POPULAR WIRELESS

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POPULAR WIRELESS AND TELEVISION TIMES

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DON'T MISS IT!
MUSIC'S ENEMIES
AIR TRAGEDY
"OLGA PULLOFFSKI"

RADIO NOTES & NEWS

SMALLEST SET!
HENRY'S TRIP
BACK TO NOAH
ORKNEY RADIO

Have You Clicked?

HAVE you clicked the turnstile at Olympia yet?

My friends in the Outer Hebrides and other geographically inconvenient localities will understand that I address the inquiry not to them, but to the Londoner—a nice fellow, but oh, so absent-minded! He dodges 'buses so nimbly that it may not occur to him to hop on to one and get an eyeful and an earful of up-to-the-second radio before the Radio Show closes on Saturday.

No citizen of Londinium should miss this festival of the fans if he wants to keep in touch with radio progress. And if he falls from that high ideal—if he merely wants to have a darned good time on one-and-six—well, Olympia is the place for radio revelry, too. The warmest welcome in the whole Show awaits you on Stand No. 13, where "P.W." is perched on the pick of the new designs.

News of New Stations.

WHATEVER damage the late frosts may have done to the fruit, there is no doubt about the fine crop of new broadcasting stations which is coming along. They are sprouting strongly everywhere, and in addition to those already reported in these columns Germany has one going up in the Saar, and is now preparing two for export—one to be planted at Bergen, Norway, and the other in Peru, near Lima.

Portugal has just officially opened "Emmissora Nacionale" at Lisbon; Spain is digging the ground for a wholesale planting of Regionals, and Italy is going to pot out a fine 50-kilowatter at Bologna.

We ought to get a good picking of programmes when these and all the new Frenchmen are fit to gather!

"You Rascal, You."

MISGUIDED wretches like you and me, listening contentedly to what we delude ourselves is music, are going to get a rude awakening soon, for the *real* musicians, the lads who know it all, are after our blood.

One of the music professors recently arose—hats off, boys! Stand reverently to attention—and told a conference of organists all about our misdeeds.

"The enemy of the musician," he said, "is the person who likes bad music. That is the person you have to fight tooth and nail all your life. That is the person who is in command of all the B.B.C.s in the world and almost every place that produces music." Go it, professor—we are all out of step except you!

The High-Mast Danger.

HOW many people have realised that the strength of the broadcast programmes they receive is often limited by considerations of flying?

MICRO-WAVE PROGRESS

A combined Telefunken micro-wave transmitter and receiver for two-way communication. The aerial is in the centre of the reflector, and is used for both transmission and reception.

The South Coast listener, for example, does not get his full kick from London Regional because the Air Ministry will not permit its mast to rise above 200 ft.

This danger of the radio mast to the flying man is recalled by a case in the King's Bench Division in connexion with the loss of the air liner "Apollo," which crashed into a wireless mast at Ruysselede, Belgium, on December 30th, 1933.

All the passengers, the pilot and first officer were killed on that occasion—a tragic instance of a radio station's danger to the navigators of the air.

Air's Debt to Radio.

THE law case looks like proving a lengthy affair. It has just been adjourned until October 10th, and may take a considerable time after the wheels of the law start turning again.

Giving evidence before the adjournment Major Mayo, a technical expert of Imperial Airways, Ltd., stated that "*The whole system of air transport in Western Europe depends on wireless.* If the wireless system broke down you would get so many accidents that the whole thing would come to an end."

I believe this is the first time that the absolute dependence of flying on its radio communications has been stated in a British court of law.

Surprising Results.

RADIO has a lot to answer for. Take the case of old Aleksei Levin, the woodcutter, who lives near Lwow in Poland. All the villagers knew Aleksei and liked the old chap, though he had been stone deaf since 1915.

One day he went on his weekly visit to the village and found everybody in the shoemaker's around a box with phones attached. From sheer politeness they passed the phones to Aleksei and clamped them on his disused ears.

He was just enjoying the feel of them, the smooth warmth, and so forth, when a twenty years' silence was shattered by somebody shouting "Olga Pulloffski, the Beautiful Spy!" With one bound the astonished Aleksei was out of that room, running for home faster than a droshky!

Now they can't get him to come out of his hut, and when the shoemaker approached it Aleksei flashed an axe at him.

The debate continues.

(*Continued on next page.*)

CHOPIN'S FUNERAL MARCH AND THE INSECTICIDE

The Radio Carnera.

ONE of those communicative bodies like Reuters, Press Association, Exchange Telegraph or Central News has succeeded once again in finding the world's tiniest radio set.

It seems that Grischa Grinberg has it, up in Vinitsa, Ukraine.

Grischa is only seventeen years old. He must be able to turn a pretty screwdriver, for his set is but a mere three-tenths of an inch wide. The height was probably a disappointment to Grischa, for it towers up (relatively speaking) to two-fifths of an inch. However, he has made up for that by keeping the weight down, the total, all-in, ringside avoirdupois coming out at one-twentieth of an ounce. And I hardly need add that "reception is perfect."

Short Waves Shock.

SOVIET officials fell back in horror from their loudspeakers recently when they heard a station playing an almost-forgotten and forbidden tune—the old Russian national anthem. And as they listened incredulously a Russian voice calmly added: "God Save the Tsar!"

This political surprise occurred on short waves, roundabout 54 metres. And the offender is going to be a difficult chap to locate, for he changes his wavelength at frequent intervals, and apparently his location also.

Short-wave enthusiasts will not regard this newcomer with much favour, I'm sure, for they have all they can do to keep tabs on the authorised transmitters without people bobbing up, shouting a few words, and then changing wavelength!

"Jazz in Spats!"

HENRY HALL is sure of a good time on his business trip to the U.S.A., for the American idea of hospitality is, at the minimum, to give the guest all he can take. Their really lavish hospitality, reserved for good sports, old timers, and fellow baseball fans is apt to leave the recipient feeling like the blow-fly that got shut in the oven with the joint—over-done, with superfluity of nourishment!

Henry is likely to experience the latter and more lavish type of welcome, for he is popular in the U.S.A., both personally and musically. They like the comparatively prim decorum of B.B.C. orchestration, and call it "Jazz in Spats!"

New Service to the Gold Coast.

WEST AFRICA'S broadcast service continues to expand, the latest development being the opening of a wireless exchange at Accra. The Gold Coast resident has now been enabled to hear the Empire programmes from Daventry with some degree of regularity—in fact, complete regularity is hoped for when the best wavelength and power have been decided.

The Colonial Secretary, Mr. Malcolm MacDonald, inaugurated the service, and another speaker was Sir Arnold Hodson, Governor of the Gold Coast, at present on a visit to this country.

The Radio Hymn.

IF you were asked to guess which European station would choose a hymn for its interval signal, your mind would probably go to a grave Dutchman, to an earnest German, or to a decorous Dane.

If, on the other hand, you were asked to pick on a sparkling "high-faluter"—a place where there was every chance of games, and games of chance—you might naturally think of lively old Juan-les-Pins, on the gay Cote d'Azur.

Yet of all the European stations it is this gay dog, Juan-les-Pins, who hymns to listeners in the interval between items. Listen on 240·2 metres to Juan the Good!

Nature's Symbolism.

A BRIGHTON reader who has been staying in Wales tells me that Mother Nature is undoubtedly interested in the theory of wireless matters. To back up his assertion he says he saw a streak of lightning one evening over the Bristol Channel that shaped itself into a perfect π.

There was a stranger instance last year in Jugo-Slavia. Some skaters on a lake were amazed by the appearance of an ice crack, nearly half a mile long, *in the form of an almost perfect sine wave.*

One scientifically minded observer hastened to measure it, and found the distance from crest to crest (wavelength) was three metres, the amplitude about half a metre, and the width of the crack ten centimetres.

Scientists have been talking about it feverishly ever since—but that's nothing to what the skaters said!

B.B.C. Orchestra's Leader.

HIS many friends will be sorry to know that Mr. Charles Woodhouse, acting on medical advice, will rest from active orchestral work during the season now opening, and will not, therefore lead the B.B.C. Orchestra at the Queen's Hall.

His deputy will be Miss Marie Wilson, who took his place last season.

Fortunately Mr. Woodhouse will be able to assist at rehearsals. But the actual sessions, with their strenuous work, will be left to those "in the pink" and to the young fellows who need exercise. And they get it, too!

Too Far.

THERE seems to have been a bit of a contretemps at Breslau over their idea for a radio-play competition. The idea was that original microphone plays should be submitted by listeners, subject to two conditions.

First, the play must not be adapted from novel or screen. And second, the author must prove his Aryan origin.

This latter proviso worried one painstaking competitor so much that he went back and back with his ancestry, *farther than necessary.* And, naturally, he finally traced his descent, like the rest of us, from Noah! The trouble with Noah is that, despite his remarkable maritime experiences, he was no Aryan.

Mobile Air Stations.

IF the wireless indications are anything to go by, our development in the air is proceeding apace. News is now to hand of a proposed mobile wireless telephone station near Kirkwall to serve airmen flying in the Orkney district. There is talk of a new public aerodrome on the main island, and Hatson has been cited as a suitable airport.

The Shetland Islands, too, are expecting the advent of a similar mobile installation, to make flying possible even in the thick "soup" which passes for a "wee bit of mist" among the islanders. Air services are at present operating to the Orkneys from Inverness and Aberdeen.

Programmes from Palestine.

JERUSALEM is expected to begin regular broadcasting at the end of November. The station buildings are at Ramallah, but the studios and administration offices will be in the new Post Office building, now completing construction in Jerusalem itself.

A remarkable feature of the projected service will be the installation of loudspeakers in about one hundred villages and settlements surrounding the station.

Control is to be vested in the postal and telegraph authorities, working with a Programmes Advisory Committee having five members. Three are appointed by the government and two are unofficial, representing the Arabs and Jews respectively.

The Gentle Art of Persuasion.

ADVOCATES of broadcasting sponsored by advertisers have often claimed that advertising over the air can be subtle and unobjectionable, and that it can bring us the world's best artists and music with hardly a hint of that baser commerce that foots the bill.

Well, the people who hold that view have now got something to live down. For one publicity expert, confronted with the problem of uplifting his audience and boosting an insecticide, arranged a talk on how to kill 'em, with a magnificent musical background—Chopin's Funeral March!

If this is subtlety, let's give three hips and a hooray for the good old B.B.C.!

ARIEL.

SHORT WAVES AT THE EXHIBITION

RADIOLYMPIA

THE short-wave enthusiast hitherto has generally visited Radiolympia with somewhat mixed feelings. He of course is as one apart from the "common herd" (or he likes to think of himself in that way). Mr. and Mrs. Broadcast Listener visit the Show to choose a new radiogram; *he* goes for the purpose of hurling quick-fire technical queries at salesmen, and with the idea of seeing some new short-wave components.

In this little résumé of this year's Show I propose to leave complete sets entirely alone, and to deal only with the short-wave components which, by the way, are far more numerous as well as more interesting than ever before.

There is much to interest the short-wave enthusiast at this year's Show—far more than last year—and an idea of the many special S.W. components is given in this article. By W.L.S.

Standardisation in Coils.

It is gratifying to note, for the first time, some small degree of standardisation about short-wave coils in particular. Practically the only types to be seen at Olympia are the four-pin "valve-base" plug-in type, and the various forms of wavechange coils.

The former, together with six-pin coils in some cases, are to be found on the stands of B.T.S., Colvern, Wearite (a new line in this case), and Eddystone. The windings do not all cover similar wave-ranges, and the connections to the base are different in most cases, but we *are* at any rate settling down to the idea of compact, small-diameter coils fitting into a four or six-pin base, and we designers are duly thankful.

If it doesn't mean anything else, it *does* help us with the layout and general shape of the set.

Wavechange coils appear on several stands and in several different guises. The "Formo" short-wave coils (which plug in horizontally into a six-pin "clip" former) are designed chiefly for use with their two-way coil holder, which incorporates an efficient switch. The designers are of the opinion that it is usually sufficient to cover *two* ranges without coil-changing at any particular time of day, and this scheme seems an admirable solution of the problem of wavechange switching without loss of efficiency.

On the Bulgin stand is a coil covering four wavebands, intended above all for use in an all-wave superheterodyne. The ranges are stated as 15–85 in two sections —200–500 and 1,000–2,000 metres. The coils are screened and mounted on porcelain bases.

Units With Wavechange.

B.T.S. have also produced a wavechange coil unit, incorporating two separate coils screened from each other. A double wavechange switch allows the selection of three ranges, and the coils are intended for use in receivers with tuned H.F., one serving as the aerial coil, the other as tuned grid coil with reaction.

Next to the short-wave coils, condensers are probably the most interesting and the most numerous components. Many firms make excellent variable condensers of ·0001 or ·00015 capacity, which, though not stamped with the tag "Short-Wave," are nevertheless excellent for the purpose. An Ormond slow-motion condenser is listed with a capacity of ·00013, and, with its pig-tail connection and silent friction gear, is excellent for short-wave tuning.

An interesting innovation on the Polar stand is the new type "G" two-gang condenser. Constructed on a Steatite base, this incorporates two separate condensers, each of ·00016 capacity, the spindle being insulated from the frame. The type "G" condenser may, therefore, be used as a "series-gap" model if desired or as an ordinary two-gang condenser in a set using H.F. The well-known type "C" condenser is continued, and the No. 4 air-dielectric reaction condenser is also useful for our special purposes.

Colvern have introduced a new short-wave condenser in various small capacities, intended primarily for use with their short-wave coils.

Formo also favour the capacity of ·00016, their new condenser being mounted on Frequentite with a very rigid scheme of construction (and, incidentally, a very low price). Here again an insulated spindle is provided.

The Eddystone stand houses a very large variety of condensers, all of low-loss construction, using the new "DL9" dielectric material. Among them is a very diminutive "midget" which will be useful for band-spreading purposes and can be mounted in practically any odd corner of the panel. An interesting component to be used in conjunction with their reaction condenser is a "slow-motion head," which, as its name implies, converts the condenser into a slow-motion type.

This is simply a very small arrangement which is mounted between the spindle and the tuning knob, for which an extra pointer and small scale are provided. A reduction of 10 : 1 results from the introduction of this useful little gadget.

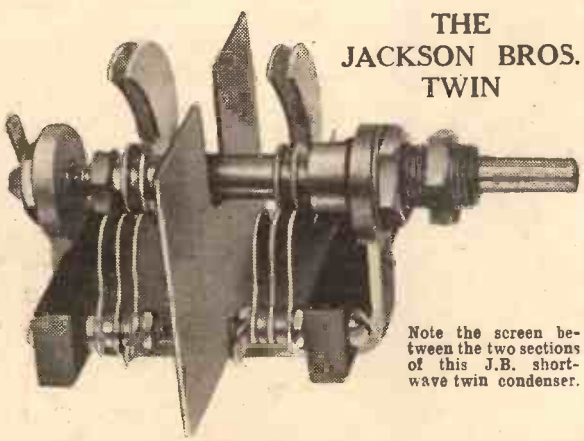
An insulated and adjustable bracket for mounting a condenser back from the panel is another component to be seen on this stand.

Another New Midget.

Jackson Bros. have also introduced a new Midget condenser which is available in single or two-gang form in capacities right down to 15 mmfd. These are intended chiefly for ultra-short-wave use, and

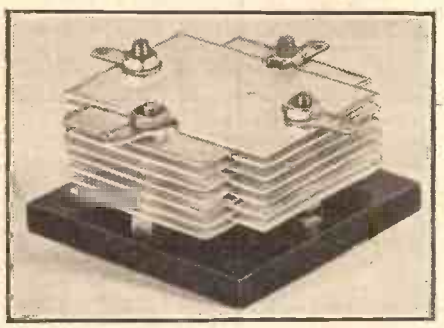
(*Continued on next page.*)

THE JACKSON BROS. TWIN



Note the screen between the two sections of this J.B. short-wave twin condenser.

FOR AERIAL COUPLING



An air-spaced short-wave fixed condenser of B.T.S. make. It is ideal for connecting in series with the aerial lead.

SHORT WAVES AT THE EXHIBITION

(*Continued from previous page.*)

Karamot insulation is used. They should be invaluable for band-spreading purposes, and can be obtained with an 8 : 1 slow-motion drive and large knob if desired.

J. B. also show a two and three-gang ·00016 model, with screening between the sections, as well as a new type of air-dielectric pre-set condenser.

Special types of valve holder for short waves appear on many stands. Generally speaking, the distinction between them and the ordinary general purpose valve holder is that the short-wave type is made of a superior material and has the sockets air-spaced, just a ring of dielectric serving to anchor them.

Low-Loss Valve Holders.

Eddystone, B.T.S., and Graham Farish are among the manufacturers who market such components. With the present preponderance of four-pin short-wave coils it is naturally logical to use a second low-loss valve holder as the coil-base, in which position it is just as desirable as for the actual detector valve holder.

Slow-motion dials are components that interest us particularly, and there is fortunately no shortage of them this year. The new Formo "Snail" dual-ratio drive is specifically intended for short-wave work, and the standard ratios are 8 : 1 and 64 : 1, with a dial movement of 270°—a very useful feature.

A large variety of friction drives will also be seen on the J. B., Ormond, and Polar stands. Most of the short-wave condensers are of the "plain" type, and the choice of a suitable drive is almost as important a matter as the choice of the condenser itself.

The use of a specially designed H.F. choke for short-wave work is very often a detail that escapes the notice of the home-constructor. In some circuits certainly it is not necessary, but there is now such a variety of special chokes (usually at prices lower than those applying to the medium and long-wave variety), that there is no excuse for neglecting this point of design.

Simple Types of H.F. Chokes.

Two Eddystone chokes (short and ultra-short wave) are wound on little cylinders the size of one-watt resistors, and provided with wire ends. They may be introduced into any part of the layout, and fitted directly into the wiring. A new Bulgin choke is similarly designed, but about 2 in. in length.

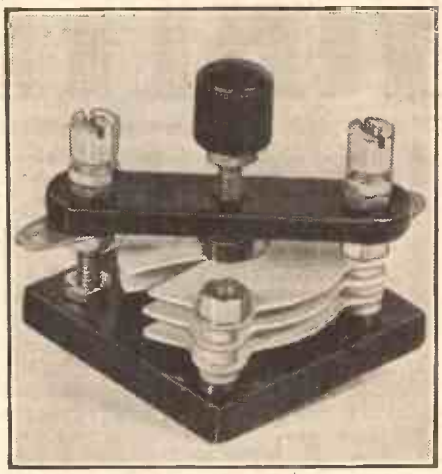
B.T.S. have produced a new choke which may be either soldered directly into the wiring or fitted into small clips. Wound on a Steatite former, it is claimed to be specially suitable for overseas use in tropical or damp climates.

Hosts of other small components which will appeal immediately to the home-constructor of short-wave gear will be found all over the Show, and I don't propose to attempt to enumerate them. Short-wave design nowadays is becoming very much a matter of choosing suitable combinations of components, and very often choosing the *smallest* ones available; a good look round and a mental or written note will probably save much trouble and catalogue searching in the future.

Readers interested in the amateur transmitters' activities will do well to pay a call at the stand of the Radio Society of Great Britain, on which several transmitters and receivers will be seen. Modern 5-metre receivers and transmitters bear little resemblance to last year's models, and the 5-metre transmitter, using straight copper tubes instead of tuning coils, is well worth inspecting.

Altogether a most interesting Show for the short-waver. I hope he takes it all in and "does his stuff" during the next season so effectively that there is even more for him next year!

A BASEBOARD VARIABLE



Here is a particularly useful B.T.S. component. It is a five-plate variable air-dielectric condenser for fixing on the baseboard or chassis.

VALVE DEVELOPMENT

Details of a new cold-valve principle.

WE hear from time to time about the valve that is going to operate without any heating current forthe fila ment—the "cold" valve, as it is generally called. This has been the dream of experimenters ever since radio started, but up to the present it has never appeared in any very practical form, or at any rate no serious attempt has ever been made to substitute it for the ordinary kind.

The ordinary radio valve uses a heated filament because this is the simplest way to get a sufficient supply of low-speed electrons. The most important really practical step towards the cold valve was the discovery by Langmuir, a few years back, of the dull-emitter filament which, although still requiring to be heated, only needs to be raised to a very dull heat as compared to the old "bright emitters."

