated wire for the connections and suitable lengths of flex for the high-tension and low-tension leads. A red and black wander plug should be attached to the positive and negative high-tension leads respectively, and red and black spade tags should be placed on the positive and negative low-tension leads. It will be seen that the positive low-tension flex goes straight through to the on-off switch on the panel.

Very probably, if you already have a one-valve set, you will continue using the same valves and batteries, but if you are buying new accessories you should note that the detector valves should be chosen from some types such as the Mullard PM2DX, Cossor 210 Det., Marconi or Osram P210, or the Mazda L210. Equivalent 4- or 6-volt valves may, of course, be used.

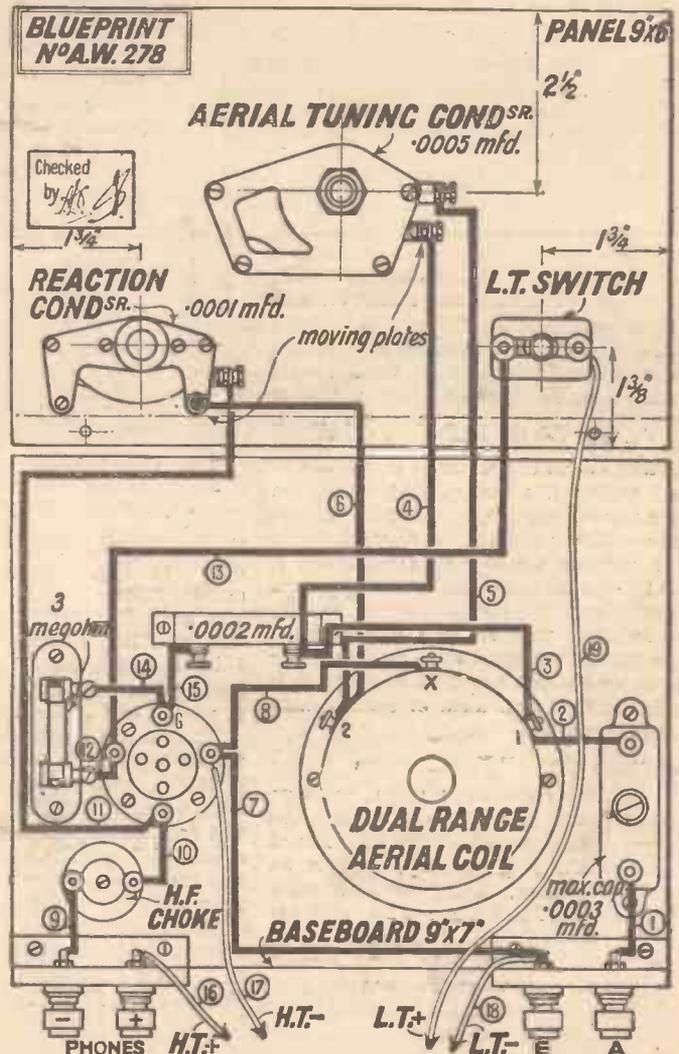
A high-tension voltage of 60 will give quite good phone reception in most districts, although if extra volume is required, then 100-volt batteries may be used and may, with certain detector valves,

Wiring

Now for wiring, which is extremely simple. It is recommended that you solder the connections and, in order to give greater space in which to handle the soldering iron, you may, perhaps, delay the mounting of the big variable condenser on the panel until some of the parts have been



The circuit



The layout and wiring diagram. Full-size Blueprint available, price 1/-



IN MY WIRELESS DEN

WEEKLY TIPS—
CONSTRUCTIONAL AND THEORETICAL

By W. JAMES.

A Giant Valve

THERE is a new Osram valve, I see, which has a length of 3 ft. 6 in. and weighs 20 lbs.

It is a water-cooled valve, the anode being of copper tube. It has a jacket through which water passes for cooling at the rate of 500 gallons per hour. The valve is capable of handling an output of 100 kilowatts, and a bank of them is being installed at the Post Office station at Rugby.

This valve, I am told, is the first of its size entirely designed and made in England. The filament, by the way, takes a current of 226 amperes at 31.5 volts.

Controlling the H.F.

Out of all the methods available for controlling the amount of the high-frequency magnification provided by a set there is none satisfactory in all respects. Many people use a potentiometer in the screen circuit of the screen-grid valves.

It is found that as the voltage applied to the screens is reduced from the normal working value the amount of the amplification falls off. This reduction is due entirely to changes in the characteristics of the valves. Thus the slope falls off and the impedance increases.

Both of these factors result in a reduction in the amplification obtained. With a good potentiometer, having a voltage across it of, say, 80, the control can be made gradual and is effective over a wide range.

But there is an effect which ought not to be lost sight of, namely, that distortion may be introduced by reducing the length of the working part of the characteristic. As the voltage applied to the screen is reduced so the length of the working part is made smaller.

The result is that really strong signals, such as we obtain from local stations, are likely to be distorted and in practice it is often found that this form of control fails in this respect.

These "Spaghetti" Resistances

"Spaghetti" resistances seem to have arrived for good. They are cheap and quite effective. A note should always be made of their current-carrying capacity, however, as the different sizes, being wound with varying gauges of resistance wire, will not all carry equal currents.

These resistances may be used almost anywhere in circuits where current must be carried. Sometimes an end is loose, with the result that the contact is not good and noises may be heard from the loud-speaker. Generally, however, it is possible to cure the fault by pinching the metal

part of the end connection with a pair of pliers.

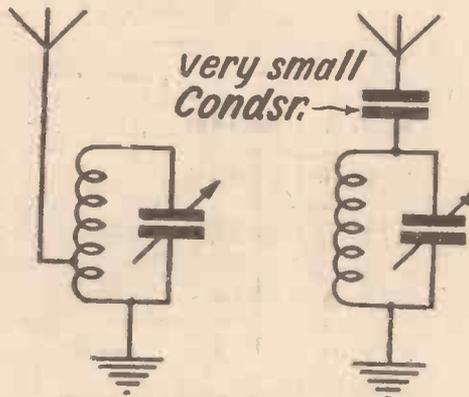
A Ganging Hint

In a set having ganged tuning special precautions must be taken to ensure that the aerial does not throw the tuning out.

As a rule a trimming condenser is used across one or more of the circuits in order that all circuits may be brought into tune. The method is satisfactory up to a point, but we still have to deal with different aeri-als.

The capacity of aeri-als varies greatly and we want to arrange matters to avoid differences in tuning.

Two schemes are available. The first is to connect the aerial to a tap on the coil near



Two useful arrangements, described in the accompanying paragraph, for preventing any troubles with ganged-tuning sets

the earth end. With this connection the effect of the capacity of the aerial is greatly reduced and can be made negligible. There is likely to be a certain loss in strength, but probably the set will stand this. Further, the selectivity will no doubt be improved by connecting the aerial near the earth end of the coil.

The second scheme is to join the aerial to the top of the coil through a condenser having a small capacity, such as 30 micro-microfarads. With such a tiny capacity in the aerial circuit the tuning will alter by a negligible amount with different aeri-als and the signal strength may well be greater than with the first scheme.

The diagrams show the two arrangements. Both are used in commercial sets in which a trimmer is not provided for the user to adjust the circuit to the rest of the set.

Special Motor-boat Stoppers

There are times when it is not possible to use the normal values of parts in an

anti-motor-boating stopper in the detection circuit.

You may have to use a fairly low value of resistance. When this is the case the value of the condenser used should be increased. Four microfarads should be tried instead of the usual two and good results will probably be obtained.

L.F. Facts

I have just been looking at the amplification-frequency curve of the new Ferranti type AF8 low-frequency transformer.

This shows a considerable rise at the high-frequency end and the transformer will, therefore, be useful in sets in which the higher notes are reduced by the tuned circuits and the detector. Some loud-speakers, too, reproduce the higher notes rather poorly and a transformer of this type will help matters.

A Good Choke Needed

A fairly good choking coil is needed in circuits of the type where the choke is connected in the anode circuit of a valve with a tuned circuit coupled to it through a condenser.

The choke is, in effect, in parallel with the tuned circuit. So it follows that if the choke has losses the tuning is made more broad and the magnification may be reduced.

There is a tendency, it seems to me, not to regard a choke as of as much importance as the rest of the tuned circuit. Actually, a choke has stray fields like any other coil and is likely to be affected by metal shielding.

The wiring to the choke, too, is also of importance. Most chokes have but little self-capacity, but the actual effective capacity may be much greater owing to the wiring and the position of the choke with respect to other parts included in the circuit.

Pick-up Troubles

Pick-ups of good make are nowadays fairly satisfactory, but occasionally you will come across one which gives trouble.

Records may soon be ruined by a pick-up out of adjustment. Sometimes the armature is a little too much to one side, with the result that the movement is restricted in one direction. Instead of the needle being able to move to and fro about its normal position it can move in one direction more freely than the other.

When this fault is present there will be an amount of noise and the reproduction will, of course, be poor. It will usually be possible to adjust the pick-up and to remove the fault.

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1 Readi-Rad Filament Switch		10	
1 Readi-Rad .0002 mfd. fixed condenser	10	6	
1 Readi-Rad Grid Leak Holder		6	
1 Telsen 4-pin Valve Holder	1	0	
1 Bulgin type A Dual Range Coil	15	6	
1 Readi-Rad H.F. Choke	4	6	
1 Sovereign Pre-set Condenser .0003 mfd.	1	6	
2 Junit Terminal Blocks	1	4	
4 Belling Lee terminals marked Aerial, Earth, Phones + Phones	1	0	
1 Readi-Rad 3 megohm Grid Leak		10	
3 Yards of thin single rubber-covered flex		3	
2 Spade terminals marked LT+, LT-, Clix		4	
2 Belling Lee wander plugs marked H.T., H.T. +		4	
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1 Valve Detector	8	6	
1 Packet Jittlinx for wiring	2	6	

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PHILIPS RADIOPLAYER

SETS OF DISTINCTION

Maker: Philips Lamps Ltd.

Price: £25

WHEN the Philips people recently sent me technical particulars of their new Radioplayer, a three-valve all-electric set with built-in loud-speaker, I was so impressed that I asked for a model to test. For the last few evenings I have been putting this new Philips product through its paces, using a total length of aerial wire of 60 feet, with, of course, a sound and short earth connection.