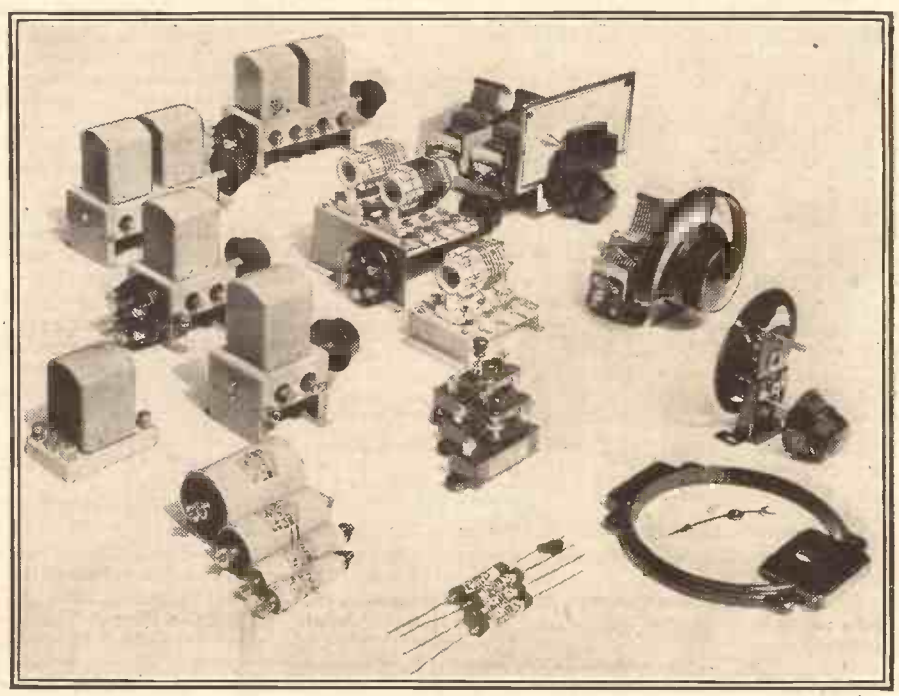
Drawing Off Electrons.

Anyway, to come back to the cold valve, various principles have been invoked to this end, and lately a new one has been tried. This is based on the fact that if a metal with a very smooth surface is exposed to a sufficiently powerful magnetic field, electrons can be drawn off from the metal. The amount of electronic emission obtained in this way is exceedingly small, but after all the principle is there and one never knows what means might be found for enhancing the effect.

It is necessary, in order to get the thing working under proper control, that the surface should be extremely smooth. It has been found practically impossible to get a smooth enough surface on a solid metal, but attempts are now being made to use the surface of liquid mercury; if the mercury is perfectly clean the surface is, of course, perfectly smooth. It is certainly a truism to say that we have not yet seen the end of valve development!

J. H. R.

SOME OF THE COMPONENTS IN THE FORMO RANGE



In the centre of this group of components can be seen the Formo short-wave coils in twin and single-unit form, while in the bottom right-hand corner can be seen the "Snail" dial and its drive.

RADIOLYMPIA

Circuit ADVANCEMENTS

A discussion of the circuits to be found in the sets at this year's Show, and explanations of the working of some of the interesting developments that are incorporated.

By A. S. CLARK.

THE main trend of development in the circuits employed in the numerous receivers at Olympia this year is towards the more general use of superhet arrangements, and in fewer valves. Of course, the latter has been made largely possible by the introduction of even more multi-valves during the past year, and it is still as true as ever that the valve manufacturers call the tune of circuit developments, while the set designer decides the instrument on which it shall be played.

In the superhet principle there is a minimum number of stages which can be used, but there seems no limit to the number of functions which one valve can be devised to perform. And the more frequent use of metal rectifiers to carry out certain of the necessary operations has been an aiding factor in reducing the total number of valves.

Multi-Purpose Valves.

The time is now long past when one valve was required for each stage of a set, and consequently it is impossible to judge the merits of a modern receiver by the number of valves employed. That is why such phrases as "seven-stage four-valve superhet circuit" are to be found in multiplicity in the catalogue details of modern receivers.

Such items as variable selectivity, compensated tone control, reflexed valves, double-diode pentodes, and so on are among this year's developments. Not, mark you, that these are necessarily particularly new in themselves, but because the development lies in the *extent* to which they are employed.

In the sets employing straight circuits, which are fewer than ever before, developments are not so numerous. Here again, though, multiple valves are in greater use, and pentode detectors are more the rule than the exception.

Before discussing in detail any of the features of modern circuits, a "look over" of a circuit representative of 1936 practice will prove helpful. You will find such a circuit in full in one of the diagrams accompanying this article. (Fig. 6.)

A TYPICAL DETECTOR

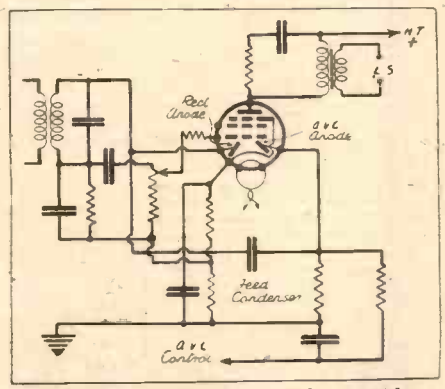


Fig. 2: How a double-diode pentode—a popular valve in this year's circuits—is used for detection, A.V.C., and output.

This is what might be termed a seven-stage superhet using five valves, one of which is the H.T. rectifier. In a minute we will consider how the number of valves might be cut down to four, including the rectifier.

In this case the seven stages are made up as follows: Band-pass mixer, which provides H.F. amplification, and oscillator—provided by the octode, I.F. amplifier—a variable-mu pentode, 2nd-detector diode rectification, and A.V.C. stage—both looked after by the double diode, and output in the form of an L.F. pentode.

The Double-Diode Pentode.

Incidentally, it is in this last stage that the biggest variations between the circuit of one make and another occur. Last year a double-diode triode followed by a pentode was most usual, and is found in some circuits this year.

There are a number of alternatives, however, one of which is shown in our circuit namely, a double-diode followed by a pentode. But the new double-diode pentode valve has enabled the output to be taken straight from the 2nd rectifier valve. Of course, a double-diode followed by a separate triode and the output valve could be utilised.

Yet another alternative which is to be found this year is the use of Westectors for both rectification and A.V.C. purposes. But this does not reduce the number of valves below that existing when a double-diode pentode is utilised.

Fig. 1 is an interesting schematic diagram showing at a glance the various sequences of the circuit with which we have just been dealing. After the mixing of incoming "signals" with the oscillator frequency, and then amplifying at the beat frequency, the currents are divided by V_3.

WHAT THE VALVES DO

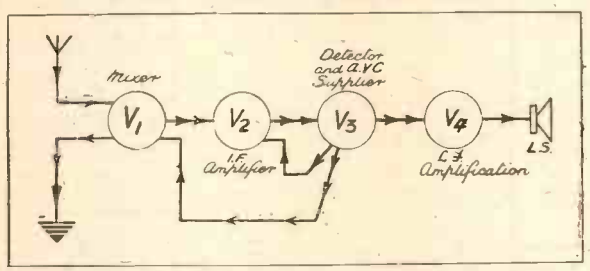


Fig. 1: A schematic diagram showing the functions and sequence relationship of the valves in a four-valve superhet.

Image Reception.

One path is on to the output valve and eventually the loudspeaker, while the other is as a varying but demodulated voltage fed to both the octode and the intermediate valve. This double application of automatic volume control ensures proper control over a wide ratio of volumes and precludes the necessity for amplification of the A.V.C.

REMOVING MAINS NOISE

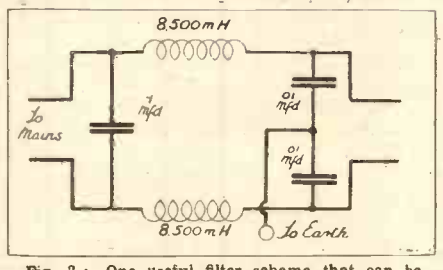


Fig. 3: One useful filter scheme that can be incorporated in a circuit to cut down mains interference.

Manual control of volume is provided by the potentiometer feeding the pentode valve, and the feed is via the fixed condenser connected to one end of the potentiometer resistance element. The variable condenser seen just below this fixed condenser in figure 6 acts as a tone control by by-passing more or less "top." This is not compensated tone control, of which we shall see more later.

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CIRCUIT ADVANCEMENTS

(*Continued from previous page.*)

In order to avoid what is usually described in some such words as "image reception," in which a station is received at more than one point on the dial and accompanied by whistling noises, really selective aerial input circuits are necessary. In our representative circuit this selectivity is obtained by band-pass coils which, by being suitably designed, give constant selectivity over both wavebands.

Often a heptode is preferred to an octode, but the difference is merely superficial. There are but few designs which show a preference for a separate and non-electron coupled oscillator.

"Quiet" Automatic Volume Control.

But to return to the question of automatic volume control, what is known as "Quiet" A.V.C. is almost universal. But this must not be confused with delayed A.V.C. and station pre-selection, although the latter two work on a somewhat similar principle. All three are quite usual features of modern designs.

FOR TRUE TONE

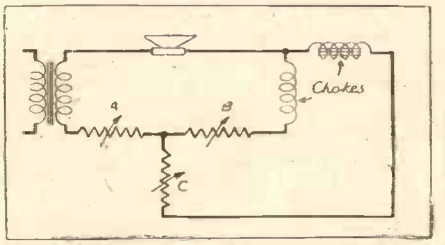


Fig. 4: Illustrating one way in which tone-compensated volume control may be achieved.

The principle of these forms of A.V.C. can be followed best by reference to Fig. 2. First of all it is necessary to remember the principle of the diode. No H.T. is applied to the anode, and current flows only on the half-cycle of A.C., which makes the anode positive. While it is negative no current will flow and there will be no "signals" or voltages produced.

Therefore, if a certain negative voltage is permanently applied to the anode, the "signal" A.C. will have to overcome this before anything happens.

First of all, take the rectifier anode of Fig. 2. By applying a negative voltage to this we prevent "signal" rectification taking place below a certain value — a value which is likely to correspond with the level of noise interference which would make reception unbearable.

That gives us the quiet part of the A.V.C. The other diode anode takes care of the actual A.V.C. itself.

As the strength of the "signals" increases, so more voltage is fed back to the grids of the earlier valves, thus reducing the amplification and consequently the volume. But so that this control hall not reduce the sensitivity of the receiver by starting to work on very weak stations which do not come up to normal strength, "delay" is introduced by applying a negative voltage to the A.V.C. diode anode.

If this voltage be made variable as, for instance, in pre-station selection, the set can be adjusted so that any station below a desired strength *at the aerial* will not be heard. This is the simplest scheme, but elaborations affecting other valves in the circuit may be employed.

VISUAL TUNING DEVICES

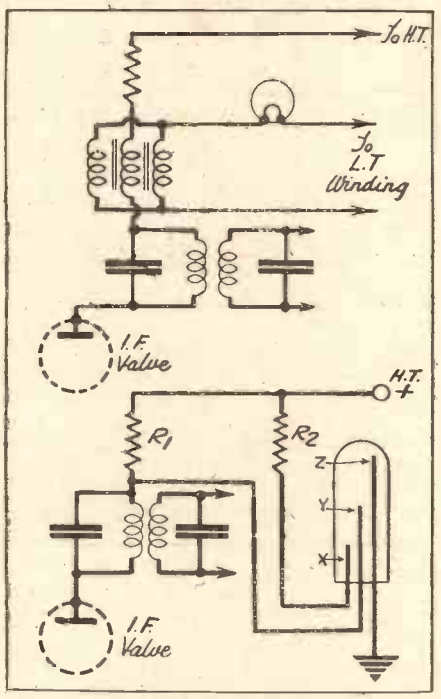


Fig. 5: Two schemes for ensuring that stations are accurately tuned-in on superhet receivers, thus safeguarding the quality.

Incidentally, one firm has introduced a scheme which makes the degree of "delay" effect automatic as well as the control of volume. This enables the A.V.C. to work on weak stations as well and so provides more stations which attain true programme value.

Now we are in a position to pass on to other aspects of circuit developments. This year it is quite common to find mains-interference suppressors incorporated as part of the receiver.

These devices proved necessary, or desirable, in so many cases last year that it is only reasonable to expect to find them an inherent part of the modern circuit. Fig. 3 shows the principle quite clearly.

It will be seen that the idea is to put obstacles in the way of the noise currents and provide an easy path for the latter. This effect is achieved by means of the two chokes and the ·1-mfd. condenser across the mains. The two condensers on the set side of the chokes ensure that any trace of unwanted potentials still existing shall be rendered harmless.

Keeping The Quality Correct.

And that brings us to a fairly recent innovation which is receiving considerably more attention in this year's circuits. That is tone-compensated volume control.

It is a well-known fact that when the volume of reproduction is cut down to be very quiet, the bass response, so far as what the ear hears, is almost removed. To overcome this it is necessary to cut down top at the same time in order to retain a desirable balance of tone.

Fig. 4 shows one way in which this can be done. The three variable resistances are all ganged to one knob so that they are all variable at the same time.

The volume is determined by A and the tone by B and C, which, together with the chokes, provide parallel paths for the "speech" currents. The choke in series with C has a high impedance to low notes while that in series with B has a high impedance to high notes.

When A is increased (volume decreased) B is decreased, so that more current tries to go through the air-cored choke, with the result that top gets cut. Similarly C is increased so that the bass-stopping properties of the iron-cored choke do not come into play very much.

Ingenious Aids To Tuning.

Visual tuning indicators are a part of modern circuit designs, so a few words on their operation will not be out of place. In Fig. 5 two forms are illustrated in circuit form.

The first is, perhaps, the more recent, and depends upon the modulation of the light intensity from an electric lamp supplied by

(*Continued on page* 678.)

A REPRESENTATIVE FIVE-VALVE SUPERHET

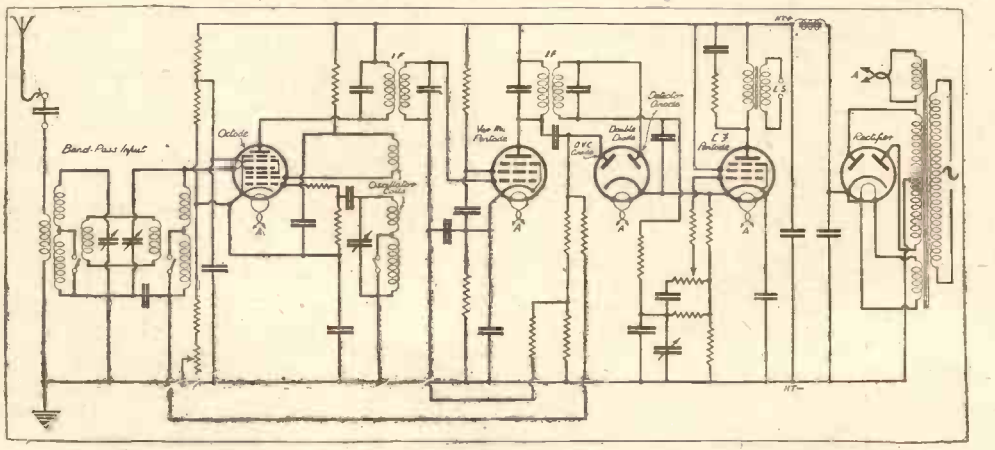


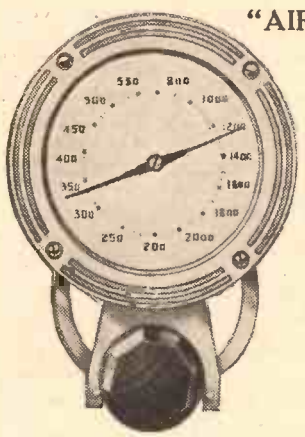
Fig. 6: A seven-stage superhet circuit, using only four receiving valves with a full-wave rectifier for high tension.

RADIOLYMPIA NOVELTIES

NOVELTIES which are at once apparent to the eye are featured by the thousand at Radiolympia. Every other set—and remember that there are about five thousand in all—is either one complete novelty in the design of its layout and cabinet or embodies some quite novel feature—perhaps several.

Mind you, this is no exhibition of bizarre nightmare forms and shapes, though here and there it must be admitted are receivers which have—well, rather peculiar appearances. But it is certain that they will find their publics, for there are plenty of people who like their possessions to be very much out of the ordinary.

We might go farther and say that while most of us would consider certain designs to be somewhat weird, to say the least of it, others will doubtless consider them to be perfectly straightforward. It is all a question of taste, and if there is one thing which stands out beyond all others at Olympia it is that there are sets to suit every conceivable variety of taste.



"AIRPLANE" TUNING DIAL

This novel type of dial has come to us from the States. The one illustrated here is a J.B. product, and is, of course, British made. In appearance it is not unlike the dials seen on aeroplane instrument boards.

★ ★

The days of standardized convention in radio design, of hard and fast layout formulæ, have gone for good, and it is now a matter of individual manufacturers striving to their utmost to produce sets which, while they must in many ways conform to circuital uniformities, do at least present original and distinctive appearances.

Striking Cabinet Designs.

Some of the designs are so novel as to be quite daring, and practically all strike very modern notes. There isn't even any distinctive tendency. We are unable to say that, for instance, the radio industry is tending to go Cubist.

Some of the cabinets run to striking effects of squares, triangles and straight lines. Others exhibit artistic welters of curves. On one stand you will find sets in ornately carved or moulded cabinets, and on another sets which are severely plain but none the less pleasing to look at for all that.

There are about 5,000 sets on view at Olympia, and as this article explains, nearly every one has something novel about it. But some of the novelties are particularly outstanding and warrant special comment.

Some designs have obviously been produced to blend with furniture as pieces of furniture, while others have been fashioned to stand out as distinctive entities. It is surely the most free-and-easy exhibition for style that has yet taken place, and thank goodness for that. Do you remember that year when every manufacturer solidly plumped for period design? All the sets were either Jacobean or Queen Anne. That is, except those which weren't chunks of apparatus pure and simple.

Well, so much for the sets themselves. To the considerable extent that they are novelties you will be able to appreciate from the many photos which we have published.

A radio novelty which has come to us from the States is the "Airplane" Tuning Dial. Its name is self-explanatory, for it is, in fact, fashioned like the dial of an instrument on an aeroplane. More familiar to most will be the dials of motor-car dashboards. Well, the "Airplane" is not unlike an enlarged oil-gauge or speedometer dial of the 360 (or thereabouts) degrees type.

Tuning Innovations.

Perhaps it is regarded as the "sports" type of dial. Anyway, it is quite attractive.

Another tuning dial novelty is to be seen in the provision of entirely separated long and medium wave scales. It figures on some of the Cossor sets. The long waves are on one side of the speaker fret and the medium on the other.

Here, too—that is, in Cossor sets—you encounter thermometer tuning which is a decided novelty, and one which we have referred to in detail in previous articles.

Then in a new Ekco set you find a cunning matching between the tuning dial and the loudspeaker in an artistically rounded design. No one could accuse this firm of working on stereotyped lines.

The majority of the dials in their various shapes and sizes are vertically placed. But there is at least one breakaway from that in a G.E.C. set where the dial is inclined back at an angle which certainly does make for comfortable viewing.

There is an incline of another kind in the dial of the Bush sets. The scale on this runs upwards in a straight line from one corner of the aperture to the other.

Escalator tuning is the name given to this scheme, and it is certainly apt. The idea behind it is obviously to obtain as great a spread-out of the stations as possible within a given space though, incidentally, there is the further advantage that the stations actually do "run up" the wavelength scales.

The "clock" type of tuning dial is not now particularly new, but there are many quite novel applications of the principle to be seen at this Show. For example, we notice on one of the K.B. sets that there is a particularly neat and distinctive dial of this order placed off-centre and below the middle line of the set.

A New Amplifying Valve.

That may appear from this bare verbal description to be a rather untidy layout, but it is very far indeed from being that. On the contrary it is particularly neat.

Among the valves there are many new developments, and we would single out of them the new Harries amplifying valve as being, in our opinion, one of the most outstanding. It is a Hivac development. Available both in mains and battery types this Harries valve is apparently equivalent to a pentode output type, though instead of a suppressor screen it embodies a new principle of electrode spacing. A performance quite a deal superior to that of its equivalent among the normal types is claimed for it.

SMALL BUT EFFICIENT

One of the new range of Hivac Midget valves, an important development that will interest everyone.

BARRY KENT CALLING

News and Views from the "Big House"

B.B.C. and Northern Ireland.

THE uncertainty about the future relations between the Irish Free State and the United Kingdom adds a special interest to the plans of the B.B.C. for the improvement of the broadcasting services in Northern Ireland. There has been a speeding up of the construction of the new transmitter there. The building is now completed, and installation of the equipment has begun. I am assured that the station will be ready for public tests by the end of this year.

The official opening date, however, is to be made to coincide with the opening of the big wireless exhibition in Belfast in February, 1936. The promise of the new station has done much to inspirit the Northern Irelanders to view the future with increased hope and an increased sense of security.

* * *

Studios at Bangor.

B.B.C. contractors are busy at Bangor, getting ready the studios for North Wales. The work should be finished by the end of 1935. There is much local interest in the extension of the B.B.C. to that area.

* * *

The "Special Branch."