First of all, let me give some of the details; the circuit comprises a screen-grid high-frequency-amplifying valve, tuned-anode-coupled to a detector valve, which is transformer coupled to a super-power pentode. The first two valves are indirectly-heated four-volt A.C. types, but the pentode is a four-volt directly-heated valve.

A.C. MAINS USE

This set is intended for A.C. mains supplies. Incorporated is a universal voltage transformer so the set can be used on all voltages between 100 and 260 volts, of periodicities between 40 and 100 cycles. It is easy to adjust the set to work for any of the voltages specified on the indication plate by altering the busbar connections shown. The power consumption is only 21 watts, which means that between 40 and 50 hours running could be obtained for the price of a unit of electricity.

The Philips Radioplayer is fitted into an unusually attractive moulding called Philite, which, I suppose, is short for Philips bakelite. Anyway, it is a most attractive material for a radio set, especially for a set including the loud-speaker. Except for the aerial and earth the Radioplayer is self-contained. It is remarkably compact considering how much is contained within the Philite case.

The loud-speaker incorporated has a robust four-pole balanced-armature movement, with cobalt-steel magnets. The loud-speaker movement is permanently adjusted before the set leaves the works. No further means of loud-speaker adjustment is necessary.

EASY CONTROL

I was most impressed with the ease of control of this set. As is usual with sets made by Philips Lamps Limited, controls are conveniently arranged on each side of the case. Immediately below the loud-speaker is the tuning scale, operated by one of the knobs on the right-hand side of the case. To the left of the tuning scale is the main on-off switch. The wave-change switch and volume control are fitted to the left-hand side and the tuning and reaction control at the right.

Although there seems to be quite a lot

of knobs to contend with in this set, every one serves a useful purpose. Operation generally would be more difficult if any of them were omitted. In a three-valver, however efficient its circuit may be, one must have a reaction control in order to bring in foreign stations at full loud-speaker strength. Just as essential is a volume control, not only to prevent the local and near-by stations from being reproduced too loudly but also to prevent overloading of the detector and power valves, with a consequent loss of quality.

In my tests I found tuning could be done simply by rotating the main tuning control. The fine tuning control made a great deal of difference to the strength of distant stations but it did not have to be adjusted very frequently. I was able to search for stations covering an appreciable wavelength band without reference to the fine tuning control.

One of the big points of difference in the Philips sets is the provision of three distinct



Back view of the Philips Radioplayer: note the neat chassis and cone speaker

wavelength ranges. In the Philips Radioplayer the wave-band switch covers 200-to-450 metres, 400-to-950 metres and 900-to-2,100 metres. I like this three-range distribution of wavelengths, because it is possible to space out the stations received more evenly than can be done with the usual two-range tuning.

My first test of the Radioplayer was on the 200-to-450 metres range where I logged a good number of foreign stations of entertainment strength and quality. The dial is marked in degrees from 0 to 180 and the following readings give some

indication of how the stations came in round the dial. Rome 160, Stockholm 157, Berlin 138, Glasgow 132, Frankfurt 136, Toulouse 124, Strasbourg 100, Bordeaux 85 and Hilversum 81.

On the 900-to-2,100 metres range I obtained very satisfactory results, logging with ease seven stations; these were Hilversum 130, Radio Paris 112, Daventry 105, Warsaw 80, Motala 76, Moscow 70, and Kalundborg 55.

A reader recently took me to task for my alleged lack of consistency in measuring the selectivity of sets referred to in this page. As other readers may be equally dubious, I should like to make it clear that all sets are tested on the same 60-foot aerial wire in south-west London, at a point some 20 miles south of Brookmans Park. I am, therefore, outside the swamp area of the powerful London Regional and National stations but sufficiently near to need a set of average selectivity in order to separate them.

On the Philips Radioplayer I noted a useful amount of space on the dial between the National and Regional transmissions. The National was tuned in at 65 but was silenced at 55 and 75, a spread of 20 degrees. The Regional was tuned in at 110 and spread to 125 and 100. Outside the limits indicated by these readings I obtained many Continental stations clear of local-station interference.

A word about the quality of reproduction is justified. The tone of the music reproduced by the Radioplayer is best described as brilliant. High notes are reproduced without the slightest harshness and bass notes are quite well in evidence. I played through some of my favourite gramophone records and obtained a quality of reproduction of a higher order than would be possible with any mechanical machine.

SET TESTER.

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KEEN "Ether Searcher" constructors should make a note of the fact that whereas in the Ready Radio announcement on page 367 of "A.W." No. 455, the monthly payment for the "Ether Searcher" kit B is given as 31s. 6d., this should be 21s. 8d. The cash price for this kit is, of course, £17 4s. 6d., and it should be unnecessary for us to reiterate the advantages of buying a complete kit of parts. Home constructors will realise that in the purchase of a complete kit of selected components they save themselves a great deal of bother, for even the smallest parts (such as the "Jiffilix" for wiring, included in the Ready Radio kits) are given.

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IMPROVING A RECEIVER

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

Read this extraordinary account of how the performance of a set was improved one hundredfold by comparatively simple alterations

A SHORT time ago I happened to examine a receiver, which although constructed on apparently orthodox lines was giving very poor results. The circuit of the receiver is shown by the diagram. It will be seen that the arrangement was of a simple and straightforward character. There were two tuned circuits, controlled by a ganged condenser. The feed to the second valve was by means of the system known as parallel feed or tuned grid. A screened anode lead was utilised from the anode in the H.F. valve in accordance with well-known practice.

As a volume control a high-resistance potentiometer of 50,000 ohms nominal resistance was connected across the H.F. condenser. I say nominal resistance, because the H.F. resistance is in all probability distinctly higher than this, and the system is one which is used to a certain extent. The idea is that as the slider is moved down the potentiometer, the feed to the first valve is reduced, and consequently there is no danger of overloading the first valve on powerful signals, such as would be obtained from a near-by local station. In order to balance up the condensers, a small trimmer was connected across the second circuit, as shown in the diagram, while a reaction control was provided in the customary manner. The detector was decoupled through a 50,000-ohm resistance and a 2-microfarad condenser; the low-frequency circuit was conventional in form.

How The Tests Were Made

On the face of it there seems to be no reason why the circuit should not work perfectly, always assuming that the tuning inductances were of reasonably good quality. Previous experience had shown that this was the case, and in fact, the existing coils in the receiver were replaced with two others known to be of good performance. This did not improve the results, indicating that the source of trouble lay elsewhere. The only thing to do was to make a thorough investigation of the position, and for this purpose an artificial signal was used from the set-testing generator employed at the laboratories for comparative tests on finished receivers. This device is, in essence, a small very carefully screened local transmitter, generating a few milliwatts of power only. The wavelength of the oscillator is capable of being varied over the whole of the broadcast band, and the signals are modulated at a definite value, either by a constant-frequency note, or by audio-frequency currents from a radio or gramophone source.

The output from this oscillator is fed into a dummy aerial, and the strength of the voltage induced in the dummy aerial is capable of being varied within wide limits, so that the effect of near-by and distant signals can easily be obtained. In the particular case in point, signals from this genera-

tor were applied to the receiver and the low-frequency output from the loud-speaker terminals was measured. The output was kept well below the maximum capabilities of the output valve, so that no question of distortion or overloading arose, and the figures for the watts output, therefore, indicate effectively the relative efficiency of the set under the different conditions.

For the purpose of this test the reaction circuit was entirely disconnected to avoid

was removed. The output immediately went up to nearly 8 milliwatts, thereby more than doubling the performance. While this was one of the causes of trouble, it should be remarked, in passing, that under normal conditions the damping introduced by this form of volume control can be tolerated. A receiver may be somewhere on the threshold of instability, and a small extra damping is often an advantage rather than the reverse.

Eight milliwatts, however, is still a very poor signal, and it should be remarked that the input applied to this receiver was by no means an abnormally weak one. It corresponded to a reasonably strong distant station, so there was still something seriously wrong with the set. The next point of attack was the trimmer connected across the second circuit. This was of the rather popular type, which is provided with bakelised paper interleaved with the plates. Dielectric

loss in this type of condenser is high, but I was somewhat surprised to find, on replacing this trimmer with an air-dielectric condenser, that the output rose to 59 milliwatts, nearly eight times as much.

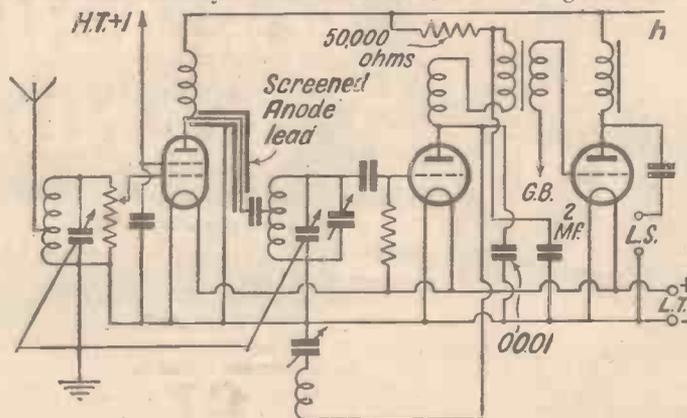
This was a point of which serious notice had to be taken. Tests made with other condensers indicated a similar loss of efficiency, and while there is no doubt that some of these condensers are better than others, the fact remains that some are not by any means comparable with air condensers with regard to high-frequency losses.

The receiver was now giving fair output, but could not by any means be considered a good signal; at any rate, 60 milliwatts is comfortably audible on the average cone or horn speaker. Various other components in the receiver were checked. For example, the H.F. choke in the anode circuit of the screen-grid valve was replaced with various other makes, but the difference was only quite small. In fact, the particular choke being used was of a high standard. The same remarks applied to the choke in the detector circuit.

The Chief Item

No marked change was obtained, however, till the screened anode lead was removed. This was the simple lead from the anode of the S.G. valve on to the detector tuning circuit, and consisted of a piece of flex around the outside of which was an aluminium tape. It was of the type often used for motor-car lighting, etc., and was

(Continued at foot of page 456)



The circuit of the receiver of which the performance was improved to a remarkable extent by a few simple alterations

any misleading effects as far as possible. The first test was to see how accurately the condensers were ganged. The condensers, of course, were adjusted approximately to the signal, the fine tuning being on the trimmer condenser provided, the receiver was tuned in to the artificial signal by ear as accurately as possible and the output noted. This was found to be 3.5 milliwatts, a very small value. Adequate loud-speaker reception requires several hundred milliwatts at least. The receiver was then

Summary of Tests

State of Receiver	Output (milliwatts)
Ganged by ear	3.5
Ganged by meter	3.5
Volume control removed	7.7
Trimmer replaced with air dielectric	59
Screened anode lead removed	425
Tuning condensers replaced. Set unstable	

tuned in again as accurately as possible by noting the meter reading, since very small changes in tune could be detected by this means, but it was found that no improvement was obtained, indicating that the aural ganging was satisfactory.

Where Faults Could Occur

The next step, therefore, was to make a list of the various possible points at which the difficulties could be creeping in. Now the connection of a high resistance across a tuning circuit must of necessity introduce damping, and consequently the volume control resistance across the first tuned circuit

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Full list of specified parts are printed in our previous advertisements, together with official letter of approval from the Editor of "Amateur Wireless."
KIT "A" £5:14:6
Pay the Postman
Or Easy Way — 12 Monthly **10/6**
Payments of — — — — —
(Less Values and Cabinet)
CABINET (as specified) £1:1:0

2 1931 ETHER SEARCHER
(A.C. Model)
Full list of specified parts is printed in our advertisement in last issue.
KIT "A" £7:3:9
Pay the Postman
Or Easy Way — 12 Monthly **13/2**
Payments of — — — — —
(Less Values and Cabinet)
CABINET beautifully French polished (oak) £1:15:0

3 1931 ETHER SEARCHER A.C. UNIT
Full list of specified parts is printed in our advertisement in last issue.
KIT £6:1:6
Pay the Postman
Or Easy Way — 12 Monthly **11/2**
Payments of — — — — —

Any items in the above kits sold separately. If value over 10/- sent C.O.D.

4 ULTRA-SELECTIVE REGIONAL ONE
(Described in this issue)
KIT "A" £2:2:6
Pay the Postman
CABINET as specified 13/6
Mullard P.M. H.F. Valve **8/6**

ATLAS A.C. ELIMINATOR TYPE A.C.244. 3 tappings—S.G. detector, power. Output 120 volts at 20 m.a.
Cash Price **£2.19.6** Only
Balance in 11 monthly payments of **5/6**

B.T.H. PICK-UP, TONE ARM, AND VOLUME CONTROL complete.
Cash Price **£2.9.6** Only
Balance in 5 monthly payments of **9/-**

JEKCO 3F.20 H.T. ELIMINATOR, 20 m.a. Tappings for S.G., 60 volts, and 120/150 volts. For A.C. mains.
Cash Price **£3.19.6** Only
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REGENTONE W.5 COMBINED H.T. ELIMINATOR AND TRICKLE CHARGER, One S.G., 1 variable, and 1 fixed tapping for H.T. L.T. charging for 2, 4, and 6 volts. For A.C. mains.
Cash Price **£5.17.6** Only
Balance in 11 monthly payments of **10/9**

EXIDE 120-VOLT WH. TYPE AC-CUMULATOR, in crates.
Cash Price **£4.13.0** Only
Balance in 11 monthly payments of **8/6**

LAMPLUGH or FARRAND INDUCTOR SPEAKER, for perfect reproduction. Unit and chassis complete, ready mounted.
Cash Price **£3.10.0** Only
Balance in 11 monthly payments of **6/5**

BLUE SPOT MODEL 51R CABINET SPEAKER. Cash Price **£4.4.0** Only
Balance in 11 monthly payments of **7/9**

EPOCH PERMANENT MAGNET SPEAKER with type B4 unit only.
Cash price, **£4.4.0** Only
Balance in 11 monthly payments of **7/9**

CELESTION D.12 LOUD-SPEAKER. Send An entirely new model in oak.
Cash Price **£5.0.0** Only
Balance in 11 monthly payments of **9/2**

STANDARD WET H.T. BATTERIES fitted with 96 No. 4 cells giving 144 volts; with chemical for fluid, 3 trays and lid for top tray.
Cash Price **£5.4.6** Only
Balance in 11 monthly payments of **9/7**

EXPRESS ORDER FORM

Please send me C.O.D./ Cash/ or H.P. (Strike out that which does not apply).
1. Kit "A" 1931 Ether Searcher.
2. Kit "A" A.C. 1931 Ether Searcher.
3. 1931 Ether Searcher A.C. Unit.
4. Ultra-Selective Regional One.
5. Accessories as detailed.
6. Special C.O.D. Items as detailed.
For which I enclose H.P. Deposit/ Cash £ s. d. Which I require C.O.D.

Name

Address

.....
A.W. 14/3/1931

PETO-SCOTT CO. LTD.

77 CITY ROAD, LONDON, E.C.1: Clerkenwell 9406; 62 HIGH HOLBORN, LONDON, W.C.1 Chancery 8266; MANCHESTER: 33 WHITELOW ROAD, CHORLTON-CUM-HARDY. Phone: Chorlton-cum-Hardy 2028. NEWCASTLE, STAFFS: 7 ALBANY ROAD. Phone: 67190.

HAVE ECLIPSED ALL OTHERS

You will Help Yourself and Help Us by Mentioning "A.W." to Advertisers



Cleaning an Accumulator

SIR,—I find that most wireless dealers fight shy of an order to "wash out and recharge" an accumulator, because once the plates are disturbed to get at the sediment they may fall to pieces!

When the battery is housed in a celluloid case it can be thoroughly scoured with very little trouble and no risk by the following method. Having emptied it, drill a $\frac{1}{2}$ -in. hole in the bottom of the case, then connect the filler plug to the water tap with a length of rubber tubing. Water can now pass right through the accumulator, scouring the plates, washing all the sediment through the hole made.

To make the casing water and acid tight, obtain a disc of celluloid and stick this over the hole with amyl acetate, taking care thoroughly to clean and dry both the disc and the surface around the hole.

S. H. B. (Wembley).

Adding an H.F. Valve

SIR,—I recently added an ordinary H.F. unit to my existing three-valve receiver thinking to increase the receiving range. Contrary to expectation, this unit has decreased my range and also the power of stations that are received. Can you account for this?

K. L. (N.W.10)

Your original set probably had reaction coupled into the aerial system, and this enabled you to overcome the effects of resistance in your aerial and earth system. Now that you have added an H.F. unit, you have no doubt

cut off the reaction from the aerial and the aerial-earth resistance is causing you poor reception. By attending to the aerial and earth, reducing resistance as far as possible you should be able to improve your reception. Another thing, your H.T. battery may have been suitable for the working of a three-valve set, but is not capable of working four valves. If you are using a standard-capacity dry-cell H.T. battery for your four valves, replace it with a double- or triple-capacity dry-cell H.T. battery. In this way you will ensure that all valves get sufficient current for efficient working.—Ed.

The "Twenty-shilling Two"

SIR,—I have wired up and given the "Twenty-shilling Two" a good test. It is splendid value and your Technical Staff are to be congratulated. The National and Regional fade rather badly, but a number of foreigners come in at loud-speaker strength. Northern readers will, I am sure, appreciate some further notes for modifying the set to bring in the new North Regional programmes.

J. J. (Barrow-in-Furness).

The "Super-het Adaptor"

SIR,—Being a reader of your weekly paper since its first issue, I thought it only fair to let you know of the remarkable results which I am getting with the "Super-het Adaptor" (No. 447). Just now while writing this, 5.30 in the afternoon (Sunday), I am listening to Schenectady (W2XAD) relaying WGY, New York. This has been consistent at very loud-speaker volume (I

have very little reaction on the Adaptor) for the last week. It does seem a bit out of the common to be able to tune in this station day after day in broad daylight, while others have to be content with the local (Glasgow, twenty miles distant), at less volume.

J. S. B. (Larbert).

Erecting a New Aerial

SIR,—My old aerial, which has been in use for the past four years, has just broken. Upon examination I find that the strands of wire at the break are eaten almost through and that, by bending the wire at any point, it breaks. In view of this corrosion, do you think it advisable to use covered wire to prevent it.

P. P. (London, E.)

Enamelled-covered copper wire will certainly withstand corrosion for a long time, but even so, we do not advise you use such wire for an aerial and expect that it will give good service for four years. Bare copper wire begins to tarnish and corrode almost as soon as it is erected. The enamel on the surface of enamelled aerial wire prevents this corrosion beginning for something like six months. When corrosion sets in, the resistance of the wire to H.F. currents increases, and as time goes on the resistance increases to such an extent that the aerial system eventually becomes non-oscillatory. Only by using excessive reaction can reception then be obtained. By making a practice of erecting a new wire every year you not only assure yourself of having a low-resistance aerial, but you will eliminate the necessity of forcing reaction, thus interfering with other listeners' pleasure.—Ed.

"IMPROVING YOUR RECEIVER"

(Continued from page 454)

apparently of quite an unsuitable class of material, since its replacement by an un-screened lead produced a further enormous increase in the output, which rose to 425 milliwatts, rather more than seven times the previous figure.

A Great Improvement

The set was now in a thoroughly satisfactory condition. It was changed over on to an outside aerial, and proceeded to pull in distant stations with the greatest ease, and indeed to behave itself as one would expect it to do. It might be thought that the large increases in the efficiency due to the last two tests were due to the receiver being near the oscillation point. The test on actual signals, however, showed that this was not the case, and that although the receiver, of course, was much more lively it was still in a perfectly stable condition. As a matter of interest, however, the following re-check was made to verify the results.

The receiver was connected up again on the test bench, and damping was deliberately introduced into the circuit by replacing the paper-dielectric trimmer condenser

across the second circuit. With the screened lead in position the output was then approximately 8 milliwatts. On the removal of the screened lead the watts output rose to 52 milliwatts, which was an increase of six and a half times, as against just over seven by the previous test. This is evidence, therefore, that the receiver was tending to become unstable, but that this instability had not invalidated the reading to a serious extent and that nearly the whole of this large increase in signal strength was due to the removal of the screened lead.

The capacity of the screened lead was measured, and in place of it a parallel capacity of the same order was connected across the valve. The same large increase was observed, indicating that it was not the capacity effect which was causing the trouble, but the dielectric loss in the lead itself. This is a point which may be responsible for loss in efficiency in quite a number of sets.