For some months past the B.B.C. has been initiating a "special branch" of its administrative division. This is to be entrusted with watching meticulously the private movements and contacts of all members of the staff whose work brings them, however little, in touch with the public. For example, those who deal with artists, give Press interviews, and arrange contracts with outside firms are to have their movements carefully checked.

The idea is not so much to "catch people out," as to make it possible to clear people from the many accusations that are lodged from time to time by all and sundry both inside and outside the organisation. I shall be much interested to follow the progress of this curious "special branch."

* * *

More Reorganisation.

I hear the Governors of the B.B.C. are now looking ahead to a more general reorganisation next spring. The present reorganisation is not really regarded as more than a makeshift development occasioned by the departure of Colonel Alan Dawnay on the completion of his special mission. Next spring Admiral Sir Charles Carpendale is almost certain to insist on being relieved of the new post of Deputy-Director-General.

By that time, too, Captain Cecil Graves will be able to indicate the changes he will want to make his programme organisation permanent. Also Sir Stephen Tallents is known to have plans of far-reaching changes in those parts of the B.B.C. work for which he will be directly responsible, that is, if he is not put into the vacancy which Admiral Carpendale's departure will entail. But I have heard nothing yet that moves me to proclaim that we are likely to have better programmes.

All these shuffles and reshuffles are obviously decided on chiefly to accommodate internal needs and internal situations. How different the position would be if the B.B.C., like a newspaper, had to struggle for existence against ever alert competition!

* * *

Mr. Hall in America.

An American radio correspondent gives me some surprising news about Mr. Hall's visit there. I had known that he was going

TOMMY HANDLEY, whom you see here, is always a popular broadcasting turn. His first broadcast was in 1925.

to try to get closer to new song hits than he can now through the "usual channels." But apparently he has other equally important work. He is going to study and report on what the Americans call "plural dance band organisation." By this is meant a service that is maintained by a gigantic band capable of being split up into self-contained units, just as the B.B.C. Symphony Orchestra has its sections, denoted by letters of the alphabet. It is only in the United States that this development of dance bands can be studied at first-hand.

If Mr. Hall's reports are favourable, the B.B.C. will embark on an extended dance band policy in the late autumn. Mr. Hall, however, will remain in charge. There is no question of his being superseded, or of the appointment of a Director of Dance Music. The organisation will conform to the ordinary bi-ped type now common to all other departments of the B.B.C., that is creative and administrative, complementary to each other.

* * *

The Ullswater Report.

I understand this will not be ready for publication until October, and that it is unlikely to be released until it can be tabled simultaneously in Parliament. This means early November.

ON THE AIR

Candid comments by our broadcasting critic on recent programmes.

TWO new acts in a Variety bill decide the question. "To listen-in or not to listen-in?" The Diamond Brothers aren't complete strangers to the British public, nor does their act inaugurate a new style. Yet the act succeeds because of its slickness. It is the amazing swiftness of the repartee that amuses, rather than the humour of the lines.

Odette and Kay sing a type of song I like. They cold-shoulder hot rhythms and the like in favour of what they call "personality songs."

* * *

Horace Kenney was the completest surprise of the bill. I hadn't heard him for a considerable time, and now he pops up unheralded in a bill that didn't even bear his name. I can laugh real laughter at Horace Kenney's humour, which is quite his own. I know no one else who has it, or, indeed, who could have it. He cuts a pathetic little figure, willing to do anything and everything, anywhere, and at any old time. His services are never wanted.

An Exceedingly Clever Artist.

The strange thing about it is that we don't shed buckets of tears over him. We roar with laughter. Such is Horace Kenney's art. His act, this time in a film studio in quest of a job, is quite as funny as that famous fireman's act of his.

* * *

I would like to hear Maria Roland sing a real concert-platform song in the concert-platform manner. In a group of Tyrolean songs she gave proof that she possesses an uncommonly fine voice. But yodelling is her game—and good yodelling, too. But as it is my weakness to be only mildly interested in yodelling, I couldn't help feeling that Maria Roland was rather wasting her talent.

* * *

To me the chief interest of "The Purple Pileus" lay in Robert Chignell's music, and the complementary part it played to the spoken word. Had the play been all spoken words, ten minutes of the forty-five would have sufficed me. I do not care for the vulgar tongue when it is too vulgar and unrelieved, and especially when it doesn't quite succeed in representing what it aims at. Even if it had succeeded, what was the point of making this grocer and his wife (besides the rest) adopt such a frightfully common tongue? After all, there are grocers and grocers.

* * *

But the cleverness of the music atoned for the imperfections of the libretto. Robert Chignell is a genius at writing descriptive music. It is true to say that I thought this music was on an altogether higher plane than the dialogue was made to seem.

* * *

The fact that Myrtle Richardson was appearing in her first important role in a radio play also tempted me to listen the play through. She wasn't given a great opportunity, I thought, of showing her worth, but I hope to see her included in the cast of a better play, and that right early.

The Salzburg Relay.

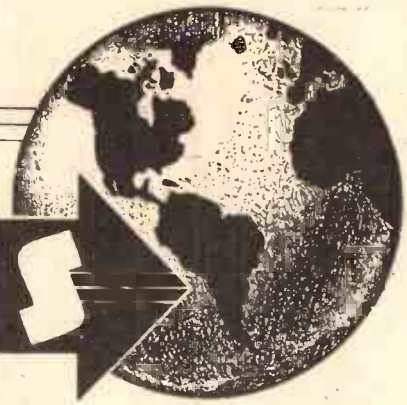
The first relay from The Residence, Salzburg, couldn't have had a better introduction than that which Mr. F. J. Nettlefold gave it. He set the scene to perfection. Every word he spoke revealed an intimate knowledge and a sincere love of Salzburg and its music. His sincerity was never in doubt for a moment. What a spell he cast over his listeners! He made me totally oblivious of my immediate surroundings. I went to Salzburg that evening, and stayed there till the 10.20 News Summary brought me back to earth.

* * *

Midweek broadcasting this week has consisted almost of music—good, bad, and indifferent. On the eve of the Proms one would have thought that just a modicum of music would have been a fitting preparation for this big musical season. One cannot but notice also what monetary saving has been effected by the B.B.C.'s chancellor.

(*Continued on page* 678.)

ON THE SHORT WAVES



GETTING SMALLER
Portable work with compact, simple receivers forms the theme of this article.
By W.L.S.

I SUPPOSE it's wrong to talk about the "discovery" of ultra-short waves. They have been there all the time, and we have known it; but only recently, or comparatively so, have we made any real attempt to use them.

One rather strange result of ultra-short-wave activity has been an immense wave of enthusiasm for portable work, whether on the transmitting or the receiving side. This, strangely enough, has "spread upwards" to the ordinary short-wave bands, with the result that many keen short-wave people are now taking little sets out into the high hills and discovering a silent background for the first time!

Quite a Tiny Set.

I've always had it at the back of my mind that the average short-wave receiver is a far more bulky affair than it need be. On the other hand, I don't see any particular point in trying to cut down its size when it is only to be used at home, in a fixed location. It's rather amusing, though, to see how small one can make a thing, and a few days back I completely "rehashed" the good old "Simplex" Two on a baseboard about one quarter of the original size.

I liked the original set very much. The new "baby" version is not quite so good from the point of view of handling, but it is certainly tiny, and will go in the cubby-hole of my car (which isn't a large one), complete with batteries, and still leave space for passengers' odds-and-ends all round it.

The diminutive affair shown in the two photographs on this page, by the way, is *not* the "Simplex," but a new receiver for 5 and 2½ metres, which I have been testing a lot over the week-ends lately. The valve shown in position is the little H.L.2/K, which, as you probably know, is quite small; and that should give you a better idea of the size of the set than my bald statement that the baseboard is 7 in. by 3 in. It is a single-valve super-regenerative set, using the well-known "grid-blocking" scheme for quenching. It receives everything that my more elaborate 5-metre receiver will get, and, as you will see, can be comfortably held between the thumb and first finger.

This "snap" gives a good idea of the actual size of the set seen in the other photo on this page.

Incidentally, the budding Sherlocks among my readers may as well be told right away that I do *not* figure in the photograph. I'm a little older than that, and much greyer on top, partly, no doubt, owing to long association with short-wave radio.

Now a short-wave portable set is not a thing that one carries about all day for the sake of entertainment. Even a short-wave portable on a car cannot be compared with "Car-Radio" as we know it. For one thing, I find that no amount of suppression applied to the engine will really cut out the ignition noises on certain parts of the tuning-range; and, for another, a short-wave loudspeaker set is not usually very portable.

The Screening Myth.

The kind of work I have been doing with mine is rather the investigation of the properties of certain kinds of localities. I have often gone out during the evening, when W 2 X A D has been perfectly consistent at home, and tried him at various spots within a five-mile or so radius. Some very bad ones have been found—also some undoubtedly good ones.

I find that screening by buildings is more or less a myth. The aerial I use on the car is pretty small, and has hardly any effective height whatever, yet W 2 X A D, with two valves and headphones, is a pretty good strength, whether one is in the shadow of a steel-frame building or on top of a beautiful hill with a view for miles in every direction.

The next development of course is in the direction of loudspeaker work, and for this I intend to use a super-regenerative set for the ordinary short-wave bands. I have already tried out several schemes at home, and I find that the stronger broadcasting stations can be received at real speaker strength with three or even two valves, but of course with a noticeable lack of selectivity, owing to the well-known properties of the "super."

Slow-motion dials can be dispensed with, as on the ultra-short waves, and tuning becomes a ridiculously flat, easy business; but only those stations that happen to be fairly clear of other equally powerful stations will be received with perfect clarity.

Quality does not suffer in the slightest, and the quench-frequency is adjusted to something well outside the audible range, so that the annoying high-pitched squeal heard on many ultra-short-wavers is absent.

As soon as the whole thing has been re-vamped in portable form, I will describe the circuit and layout in detail.

Small Transmitters, Too!

The size, by the way, will be really minute. I am hoping to get it all in a wooden box 6 in. by 4 in. by 3 in.!

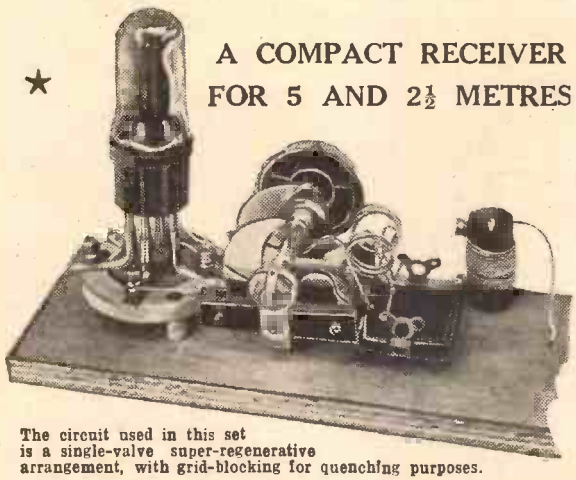
To return to the ultra-short-wave enthusiasts, I might mention that their transmitters are becoming just as small as their receivers, and in some cases even smaller. I have evolved a new one myself which, when I go "all portable," as a friend puts it, is simply hauled to the top of a tree, complete with its little di-pole aerial, and the battery-leads hang down from it.

One can't risk suspending bulky or heavy things from tree-tops, so you will gather that it's small and light. The whole point of the scheme is that it seems to be easier and more efficient to operate an ultra-short-wave transmitter with a fixed aerial and feeder system than to leave the transmitter on the ground while one tries to cut aerial and feeders to the right length, prior to hauling *them* up in the air.

If you have no intention of building an ordinary short-waver early in this season, you will find that you can derive much interest and amusement from a portable.

ON THE SHORT WAVES is continued on page 666.

★ A COMPACT RECEIVER FOR 5 AND 2½ METRES



The circuit used in this set is a single-valve super-regenerative arrangement, with grid-blocking for quenching purposes.

COSSOR

Illustration shows Models 368 & 436B. Models 360, 363 and 369A are generally similar.

IN these splendid new models Cossor offers the greatest value obtainable in up-to-date radio. Behind their production is one of the finest research laboratories in the country — a big staff of highly qualified engineers and a vast organisation (the largest of its kind in the country) operating in no less than six factories, each planned on the most modern lines. Little wonder that Cossor Radio is so efficient—so reliable!

COSSOR 'SUPER-FERRODYNE' REGD. RADIO

BATTERY MODELS

Model 360 (Power Output)

With Variable-Mu Screened Grid H.F. Pentode, H.F. Pentode Det. and Triode Power Output. Sensitive Moving Iron Speaker. Cabinet accommodates Batteries. **£5.15.0**

(Exclusive of Batteries)

Hire Purchase Terms: 12/6 deposit and 12 monthly payments of 10/-.

Model 363 (Pentode Output)

With Variable-Mu Screened Grid H.F. Pentode, H.F. Pentode Det. and Economy Pentode Output. Sensitive 8" Permanent Magnet Moving Coil Speaker. Cabinet accommodates batteries. **£6.15.0**

(Exclusive of Batteries)

Hire Purchase Terms: 13/- deposit and 11 monthly payments of 13/-.

Model 436B (Class B Amplification)

With Variable-Mu Screened Grid H.F. Pentode, H.F. Pentode Det., High Slope Power Driver and Class 'B' Output. Special 8" Permanent Magnet Moving Coil Speaker. Cabinet accommodates batteries. **£8.8.0**

(Exclusive of Batteries)

Hire Purchase Terms: 16/- deposit and 11 monthly payments of 16/-.

ALL-ELECTRIC MODELS

Model 368 (A.C. Mains)

With Variable-Mu Screened Grid H.F. Pentode, H.F. Pentode Det., Triode Power Output, Heavy Duty Rect. 8" Energised Moving Coil Speaker. For A.C. Mains only 200/250 v. (adjust.) 40/100 cycles. **£8.18.6**

Hire Purchase Terms: 15/6 deposit and 12 monthly payments of 15/6.

Model 369A (D.C./A.C. Mains)

Universal Receiver similar to illustration above. Specification as model 368 but with 8" Energised Moving Coil Speaker. For D.C. 200/250 v. (adjust.) and A.C. 200/250 v. (adjust.) 50/100 cycles. **£8.8.0**

Hire Purchase Terms: 14/6 deposit and 12 monthly payments of 14/6.

De Luxe Model 367 (A.C. Mains)

(illustrated on right)

With Variable-Mu Screened Grid H.F. Pentode, H.F. Pentode Det., Directly Heated Power Pentode Output. Heavy Duty Rect. "*Thermometer Tuning*" with illuminated wavelength scale. 8" Energised Moving Coil Speaker. For A.C. Mains only 200/250v. (adjust.) 40/100 cycles. **£9.19.6**

Hire Purchase Terms: 17/- deposit and 12 monthly payments of 17/-.

The De Luxe Model 367

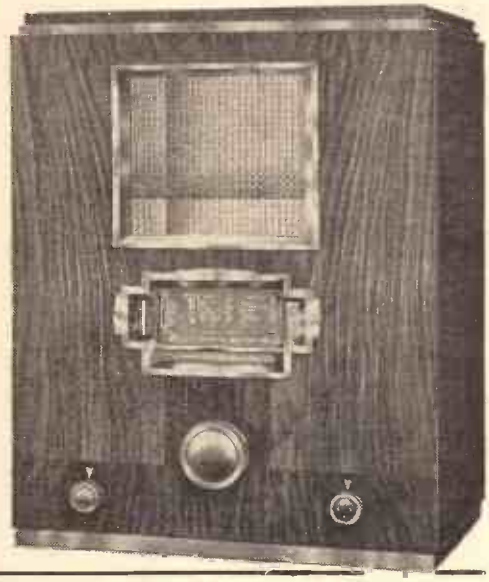
1935-36 *Quality* Radio

See them all at RADIOLYMPIA STAND 70

or send coupon for free literature giving *fullest* particulars.

COSSOR SUPERHET RADIO

The De Luxe Model 365



A.C. MAINS MODEL 364

(Similar to illustration above)

With Pentagrid Frequency Changer, H.F. Pentode I.F. Amplifier, Double Diode Detector, High Slope Pentode Output, Full Wave Rect., Thermometer Twin illuminated and detachable Scales. Combined On/Off, Wavechange and Pick-up Switch, Volume Control. 8" Mains Energised M.C. Speaker. Complete with plug and sockets for extension Speaker and for pick-up. A.C. Mains only 200/250 volts (adjust.) 40/100 cycles.

11 GNS.

Hire Purchase Terms: 20/- deposit and 12 monthly payments of 20/-.

Prices do not apply in I.F.S.

BATTERY MODEL 366A

(illustrated above)

A Battery operated Superhet with Pentagrid Frequency Changer, H.F. Screened Pentode I.F. Amplifier, Double Diode Detector and Economy Pentode Output. 8" Moving Coil Speaker. Cabinet with accommodation for suitable Accumulator and Batteries.

9 GNS.

Hire Purchase Terms: 17/6 deposit and 11 monthly payments of 17/6.

(Exclusive of Batteries.)

DE LUXE A.C. MAINS MODEL 365

(illustrated on right)

With a performance unsurpassed by any receiver regardless of price, this model incorporates every possible refinement that gives greater efficiency, simplicity and dependability. With Pentagrid Frequency Changer, H.F. Pentode I.F. Amplifier, Double Diode Triode Detector/Amplifier, Super Power Triode Output, Full-Wave Rect. Improved Superhet compensated Anti-Fading circuit with NEON Visual Tuning. Illuminated and detachable Scales. Combined On/Off Wavechange and Pick-up Switch. Volume Control. 10" Concert Grand Mains energised M.C. Speaker. Variable Tone control. Special switch plug for extension speaker. Connections for pick-up. A.C. Mains only 200/250 volts (adjust.) 40/100 cycles.

14 GNS.

Hire Purchase Terms: 25/- deposit and 12 monthly payments of 25/-.

THIS COUPON BRINGS FULL DETAILS

To A. C. Cossor Ltd.,
Melody Dept., Highbury Grove, London, N.5.

Please send me free of charge, literature giving full particulars of the *Model.....

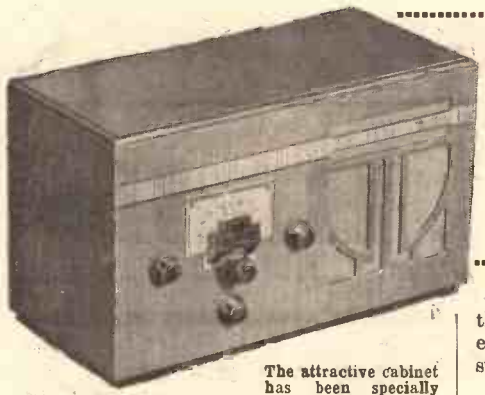
*Please state Model required.

Name .....

Address .....

P.W. 24/8/35

7319



The attractive cabinet has been specially designed for the receiver by a well-known artist.

THE "SENSITY SUPER"

A few days ago a bulky parcel arrived in the Research Department from Graham Farish, Ltd. Inside was the kit of a new three-valve set and full details for its construction. The set was assembled, and here are a few details concerning it.

AS I write this I have in front of me two outstanding pieces of workmanship. The first is the latest three-valver to be turned out as a home-constructor set by Graham Farish ; the other is the publication in which, among many other interesting things, the full description and blue print are provided—namely, the second issue of "Contact."

In this review of the "Sensity Super" I will try to give you some idea of these two outstanding products. Oh, I have forgotten—there is included in "Contact" a further unusual thing, in the form of a paper "crying towel," which readers are requested to present to any who may come crying to them with the complaint that they cannot get good programmes. On this lachrymal gift you are requested to urge the unfortunate listener to build the "Sensity Super" and "pick up the best of the world's transmissions."

It is an idea, Mr. Farish, an idea!

Quite a Good Looker.

But to get down to more serious topics. I have got the set made up in accordance with the instructions in "Contact," though I am not going to mislead you into assuming I did it myself. Anyway, it *is* made up in front of me as I write.

And it looks good, too. The Laurence cabinet is a very fine piece of work, and if I do not go into rhapsodies over the combination of dial and cabinet, well—that is probably my vile taste. Others will no doubt enthuse.

Let me explain that I have nothing against the dial itself. It is a piece of workmanship of which the makers can be justly proud. It is clear in its markings and the position of the pointer is always readily seen. But I, as befits one who is "writing up" a set, must find some adverse criticism. It is characteristic of all "reviewers." And now I have found it I feel satisfied. That it is such a small matter—and that I admit readily—goes to prove how excellent is the rest and all-important part of the whole outfit—the chassis itself.

The Circuit Employed.

The receiver, you must know, is not a superhet, though it can reasonably be called a "super," for the results it can give are in the super class.

I have had long experience of "Sensity" coils, and I know what they can do. I know their powers of bringing in the very last ounce of signal strength, for finding that distant station that you hardly knew existed, and bringing it up to comfortable strength.

In these iron-cored coils the "Sensity Super" has a mainstay of station-getting powers that means a very great deal.