Use Good Condensers

As a final test the tuning condensers themselves, which were of an inexpensive type, were replaced with condensers known to have a very small high-frequency loss. The receiver immediately became unstable,

when all the other improvements had been made. Consequently, in order to obtain an estimate of the relative difference between the condensers, damping had to be deliberately introduced. Here again, the results were quite surprising, for it was found that the voltage developed increased just over three times, giving nearly ten times the power output from the loud-speaker, using the good condensers as against the cheaper ones. This is an overwhelming argument in favour of the use of good condensers.

In the case in point, however, since the set was unstable with the good condensers, the alternative make was allowed to remain, the damping introduced being utilised to hold the receiver in stability. In order to make use of the good condensers it would be necessary to adopt more elaborate screening and in the particular circumstances this was not considered justifiable.

The fact remains, however, that quite apart from this question of the condensers themselves, the various improvements which have been enumerated resulted in an increase in the output power by more than one hundred times. For purposes of comparison the results have been summarised in the table accompanying this article.

YOUR SET WILL FUNCTION BETTER WITH ETA VALVES

Experts have been busy looking into the credentials of the new valve — ETA. What can it do? What is its performance? And the experts are satisfied. The Eta Valve has come to stay. In price, quality and performance, it is RIGHT. Among the wide range there are valves suitable for every set — British, Continental and American. Ask your radio dealer for particulars of the Eta Valve to suit your set.

ETA VALVES

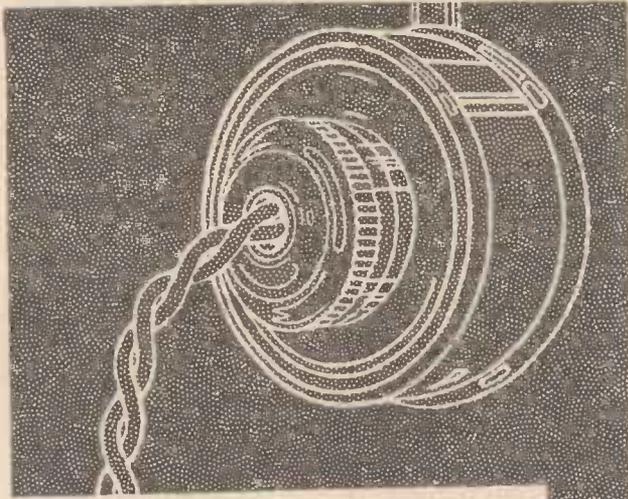
THE ELECTRICAL TRADING ASSOCIATION LTD.,
ALDWYCH HOUSE, ALDWYCH, W.C.2.

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Don't Forget to Say That You Saw it in "A.W."

YOU CAN JUST PLUG IN!



Your mains provide better and more certain reception, with greater economy and considerably less trouble than any battery, however good it may be.

Most mains supply alternating current, which for radio purposes has to be converted into direct current; and for this a rectifier is necessary.

Of the various types of rectifiers, the Westinghouse is acknowledged to be the most efficient. Unlike valve or chemical rectifiers, it does not burn or wear out. It outlives your set! Its use—with certain other components—converts "battery-run" into "mains-run" radio; it is most suitable for fitting into amateur-built sets. Prices are from 15/-, according to the type required.

If you are buying a mains-set, you will do well to make sure that the Westinghouse Rectifier is incorporated—you will find it in most good makes.

Complete technical details are given in an interesting and lucid manner in our forty-page booklet, "The All-Metal Way, 1931," which contains chapters on radio-sets, eliminators, battery-chargers, moving-coil loud-speakers, etc. The coupon will bring you a copy by return of post (please enclose 3d. to cover cost).



METAL RECTIFIERS

THE WESTINGHOUSE BRAKE AND SAXBY
SIGNAL CO., LTD.,

82 York Road, King's Cross, London, N.1.
Telephone: North 2415

COUPON

Please send your forty-page booklet, "The All-Metal Way, 1931," for which I enclose 3d. in stamps.

NAME.....

ADDRESS.....

(Please write in Block Letters)

A.W.14-3-3T.

RADIOGRAMS

NELLIE WALLACE will broadcast in the National vaudeville programmes on March 12.

Birmingham intends to maintain the high standard of its light entertainments with a new series of revues called *Nine-thirty Novelties*, the first of which will be broadcast on March 20. Charles Brewer will be responsible for their compilation and presentation, and each show will be of forty to forty-five minutes' duration. The revues will be given at intervals of two or three weeks and will begin at 9.30 p.m. They will include burlesques and satires upon topical events.

Every year the Hallé Society gives a concert in aid of its Pension Fund and this year the concert will be relayed from Manchester on March 19.

The first performance in London of "Morning Heroes," by Arthur Bliss, will be broadcast from the Queen's Hall on March 25, with the composer as conductor. This requires the use of an orator, who will be Basil Maine, the National Chorus, and the B.B.C. Symphony Orchestra.

"In Memory of Anna Pavlova," a concert of the music to which she danced, will be broadcast on the National wavelengths on March 30. The B.B.C. Orchestra will be conducted by Walford Hyden.

St. Patrick's Day, March 17, will be marked by a programme for National listeners relayed from Belfast.

Operatic excerpts played by the B.B.C. Orchestra, conducted by Joseph Lewis, were recently introduced into the programmes in a new form. The demand from listeners for more of these extended passages from the great composers has led to the arrangement of a similar programme for April 4, when a wide selection from *Faust* will be given.

An Australian wireless journal says "Even with George Bernard Shaw's brief play, *You Never Can Tell*, the B.B.C. breaks the broadcast with an interval of music to ease the strain of the listener's attention. Our A stations might try a little longer interval when broadcasting plays; more listeners might listen to them."

Released from prison, a young German went to see a newspaper editor and showed him a wireless set, constructed of materials smuggled in by friends. He had listened in on it regularly in prison to concerts and to theatre broadcasts, and had concealed it from warders during the day in the breast pocket of his tunic.

It is estimated that there has been an increase of 2,000,000 listeners to British broadcasting during the last twelve months. This is based on an official return of 3,501,007 licences issued to the end of last month, exclusive of 19,942 free licences to the blind. More than 500,000 additional licences have been taken out since the end of January last year.

A new station is being built at Bogorodussja which will have a power of 100 kilowatts. The station will chiefly relay the programmes from Moscow.

There are 13,478,000 listeners in the United States according to the latest return. A notable feature of the return is that the number of sets is proportional to the number of cars. The states of New York, California, and Illinois show the largest number of receivers, while Nevada comes last.

Up to now, there have been few stations in Western France. Now, however, it is rumoured that a high-power transmitter is shortly to be erected at Le Hayre.

The Flemish Liberal Party in Belgium has formed a society in order to get a broadcasting station in operation. It calls itself "Libradio," and in the near future it is hoped to make arrangements for broadcasting through an existing station.

French listeners are having increasing trouble in cutting out electrical interference, and the Ministry of Public Works has decided to set up a special commission to go thoroughly into the question of electrical interference. Would that the B.B.C. could take similar action!

The best and cheapest way to build an ALL-ELECTRIC

Use the Six-Sixty Power Unit for the mains drive of your Ether Searcher. H.T., L.T., and G.B. form a compact unit 13" x 5 1/2" x 4" overall. A real "power" unit too, with ample reserves for any set you may build later on, for it gives up to 40 m/a H.T. at 200 volts and 5 amps L.T. at 4 volts.

ETHER SEARCHER



By using the famous Six-Sixty A.C. Valves as well as the Six-Sixty Power Unit you will get the very best results, since Valves and Power Unit are made to work together. . . . And it is the *cheapest* way, for the complete Mains Drive and a set of Six-Sixty A.C. Valves cost only £9 3s. 6d.

You can make your Battery Model Ether Searcher all-mains in a few minutes. All you need is the Six-Sixty Power Unit, Six-Sixty A.C. Valves and three Six-Sixty 4/5 pin Valveholder Adaptors. The total cost is only £9 9s. 6d., considerably less than the average conversion kit. . . . And the change is made without altering a single wire in your set.

Write for Free Booklet giving full particulars of the Six-Sixty Power Unit, All-Mains Conversion Equipment and range of famous Valves.

SAY

SIX-SIXTY

(B.V.A. RADIO VALVES AND EQUIPMENT).

Six-Sixty Radio Co. Ltd., Six-Sixty House, 17-18, Rathbone Place, Oxford Street, London, W.1 Telephone: Museum 6116-7

1931 ALL-ELECTRIC ETHER SEARCHER

The new J.B. "Chassimount" is the basis of the season's Star Circuits—the Mullard "Orgolas," the "Challenge" series, the amazing "1931 Ether Searcher." Two, three, even six tuned circuits—one knob keeps them perfectly in tune, brings in station after station.

CHASSIMOUNT AGAIN!

Built and designed as a unit. Each stage is adequately screened, and has a "trimmer" to balance out stray capacities. This trimmer is adjusted *once only*—no alterations during tuning.



J.B. "CHASSIMOUNT" GANG CONDENSERS (with drum drive)
Type D2 2 stage .0005 26/6
" D3 3 " " 35/-
(Illustrated above). As required for the 1931 All-Electric Ether Searcher
Type D4 4 stage .0005 42/6
" D5 5 " " 50/-
" D6 6 " " 57/6
Also supplied without Drum Drive

THE SENSATION OF THE SEASON!

Don't Forget to Say That You Saw it in "A.W."

Advertisement of Jackson Brothers, 72 St. Thomas Street, London, S.E.1 Telephone: Hop 1837

"GOODS ON APPROVAL" AND THE LAW

By A Solicitor

THERE is hardly a firm in the wireless trade which is not willing to send its wares to its prospective customers under the system which is now generally known as "on approval," though probably more correctly termed "on sale or return." It is, therefore, very understandable that a prospective buyer will want to know something about his rights and obligations in the matter and what liabilities he may incur by accepting the invitation of a firm to send him this or that on approval. For instance he will want to know who is going to lose if the goods are stolen while in his possession or perhaps destroyed by fire or damaged or lost in some other way.

To solve this problem we shall have to consider two sets of circumstances, the first where the loss or damage is the result of some careless or wrongful act on the part of the person who has accepted these goods on sale or return, and the second where their loss or destruction is purely accidental.

If the goods are lost, destroyed or damaged as a result of the carelessness or negligence of the person who has taken them, or his servant or someone for whom he is responsible then he is under an obligation to make good the loss unless there has been some agreement between the parties which dictates otherwise.

The cases however which are likely to give rise to most trouble do not occur where the loss is the result of some negligent act but where it is purely accidental. For cases of this description we shall have to refer to the Sale of Goods Act of 1893, which provides special rules upon the subject of goods sent on sale or return. It provides, in fact when in certain circumstances

the "property" in the goods passes from buyer to seller and in the absence of any agreement to the contrary, where the loss is purely accidental, the buyer will not be liable if the goods are destroyed unless the "property" in them has passed to him. What we have to discover then is, when does the property in the goods sent on approval pass from buyer to seller?

Three Rules

For the purpose of answering this question the Sale of Goods Act provides three rules, and under the first of these rules it is enacted that the property passes when the buyer signifies to the seller his approval of the goods. Naturally by approving goods sent "on approval," a prospective buyer becomes a proper buyer and as

a proper buyer he must bear future risks.

The second rule is that "the property" (and with it the risk) passes to the buyer when he does "any act adopting the transaction." Here, of course, we must discover what is an act adopting the transaction. Generally we may say that any act which an ordinary man would consider one which an owner and not a prospective owner only would do, would come within this term. It is an act on the part of the prospective buyer which shows that he regarded himself as owner. Each case, of course, will have to be decided on its own particular circumstances but if the act is one of an owner as opposed to a prospective buyer it will probably come within the words "an act adopting the transaction."

The third rule provides that if a time has been stipulated within which the articles in question have to be returned, then if on the expiration of that time they have not been returned the property in them passes to the prospective buyer and he must be regarded as the owner and so bear the risk of any loss. As most firms stipulate the time within which their goods have to be returned, it is very important that a note should be made of this, otherwise the prospective buyer may find himself in a very difficult position.

The selling firm does not always, however, stipulate the time within which the goods are to be returned and when such is the case the Sale of Goods Act provides that they are to be returned within a reasonable time. Again it will have to be decided, upon the particular circumstances of the case under consideration, what is a reasonable time.

"ETHER SEARCHER" PRIZES

ETHER SEARCHER" builders who intend entering our great £50 Competition (see details on page 438) will be pleased to know that every prizewinner who has built his set with a "Pilot" kit of parts supplied by the Peto-Scott Co., Ltd, will be allowed to select further Peto-Scott apparatus to the value of the prize awarded. This is, therefore, a great additional inducement to every "Ether Searcher" builder, over and above the fifteen cash prizes to be awarded in the competition itself. Every builder of the "1931 Ether Searcher," either mains or battery-driven, should send in his entry at once.

NOW MEET THE "POLARGANG"

Those with years of experience in radio always use Polar Condensers because they are produced by specialists who give more attention to detail. Polar means better construction and greater service.

THE "POLARGANG"

A 2-, 3-, 4- or 5-Gang Condenser for the accurate control of a number of tuned circuits by means of the Polar Drum Drive.

Each condenser is fitted with a separate trimmer which is easily accessible from the top of the condenser.

The "Polargang" is rigidly constructed and has adjustable fixing supports.

Very compact. The "Polargang 3" measures only 8½ ins. long by 4 ins. deep.

PRICES:

2-Gang	- -	27/6	4-Gang	- -	42/6
3-Gang	- -	35/-	5-Gang	- -	50/-



24-PAGE POLAR
CATALOGUE FREE

WINGROVE & ROGERS, LTD.

188-189 STRAND, LONDON, W.C.2. POLAR WORKS, MILL LANE, OLD SWAN, LIVERPOOL

PURITY

POWER

PUNCH

FROM YOUR LOUD-SPEAKER

IF YOU USE

CARLTON

**LONG LIFE·LOW PRICE
RADIO BATTERIES**

Absolute efficiency in working is the secret of CARLTON popularity—each battery carefully manufactured of the finest materials and thoroughly tested.

You get remarkable value in Carlton; give it a trial and get radio satisfaction.

60 Volts (reads 66) **6/-**

100 Volts (reads 108) **10/-**

120 Volts - - **11/9**

If any difficulty in obtaining write the Manufacturers for name of nearest dealer.

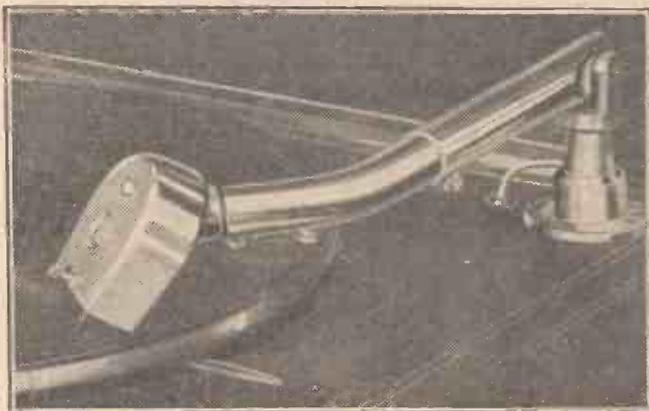
VINCE'S DRY BATTERIES LTD.
LION WORKS, GARFORD STREET,
LONDON, E.14

**BRITISH
MADE**



**TRY A
CARLTON
NEXT TIME**

There's more
in your records



when you play
them with a...



**PICK-UP
and TONE ARM**

Only when you fit a B.T.H. Pick-Up and Tone Arm do you realise how much you have been missing in your records. Passages which are a confused medley when reproduced by ordinary means are now heard with a crisp, sparkling vitality that makes record music live.

**PRICE
COMPLETE
45/-**

Records last longer when played with a B.T.H. Pick-Up. Needle-scratch is eliminated and carefully balanced design gives finest reproduction with an absolute minimum of record wear.

Get a B.T.H. Pick-Up and Tone Arm to-day. It will make your gramophone as good as a factory-built radiogram for a fraction of the cost.



THE EDISON SWAN ELECTRIC CO. LTD.
Radio Division Showrooms:
155 Charing Cross Road, London, W.C.2
Showrooms in all the Principal Towns.

EDISWAN

W.136

Advertisers Appreciate Mention of "A.W." with Your Order

THE aerial mast described below possesses several novel constructional features; moreover, it is cheap and easy to construct, and is light and strong.

Purchase from a timber yard the longest length of 6 in. by 1 in. (square edge) flooring board obtainable. (The writer succeeded in getting one 28 ft. long.) At one end of the board make a pencil mark $3\frac{3}{4}$ in. from one edge.

At the other end, make a mark $2\frac{3}{4}$ in.



Fig. 1. How the board is cut

A NOVEL AERIAL MAST

from the same edge, and draw a line, from end to end, connecting these points.

Now get the board sawn in two, along this line (Fig. 1), and you will have one piece, measuring $3\frac{3}{4}$ in. at the bottom, tapering to $2\frac{3}{4}$ in. wide at the top and the other will be $3\frac{3}{4}$ in. at the bottom and $2\frac{1}{4}$ in. at the top.

Nail the two boards together to form a girder having a T section (see Fig. 2), proceeding in the following manner: Draw a line from end to end of the wider piece through the centre and along this line, at intervals of 8 in., start a row of $2\frac{1}{2}$ -in. nails.

Place the narrow board, on edge, on the

ground (with the sawn edge down) and placing the wider board on top of it, drive home one nail at each end:

Next centre the underneath board throughout its length, and drive in the remaining nails, commencing at some point near the middle. A rigid but light mast will result which should cost only about two-pence per foot to make. In erection, it is best to hinge the mast to a post anchored in the ground, and to keep it upright with guys.

D. S. REED.



Fig. 2. How the boards are assembled

FIT IT NOW
AND HEAR THE DIFFERENCE

Hear how much superior the SOVEREIGN VOLUME CONTROL is. (Shown here with dust and damp proof cover removed.) Its silent, silky action controls volume smoothly. It's the very component you have always wanted. Complete with moulded Bakelite pointer knob, nickelled fittings, etc. Fit Sovereign Components to improve any circuit.

50,000 100,000 and 500,000 ohms, 1 and 2 megohms, each **4/6**

If your dealer cannot supply write direct (also for list of full range of Sovereign Components) to

SOVEREIGN PRODUCTS LTD.
52/54 ROSEBERY AV., LONDON, E.C.1

SOVEREIGN
OF BRITISH MANUFACTURE

S.F.B.

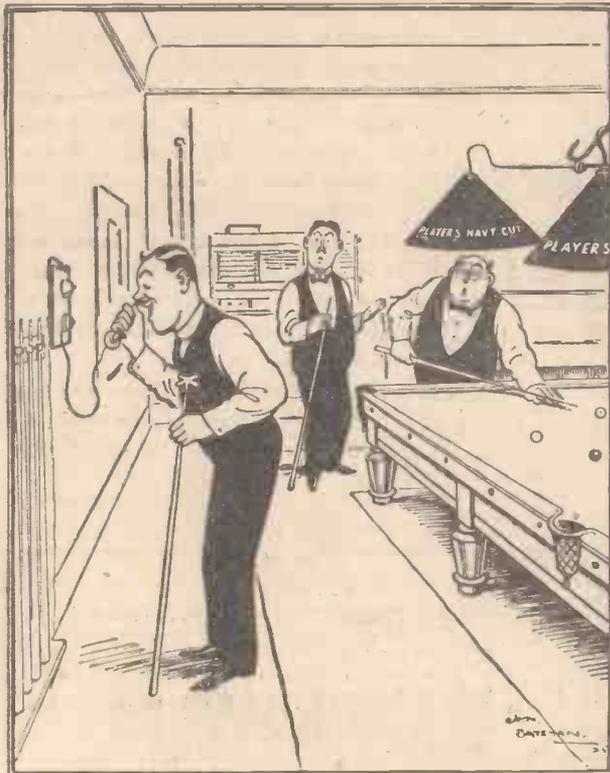
BECOL EBRONITE
LOW LOSS FORMERS

PANELS, TUBES
BRITISH MADE

NOTE—Formers tested before despatch
RIGID—RELIABLE LOOK FOR TRADE-MARK

Sole Makers—
THE BRITISH EBRONITE CO., LTD.
HANWELL, LONDON, W.7

MISUNDERSTOOD

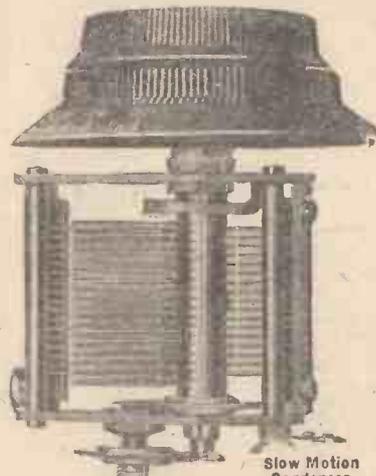


MARKER: "Send up some more PLAYERS. please!"