A steep slope S.G. valve and an efficient detector are employed in the set, followed by auto-transformer coupling and a steep slope pentode. The valves are very well chosen, and are of Hivac make.

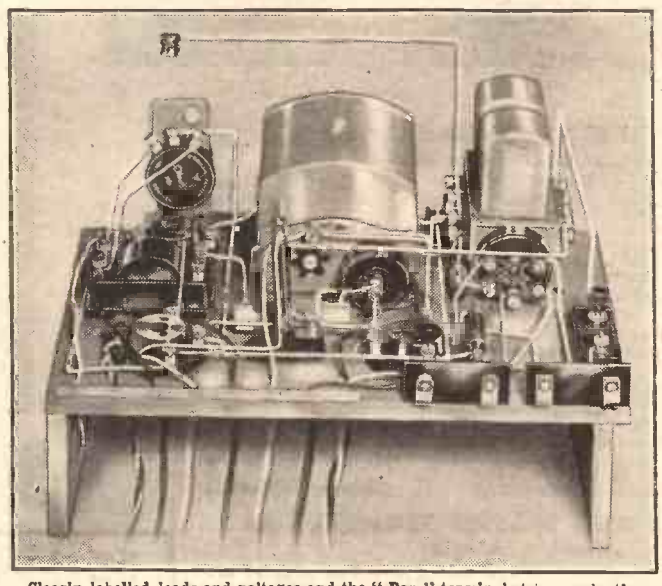
Lucid Explanation and Diagrams.

Volume controlling is carried out across the L.F. transformer, which is shunt-fed from the detector.

As I say, I have not actually built the set myself, but can assure readers that it does not take long to construct with the very lucid explanation and diagrams provided by the designers in "Contact."

To cap a good circuit we have a W.B. Stentorian speaker, so that readers of "P.W." will understand at a glance that the team work of the whole set has been carefully thought out.

A PARTICULARLY NEAT CHASSIS



Clearly labelled leads and voltages and the "Pop" terminal strips, make the "Sensity Super" exceedingly easy to connect to batteries, aerial and earth.

If I did not build the set I *did* connect it up to the batteries and aerial. Not hard work, you will say. You are right, but "righter" than you may think, for the set is one of the best I have ever had to connect—because it uses those new Graham Farish "Pop" terminals. You remember—those things with the springs instead of terminal heads on the outside. Very good they are, too. Easy to use, and hold the wires like a vice.

I am not going to tell you of the results I got with the "Sensity Super." In these days of big station bags it would be ridiculous. A list of stations would not convey much to you. But if I say that only twice did I go for a station during a whole evening's test and fail to get it, you may begin to get some inkling of the sensitivity of the receiver. And it was not because I did not try for many—that dial I have already mentioned simply demands that you should try for stations.

No, I think the reason is fairly easy to find. I do not believe the stations were on.

Lively and Sensitive.

The "Sensity Super" is a good set. It is certainly sensitive, and one of the most lively threes I have handled. I do not mean it is unstable. Certainly not. But it is one of those sets that simply asks you to use the reaction and do a bit of coaxing here and there, for you know that you are going to hear something out of the ordinary.

The series aerial condenser is useful. It allows the set to be "matched" up to practically any aerial, and enables the ganging to be accurately done. The tuning condenser has, of course, a concentric trimmer, so that one is never in doubt as to the state of ganging over any part of the wavelength range. It is always in step—it cannot help it. And to that trimmer must undoubtedly belong some of the praise that is due to the set for its station-getting powers.

About "Contact."

I have said enough. But before I close down I must say one more thing about the magazine "Contact." It is not filled with set descriptions. It has many articles of the more general type. Also there is a useful list of Graham Farish components and prices. A valuable book to have by you. And an interesting one, too.

I particularly like the large list of Graham Farish radio dealers who are "pledged to help you."

It is a goodly list and should prove of value to many constructors throughout the country. Yes; the book is not a bad four-penny-worth.

K. D. R.

RADIOLYMPIA

The NEW ACCESSORIES

RADIOLYMPIA can show you all the sets and components which are worth seeing; there is apparatus on view there which in the normal course of events you would probably never be able to examine at close quarters. Merely to be able to inspect all the different sets in the ordinary way, including the many new ones when they are released, you would have to go into a hundred different shops. Even then there might be many models of special kinds that could only be obtained by the retailer on order.

But even more importantly you are provided with the opportunity of hearing practically all the types and makes of loud-

The Radio Exhibition which is now on—until August 24th—is an ideal place in which to compare the latest components. Full of up-to-date developments, Olympia offers an unrivalled opportunity for the home constructor and set owner to obtain a comprehensive idea of "what is doing" in the world of wireless. In this article we offer guidance to the visitor to the Show and some valuable information on the matter of radio accessories for those who cannot go to Olympia.

HIGH AND LOW NOTES

One of the outstanding speakers at the Radio Show. It is a double unit incorporating both normal moving-coil and a horn "tweeter," and is made by W.B.

speakers actually working. And each and every one is fed from the one correctly balanced B.B.C. amplifier. It is a marvellous opportunity to obtain hundreds of comparative aural tests.

Walking from stand to stand you can go from one working loudspeaker to another. Dozens of them within an area you can cover with a few paces—and a bit of jostling! Compare this with those laborious one-at-a-time demonstrations in shops, even when as much as that is offered to you.

Worth Listening To.

You will find the speakers at this Show decidedly worth listening to. Probably in no other component or accessory is there so much marked progress, or progress which can at once be appreciated by the ordinary listener and constructor.

It takes complicated measuring instruments and expert knowledge to assess improvements in most pieces of radio apparatus, but the speaker is the last link in the reception chain, the link which transforms electrical impulses into sound, and obviously any serious faults or, on the other hand, any special virtues in its functioning will be directly appreciable by the ear.

What is particularly noticeable in the 1936 range of loudspeakers is that the moving-coil has now become almost the one and only principle of design. The reed and other moving irons in all their multifarious varieties have faded away into history with but one or two exceptions.

Remarkable Developments.

The development of the moving coil is a quite startling phenomenon, and it has brought really high-class reproduction within the grasp of every listener.

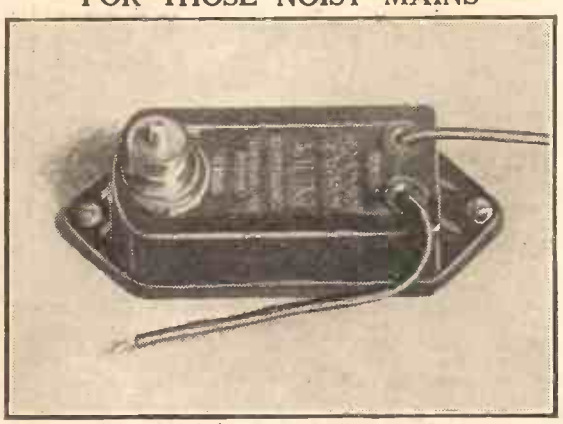
The Show reveals that there has been a great deal of work done on the "m.c." during the past year. The improvements more or less fall under three heads. First, those connected with the magnet system. The permanent magnet types are achieving what are, in the circumstances, amazing degrees of sensitivity, and this is in part due to improved magnets.

Among the new alloys which are being used is "Alni," the mixture of aluminium and nickel. This is much lighter than cobalt steel, but for a given mass produces a rather greater magnetic power.

And then again, methods of constructing the coil and retaining it in its position have improved, enabling closer limits to be worked to in mass production without reducing reliability and consistency of performance.

Thirdly, new cone designs and constructions are to be seen. In general, the purposes of these are to give a less-focused emission of high notes, so as to reduce the directional tendency of the speaker and to eliminate resonance effects occurring within the normal audio band of frequencies.

FOR THOSE NOISY MAINS



Here is a different kind of trap—one for the noises that get into a wireless set from the mains. It is the Graham Farish "Mum" Suppressor.

STATION SEPARATION

A neat wavetrap unit that has been specially designed by Wearite to cope with modern conditions.

In at least one case an elliptical shape of cone has been adopted. In others, special sectionised constructions are employed. For example, one make has a very stiff centre for high-note handling and a large, curving outer section for the efficient discrimination of low notes.

The responses given by some of the "baby" permanent magnet moving-coil loudspeakers which appear at Olympia are really quite staggering. From little instruments of the size of saucers come forth low notes that are quite full and robust and, which is more to be expected, clean and clear high notes, at a volume almost incongruous in its intensity.

Extension Speakers.

These "babies" cost round about £1, while for twice that figure you can now obtain senior models big and robust and brimful of up-to-the-minute technique.

The double-loudspeaker idea still holds its ground. In fact it has, we believe, advanced to some extent.

And there is no doubt at all as to the increase in interest in the extension speaker idea. The larger

(*Continued on next page.*)

THE NEW ACCESSORIES

(Continued from previous page.)

proportion of sets at this year's Show are designed to permit the easy connection of additional speakers. This reminds us of a rather interesting letter we received from a reader a few weeks ago.

He wrote to us asking why it was his set gave better results when an extension speaker was connected. Answering certain questions which we asked him in order to elucidate the matter, it appeared that what he meant was that the results on the extension speaker were superior to those given by the speaker built into his set.

TO KEEP IT QUIET

A Belling-Lee flex lead suppressor for fitting close to an unearthed electrical appliance such as a vacuum-cleaner or fan suspected of creating interference.

The facts of the case were that the new speaker was a much better one, and it was operating under better conditions in the bargain, for, instead of being crowded into a rather small and cramped cabinet with all the set components and so on, it was mounted on a fair sized baffle. No wonder the "set gave better results"!

There is a moral here—several in fact. One is that a set is no better than its loudspeaker. There are probably hundreds of thousands of receivers working which have outputs rather better than their loudspeakers can take full advantage of.

Everyone who is operating an all-in set a few years old ought to give very close consideration to this extension speaker idea for reasons of good radio reception.

Valves have by no means stood still during the year that has elapsed since the last exhibition at Olympia. Many new and special types have made their appearances. There are miniature valves having first-class characteristics and a whole horde of such multi-functional valves as octode frequency changers, double-diode triodes, and so on.

Improvements in Characteristics.

It is true that many of these are not exactly new in principle, but there are notable improvements in characteristics and extensions of what were exclusively mains types into the battery ranges.

Probably the greatest improvements are to be seen in the universal mains valves for A.C./D.C. working. These are no longer in the nature of Cinderellas, but now rank in importance with the lordly A.C.'s.

Interference elimination is a subject which must at one time or another be of direct importance to all of us. The disturbances occasioned by "man-made static" are, in fact, terribly widespread nuisances. One of these days there may be official action on a large scale against them.

This is very much warranted as many listeners know to their cost. Several years ago an official committee commenced to investigate the matter. It is still investigating.

One of the many types of Clix heavy-duty spade terminals.

But the radio industry has not stood still. Interference-suppressing devices by the score are to be seen at Radiolympia. Many of these are concerned with the elimination of the interference at its source. Thus, there are special suppressors for domestic appliances such as vacuum cleaners, fans, refrigerators, and so forth, others for lifts, flashing signs, etc.

But when it is impossible to have the interference muzzled in that way, there are still steps which can be taken by the listener-sufferer himself. Thus, there are suppressors for preventing interference from entering into the set via the mains. Easy ones to connect up too, some being ingeniously designed as plug-adaptors.

H.T. and G.B. batteries, though better, are cheaper than ever.

A notable feature in the L.T. batteries shown is the increasing adoption of "tell-tale" devices to provide immediate visual evidence of the condition of cells. These all operate on the hydrometer principle, that is to say, they function in accordance with alterations in the specific gravity of the acid solution.

There is an extremely agreeable tendency for a greater robustness of the construction of the radio L.T.'s. Substantial protected terminals and large filler stops and vents all make for better service and longer battery life.

"P.W." LEADS AGAIN!

IMPORTANT FEATURE TO PROVIDE AUTHORITATIVE GUIDANCE FOR LISTENERS.

"P.W." is pleased to be able to announce that arrangements have now been concluded for the inauguration almost immediately of a unique and authoritative series of test reports dealing with the most outstanding sets of 1936.

The galaxy of wonderful designs at Olympia this year, while constituting a striking tribute to the virility of the industry and to British radio as a whole, does not tend to simplify the listener's problem of selecting, from so many possibles, the receiver most suited to his own particular requirements.

In this new series of tests, therefore, it will be the aim to provide authoritative guidance for listeners in as non-technical a manner as possible, and while all sets submitted to us will be subjected to most stringent laboratory tests, the reports will be prepared with particular regard to ordinary domestic considerations.

This invaluable feature, which is to include such leading makes as **Cossor, Ekco, Marconiphone, H.M.V., Ferranti, G.E.C.**, etc., will commence in an early issue.

PIN YOUR FAITH TO "P.W."!

TELEVISION JOTTINGS

By L. H. Thomas

I AM still trying to make up my mind whether a recent statement in the non-technical Press was intentionally or merely unintentionally humorous. It referred to the possibility, in the distant future, of "car-television-and-radio"! Car-radio, we know, is very much in the news this year, and it seems to be generally agreed, after a certain amount of argument, that the normal human being *can* still drive a car when various distracting sounds are circulating round the inside of that vehicle.

Where he is supposed to acquire his second pair of eyes from in order to watch "car-television" I haven't yet fathomed. Perhaps however such conveniences are intended for the passengers only.

The Main Point.

The main point at issue seems to be whether the motor trade would consent to a general increase in the size of their products in order to accommodate high-definition television receivers.

Looking back at the paragraph in question I have come to the conclusion that the humour *was* unintentional!

With television so much in the news as a final achievement, it is natural that much ink should be spilled in writing about its future (hypothetical) spheres of usefulness. Either the writers who have tackled the subject suffer from a severe shortage of imagination or else they are too well aware of the technical limitations. Their idea of bliss appears to be the possibility of seeing the face of the person whom one is 'phoning—a very doubtful pleasure in many cases.

Television, to have any advantage over the films, must be used either in cases where it is of vital importance that the scene transmitted should be seen *instantaneously* at a distance, or in others in which it is impracticable to use a film camera at the other end. In the latter class one instantly visualises the cases in which the operator cannot be at the "other end," and a remotely controlled television transmitter takes his place.

The televising of distant views by means of a transmitter in a remotely controlled aeroplane has already been suggested. Another possible application that springs to mind is concerned with railway work, particularly during fog, when "noctovision," or some development of it, could be used.

No doubt when the new transmissions really start up we shall slowly exhaust the range of thrilling broadcasts—the first transmission from the air, from the bottom of the sea, and from all sorts of queer places will simply be queueing up to be released upon us.

Special S.W. Valves.

The ultra-short-wave superhet will be very much to the fore by Christmas, as it seems to be generally agreed that it is the only reliable means of receiving television signals unless one is very close to the transmitter. It is good therefore to learn that special valves will shortly be available, designed expressly to work on the ultra-shorts. In America, of course, they have a marvellous "Acorn pentode" which actually gives a high amount of gain on frequencies right up to 60 megacycles. The detector and oscillator, however, are equally important.

Many of the existing types of triodes are unreliable as oscillators on 5 metres, although most of them will start up without any trouble when a Hartley or Colpitts type of circuit is used.

The new valves, it is claimed, will oscillate easily down to wavelengths of less than 1 metre. How long it will be before it is necessary to use such wavelengths we cannot say.

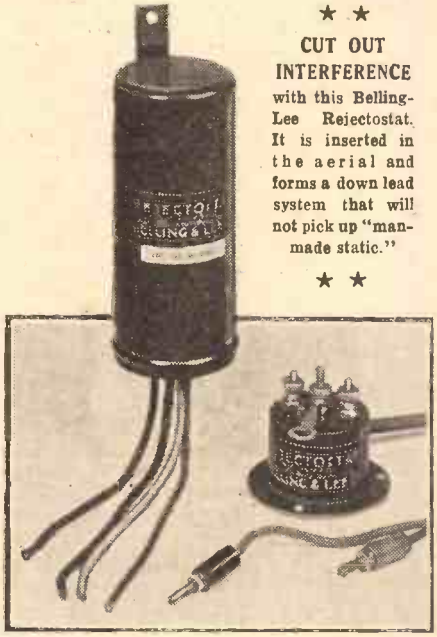
COMPONENT DEVELOPMENTS

RADIOLYMPIA

THIS is a great year for the home constructor. There has never previously been a radio exhibition revealing so many novelties and developments in components.

There may have been more components in the bulk to be seen at some of the earlier Shows. But if those bulks were to be analysed in the light of present-day knowledge, it would be seen that there was a great deal of repetition, much of it rather unnecessary from a technical point of view.

It can now be said that every different component has its different purpose. Difference for the mere sake of variety no longer attracts the man who builds his own sets—he knows a bit too much about his subject.



★ ★

CUT OUT INTERFERENCE

with this Belling-Lee Rejectostat. It is inserted in the aerial and forms a down lead system that will not pick up "man-made static."

★ ★

At one time it seemed almost as though some of the so-called "new components" which made their appearance were merely the old ones in new cases, or made up in a slightly different manner.

Entirely Different Introductions

But at the 1935 Radiolympia it can be said, without the slightest exaggeration, that there are components entirely different from any which have preceded them and components which, moreover, are capable of unique applications.

For instance, several firms are exhibiting ultra-short-wave apparatus. The ultra-short waves have hitherto been the exclusive province of the advanced amateur. There have been no commercial parts available for many of the circuits, and so they have had to be home-made, and that is often a tricky job calling for no mean skill.

By the way, we see once again how the home constructor leads the way. A few years ago there were very few, if any, factory-built short-wave sets on the market, but as home constructors who, building their own outfits, increased in number and began to spread the news of short-wave doings to the listening public, so the radio industry began to meet a growing demand by producing commercial short-wave sets.

The design of radio receiver parts has gone ahead by leaps and bounds during the past few months. Coils, condensers, valve holders, etc., all show marked signs of considerable improvement. Here is a brief description of the latest components that are now available.

At this present Radiolympia there are many makes of all-wavers to be seen, but none which goes down to the ultra-short waves.

It is a fascinating waveband, although at present there are only amateur transmitters and a few experimental television transmissions to be heard on it. However, very shortly now the television service will be in operation providing sound and vision programmes every day, at first for the London area and later for the provinces.

A New Field

This is an entirely new field of interest for the home constructor to explore. Ultra-short-wave receivers are not difficult to construct. Now there are special components on the market for such sets it can be said that there are really few, if any, greater difficulties than are encountered on the ordinary wavebands.

The ultra-short-wave components which are on view at Olympia are therefore of more than passing interest, for they are precursors of a new home-constructor movement. Besides that, they are of very great technical importance.

A coil for tuning six or seven metres is an entirely different proposition from the ordinary coil. The iron-cored technique for instance, cannot be followed down on the ultra-shorts. Here you get unshielded coils of a mere turn or two of wire. Also special methods of connection have to be adopted. A few inches of lead here or there might not matter when you are dealing with a medium-wave station, but the inductance of a lead, regarded as of moderate length in the normal course of events, might easily be as great as that of the coil itself in the case of an ultra-short waver!

And then there are such things as H.F. chokes and valve holders and tuning condensers. All these must be specially designed in accordance with a different set of standards. And their appearances interestingly reveal that fact.

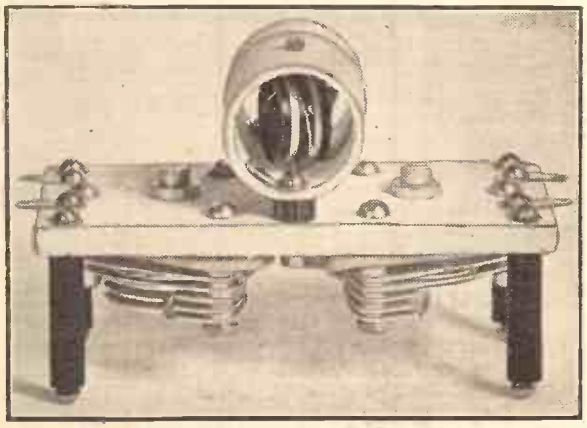
No good trying to employ a standard ·0005-mfds. variable for tuning Alexandra Palace (when it starts). A very small capacity is needed, of course, but that old series aerial condenser won't do the job!

Proof of Potentialities

Among those who are exhibiting ultra-short-wave apparatus are such notable firms as Colvern, British Television Supplies, Stratton, Wright and Weaire, Graham Farish, Wingrove and Rogers, and Bulgin. The number and calibre of the firms engaged in this new radio enterprise provide very clear proof of its potentialities.

There is also much that is new and interesting in regard to normal short-wave gear, and elsewhere in this number you will find a special article dealing exclusively with this, and which also has more to say about the ultra-shorts.

FOR S.W. SUPERHETS



A new intermediate frequency unit for ultra-short-wave superhets. It is mounted on a Meganite base and is made by B.T.S.