CONDENSERS

Praised and used by the Technical Press.



SLOW MOTION CONDENSER

Mid Log Line Type. Accurate in design and construction, with faultless fast and slow motion dial control. Action is silent and control is smooth but firm. Scale 0-100, 3 in. dial.

.0005 or .0003 **7/6**

With Mica Dielectric .0005 or .0003, 6s.

DIFFERENTIAL CONDENSER

High insulation. smooth movement and silent action. Terminals and Tags for connections. .00015, each side, 3/6.

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Type No. 2, 4 in. diameter	5/-
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"Astra" Popular, 3 in. "	3/-

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'NOTHING BUT PRAISE' Writes Mr. Barton Chapple



And these are the reasons:—*Great sensitivity*—a three valve set will drive it. *No resonances or boom. Freedom from speaker hum*—no field current necessary to energise it. *Moving-Coil reproduction anywhere*—no supply mains or batteries needed. *No running costs.* Its Sheffield-made Cobalt Steel Magnet weighs 10½ lbs. Your dealer will demonstrate—you should hear it!

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Cak Cabinet Model, £5:8:0

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Whiteley Electrical Radio Co., Ltd., Radio Works
Nottingham Road, Mansfield, Notts.

Irish Free State Distributors: Kelly & Shiel, Ltd., 47 Fleet St., Dublin

OUR LISTENING POST

By JAY COOTE

DID you pick up the tests made by I.L.S. the new 25 kilowatt at Sottens, Switzerland? To readers of this journal the first Swiss National transmitter could not have been classed as a "mystery" station, for notice of its forthcoming launch in the ether was given some little time ago. Although in its tests broadcasts were made on wavelengths in the neighbourhood of 404 metres, it is now using its allotted channel, namely, 403 metres, as monopolised to date by Berne. Possibly mystification was caused by the fact that the calls were put out in the English language, but seeing that an English company is responsible for its construction it is only natural that the engineers on the job should announce in their native tongue.

As a matter of fact as the tests developed, so the Swiss engineers using the "mike" made it perfectly clear that the station was "*le poste national Suisse de Sottens*," which, by the way, is not pronounced as spelt, but as the French word "sautant." Information was given regarding the wavelength and the power in the aerial was stated to be 25 kilowatts. It is no wonder, therefore, that the broadcasts were heard at good strength in all parts of the British Isles and in many districts of the Irish Free State.

This high-power transmitter will serve the French-speaking portion of Switzerland and will relay programmes from Geneva, Lausanne and, on occasion, from Berne. Very shortly, also, you will pick up the call of the second Swiss National transmitter now nearing completion at Muenster; through this channel we shall be provided with the Zurich, Basle, and Berne broadcasts.

More High-power Stations

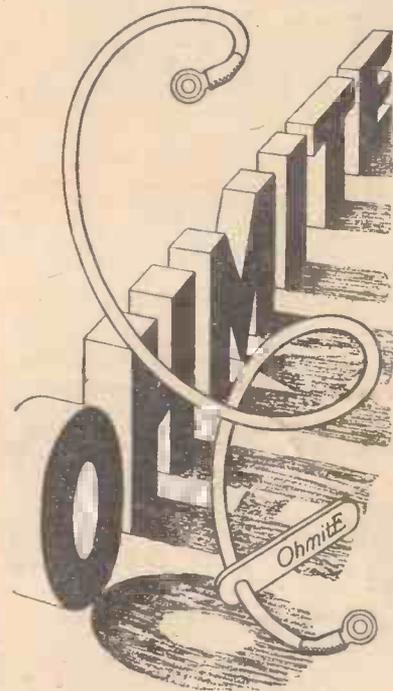
Whilst on this subject I may as well advise you that at any moment you may also find the Brno transmissions take on considerably more energy, for the new 36-kilowatt plant is ready to go on the air. No special search will be necessary, as the signals will go out on 341.7 metres as hitherto. Cesky-Brod, the Czechoslovakian giant of 120 kilowatts, is about due towards the end of this month; when it starts up, as was the case with Warsaw-Raszyn, you will need no warning, for through this channel the Prague call should rattle your loud-speakers. Stand by, also, for the regenerated Radio Paris on 80 kilowatts.

We may now realise that the war in the ether is an accomplished fact, for in view of the activity of its immediate neighbours, Hungary has definitely decided to build an entirely new station; it is to be capable of radiating 150 kilowatts in the aerial!

It was evident that a running commentary on the France-Wales Rugby match, played at Swansea on February 28, would make a keen appeal to French listeners, and for this reason while it was being played I switched over to the other side of the Channel to ascertain what was being done in the matter. I found that Radio Paris was the only station giving such a service to its listeners. The transmission furnished a curious experience, inasmuch as from the French studio I could hear the English commentary given out through a loud-speaker, then immediately afterwards an abbreviated French translation by the Paris announcer at the microphone.

All this was possible so long as the English account was spoken slowly, but during the more tense moments of the game our eye witnesses grew enthusiastic, with the result that the French commentator listening to a rapid jumble of sentences through the loud-speaker was reduced to informing his listeners that the "match was an exciting one" and, to kill time, repeated the score several times.

insist on



SPAGHETTI RESISTANCES

for these 6 reasons

Because

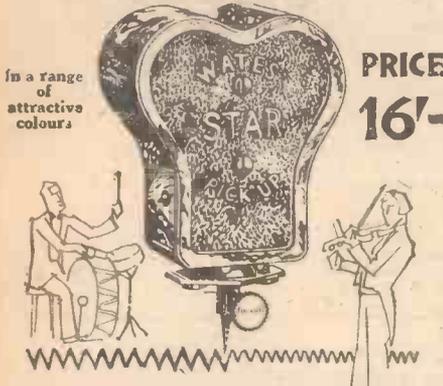
1. Ohmite is the smallest Spaghetti Resistance made with the highest current-carrying capacity.
2. Ohmite Spaghetti Resistance has a solid copper core, giving rapid heat dissipation and low temperature co-efficient.
3. The end contacts are riveted.
4. The value of the resistance is clearly indicated on the Bakelite name tag, which is stamped "Ohmite" for your protection against imitation.
5. Ohmite Spaghetti Resistances are made by Graham Farish Ltd., and are backed by 10 years' experience of resistance manufacture. They carry a written guarantee of accuracy.
6. Obtainable in all values. 1,000 ohms (12 m/a) to 20,000 ohms (6 m/a), price 1/-. 25,000 ohms (6 m/a) to 100,000 ohms (5 m/a), price 1/6. Above 100,000 ohms up to 500,000 ohms (2 m/a), price 2/-.

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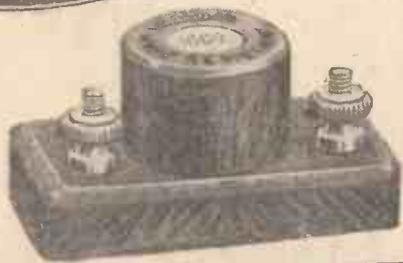
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M.B.

"A.W." Solves your Wireless Problems

A NEW



WIRE WOUND RESISTANCE

This new wire-wound Resistance has been specially designed for circuits requiring non-inductive wire-wound resistances, such as in potential dividing, series resistance, free grid biasing, voltage regulation, etc.

The wire is wound on sectionalised spaced bakelite bobbins, mounted in such a way as to enable free air cooling, although the size of the wire used for the rating of the resistance is sufficiently large that if the current is not exceeded the temperature rise is less than 10 per cent.

The values and the current-carrying capacity are clearly marked on the top, and the whole mounted in attractive mottled bakelite case, with suitable connecting terminals and screwing-down holes. The illustration is approximately full size, so that very little space is required to accommodate. We can always supply quickly in sizes or values additional to those listed below, and in some cases, if necessary, higher current rating, at a slightly increased charge.

Resistance Value.	Carrying Capacity.	Price.
100 to 600 ohms ...	50 mA	1/6
1,000 to 2,000 ohms...	30 mA	2/-
3,000 to 5,000 ohms...	20 mA	2/6
6,000 to 10,000 ohms	16 mA	3/-
15,000 to 20,000 ohms	11 mA	3/6
25,000 ohms ...	11 mA	4/-
50,000 ohms ...	8 mA	5/6
100,000 ohms...	6 mA	7/6

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BROADCAST TELEPHONY

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

Kilo-Metres cycles	Station and Call Sign	Power (Kw.)	Kilo-Metres cycles	Station and Call Sign	Power (Kw.)	Kilo-Metres cycles	Station and Call Sign	Power (Kw.)
GREAT BRITAIN								
25.53	11,751 Chelmsford	15.0	204.6	1,018 Limoges (PTT)...	0.5	410	721 Radio Marco	10.0
200	1,500 Leeds.....	0.16	304.3	986 Bordeaux (PTT)...	85.0	1,250	2,475 Tunis Kasbah ...	0.6
242	1,238 Belfast.....	1.2	314.7	953.2 Natan-Vitus(Paris)0.5	1.5	NORWAY		
261.3	1,148 London Nat. ...	68.0	327.3	945.4 Marseilles (PTT)...	3.0	235.5	1,270 Kristiansand ...	0.5
288.5	1,040 Newcastle.....	1.2	329.5	914 Grenoble (PTT)...	1.2	241	1,244.5 Stavanger.....	0.5
288.5	1,040 Swansea.....	0.16	343.2	869 Poste Parisien ...	1.2	364	824 Bergen.....	1.0
288.5	1,040 Stoke-on-Trent	0.16	370	870.5 Radio LL (Paris)...	0.5	365.1	821.7 Fredericksstad ...	0.7
288.5	1,040 Hull.....	0.16	385	779 Radio Toulouse...	15.0	453.2	662 Porsgrund.....	1.5
288.5	1,040 Sheffield.....	0.16	447	671 Paris (PTT).....	2.0	493.4	608 Nidaros.....	1.2
288.5	1,040 Plymouth.....	0.16	466	671 Lyons (PTT).....	2.3	589.6	508.8 Hamar.....	0.8
288.5	1,040 Liverpool.....	0.16	1,445.7	644 Eiffel Tower.....	15.0	1,071	280 Oslo.....	76.0
288.5	1,040 Edinburgh.....	0.4	1,723	174 Radio Paris.....	17.0	POLAND		
288.5	1,040 Dundee.....	0.16	GERMANY					
288.5	1,040 Bournemouth ...	1.2	31.38	9,560 Zeesen.....	15.0	214.2	1,400 Warsaw (2).....	1.9
288.5	1,040 Bradford.....	0.16	216.3	1,387 Königsberg.....	1.7	231	1,283 Lodz.....	2.2
301	995 Aberdeen.....	1.2	219	1,369.7 Flensburg.....	0.6	244	1,229 Cracow.....	1.5
309.9	968 Cardiff.....	1.2	227	1,379 Cologne.....	1.7	363.9	873.1 Wilno.....	20.0
356.3	842 London Reg. ...	45.0	227	1,379 Münster.....	0.6	338.1	887.1 Poznan.....	1.9
376.4	797 Manchester.....	1.2	227	1,379 Aachen.....	0.3	385.1	779 Lvov.....	16.0
398.0	752 Glasgow.....	1.2	232.2	1,292 Kiel.....	0.31	403	734 Katowice.....	16.0
479.2	626 Midland Reg. ...	38.0	230	1,256 Nürnberg.....	2.3	1,411.8	212.5 Warsaw(testing)	10.0
1,554.4	193 Daventry (Nat.)	35.0	246.4	1,217.2 Cassel.....	0.3	PORTUGAL		
AUSTRIA								
218.5	1,372 Salzburg.....	0.6	253.4	1,184 Gleiwitz.....	5.6	240	1,250 Oporto	0.25
246	1,220 Linz.....	0.6	250.3	1,157 Leipzig.....	2.3	284.7	1,053.6 Lisbon (CTIAA)	0.25
284.7	1,053.5 Innsbruck.....	0.6	269.8	1,112 Bremen.....	0.3	ROMANIA		
351.7	853 Graz.....	9.5	276.5	1,035 Heilsberg.....	76.0	391	761 Bucharest.....	18.0
453	666 Klagenfurt.....	0.6	283.6	1,058 Magdeburg.....	6.0	RUSSIA		
517	531 Vienna.....	20.0	283.6	1,058 Berlin (E).....	0.6	426.3	703.7 Kharkov.....	4.0
BELGIUM								
206	1,456 Verviers.....	0.3	283.0	1,058 Stettin.....	0.6	720	416.6 Moscow (PTT)...	20.0
206	1,456 Antwerp.....	0.4	318.8	941 Dresden.....	0.3	800	375 Kiev.....	20.0
210	1,391 Chatelineau.....	0.25	323.3	927.7 Breslau.....	1.7	824	364 Sverdlovsk.....	25.0
216	1,391 Radio Conférence	0.25	360	833 Mühlacker.....	75.0	937.5	320 Kharkov (RV20)	25.0
244.7	1,226 Ghent.....	0.25	372	806 Hamburg.....	1.7	1,000	300 Leningrad.....	40.0
249.6	1,202 Schaarbeek.....	0.5	390	770 Frankfurt.....	1.7	1,065	282.7 Tiflis.....	15.0
338.2	887 Brussels No. 2 ...	15.0	418	716 Berlin.....	1.7	1,103	272 Moscow Popoff.....	40.0
609	590 Brussels (No. 1)	75.0	452.1	662 Danzig.....	0.2	1,200	250 Kharkov (RV4)	25.0
BULGARIA								
319	941 Sofia	1.0	473	635 Langenberg.....	17.0	1,301	230 Moscow (Trades)	165.0
CZECHO-SLOVAKIA								
203.8	1,197 Moravska-Ostrava	11.0	533	503 Munich.....	1.7	1,380	217.5 Bakou.....	10.0
278.3	1,028 Bratislava.....	14.0	559.7	536 Kaiserslautern... ..	1.0	1,442	208.7 Moscow (Kom)	20.0
293.6	1,022 Kosice.....	2.5	559.7	536 Augsburg.....	0.3	SPAIN		
341.7	878 Brunn (Brno) ...	34.0	566	530 Hanover.....	0.3	251	1,193 Barcelona	1.0
487	617 Prague (Praha) ...	5.5	570	527 Freiburg.....	0.35	(EAJ15)		
DENMARK								
281	1,067 Copenhagen.....	1.0	1,635	123.5 Zeesen.....	35.0	266.5	1,125.4 Barcelona	10.0
1,163	260 Kalundborg.....	10.0	1,635	123.5 Norddeich.....	10.0	(EAJ13)		
ESTONIA								
206.1	1,013 Tallinn.....	0.7	31.29	9,599 Eindhoven (PCJ)...	30.0	349	860 Barcelona (EAJ1)	8.0
415.8	644 Tartu.....	0.5	299	1,004 Huizen.....	8.5	368	825 Seville (EAJ15)...	1.5
FINLAND								
453.2	662 Helsinki.....	15.0	299	1,004 Radio IJzerda	3.0	424	707 Madrid (EAJ7)...	2.0
201	1,031 Tampere.....	15.0	(The Hague)			453	662.2 San Sebastian	0.5
1,796	167 Lahti.....	54.0	1,071	280 Scheveningen-	5.0	SWEDEN		
FRANCE								
172.5	1,730 St. Quentin.....	0.3	1,875	160 Hilversum.....	8.5	230.3	1,304 Malmö.....	0.75
222.9	1,346 Fécamp.....	1.0	550	545 Budapest.....	23.0	257	1,166 Hörby.....	15.0
225	1,337 Strasbourg 8GF	0.3	HUNGARY					
235.1	1,275 Nîmes.....	1.0	550	545 Budapest.....	23.0	304.3	986 Falun.....	0.65
237.2	1,263 Bordeaux-	2.0	ICELAND					
240.6	1,247 Béziers.....	0.6	1,200	250 Reykjavik.....	16.0	322	932 Göteborg.....	15.0
249	1,205 Juan-les-Pins ...	0.5	IRISH FREE STATE					
250	1,171 Toulouse (PTT) ...	1.0	224.5	1,337 Cork (IFS).....	1.5	436	689 Stockholm.....	75.0
265	1,130 Lille (PTT).....	15.0	413	725 Dublin (2RN) ...	1.5	542	554 Sundsvall.....	15.0
272	1,103 Rennes.....	1.2	ITALY					
285.7	1,080 Radio Lyons.....	0.5	25.4 and 80	Rome (3RO).....	9.0	770	389 Östersund.....	0.75
285.4	1,051 Montpellier.....	2.0	296	1,013.4 Turin (Torino)...	8.5	1,234	243.1 Boden.....	0.75
GERMANY								
312.8	959 Genoa (Genova)*	1.5	441	680 Rome (Roma) ...	75.0	1,348	222.5 Motala.....	40.0
330.5	907.8 Naples (Napoli)...	1.7	453	662 Bolzano (IBZ) ...	0.2	SWITZERLAND		
441	680 Rome (Roma) ...	75.0	501	509 Milan (Milano)...	8.5	213.8	1,230.2 Basle.....	0.5
501	509 Milan (Milano)...	8.5	(testing on 524 m.)					
HOLLAND								
31.29	9,599 Eindhoven (PCJ)...	30.0	LATVIA					
299	1,004 Huizen.....	8.5	525	572 Riga.....	12.0	1,242	241.5 Istanbul.....	5.0
299	1,004 Radio IJzerda	3.0	LITHUANIA					
IRISH FREE STATE								
224.5	1,337 Cork (IFS).....	1.5	1,935	153 Kaunas.....	7.0	306	980 Zagreb (Agram)	0.7
413	725 Dublin (2RN) ...	1.5	NORTH AFRICA					
363.4	825.3 Algiers (PTT) ...	13.0	430.5	696.8 Belgrade.....	3.0	574.7	522 Ljubijana.....	2.8

LEWCOS RESISTANCES

THE Lewcos interchangeable type wire-wound resistance, a Test Report of which was given last week on page 426, is



illustrated herewith, and it should be noted that the Watmel resistance of the same type was shown in error. These Lewcos resistances are non-inductively wound and have a very good current-carrying capacity. Useful spaghetti type resistances are also made by Lewcos and, although only recently placed on the market, are already proving very popular. The spaghetti type resistances are obtainable in a wide range of resistance values and are of great assistance to set builders on account of their adaptability.

It is stated that the police in Holland are getting very satisfactory results with broadcast S.O.S.'s, and that last year over three thousand police notices were broadcast.

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 MEND CHINA,
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The designing of apparatus or receivers cannot be undertaken.

Modifications of a straightforward nature can be made to blueprints, but we reserve to ourselves the right to determine the extent of an alteration to come within the scope of a query.

Queries cannot be answered personally or by telephone.

**Postcard
 Radiō
 Literature**

GET THESE CATALOGUES FREE

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

Spans Europe!

I SEE that reduced prices are now in force for the all-electric Columbia sets type 307 (the very useful table model) and type 331, the pedestal model. You can get through my free catalogue service a fine folder describing these sets, and certainly if you have the slightest wish to change over from your present equipment to something up to date, then I think you should consider Columbia. **199**

For Short-wavers

Not everybody wants to make up a special set in order to receive the short-wave stations and I am rather attracted by the Magnum short-wave converter which brings the fun of short-wave listening to every set owner. The converter is fully described in a new leaflet just issued. **200**

The Drydex Battery

I hear that all the technical folk are speaking very well of the new Drydex high-tension and grid-bias battery produced by Exide. Full particulars can be obtained free through my catalogue service. **201**

A Reliability Guide

I see that a new edition has just been issued of the Reliability Wireless Guide produced by J. H. Taylor & Co., of Huddersfield. This is a fine 96-page catalogue of all parts and can be obtained free through my catalogue service. **202**

For Transportable Owners

An extremely handy guide has just been issued by the Fullers Accumulator Co. (1926), Ltd., showing the types of Sparta non-spill accumulator to suit every popular type of portable and transportable set. This little guide can be obtained free and I am sure it will appeal to all transportableites. **203**

New R.I. Parts

From R.I. I have just received details of several new interesting parts, these being an output filter choke, mains transformer, filament transformer, dual-range coil, power choke and general purpose transformer. Although these are "hot from the press," I am assured that full details are available, and if you are in need of any new parts I advise you to write for particulars of these new R.I. lines. **204**

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 "ALL-ELECTRIC"**

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and 11 payments of 8/8 or
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 Tappings.
- G.B.**..... 3 Tappings up
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 H.T.
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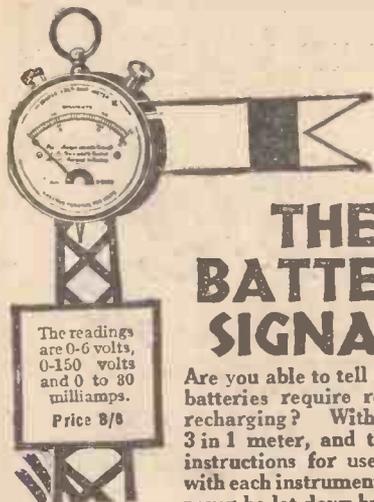


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 and SELECTIVITY**

Scrupulous attention to detail characterises the entire range of Tunewell Coils. Their careful design, low self-capacity and excellent finish combine to give that performance for which Tunewell are already famous.