It might reasonably have been thought that ordinary coils had more or less reached finality. The iron-cored technique has for some time been mastered. In its earlier stages of development

(*Continued on next page.*)

COMPONENT DEVELOPMENTS

(Continued from previous page.)

there was naturally a certain amount of production experimentalism, but for a year at least iron-cored coils have been standard components mass produced.

Nevertheless, there are several new types of iron-cored coils to be seen at Radiolympia. These do not, for the most part, include improvements of a fundamental nature, but rather refinements or, more often, they are special constructions designed for specific modern uses.

There have been several circuit developments of a fairly revolutionary character lately. For instance, the superhet has, with its octode frequency changer, double-diode triodes and pentodes, blossomed out as an entirely different conception from the superhet of a few Shows ago.

Advancement in I.F. Transformers.

There has also been considerable advancement in connection with the I.F. channel. To meet the special requirements of these modern circuital structures the coil manufacturers have produced special coils and coil units and I.F. transformers.

Varley, Colvern, and Wright and Weaire are among the several firms who are including new iron-cored coils in their lists.

Air-cored coils are still being produced, however, and, generally speaking, the reasons are that they are slightly cheaper, and in certain circumstances they can be used just as well as the more efficient iron-cored varieties.

One really notable fact plainly evinces itself, and that is there is a very marked tendency for the price of components to fall. Components are cheaper as well as better.

The Use of Wire Ends.

We believe the reason is that the line of demarcation between set-makers' components and components for sale separately to home constructors is not now so clear cut.

You see this most clearly in the wire-end compartments, those resistances and condensers which, instead of requiring holders or having terminals, possess short lengths of bare wire as their connectors.

Obviously, parts like that are equally suitable for either the set manufacturer or the home constructor, and being thus standardised for two markets, the cost of production is greatly lowered.

The same kind of thing, though not in so marked a degree, applies to many of the other components.

Reverting back to coils, another feature to be noted is the wider applications of the ganging principle. It is now possible to take standard coils of one of several makes and gang them in a variety of formations. This says a great deal for the high degree of accuracy in manufacture which has been attained.

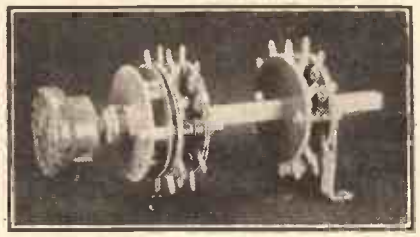
Not so very long ago individual matching was essential and so gang assemblies were always regarded with suspicion if they were not rigidly marshalled by the manufacturer and more or less locked up solidly.

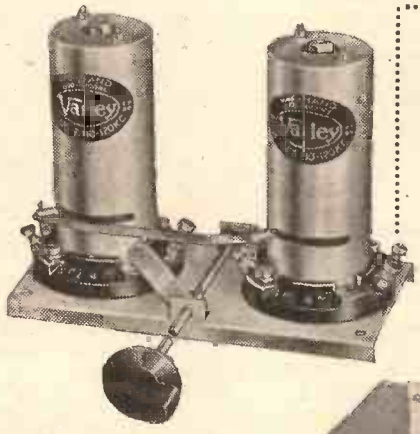
Referring to ganging reminds us of the number of makes of potentiometers which are now supplied either incorporating switches or so designed that they can subsequently be ganged with a switch.

This is a POPULAR WIRELESS scheme, and we well remember the difficulties we encountered in getting the industry to apply it. One or two firms were, however, quick to see its potentialities and advantages. To-day we have the satisfaction of seeing switch-volume controls, and potentiometers used for various purposes which also include switches, on a quite considerable proportion of the sets exhibited at Olympia.

Many new types of valve holders are to be seen at this Show. There are five, seven and nine-pin models in a variety of novel constructions. There are, too, a number of short-wave valve holders, and the most outstanding point about these is that new and improved insulating materials make their appearance.

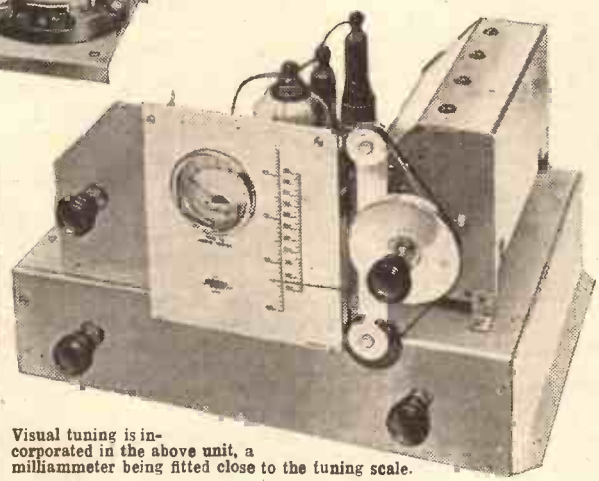
Constructors will also note the continued progress that is being made in what we may term the gadgets. It is now possible to purchase at little cost highly finished panel lights, switch indications, knobs, plugs and sockets and other such fitments which can contribute to a real professional appearance to a set.





AN INTERESTING GROUP

These are all new components which have just made their appearance on the market. Above is a Bulgin S.122 switch, a five-position affair for the firm's four-range coils and radiogram switching. To the left is a Varley Variband Duo Nicore intermediate transformer unit. Below can be seen a special Haynes tuning unit, for two H.F. stages.



Visual tuning is incorporated in the above unit, a milliammeter being fitted close to the tuning scale.

Rough finishes, such as marked many previous articles designed for amateur use, are now not to be seen anywhere. Instead, nickel and chromium plating and tasteful bakelite mouldings are found even in the smallest items.

There has been no swing away from terminals. There is still a small proportion of makes of components of various kinds which demand soldering, but the proportion is no higher than before. Rather it is lower.

Progress in Insulated Terminals.

In terminals as separate items there has been further progress particularly in regard to insulated types for mains sets and units. In these the diversity of forms will please the man who likes to be able to choose from many equally suitable alternatives.

And then again there are numerous items directed at making the lot of the home constructor easier than ever. We can instance the various connectors and adaptors offered by Messrs. Belling and Lee.

Although television as such does not figure in a noticeable fashion at this Show, following the dictates of the R.M.A., there are many components to be seen which have obviously been designed to be specially suited to the requirements of television radio sets.

All that ultra-short-wave gear to which we have already referred is clearly of direct television interest, but in addition to this there are high voltage condensers of the oil immersion type. Dubiliers, for one, are making them.

For Cathode-Ray Work.

These, despite their compactness, are able to withstand the high voltages, in cases up to thousands of volts, which are encountered in cathode ray work.

There are also mains transformers and rectifiers which, similarly, are applicable to these tasks.

No doubt at the next Show there will be television sets by the score, but this year television will no doubt largely remain the preserves of the amateur.

Variable condensers do not reveal any very marked developments—that is, variable condensers for use on the medium and long wavebands. But then these components have for some time now reached very high standards of mechanical and electrical efficiencies. Indeed, condenser making has been the subject of skilled specialisation and has, therefore, advanced rather more rapidly than almost any other department of the radio industry.

But what are to be seen at this great show at Olympia are various attractive and useful new refinements in slow-motion devices. These are available in a multitude of forms and sizes and provide the home constructor with a magnificent selection of alternatives from which to choose. It is a simple matter for him to duplicate almost any commercial set style of panel layout which he finds attractive.

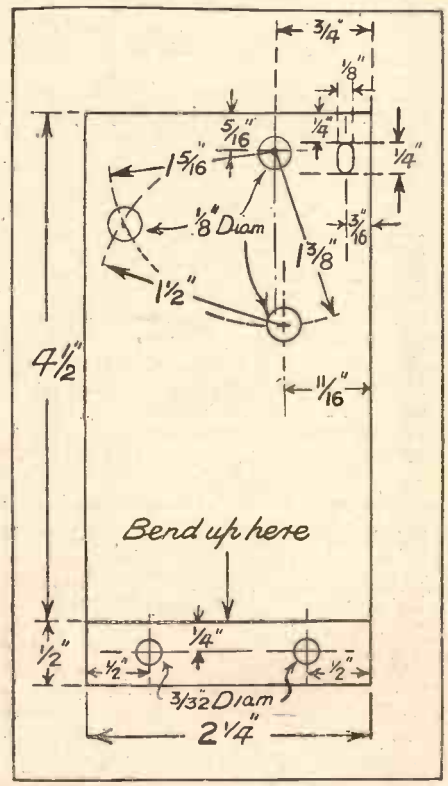
The "All-Ways" Three

TRIMMING THE GANG CONDENSER—THE H.T. VOLTAGES TO USE AND TUNING IN ON THE SHORT WAVES ARE AMONG THE POINTS DEALT WITH IN THESE HINTS ON GETTING THE BEST RESULTS FROM OUR SPECIAL EXHIBITION TWO-CHANNEL RECEIVER.

WELL, are you ready to try out your two-channel receiver? Perhaps you have not quite finished completing it. Possibly you have decided to make your own bracket for the short-wave coil holder in preference to buying one. If so, you will find the necessary dimensions in a diagram on this page.

In any case, whether you have completed the instrument or still have some way to go before the job is finished, you will be ready for these hints on getting the best results.

THE SPECIAL BRACKET



This diagram gives all the dimensions for the special short-wave-coil mounting bracket. It should be made from stout aluminium or brass.

As you already know the "All-Ways" Three is virtually split into two portions: the broadcast side is treated separately from the short-wave portion. This feature is one which simplifies both the operation and adjustment as well as the construction.

When you adjust the ganging of the broadcast portion you simply forget all about short waves—that side of the set might as well not exist as far as broadcasting is concerned. Then when you come to the short-wave side you just forget the broadcast section. How easy this makes it!

The cabinet design, you will note, is such that the short-wave panel can be shut off so that only the broadcast controls are visible or vice versa. Of course, if you are using the set for simultaneous reception you will, first of all, adjust the broadcast tuning to some station you want to hear, or rather, the rest of the family want to hear, and then shut off this side by lifting the lid on the front of the set, thus exposing the short-wave controls which you can then operate as you wish, so as to bring in the various transmissions on these frequencies.

Two Programmes at Once.

In the meantime of course the family are listening to their favourite broadcasting station on the medium or long waves on the extension speaker in another room.

You have a pair of telephones over your head and are quietly enjoying the thrills of short-wave listening.

First of all we will talk about the broadcast portion. From the point of view of adjustment, that is, trimming and so forth, it is just like any ordinary conventional set. There are only two H.T. tappings on the set, H.T.+2 supplying the anodes of V_2 and V_3, as well as the J240 with H.T. current, H.T.+1 goes to the J240 valve and nowhere else. H.T.+2 is plugged into the maximum voltage of the battery, which in the majority of cases will be 120 volts. H.T.+1 is plugged in at about 60 volts. G.B.—2 should be 3 volts.

Connect your loudspeaker to the two terminals marked "Broadcast Output." Your 'phones for short-wave listening are joined to the two terminals marked "Short-wave Output."

The aerial and earth are joined to the appropriate terminals. Use a perfectly normal earth connection, such as a tube, piece of metal buried in the ground, or water pipe. For the aerial use the best arrangement you can erect, according to your own particular circumstances.

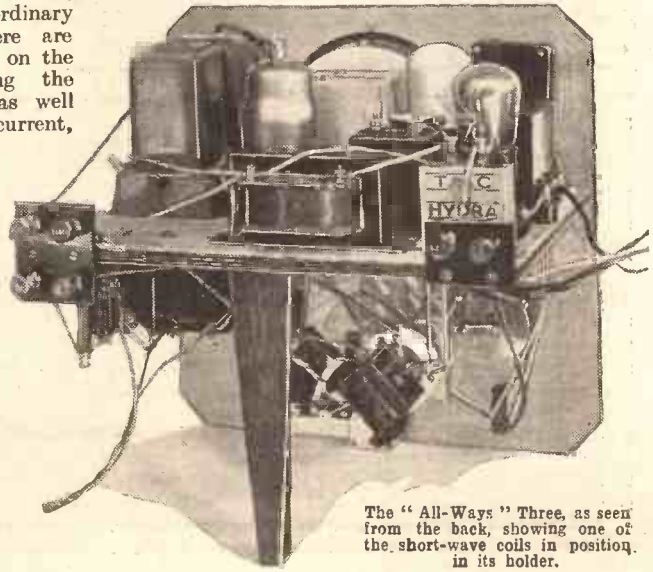
Obviously an outside aerial will give better results than one of the indoor variety. In fact we recommend a good outdoor aerial if this can be arranged.

Broadcast Section Adjustments.

Switch on the broadcasting section by pulling down the toggle "on-off" switch. Rotate the volume control knob clockwise to the maximum volume position. Then without touching the trimmers on the two-gang condenser and with the wavechange switch in the medium-wave position, tune-in a station. Try to pick up a weak transmission near the lower end of the wave range. Then adjust the trimmers, starting with the rearmost one, until the transmission is heard at its maximum volume. Increase the reaction slightly, so as to bring up the strength of the station, and then reduce the strength by using the volume control. Again slightly readjust the trimmers should this be necessary until you find that you

(*Continued on next page.*)

EVERYTHING COMPLETE



The "All-Ways" Three, as seen from the back, showing one of the short-wave coils in position in its holder.

THE "ALL-WAYS" THREE

(Continued from previous page.)

cannot improve on the volume of the station any more.

The ganging should now be O.K. for the broadcast waveband. To bring up a station to its maximum strength and to get the very highest degree of selectivity, you should increase the amount of reaction by moving the reaction knob in a clockwise direction.

Alternatively, if you want to listen to your local station in comfort, keep the reaction control in its zero reaction position, and cut down the volume as required with the volume control on the right of the panel.

The Trimmers

Incidentally, the trimmers are of the screw-head type, and can easily be adjusted by sharpening a piece of wood after the fashion of a screwdriver blade. This will engage the slotted head and enable you to achieve the necessary fine adjustment.

And now for the short-wave side. Switch off the broadcast "on-off" switch and switch on the short-wave "on-off" switch.

The H.T. voltages remain the same as for the broadcast section, and G.B.—1 should be plugged into the 1½-volt tapping on the G.B. battery. Incidentally, this plug must be inserted before you switch on the set.

To tune in a station on the ordinary short waveband, place the ultra-short wave tuning condenser so that the moving vane is fully disengaged from the fixed.

Carry out your tuning on the ·00015 condenser in the centre of the panel. Insert a short-wave coil in the coil holder, and, keeping the short-wave reaction condenser so that the set is just not quite oscillating, slowly rotate the short-wave tuning condenser knob.

Handling Reaction on Short Waves

You must bear in mind that your results on the short waveband depend very largely upon the use of reaction, and therefore you should always keep reaction fairly near the oscillation point, but not so close that it causes a hopeless jumbling up of reception.

Also rotate the tuning condenser knob very slowly indeed. It is very easy to miss a short-wave transmission.

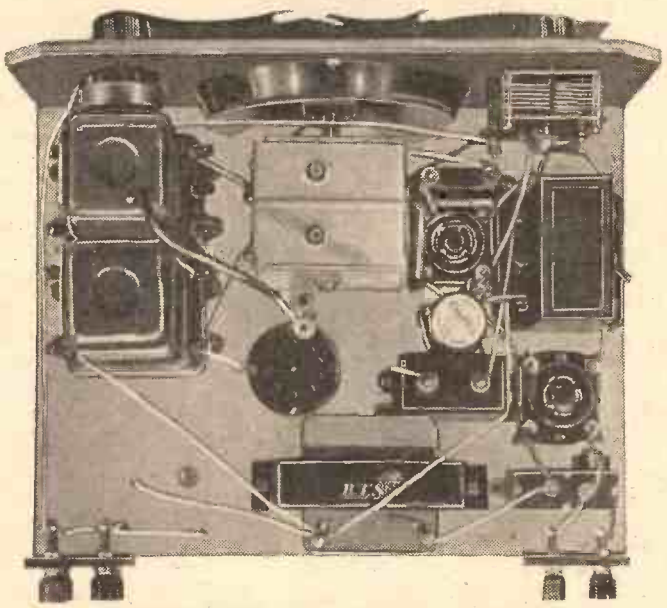
The best time for listening depends upon the part of the world in which the short-wave station is situated. "P.W.'s" short-wave expert, W. L. S., frequently gives valuable hints on this point, and we recommend you to read this popular feature regularly from which you will derive a great deal of helpful information.

The ultra-short waves should be tuned-in on the ultra-short-wave condenser, which is the knob on the left-hand side of the panel. While on this waveband, the ·00015 tuning condenser knob should be turned so that the moving vanes are right out, that is, so that the condenser is at its minimum capacity.

You will want this condenser only when you are using the smallest of your coils.

By the way, when you are carrying out simultaneous broadcast and short-wave reception, there is no need to have both of the "on-off" switches in the "on" position. The broadcast "on-off" switch will serve both purposes; the short-wave switch is needed only when you wish to listen on the short waves with the broadcast side of the set not working.

AS SEEN FROM ABOVE



THE BROADCAST SECTION. Note the two trimmers on the top of the two-gang condenser. These should be adjusted on a weak transmission, as described in the article.

MICRO-WAVES IN GERMANY

GERMAN research workers have lagged behind the general development of micro-wave technique in other countries. The well-known German firm of C. Lorenz, which stands in close connection with the "Standard" group has, however, been making successful use of micro-wave apparatus for various purposes. Recently, the German Press were invited to the first large-scale public demonstration of micro-waves in Germany by the Telefunken Company. Dr. Runge demonstrated the curious directional properties of these waves, and gave interesting details as to their application.

The visitors were then taken to the Müggelsee, a lake near Berlin, where the special uses of micro-waves for guiding ships in bad weather were successfully demonstrated. A large-dial instrument was placed in the bows of the ship, and steering became a simple matter by following the central beam from a transmitter some distance away.

The Telefunken Company make use of the so-called "Habann valve" for their micro-wave work. This valve has only two electrodes, but it is situated in a magnetic field which more or less takes the place of the grid. Professor Habann of the technical university in Braunschweig is the inventor of the valve.

ALL THE PARTS YOU REQUIRE ARE GIVEN IN THIS LIST

1 "Polar" 2-gang ·0005-mfd. tuning condenser, Midget type.
1 "Polar" semi-circular drive for above.
1 Pair "Wearite" screened coils, types W.L.Q and W.L.T.
1 "Polar" 10,000-ohm potentiometer.
1 J.B. ·0003-mfd. differential reaction condenser.
1 "Clix" chassis-mounting 9-pin valve holder, with screw terminals.
2 Benjamin "Vibrolder" 4-pin valve holders.
1 Varley multi-cellular junior H.F choke.
1 Bulgin universal Transcoupler.
1 B.T.S. output choke.
1 Bulgin 3-point shorting toggle-switch, type S.87.
2 T.C.C. 2-mfd. fixed condensers, type 50.
1 T.M.C.-Hydra 2-mfd. fixed condenser, type 30.
1 Dubilier 2-mfd. fixed condenser, type B.B.
1 T.M.C.-Hydra ·25-mfd. tubular fixed condenser, 300-v. D.C. working.
1 Dubilier ·001-mfd. fixed condenser, type 670.
1 Dubilier ·0003-mfd. fixed condenser, type 670.
1 T.C.C. ·0003-mfd. fixed condenser, type 34.
1 "Erie" 2-meg. grid leak, 1-watt type.
1 "Erie" 1-meg. grid leak, 1-watt type.
1 "Erie" 25,000-ohm resistance, 1-watt type.
1 Graham Farish 15,000-ohm resistance in vertical holder.
1 J.B. ·00015-mfd. short-wave tuning condenser.
1 J.B. double-ratio drive for above.
1 Eddystone ·0002-mfd. S.W. slow-motion reaction condenser.
1 Set Colvern short-wave coils.
1 Colvern special ultra-short-wave tuning condenser.
1 Eddystone 4-pin S.W. valve holder, baseboard mounting type.
1 Bulgin S.W. H.F. choke, type H.F.3.
1 Varley "Niclet" L.F. transformer, 3·5/1.
1 Bulgin toggle on-off switch, type S.80.
1 Peto-Scott special bracket for S.W. coil holder.
1 Peto-Scott "Metaplex" (both sides), baseboard 12 in. × 9 in. × ⅜ in., with support.
1 Peto-Scott polished wood panel, 12 in. × 12 in. × ¼ in.
1 Sheet copper foil 12 in. × 12 in.
1 Peto-Scott special cabinet.
1 Peto-Scott terminal strip, 2⅜ in. × 2 in.
1 Peto-Scott terminal strip, 2 in. × 1⅜ in.
6 "Clix" terminals, type A.
5 "Clix" wander-plugs.
1 Belling & Lee wander-fuse.
2 Belling & Lee accumulator spades.
Screws, flex, etc.

VALVES.
Hivac J.240. Cossor 210 H.F.
Cossor 220P.A.

BATTERIES.
H.T.—120 volts: G.E.C.
L.T.—2 volts: Exide.
G.B.—4½ volts: G.E.C.

LOUDSPEAKER.—W.B. Model 36S "Stentorian."

AN HISTORIC ATTAINMENT

Mr. G. V. Dowding, Associate I.E.E., Technical Editor of "POPULAR WIRELESS":

"In my opinion your new 'Stentorian Senior' marks a very definite step forward in sound reproduction. Knowing something of the intricacies and problems involved in the technique of Loudspeakers design, I find it amazing that such sensitivity and balance of response have been achieved.

"You are to be congratulated on what is one of the most praiseworthy radio developments of the year, and the Public is indeed fortunate in having the opportunity to acquire this latest W. B. advance at a reasonable price.

"You are certainly setting a hot pace in Loudspeaker design!

"As a technician I have gained great pleasure in running up and down the frequency scale of this new 'Stentorian,' noting the width of the audio spectrum which it encompasses and the absence of interfering resonances; and as a listener to the Broadcast Programme I have appreciated its wonderfully 'naturalistic' rendition of speech and musical items."

G. V. Dowding

Hear for yourself—on your OWN set if possible — the reason for Mr. Dowding's enthusiasm. You will be struck by the magnificent volume and the new cleanness of reproduction. You will notice clear top notes and a strikingly colourful realism of which you never thought your set capable. Ask your Dealer TO-DAY or write for the leaflet.

This startling new design, bristling with important improvements on orthodox practice, marks a new peak of high achievement in Speaker technique. It enables the "quality" enthusiast to obtain, at reasonable cost, a "laboratory" standard of reproduction previously only obtainable at almost prohibitive expense.

Amongst the "1936 Stentorian's" innumerable technical advantages the following are outstanding. Each in itself is a marked advance. Each takes an important part in bringing a new high fidelity and volume.

- New and larger "Mansfield" magnet, giving a flux density previously unequalled in a commercial instrument.
- New micro-accurate construction, providing better sensitivity and cleaner reproduction.
- Improved "Microlode" matching device, section-wound and paper interleaved.
- Hand-made cone, for improved attack and freedom from frequency-doubling and focussing.

Read Mr. Dowding's message, and then hear a "1936 Stentorian" for yourself. You will be amazed at the new quality it gives!

1936 STENTORIAN

Senior Chassis **42/-**
Junior Chassis **32/6**
Baby Chassis **23/6**
Midget Chassis **17/6**
Stentorian Duplex **84/-**

1936

RADIOLYMPIA See Them On STAND No. 95

STENTORIAN

PERMANENT MAGNET MOVING-COIL SPEAKER

Whiteley Electrical Radio Co., Ltd., Information Dept., Radio Works, Mansfield, Notts.
Sole Agents in I.F.S.: Kelly & Shiel, Ltd., 47, Fleet Street, Dublin.

ON THE SHORT WAVES—*Contd. from page 653.*

Points from the POST-BAG

B. P. T. (Bath) has built the "Simplex" Two, and is trying to wind his own coils on valve-bases, as I suggested. He finds, though, that the ebonite of which they are made is so glossy that it is difficult to keep the turns from slipping about. Well, B. P. T., you must either wind them *very* tightly (having previously stretched the wire, of course) or you must rub down the formers with emery paper until they have a matt finish.

Yes, your samples of wire are of suitable gauges. I should imagine that your trouble is simply that you haven't stretched the enamelled wire sufficiently before starting the job.

Four-Valve S.W. Converter.

F. G. (Old Lenton) has logged L U 8 V R, on 20 metres, working with G 5 N I, and wants his full address. He's not in my call-book, but he is, of course, in Argentina.

H. C. L. (Buckley) has also been after amateurs, and frequently logs the Barbados station V P 6 Y B on telephony. He heard a description of his receiver, which appears to be a "12-tube" American broadcast receiver with a four valve short-wave converter! By the way, H. C. L., your Swiss station's call-sign is H B 9 G. H B is the regular prefix for Switzerland.

K. B. (Bournemouth) finds that he can't hear much on the 20-metre amateur band, and wants to know if a change in the direction of his aerial would be beneficial. I don't think it would for a moment, K. B., unless your present arrangement is badly screened or inefficient in some other way.

"Normandie" Logged.

I expect your trouble is in the receiver, because the 20-metre stations you do mention are just the very strongest ones, and you won't hear anything on the amateur band to compare with them in power.

Incidentally, K. B. is among a group of readers who were fortunate enough to log the "Normandie" on her maiden voyage. He heard a London newspaper reporter sending in his article by 'phone from the ship.

Mr. J. R. Gordon, of 15, Station Road, Fife-Keith, Banffshire, wants to get in touch with a fellow short-wave fan somewhere in his vicinity. Will someone please introduce himself to him? J. R. G. says that he has demonstrated my single valver to "loads of local sceptics," some of whom have walked miles to hear Sydney on Sunday afternoons.

It's a funny thing that people who will walk miles to hear Sydney won't pluck up the courage to make their own little receiver! We short-wave people seem to be the victims of much mistrust still, don't we?

Yet another "lone hand" is Mr. George Bolton, 13, Abbey Street, Gateshead, Co. Durham, and he, too, would like to meet a fellow-enthusiast. This same G. B. appears to have the constructive complex—he's only been at short waves for eighteen months, and has built more than a dozen sets! He says, "No sooner do I finish one than I think of a better layout, which is the best part of the game . . . . in between whiles, I build broadcast receivers."

Lastly, we have Mr. L. Mitchell, 213, Wandsworth Road, S.W.8, who wants to find a local club or even another short-wave listener in his neighbourhood.

Cannot Get Reaction.

W. P. (Liverpool) writes to say some kind things about the "B.C.L." Two, but he finds that he cannot get reaction on any of the three-winding coils unless he uses a pre-set condenser to reduce the amount of aerial coupling. That's all right, W. P. The aerial windings on those particular coils appear to be designed for use with quite a small aerial, and, contrary to your suggestion, I have already advised readers who cannot make their set oscillate to decrease the aerial coupling by means of a series condenser.

Referring to your "wobble" with the Red-Spot coil, I'm afraid I haven't met that one! It's obviously some form of faulty reaction, but I can't suggest a cure without knowing a little more about it.

COMPLETELY EQUIPPED

Last week we published a view of the laboratory owned by C. H. H., of Calstock. Here is another one showing still more of his gear. The top of the bench is covered with rubber and the test sets on the left rest on a "Sorbo" mat.

The method I used for connecting the L.F. transformer in that set is the ordinary parallel-feed method, as opposed to the auto-coupling that is sometimes used.

E. B. T., a reader in Colombo, says he is afraid that his letter will "evoke the arrows of my wit." He wants to build up a short-wave transmitter, a short-wave receiver and an ordinary receiver, both the latter to be capable of giving real loud-speaker reception. Can I help him with any literature?

Well, E. B. T., I strongly advise you to write to the R. S. G. B. at 53, Victoria Street, S.W.1, for their new edition of the "Guide to Amateur Radio."

SHORT-WAVE NEWS

As usual, the R. S. G. B. has a stand at Olympia, and this will serve not only as a "show-case," but as a meeting-ground for members. The Convention arrangements have been greatly expanded this year, and the following programmes arranged for the latter part of this week.

Tomorrow, August 22nd, there is a visit to the Dollis Hill Research Laboratories of the Post Office at 2.30 p.m. On Friday, August 23rd, at 10.30 a.m., visit to Brookmans Park; at 2.30 p.m. visit to the works of Standard Telephones and Cables, Ltd.; 6 p.m., running buffet and conversazione at the Florence Restaurant.

Superhet or "Superegen"?

Saturday is mostly occupied with business, commencing with the business meeting at the Institution of Electrical Engineers at 11 a.m. The afternoon meeting, at 2.30 p.m., is filled by a lecture and demonstration entitled "Cathode-Ray Tube Developments." At 6.15 p.m. the annual convention dinner rounds off the proceedings, which, however, usually continue informally over Sunday with station visits.

Full particulars of Mr. Douglas Walters' tests from Snowdon make one wonder whether the superiority of the superhet for ultra-short-wave reception has yet been proved. One of the earlier long-distance reports was from a superhet user, but the later report from Essex, according to my information, was from a listener using a super-regenerative receiver.

Mr. Walters tells me that he hopes to run another series of more ambitious tests shortly.

The "W.F.S.R.A."

The recent tests of 5-metre transmission and reception between a fire-station and fire-engines, held at Surbiton, went off very successfully, and it seems that a midget transmitter or "transceiver" will soon be standard equipment on fire-engines. The gear will have to be more reliable and "stay-puttable" than that used by many amateurs, though! Some of the weird efforts I have seen recently can hardly be believed.

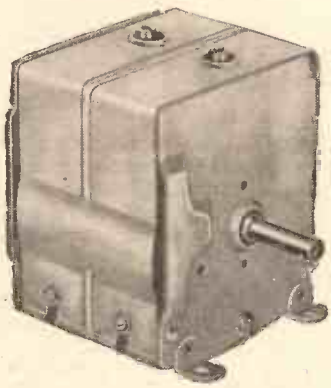
If the title of "The World Friendship Society of Radio Amateurs" intrigues you, you had better write to Mr. D. Magill, W 9 D Q D, at 730N, 6th Street, Grand Junction, Colorado, U.S.A., and find out some more about it. All that I know about it is that it has been founded, and that's the title!

This has been mostly amateur news this time. Conditions on the broadcast bands hardly warrant comment, having been uniformly good except for a very occasional blank day.

W. L. S.

POLAR and N.S.F.

Specified by the designer of the 'ALL-WAYS' THREE



POLAR MIDGET TWO GANG CONDENSER

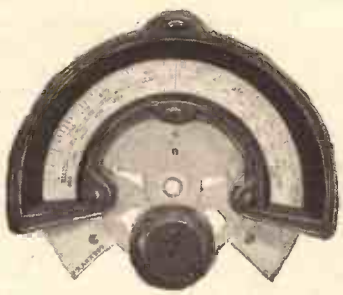
One-piece steel frame—aluminium vanes. Ball-bearing shafts. Sections matched within ½ per cent. or 1 mmfds., whichever is the greater. Trimmers operated from top. Small overall dimensions.

ONE REQUIRED **11/-**

Also made in

Three-Gang	16/6
Three-Gang Superhet	16/6
Four-Gang	22/-
Four-Gang Superhet	22/-

POLAR SEMI-CIRCULAR DRIVE



Slow motion. Provided with Wavelength Scale. Moulded Escutcheon. Lampholders provided.

ONE REQUIRED **5/9**

Other Polar Drives include

V.P. Horizontal, Vertical C.K., Arcuate, Panel-Mounting Drive, Drum Drive, Micro-Drives "Horizontal," "Semi-circular" and "Arcuate."

POLAR–N.S.F. VOLUME CONTROL

Special carbon element. Noiseless in action. Insulated spindle with knob. Mechanically sound throughout.

ONE REQUIRED **4/-**

10,000 ohms. (without switch)

Full range as follows: 5,000, 10,000, 50,000, 100,000 ohms. ½, ¼, 1 and 2 megohms.

With Switch 5/-

Without Switch 4/-

See the full RANGE OF POLAR and N.S.F. Components on **STANDS 48 & 49 RADIOLYMPIA**

WINGROVE & ROGERS, LTD.

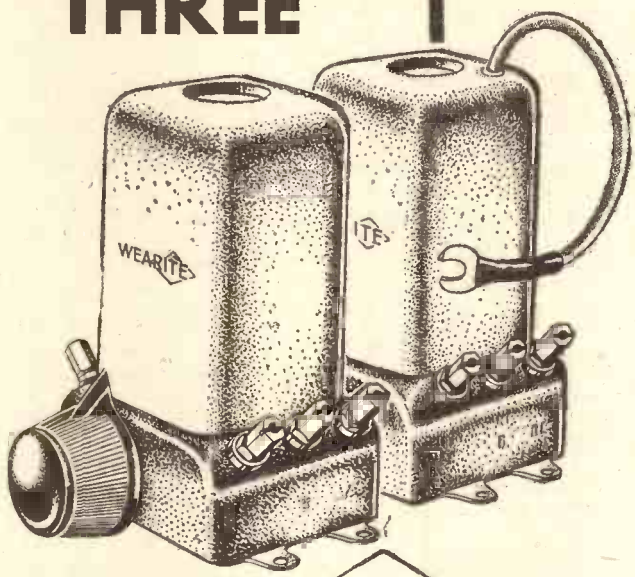
188/189, STRAND, LONDON, W.C.2.

'PHONE - - - - TEMPLE BAR 2244.

WORKS - - - OLD SWAN, LIVERPOOL.

7244

Specified for the "ALL-WAYS THREE"



WEARITE

Regd. Trade Mark

Q. & T. COIL ASSEMBLY

Selected for the "All-Ways Three," these Wearite Coils represent a definite advance in Air-Core Coil design. Special stranded secondaries, a unique method of 'waveform' winding on the long band, a new type of moulded bobbin, together ensure minimum losses throughout the whole range.

Complete Unit as shown, with spindle, switches and knob. **PRICE 15/-**

Available as separate coil units (complete with switch and knob). Price 7/6 each.

SEE THE COMPLETE RANGE OF WEARITE COMPONENTS on STAND 217 RADIOLYMPIA

The WEARITE IRON-CORED WAVE-TRAP COIL UNIT....

Here is a wave-trap coil that really does its job. With ·0005 Variable Condenser and a Switch, you have a Unit that will cut out that interfering station with ease—and no loss of volume from the wanted station! It works on any Set—'Super'—'Straight' or 'Short Waver.' Coil unit as shown. **7/6**

A Suitable Wearite Switch is the G.S.P Price 1/-

POST THIS COUPON!

To Messrs. Wright & Weaire, Ltd., 740, High Rd., Tottenham, London, N.17

P'lease send me your NEW and revised Book No. 735 together with Blue Prints and circuits of the new series of up-to-date Receivers for which I enclose Three penny stamps.

Name .....

Address .....

Pop. W. 24/8/35 .....

7235

The Kelsey "PORTADAPTOR"

LAST week I went to some length to explain the various uses of my new multi-purpose short-wave adaptor, and since there are so many ways in which I can be helpful in describing the constructional procedure, I do not propose this week to say very much else in that connection. Instead I want to devote my space almost entirely to the construction.

But before delving irrevocably into screwdrivers, pliers and so forth, there *is* just one little matter to which I should like to refer, if only to save some of you—perhaps a very small minority—from ultimate disappointment.

Suitable Sets to Use.

I suppose I rather ask for it by advertising the fact that this adaptor, like the previous ones I have described, can be used with any type or make of battery set. In point of fact, it can, but please, *please* do not expect it miraculously to transform a "dustbin two" into a super-sensitive five, just because it happens to be short waves.

I repeatedly make reference to the fact that it is possible with a short-wave adaptor to hear some of the American programmes on the speaker, but out of fairness to everybody I must qualify that claim and say that I assume that it will be used with an averagely good broadcast set.

Good Advice.

That is because I like to think that all "P.W." readers at least will be using decent broadcast receivers, and I am pretty certain that in the vast majority of cases that is so. But if there are any of you who are still harbouring antiquities, I advise you to spend whatever money you may have available upon the parts for a new broadcast set before you think of touching short waves. Otherwise, you may find the waves *very* short—very short *of stations*. I cannot put into your set what isn't there already.

My little grouse is over—and believe me, if you could see some of my correspondence, you would think it a very well-merited grouse—let's get very friendly and get down to the same work bench or kitchen table together.

I shouldn't be at all surprised if I join you this week at the stage where you are biting your nails over that mongrel cabinet of mine. Go on with you! It is not as bad as that. Let us just study together that cabinet assembly diagram which was shown on page 611 of the last issue of "P.W."

First of all, the outer "shell." Well, you can make it in two ways. You can either cut and nail or glue together four pieces of

Those who read the article in our last issue on the latest short-wave adaptor will be keen to study Mr. G. T. Kelsey's article this week in which he deals with the construction of this fascinating portable instrument.

plywood so that the *in*ternal dimensions are 6 in. × 5 in., or alternatively you can use one long length of aluminium or similar sheet metal, bend it round to shape and bolt the edges together.

I think that the latter method is the more satisfactory and was, in fact, the one I used when making the original. You probably will not like the idea of the metal work, but I can promise you that it is not such a very difficult task. The great thing is first to get the metal accurately cut to size, and then it is simply a matter of bending it up.

I am afraid that I do not profess to be a metal worker, and the way in which I am going to tell you to carry out the bending process may be frowned upon by those of you who know more about it than I do. Never mind, it works!

Scratch lines across the metal (and, by the way, don't buy metal any thicker than 18 gauge) where it is desired to make the bends, obtain two stout pieces of wood with square edges and place one at each side of the metal along the first of the scratch lines.

If you happen to have a vice, place the two pieces of wood between the vice jaws and tighten up. You will then be able to bend the metal quite easily and, moreover, quite straight. If you haven't a vice, *screw* the two pieces of wood together where they overlap the metal at the sides. Then when you have done the bending you can unscrew them again and move them down to the next scratch mark. Get the idea?

Finishing Off the Case.

The carrying handle you can obtain from a leather stores, and the covering material can be rexine or anything else that you happen to be able to get hold of. There is not of course any point in covering the whole of the inside.

Now about the actual tray or chassis on which the set is built. Do I need to add very much to the information which is given in the diagram to which we are referring? I should certainly use quarter-inch plywood for the bits and pieces, and for cutting it there is nothing to beat a common or garden fret-saw. The front "D" is hinged to the main baseboard "A," and the platform "C" (which carries the terminal mounts) is hinged to the back piece "B."

Although the panel "E" should be drilled before this piece of wood is secured to the baseboard, shelf "F" should not be fixed in position until the tuning condenser and most of the other baseboard components are fitted. By the way, just a word about the panel.

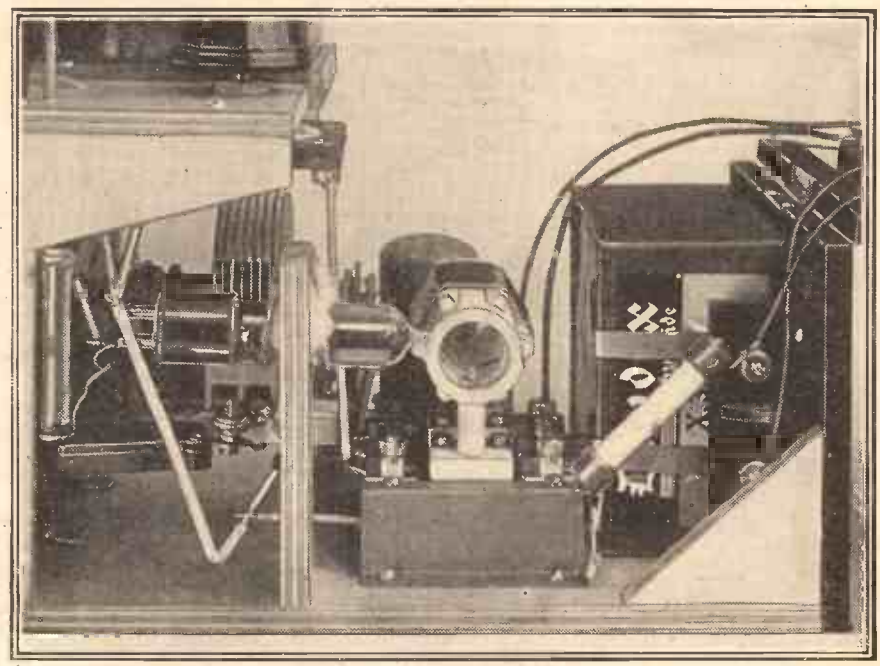
Condenser Template.

An accurate drilling template is provided on the side of the box in which the Formo snail drive is packed, and you will save yourself a lot of troub'e if you use that. As for the positions of the L.T. switch and the two terminals, these you can obtain from the panel diagram which appeared in the last issue. And to save one of the brightest wags a 1½d. stamp, I *know* that the L.T. switch is upside down, and I'm sorry, and all that. But since it doesn't make an atom of difference anyway, I am afraid I have had to concern myself more with compactness than appearance.

By the way, don't forget the copper foil behind the panel. It extends the full width, and is held in position at the sides by the

(*Continued on page* 670.)

THE NOVEL METHOD OF VALVE MOUNTING



No valve holder is used, the valve being held in place in a padded hole in a piece of plywood by means of a rubber band. This forms a good anti-microphone mounting.