Dual Range Double X Tapped Coils, Panel Mounting	10/6
6-pin Dual Range Coil, less switch	7/9
New "P.W." Coils, specially wound to "P.W." specification	10/8
Separate 6-pin Coils, 20/45, 40/90, 200/600 metres	3/11
1,000/2,000 metres	4/8
2-pin Coils, ultra-short	1/6
Broadcast and High Wavebands from	1/6
Centre Tapped ditto, each extra	8d.
X Type ditto, each extra	1/-
Transformer	6/6
Special New H.F. Choke	12/6
Speaker Unit	22/6
Tunewell Portable Turntable	8/8
TUNEWELL ALL-BRITISH SPAGHETTI RESISTANCES	
10,000 and 15,000 ohms	1/-
20,000, 25,000 and 30,000 ohms	1/6
40,000, 50,000 and 60,000 ohms	1/6

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Are you able to tell when your batteries require renewal or recharging? With a Wates 3 in 1 meter, and the simple instructions for use supplied with each instrument, you need never be let down by batteries

running out. There are nearly a million in use, and although the cost is only 8/6 complete, we service them for all time and they are guaranteed in every way. They test H.T., L.T., and grid bias consumption of set in H.T.—an invaluable test this!

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Buy one now from any Radio Dealer. They tell you all you want to know about your batteries.

Leaflets and particulars from
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POSHI

BESIDES being a thoroughly sound job both mechanically and electrically the Benjamin Rotary Switches, both Single and Double Pole, present a most pleasing appearance when fitted to the insulated or metal panel of your receiver. The bakelite pointer and the engraved dial proclaim the switch to be what it is—a first-class job.

Write for Catalogue No. 1141

The BENJAMIN ELECTRIC LTD.
Tarriff Road, Tottenham, N.17.
Tottenham 1500

3/6

BENJAMIN

TAYLEX WET H.T. BATTERIES
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WE TEST FOR YOU

A weekly review of new components

and tests of apparatus



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

Watmel Resistances

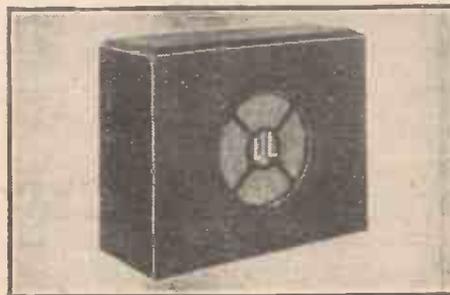
A PARTICULARLY neat series of wire-wound resistances has recently been introduced by Messrs. Watmel Wireless Co. These resistances are contained in a handsome brown moulded bakelite case, having two terminals.

The resistance itself is wound on a bobbin fitted inside the case, the winding, of course, being reversed in the middle to avoid inductive effects. The size of the wire employed is rather larger than usual, as a result of which the current-carrying capacity of these resistances is good.

The 100,000-ohm resistance is rated to carry 6 milliamps, whilst the 600-ohm resistance will carry 50 milliamps quite safely. We tested several of these resistances both for value and current-carrying capacity, and found them as rated. The resistances range from 100 to 100,000 ohms, the prices running from 1s. 6d. to 7s. 6d., according to the resistance. The space occupied on the baseboard is very small, and the product is neat and compact.

New Lanchester Speaker

THERE are occasions in the routine testing of components where one comes across a component which arrests one's attention by its superiority. This was the case with the Lanchester moving-coil speaker which we received this week. The instrument is of the permanent magnet type, a particularly small magnet being employed in the make-up. The cone is also of relatively small diameter, and the whole apparatus is housed in a case measuring 13 in. by 10 in. by 5 1/2 in. It is finished in blue leather cloth, with slightly bevelled edges, and is indeed distinctly attractive in appearance as well as in performance.



This is the new Lanchester moving-coil speaker

Our test results showed that it was not only sensitive, but had a very even frequency response. The upper register was distinctly better than the general run of moving-coil speakers, and we found indeed that it compared very favourably with our standard laboratory equipment, which is a much more expensive outfit.

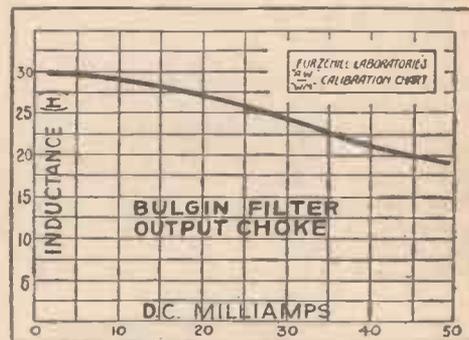
The arrangement is fitted with an input transformer to suit standard output, and there is also provision for obtaining direct access to the coil, without going through the input transformer, for those who wish to match up for themselves.

The impedance did not vary to a great extent over the working frequency range. Its value at 400 cycles was 6,300 ohms, measured at the input terminals of the step-down transformer provided, and the impedance was of the same order over the whole frequency range up to 2,000 cycles, when it commenced to rise rapidly as is usually the case with moving-coil speakers.

At a price of £4 4s. only, this is an instrument worth sampling.

Bulgin Filter Choke

A COMPONENT which is achieving a well-merited popularity is the Bulgin filter output choke. This component is



The excellent characteristic curve of the Bulgin filter choke

designed on up-to-date lines and incorporates an air-gap for the purpose of maintaining the inductance at a high value, despite the passage of a relatively heavy direct current through the winding. It is, of course, easy to ensure that the inductance hardly varies at all, whatever the anode current, by using a very large gap, but this method is quite impracticable, since it either involves a very low inductance or a high D.C. resistance.

The skill of the designer lies in estimating the right value of gap to give the required inductance with the minimum D.C. resistance and in many cases absolute constancy is sacrificed to this end, the inductance being allowed to fall slightly over the working range.

The Bulgin choke is a case in point. The sample we tested was rated at 20 henries and 50 milliamps. From the curve herewith it will be seen that the inductance starts off at 30 henries, falling to just below 20 at the rated current. As the D.C. resistance is only 350 ohms this is a very useful performance.

(Continued on next page)

Uniform with this 20-henry choke is a 32-henry model constructed on the same lines, but designed to carry 30 milliamps only. These two components, which retail at 12s. 6d. only, will find a variety of uses not only for choke-output stages, but for eliminators and de-coupling.



A useful component in practically any set—the Bulgin choke

W. and B. Switch

THREE - POINT short circuiting switches are very often used to-day in changing from low to high wavelengths. The form of switch developed for the purpose has been a modified version of the push-pull battery switch, and there can be no doubt that this is not altogether a satisfactory job for the purpose. Even in a low-tension circuit trouble often does arise owing to loose contacts and it is well known that a joint which is quite satisfactory for D.C. may be troublesome at high frequencies, so that there is double need for a really good switch in this part of the set.

In an endeavour to overcome this defect, Messrs. Whiteley, Boneham & Co. have introduced an ingenious switch, in which there are two surfaces of each contact. First of all there is the spring resting against the centre spindle in the usual manner. One part of the spindle is metal and the other part is covered with an insulating sleeve, so that as the spindle is pushed in the contact becomes insulated. When the rod is pulled out the spring rests on the metal centre portion in the usual manner, but over this is a small cap of conical shape, which also makes contact with the outside of the spring, and there is thus contact on both inner and outer surfaces of the blade. This, of course, applies to all three contacts.

Certainly we found that the contact was good, and there was also a pleasing tendency for the switch to spring into the position of contact. That is to say that once the spindle was pulled out it tended to stay out and required some force to push it in again.

B.T.H. CONE SPEAKER

READERS will be interested to note that the B.T.H. type E cone speaker, described on page 426 of last week's issue, is now available at the specially reduced price of £2 10s. It will be seen from the Test Report given that the performance of this speaker is of an excellent order and we feel sure that, quite apart from any question of price, this B.T.H. instrument is bound to appeal to very many set users who want better performance.

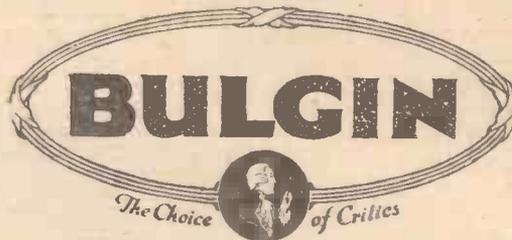
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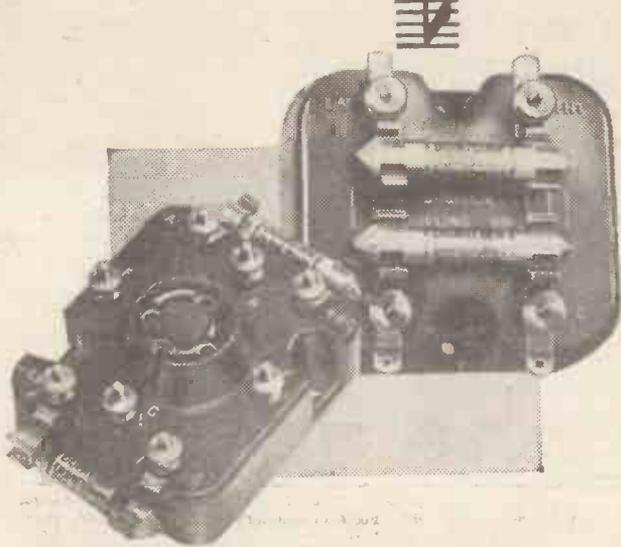
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