THE KELSEY "PORTADAPTOR"

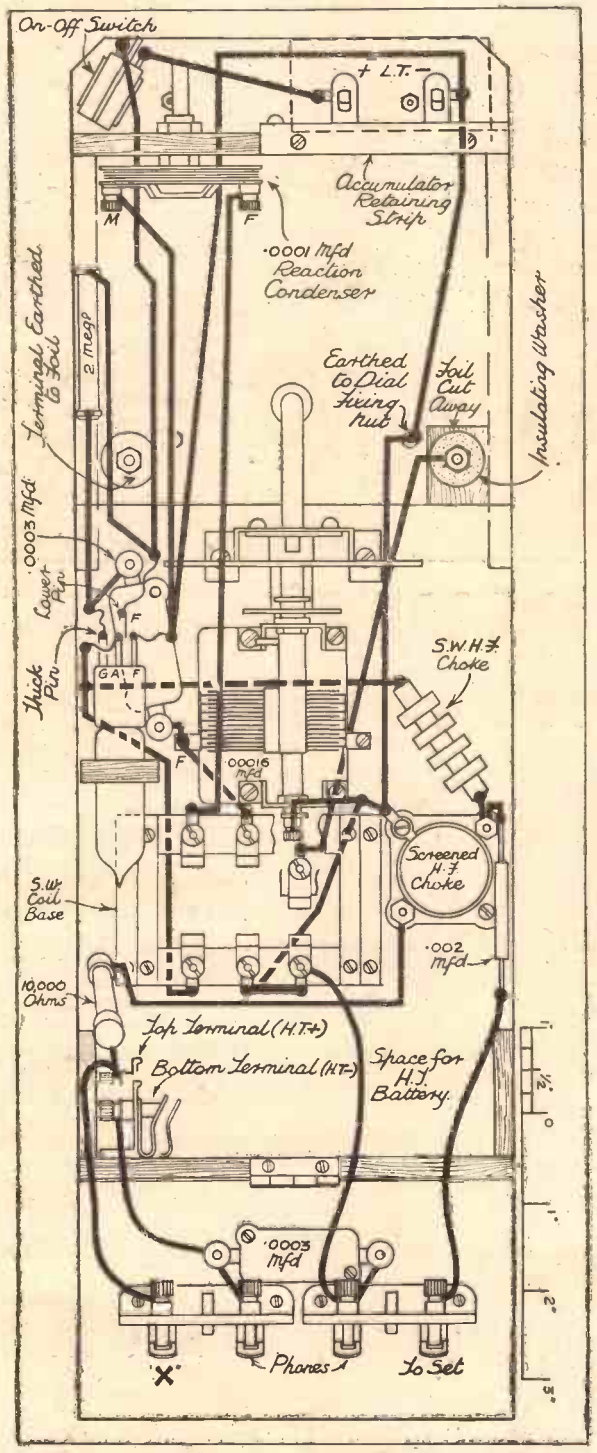
(*Continued from page 668.*)

two supports "G," but it should not extend upwards beyond the shelf "F." The nuts of the earth terminal should make contact with the foil at the back, but the aerial terminal *must* be completely insulated from it. This can be done either by using an insulating bush or by cutting away a piece of the foil where the aerial terminal comes through.

You will find both ways indicated in the wiring diagram simply to show how they are done, but you need not, of course, resort to both methods. Choose the one that suits you best, but be certain that the aerial terminal *is* completely insulated from the foil, that's all.

I am going to assume now that the sliding tray and the "gallows"—as one of my well-meaning colleagues has termed the panel and supports—are assembled, and that all is ready for the mounting of components. You haven't forgotten what I said about leaving the shelf "F" off for the time being? Good. Now for the components. Start off with the dial and escutcheon, the aerial and earth terminals and the on-off switch. The first are quite straightforward, but with regard to the switch, you must be careful to see that the angle at which it is mounted permits of the shelf "F" being slid into position afterwards.

THE WIRING IN PLAN FORM



You should follow this wiring diagram closely in conjunction with the details of assembly and wiring in the text.

Component Mounting.

The first baseboard component to mount is the tuning condenser. The position will be obvious, for the spindles have to line up with the holes in the panel.

After this I should mount in this order, the coil base, the screened H.F. choke, the "Pop" terminal mount on back-piece "B" (the spring contacts of these terminals being used ultimately for making contact with the strips on the H.T. battery), the two "Pop" terminal mounts on the hinged back-piece "C" and the ·0003-mfd. fixed condenser which goes alongside.

That accounts for three of the "Pop" terminal mounts. But you will find, if you have adhered to my original list of parts, that four were specified, and you are probably wondering what to do with the fourth one. Take it to bits! A nasty thought I know when you have had to pay sixpence for it, but the uses to which the pieces are put well justify the sixpence. They provide the spring contacts for the accumulator, and they are held in position by ordinary wood screws.

Fixing The Shelf.

But before mounting them you would be well advised first to fix the reaction condenser to shelf "F" (with the terminals positioned as in the wiring diagram) after which this shelf can be finally secured in position.

READY FOR TUNING

Here is the adaptor as it will appear when it has reached the stage at which this week's details close—all ready for operation—details for which will appear in our next issue.

With this shelf in position you can best determine the correct positions for the accumulator contacts by placing the accumulator in position and by marking the appropriate centres on the back of the wooden panel.

By the way, while on the subject of battery connections, I should perhaps have made it clear that the "Pop" terminal block on back-piece "B" must be mounted in such a position that the spring lugs make contact with the H.T. battery spring strips when the battery is standing in position on the baseboard, as shown in one of the sketches. An obvious point, perhaps, but one that is easily overlooked.

Holding The Valve In Place.

Now about the valve mounting. Who said Heath Robinson? There may be something in what you say, but rest assured that there is a method in my madness.

One always has to guard against the possibility of valve microphony in designing portables of any description, and since, as far as I can determine, anti-microphonic valve holders are not yet available for midget valves, I had to find another way out of the difficulty. The method I have employed is entirely satisfactory, and it consists of a piece of cotton-wool and an elastic band.

The valve is passed through the hole (which should be about a sixteenth larger than the diameter of the valve bulb) in the

(*Continued on page 672.*)

THE KELSEY "PORTADAPTOR"

(Continued from page 670.)

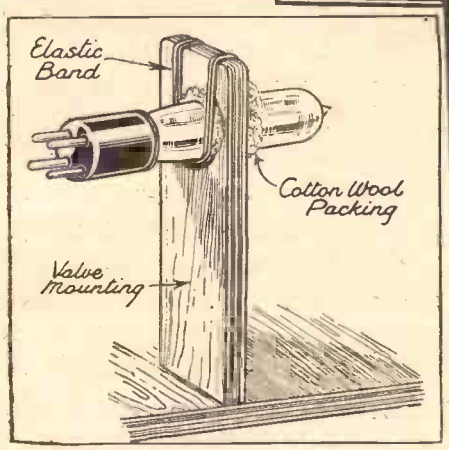
upright support "H," and with the cotton-wool "buffer" in between, the valve is pulled up against the top edge of this hole by the elastic band which is passed round the valve bulb on one side, over the top of the support, and then round the valve bulb on the other side. Crude, perhaps, but highly effective, and in fact almost worth patenting!

Connecting up the Valve.

But if you want to obviate this cotton-wool business, you can obtain a valve holder from Clix, but it is not of the anti-pong type.

There is not such a lot about the wiring that is difficult, but the method of making contact with the valve pins calls for explanation. I am afraid in this connection that soldering is imperative, and it is vitally important that you should solder to the sides of the pins, and under no circumstances to the ends.

The value of my improvised anti-pong device will be lost if you solder the heavy connecting wires direct to the valve pins, but if you bring them to within about a quarter of an inch of the pins, and then bridge the gaps with pieces of No. 28 or 30 copper wire, the springiness will be preserved.



The details of the valve mounting can be clearly followed from this sketch.

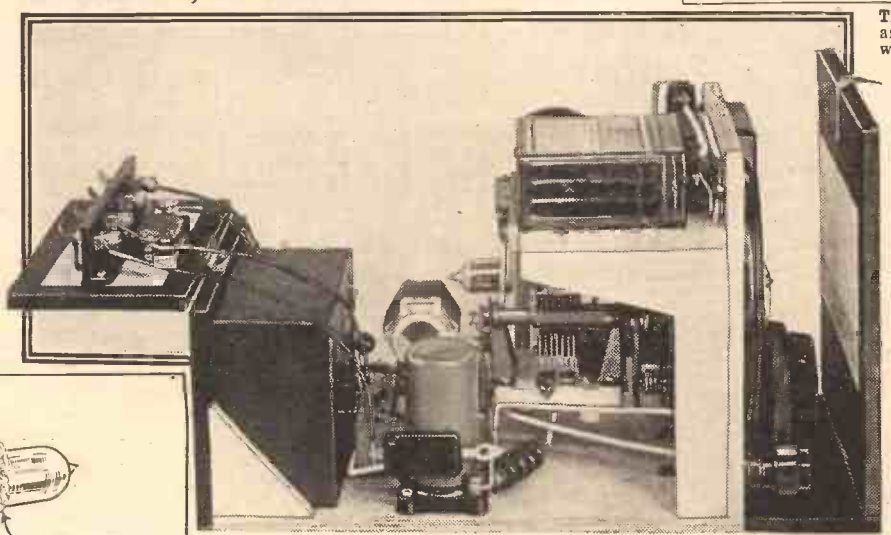
As will be apparent from the wiring diagram, several of the components are held in position by means of their connecting wires, and these include the grid condenser and grid-leak, the short-wave H.F. choke, the ·002-mfd. fixed condenser, and the 10,000-ohm resistance.

I think I have given you almost enough this week to get on with, and I propose to leave the general question of operation over until the next week, as it is not a subject that can be covered in a hundred words or so. But there is no reason why you should not give your adaptor a try-out as a single-valve short-waver when you have completed it, for that is very easily done. Just join a pair of phones to the terminals so marked, join up your aerial and earth leads, and switch on.

Before I leave the subject this week I must, of course, tell you something of the controls, for, although the "Portadaptor" cannot under any circumstances be considered difficult to operate, the fact that it is a short-waver does call for extra care, especially if you have not previously handled a set on these waves. I propose, therefore, just to give you sufficient information to bide you over until my final operating article next week.

First a word or two about the coils for the unit. There are several coils available in the Formo range; but of these only two will be required for all normal purposes, for it will be possible with these two coils to cover the wavelengths of practically all of the important short-wave stations. The coils in question are the ones which together cover the band from 13 to 50 metres, and, although I understand that these coils are officially designated the B and C coils, it will be sufficient when ordering if you ask for the two coils specified for the "Portadaptor."

COMPLETE, BUT WITH CASE REMOVED



The completely assembled chassis. Note the hinged portion on the left which gives access to the phones and other terminals.

For the preliminary try-out of the unit I should use the larger of the two coils; and it is rather important to see that it is inserted in the holder the right way round, for you will find that it fits in both ways.

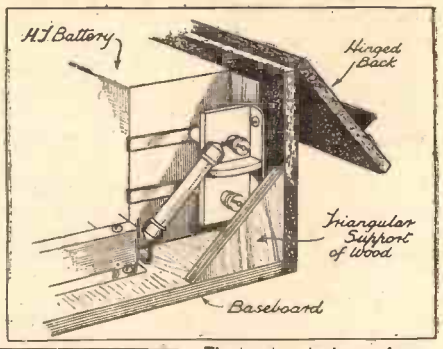
The coil is in correctly when the winding in the slot is on the left when looking at the "Portadaptor" from the panel end.

To operate the "Portadaptor" as a single-valve receiver, you have only to concern yourself with just the two controls—the main tuning dial and reaction. Start off with the dial at zero, and slowly advance the reaction control (the knob on the accumulator shelf) until the adaptor commences to oscillate or, in other words, until you hear a rushing sound in the phones. Keeping the adaptor in this oscillating condition (just over the border line), slowly tune with the main tuning control until you hear a carrier wave—or, if you like, a whistle. Now reduce the reaction condenser until the unit ceases to oscillate, whereupon, if it is a telephony station, you should hear what is going on.

By the way—and this is a piece of good news for constructors—I have been asked by the makers of the Drydex battery used in the "Portadaptor" to express their regrets for a price inaccuracy which occurred in their advertisement last week. The price of the X325 should have been five—not seven—shillings.

SEE THIS SHORT-WAVE ADAPTOR ON THE "POPULAR WIRELESS" STAND No. 13 AT THE RADIO EXHIBITION.

HIGH-TENSION TERMINALS



The two terminals seen here are used to make contact with the metal strips on the H.T. battery.

EVERYTHING YOU NEED TO OBTAIN

1 Formo ·00016 short-wave tuning condenser.
1 Formo snail-drive and escutcheon.
1 Graham Farish ·0001-mfd. "Litlos" reaction condenser.
1 Wearite screened H.F. choke, type H.F.P.
1 Eddystone short-wave choke.
1 Formo short-wave coil base.
1 T.C.C. ·002-mfd. fixed condenser, type M.
2 Dubilier ·0003-mfd. fixed condensers, type 670.
4 Graham Farish "Pop" terminal mounts.
1 Erie 2-megohm resistance, 1-watt type.
1 Dubilier 10,000-ohm 1-watt resistance.
1 Bulgin toggle on/off switch, type S 80.
2 Belling-Lee terminals, marked aerial and earth, type B.
1 piece of copper foil, 4½ × 5 ins.
Material for cabinet (see note in text), wire, flex, screws, etc.

ACCESSORIES

1 Exide Gel-Cel accumulator, type P.R.A.3.
1 Drydex H.T. battery, type X. 325.
1 Hivac Midget valve, type X.I.
Formo short-wave coils. (See text for wavelength ranges.)

MOTOR CAR AERIALS

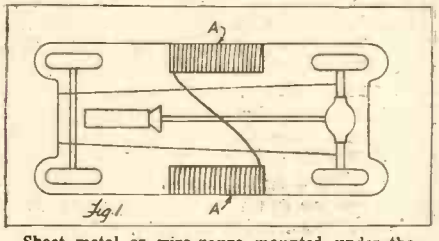
A highly interesting description of some of the ingenious methods used for accommodating aerials in car-radio outfits.

By J. C. JEVONS

ALTHOUGH conditions for listening-in "on the road" are about as difficult as they can be, the quality of reception is surprisingly good in practice, "static" being remarkable only for its absence. This, in spite of the fact that the set is, of necessity, located almost cheek by jowl with the ignition system, and that it is in most cases coupled to a comparatively inefficient form of aerial.

Static has, of course, been eliminated by the use of suppressors and by careful screening. The aerial, however, still remains something of a problem, though the use of modern high-gain amplifiers prevents it from being a serious handicap. As we know, the up-to-date receiver will do wonders with a very microscopic pick up, and most motorists are satisfied if they can get the local B.B.C. programmes, plus one or two of the more powerful foreigners.

UNDER THE RUNNING-BOARDS



Sheet metal or wire-gauze, mounted under the running-boards, is often used for motor-car aerials.

In theory the best kind of aerial would be one reaching up above the car, but people very naturally object to using a pole, or a network of wires strung over the roof. They prefer the aerial to be hidden discreetly out of sight, even at the cost of some loss in "reach."

Obviously the next best thing is to locate it inside the roof of the car, and this was for some time the standard practice in America, where car-radio has been in general use much longer than it has here. Usually it takes the form of a number of parallel wires, or a sheet of wire-gauze fitted permanently inside the upholstery of the roof, though another and less expensive plan is to fix a stick-tape, containing the aerial wire, either in parallel or zig-zag lines across the inside of the roof.

Hidden Underneath the Car.

The roof aerial is now being replaced in many cases by a strip of sheet-metal or wire-gauze mounted underneath one or both of the running-boards. As shown in Fig. 1, the two strips A are connected in series by a wire, a waterproof cover being laid over the insets to protect them from wet and mud. Apart from its nearness to the ground, this type of aerial has the merit of being located well out of sight, and does not occupy space that could be used otherwise.

The use of frame or closed-circuit aerials is not to be recommended on account of their well-known directional properties Variations in signal strength, as the car follows a winding road, are often quite pronounced, even with an open or non-directive type of aerial, and although such fluctuations are largely held in check by A.V.C., it is better not to give the latter unnecessary work to do.

There is something to be said for the idea of getting as much aerial "pick-up" as possible, so long as the set is actually in operation, and then hiding the aerial away when it is not required. An arrangement of this sort is illustrated in elevation in Fig. 2 and in plan in Fig. 3.

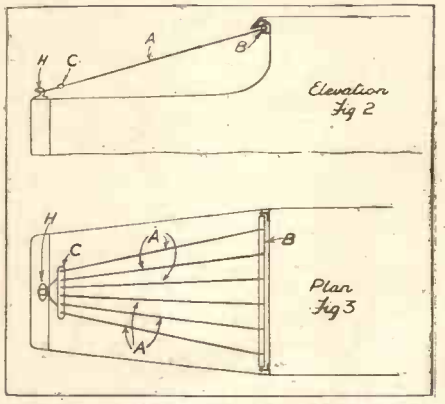
A Readily Detachable System.

The aerial A consists of a number of wires A which are normally wound up around a spring roller B of the window-blind type. The roller is mounted just below the front edge of the roof, where it is practically out of sight. The aerial is set ready for use by drawing-out the end plate C and fastening it to a hook H at the top of the radiator.

The wires then extend in a fan-shaped group in front of the driver as shown, without, however, obstructing his view of the road. At the end of the journey, or at any other time, the aerial can be dismantled by simply unfastening end-plate C from the hook. The wires are then automatically coiled away out of sight by the spring action of the roller B.

Another and less elaborate plan is to wind the aerial wire around a short upright rod which is mounted on the off-side of the front mudguard, where it will also serve as a "guide" to allow the driver to judge the width of his car when running close to an obstacle or in crowded traffic.

THE "WINDOW-BLIND" TYPE

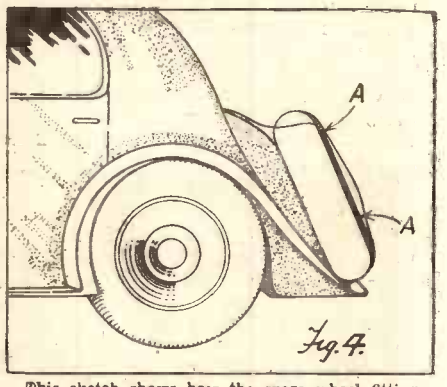


An alternative form of aerial which is wound up round a spring roller (B) of the window-blind type when not required.

The spare-wheel fitting, mounted at the back of the car, is another available place in which to install a wireless aerial, and is, in fact, rather a favoured "notion" in America. As shown in Fig. 4, the waterproof cover used to protect the spare wheel is fitted with a side strip or pocket to house the aerial wire A. As an alternative, a thin metal plate or sheet of wire-gauze can be fitted independently at the back of the space occupied by the spare wheel.

Both these arrangements have the merit of not requiring any addition to, or alteration of, the roof, running-boards, or other part of the coach-work of the car. The aerial is not unfavourably placed as regards signal pick-up and moreover is situated as far away as possible from the ignition system of the engine.

UTILISING THE SPARE WHEEL



This sketch shows how the spare wheel fitting can be utilised as an aerial. It is a method favoured in America.

Apart altogether from broadcast reception, the suggestion has been made to use a wireless "beam" as a substitute for the front and rear lamps of a motor car, particularly in foggy weather, when bad visibility is a frequent cause of collision. In fine weather it could also be used to give warning signals when overtaking, or at sharp corners, in place of the usual noisy horn.

According to this scheme, each car is fitted in front of the radiator with a small rod or dipole transmitting aerial, and at the rear with a similar receiving aerial, the latter being coupled to a detector which operates a relay. The relay, in turn, works an indicator which is mounted where the driver can readily see it.

The transmitter is of a simple type, and is operated by a push button on the driving wheel from the ignition system. When one car, for instance, wishes to overtake another it transmits what is, in effect, a short-wave wireless beam.

This is picked up by the receiving aerial at the rear of the other car, and operates a signal lamp on the dash-board, or a buzzer placed near the ear of the driver.

"FIVE HOURS BACK"

A famous feature to be revived.

A REGULAR broadcast which was extremely popular during its run of three months early in the year is to be revived on October 5th next and will continue into December. The same title—namely, "Five Hours Back"—will be used again and the programmes to be heard by listeners on the National wavelength will be those which are being broadcast in America at about mid-day. The programmes are picked up from American short-wave stations and re-broadcast, so perfect reliability of reception cannot be guaranteed; but the aim is to permit British listeners to dip into programmes from the other side of the Atlantic in the early part of the day, the hour of broadcasting in this country being 5.30 p.m.

MORE NEW B.B.C. STUDIOS

IN addition to the large studio recently opened by the B.B.C. at Maida Vale, there are now four other studios approaching completion at the same place.

Only half the available space at the disused roller skating rink was occupied by the large No. 1 studio. It was always intended that further studios should be built into the rest of the accommodation. And now, those plans are sufficiently far advanced to enable me to give you some idea of what "Orchestral House" will eventually consist.

No. 2 studio will be quite a large affair, measuring 42 ft. by 70 ft. by 20 ft. It will be especially different from existing studios because of its serrated walls and ceiling, these surfaces being divided into rectangular hills and valleys, so to speak. The acoustical treatment of this new studio will furnish the Research Department with some valuable data for future work.

A Stage of Orthodoxy.

No. 3 studio is designed to be about the same cubic capacity as No. 2, with very roughly the same dimensions. It will have flat surface walls and ceiling though, thereby showing that the B.B.C. has reached a stage of orthodoxy it does not yet consider desirable to depart from.

Both these big studios will be suitable for large and important orchestral concerts, or for massed choirs—even for very big dance bands, so they say. Henry Hall and his "boys" have a claim on one of the Maida Vale studios, but it is unlikely that they will get one of these two for regular work. Nor, probably, would they welcome it.

No. 4 studio will be a very unusual, but not actually a unique, shape. It will resemble nothing so much as a flat-iron, and in that characteristic it reminds one of the No. 8A studio wherein the Military Band under O'Donnell is wont to make the welkin ring. This studio will also conform to pattern in having the usual plain walls and ceiling, with half-plaster dado to break the monotony, and ordinary plaster for the ceiling itself.

Henry Hall's Studio ?

No. 5 studio is more rectangular, having much the same cubic size as No. 4 just mentioned. No. 5's measurements are now known—44 ft. by 20 ft. by 20 ft. A fair-sized studio, and one that perhaps Henry Hall may eventually come to rest in—after wandering round wharves and all that.

The B.B.C. is going to very great pains to incorporate all its latest "gadgets" and acoustic technique in the new Maida Vale studios. That much is obvious from the descriptions I have had given me of the general layout and treatment.

For instance, every studio will be entirely isolated from its neighbours by screened walls running right up to the roof of the building. There will thus be no chance of sound penetration as, let it be whispered, the B.B.C. has noticed with one or two of the studios at the "Big House."

Latest technique in ventilation will be employed, complete with fans and air washers. More attention is given these days to conditioning the air in studios, in order to give artists the very best chance to work under ideal conditions.

Temperature control will be very largely automatic, although it will be possible to adjust the mean heating effect by hand controls fitted inside every studio at convenient points.

Ready by the Autumn.

All these studios ought to be ready for service in a month or two. A B.B.C. informant puts November as the probable opening month; but, then, he *has* to be pessimistic. Anyway, London will have at its command greatly increased studio accommodation, which will no doubt be reflected in improved orchestral concerts during the coming season.

The B.B.C. would seem to have tacitly admitted what it once strenuously denied—that the "Big House" is not big enough. Whether the Maida Vale suite will be so essential when the present building in Portland Place is doubled in size—as the B.B.C. intends to do as soon as adjacent leases fall in—cannot yet be said. Sufficient unto the next year or two seems to be the motto—and, with such incredibly fast development in broadcasting, who can blame the B.B.C. for taking this attitude ?

A. H.

ROUND THE RECORDS

DID you hear The Street Singer when he broadcast recently? And what did you think of *Ninon*, one of the songs he sang at the Jubilee Gala performance?

This number has now been released by Decca on F5607, together with *My Heart is an Open Book*.

Arthur Tracy, alias The Street Singer, has been a most popular importation from America. His tour has been a round of success, probably partly due to the simplicity of his act as well as his voice. There is no trick presentation. The curtains part and he is found standing against a back cloth. The only furnishing is the microphone. Arthur Tracy is dressed in the garb of an Italian street singer, in brown corduroy coat and coloured sash.

The other American stars, The Boswell Sisters, are still touring Britain, and to mark the occasion of the broadcast of Connie Boswell with Ambrose a record was made, which has just been released.

The broadcast with Ambrose was the first occasion on which Connie had broadcast with any dance band, and she did so to mark her friendship to Ambrose. He, in his turn, said he would bring his complete broadcasting orchestra to the Decca studios and make a record with Connie before she left London on tour.

The result is published on Brunswick 02046, and the titles of the disc are *Things Might Have Been So Different* and *I'll Never Say Never Again, Again*.

I have just been listening to a record by Harry Roy and Elizabeth Brooke (now Mrs. Harry Roy) on Parlophone. It is called *Call Me Sweetheart*, and the vocals are sung in turn by the two. As a record of dance history it may be interesting.. From the point of view of rhythmic art I must confess I do not like it.

The number is F191 and I leave it to you to hear the record and judge for yourself.

A Disc Worth Hearing.

Nat Gonella is good on his Parlophone record of *Fascinating Rhythm* and *Hesitation Blues*. Nat is one of the finest trumpeters in the country, so it is not surprising to find some fine trumpet work in the record.

The pianist, Harold Wood, is only seventeen, but he can play! Sometimes Nat's brother comes into this recording combination, known as the Georgians, and he is then responsible for the second trumpet.

You can always be sure of a good record if it bears the name of Gonella, who has been acclaimed the Louis Armstrong of Britain. But his records are not quite so modernistic in style as those of the American star; they are more tuneful than Armstrong's usually are.

If you have not heard this rapidly rising orchestra, get hold of Parlophone F192. If you like dance music "hot" without being unintelligible you will like this one.

* * *

The rumba is received with mixed feelings among most of my acquaintances. Not as a dance, I mean, but as a piece of dance rhythm to listen to. Many people cannot stand the jangle that so often accompanies the rumba band.

That this jangle need not be so obtrusive as it often is has been proved by records such as Parlophone F199, where *Look Out* is recorded by the Robert Renard Dance Orchestra.

* * *

I was glad to hear Ray Noble again, on H.M.V. We have missed his individual style, and his link up with Al Bowlly to make a very attractive record of *Paris in the Spring* was very welcome. The other side is not so like Noble, perhaps, but it is nevertheless well worth hearing. It is *Bon Jour, Mam'selle*. Both numbers come from the film "Paris Love Song." (BD192.)

Russ Colombo's Last Recording.

A few months ago Decca issued a record made by that ill-fated artist Russ Colombo just before he was tragically shot in Hollywood.

There remained one side from that recording session of *Let's Pretend There's a Moon*. That number has now been released, backed by a recording by Dick Powell. It is a sad thought that now the remaining "side" has been published there remains nothing more. It is the last recording that we shall ever hear from the unfortunate film star. (Decca F5596.)

* * *

With Maurice Winnick temporarily taking Harry Roy's place at the May Fair Hotel, his records will become even more in demand. Like Ambrose and Roy Fox he records for Decca, and his latest record *Paris in the Spring* should be a good seller.

I like Winnick. His band is easy to listen to without being monotonous or obtrusive. If you have not heard him, either on record or on the air, I advise you to make a point of giving him a trial. I do not think you will be disappointed, unless you're a "hot-every-time" fiend. Winnick's band is not a "hot" one. (Decca F5617.)

K. D. R.

RADIOTORIAL

The Editor will be pleased to consider articles and photographs dealing with all radio subjects, but cannot accept responsibility for manuscripts or photos. Every care will be taken to return M S S. not accepted for publication. A stamped, addressed envelope must be sent with every article.

All Editorial communications should be addressed to the Editor, POPULAR WIRELESS, Tallis House, Tallis Street, London, E.C.4.

All inquiries concerning advertising rates, etc., to be addressed to the Advertisement Offices, John Carpenter House, John Carpenter Street, London, E.C.4.

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

QUESTIONS AND ANSWERS

WEAK AND DISTORTED.

H. P. (Epping, Essex).—"I have always been interested in wireless and I made the S.T.100 when it came out years ago. But I could not keep up my study of the subject, and for some years previous to 1934 I had to forgo my wireless set altogether.

"Last year, however, I bought a three-valve instrument, of unnamed make, and as it worked perfectly well at the time, and proved quite light on the pocket, I felt I had got a bargain.

"During the past three months I had to travel a lot and leave it behind, and every time I come back to it it seems to deteriorate. It is not the batteries, as I have proved the L.T. is in order, and bought new H.T. Bias also is up to voltage, on all tappings.

"I should think that the strength now is not as much as a quarter of what it was. And quality has gone from very good, at first, to very distorted now. A new set of valves has not put it right.

"If you can tell me the best thing to do I shall be thankful, as I really know nothing at all about wireless, and it is a worry."

Although we are unable to say what the fault is, from your description, we see no reason why it should not be put right without much trouble. What is needed is an overhaul by an expert.

A good radio serviceman, or even a skilled amateur, would probably be able to locate the cause of the deterioration very quickly. But it is essentially an instance for testing instruments rather than for written advice.

Although the valves are new, it is not certain that they are up to standard. A test would settle that point in a few minutes. It is surprising how little a thing can make a big difference to reception; so we should think it likely that some slight maladjustment or fault will be discovered, which will be put right quite inexpensively.

Switches, for example, can easily cause the kind of results you complain of, if they become dirty or weak in action. A similar cause of fall-off is bad contact at one or more valve holders.

There are, in fact, many points on the ordinary set where a simple fault may ruin the results obtained. And the owner, unless he knows something about the proper tests to apply, stands a very poor chance of finding the trouble for himself.

On the other hand, the location of such a fault by the experienced man is just a routine matter of applying the appropriate tests. We think you will find that once the fault has been located it will prove possible to restore the original excellent results at no great cost.

JOINING ELECTROLYTIC CONDENSERS IN SERIES.

S. P. (Devonport).—"When explaining 'Condensers in Series,' etc., you have never given, so far as I remember, any details of electrolytics.

"As these are marked + and —, is it right to assume that they should be treated, in series, like batteries are, the + of one condenser joined to the — of its fellow, the 'outer' + and — then taking the place of the markings on the single condenser?

"Also, will there be a reduction in the total capacity of two electrolytics joined in series, as there is when two ordinary condensers are connected in that way?"

That question of correct polarity of connections is important. The + side of an electrolytic condenser should *always* be joined towards the + side of the input; so when electrolytic condensers are joined in series, the + of the first will be connected to the + lead, the — of the first will be joined to the + of the second, and so forth, as you suggest.

On the other hand, if the condensers are joined in parallel, the +'s will all be joined together, to the + input: the important point to remember being that the + terminal must *always* be connected towards the + of the supply, so that the current passing will always be in that direction. (Reversed current will soon ruin the condenser.) The effect on the total capacity of electrolytic condensers joined in series or in parallel is similar to that when placing ordinary condensers in series or parallel.

CONSTRUCTING THE S.T.600.

G. E. (Brighton).—"Just two points about the S.T.600. I should like to have a fuse in, in case of accidents. Where should it go?

"And do I need a mounting block or the gang condenser if I use a J.B.?"

The best place for a fuse is at the H.T. — socket of the battery, and the best way to fit it is to use a wander-fuse, which takes the form of a special kind of wander-plug in which a fuse is incorporated.

There will be no need for a block for mounting if you use a ganged condenser of the J.B. type.

"MILLIAMMETER TUNING" UPSETS REACTION CONTROL.

E. S. (Truro).—"Having recently become the proud possessor of a milliammeter, I thought I would try the stunt I have seen described in 'P.W.' and insert it in the detector's plate lead, to check the tuning. It seems to work, but not properly, as it throws out reaction.

"Is it right to insert it with the milliammeter + terminal to H.F. choke, and milliammeter — terminal to detector P terminal?"

No; you have got the milliammeter in the high-frequency circuit, and it is a wonder it did not throw out your results more.

Take it out of the present position and put it on the other side of the H.F. choke, between the L.F. coupling component and the H.T. + supply.

If your detector has a separate H.T. + lead, the milliammeter can be connected in that.

SPENDING TOO MUCH ON H.T.

W. S. (Cambridge).—"I am spending too much on H.T. since I fitted the super-power valve. Is it right for the battery to be down in six or seven weeks every time? It used to last me best part of three months with the other valve."

Six or seven weeks is too short a life for a battery under ordinary circumstances, and we suspect that you have been over-running it.

When you fitted a new valve, which required more

(*Continued on next page.*)

RADIOTORIAL QUESTIONS & ANSWERS

(*Continued from previous page.*)

current, did you change to a different type of H.T. battery which could supply more current? If not, there is no need to wonder further why the battery does not last longer. It is being over-worked.

You will always be spending more than necessary on H.T. if you use a battery that is too small for the set.

To make sure you get the right kind of battery, you must first of all know how many milliamps. your valves should take. You can measure this if you insert a suitable milliammeter in the negative H.T. lead, *when all the voltages, G.B., H.T. and L.T., are correct.*

If you cannot measure with a milliammeter, find out how many milliamps. are required by each valve in working order, and add these figures together to find the set's total H.T. current. (The number of milliamps. is given on the valve-maker's literature, and if you tell your dealer what valves you use, he will be able to calculate the total H.T. current required for the set.)

We recommend that you should *test* the current requirements by the milliammeter, if possible, rather than rely upon such a calculation, because the use of the milliammeter will enable you, at the same time, to make sure that there is not a fault in the set that is causing the battery to run down too quickly.

If you borrow a milliammeter, its owner will show you how it is inserted in the H.T. lead to measure the total H.T. current flowing.

When this figure has been found, leave the milliammeter where it is and turn off the L.T. switch.

When this has been done the milliammeter reading should drop down to 0. Sometimes the reading does not fall right back to 0, but instead the needle comes to rest where it indicates a small current flow, although the set is "off."

This indicates an H.T. leak—the sort of fault that continually drains the H.T. battery, and must therefore be traced without delay. It is generally due to broken insulation on one of the leads, or to a faulty condenser.

You can trace it easily, in most instances, by watching the still-connected milliammeter whilst gingerly moving any suspected leads or undoing the earthed side of any suspected condenser. As soon as the fault is located the needle will drop back to the 0 on the scale.

Summing up, we can say there are two likely causes for your short H.T. battery life: (1) use of an unsuitable battery, and (2) insulation defect.

They may occur separately or together, and the milliammeter test is the best method of dealing with either.

HOW TO IDENTIFY THE SHORT-WAVE STATIONS.

R. G. (Oulton Broad, Lowestoft).—"I was specially interested in the article called 'Finding Your Way,' on page 449 of the July 6th issue of your paper. The difficulty that I have found with short-wave reception is the very one mentioned—stations which resolutely refuse to make any announcement, and keep you hanging on indefinitely in the hope of finding where the programme comes from.

"There would be no difficulty in constructing the very natty little absorption wavemeter that you describe, but I find a little difficulty in understanding how, even with such an instrument, you can tune-in an unknown station and *identify* it. Is it the intention that, having found an unknown station which is really, say, W 2 X A D, on 48 degrees, the exact wavelength can be found on the left-hand scale by judging the position between the 15 and 20 markings?

"It seems to me that, with the sharp tuning and small separations on short wavelengths, this would be a very haphazard guess, instead of an accurate or nearly accurate identification of the wavelength.

"But perhaps I have misunderstood?"

Yes, you appear to have been misled by the simplified curve that accompanied the article. It is not possible, in the small space available, to show all the details of a calibration chart, so the sketch was merely to give an idea of the general outline of the tuning curve.

In practice, you use a piece of squared (or "graph") paper to draw the curve on; and, instead of having only 30 squares, like the one shown in our diagram, it will have thin lines in between the thicker ones, subdividing it into many hundreds of squares.

With such a piece of finely-divided graph paper

(*Continued on next page.*)

RADIOTORIAL QUESTIONS & ANSWERS

(*Continued from previous page.*)

(which, by the way, is obtainable at almost any stationers for a few pence a sheet) you can record the dial positions with very great accuracy on the up-and-down lines of the chart.

Before you attempt to identify unknown stations with the wavemeter, you should "fix" on it a number of dial-readings of *known* stations. You will notice that this is stated briefly below the sketch. Having obtained a good number of these known stations, and having placed a dot on the exact spot where the station's dial reading (up-and-down line) crosses that station's exact wavelength (left-and-right line), you lightly join the dots together with a pencilled curve, passing through the centre of each; that is your calibration curve.

And when the curve has been drawn in on a proper piece of graph paper, it shows with remarkable exactitude how the dial readings, even to the smallest fraction of a degree, correspond with the wavelengths. So, if you have drawn in your known stations accurately, you can say with certainty what wavelengths correspond with the dial readings over practically the whole tuning range.

THE A.I.F. ASSEMBLY.

H. M. (Leicester).—"Seeing your detailed 'A.I.F. Assembly,' I should like to build it for this winter. Before I start on it, I should just like to know if it will be capable of bringing in a few foreigners in daylight, especially on Sunday, as one would like a change from the ordinary B.B.C. music?

"Should I be able to keep my L.T. battery up with a trickle-charger? I have a good outside aerial. Could I use that on the set?

"Also, I am a bit bothered as regards E.T.G. terminals. Where would they go?"

Yes, you will be able to get foreigners in daylight with the A.I.F. Assembly—plenty of them if you have an outdoor aerial to supplement the frame, though you may find that the frame alone will give you the necessary alternative programmes, and the outdoor aerial will then be unnecessary.

If, however, you decide to use the outdoor aerial, look at the diagram on page 419. To the left are the two coils, marked "M.W. (medium-wave) Winding" and "L.W. (long-wave) Winding," respectively.

Nearby you will see the letters G, A, T and E, with the earth lead connected to E and the outside aerial to A. (Between the aerial and this A terminal a small variable condenser is shown dotted in. This is an optional selectivity control and, if used, should have a maximum value of about '0001 mfd.)

You will find the points G, A, T and E also marked on the sketch giving details of the frame aerial on page 421.

It will be quite in order to keep the L.T. battery up to scratch by means of trickle-charging.

ON THE AIR

(*Continued from page* 652.)

The Air-do-Wells did offer a little relief, though the proportion here of music to patter was rather in favour of the former. I consider the Air-do-Wells are almost the ideal concert party. Just the right size, and everyone knows the business. In Claude Gardner they have the perfect comedian. I would like them better, perhaps, if they presented more sketches. But this is a purely personal view.

* * *

The vast improvement in the news service lately cannot have escaped anyone's notice. In spite of Geneva, a number of most interesting stories have been collected and nicely written up. There have also been a number of summaries of official reports which have been extremely interesting. Even the warnings have been delicately proclaimed. I like to hear experts and men on the spot, too, in the News Bulletins. They give the bulletins the right authoritative touch.

* * *

Alick Maclean and his Spa Orchestra, to me, is always an event. Partly because of old memories, and partly because his orchestra is second to none where seaside orchestras are concerned. On the occasion of his recent broadcast he provided us with the unusual experience on the air of hearing an encore. "The Gondoliers" is always popular, of course.

* * *

"New Songs for Old, Part IV," was an item of good features and one excellent one. The excellent feature was the compering of Harcourt Williams. The whole programme was well conceived and brilliantly carried out. Harcourt Williams welded the whole into the completest performance possible. He said nothing that was redundant. I liked the contrast of recorded and original singing.

C. B.

CIRCUIT ADVANCEMENTS

(*Continued from page* 650.)

the mains transformer with its constant A.C. current. As the current through the centre winding of the transformer varies, so the effect of the steady field due to it increases or decreases in its impression on the A.C. field due to the bulb's current.

The current in the anode circuit will vary as the A.V.C. varies, a minimum being attained at the strongest part of the station's tuning—namely, at the dead tuned-in point.

The Neon Type of Indicator.

The more common form of neon-tube indicator is shown in the lower sketch. In this case the length of the discharge varies according to the tuning of a station. The principle is clearly explained as follows:

A normal discharge takes place permanently between X and Z, and a varying potential is applied to Y. The value of this will depend on the voltage drop across R_1, this in turn depends on the current flowing through R_1, which will be less with maximum "signal" strength, and therefore maximum automatic G.B. applied to the intermediate-frequency valve.

As the voltage on Y increases so the length of the discharge increases. R_2 is merely a voltage dropping resistance to ensure a small striking voltage only.

It has been impossible to deal in any way fully with modern circuits in this article, but sufficient has been written to give a good idea of the circuits used in modern receivers and the way in which they work.

PRICE CORRECTION

Messrs. The Chloride Electrical Storage Co., Ltd., have asked us to express to "P.W." readers their regrets for an error which occurred in their advertisement last week. The price of the Drydex 120-volt battery type H.1015, which was specified for the "All-Ways" Three, should have been 16s. and not 17s. 6d. as printed.

We are also asked to call attention to a slight mis-print which occurred in the advertisement concerning Polar condensers. The price of the midget three-gang condenser and the midget three-gang superhet condenser should have been 16s. 6d. and not 16s.

TECHNICAL JOTTINGS

Items of Interest to Every Enthusiast.

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

Limit to Power.

OF course, there is a limit to the amount of power which has to be consumed in the set, because obviously this bears a relationship to the power output. But with improvement in design of sets, and particularly in the design of *valves*, there is no theoretical reason why the current consumption should not be brought down a good deal further than it has been so far. I say this because the power output of even a powerful set is only a fraction of the power consumed from the batteries or other source of supply.

For instance, take a set which delivers an undistorted output of, say, 2 watts, which is quite a large output for ordinary home use. Two watts represent a current of 1 amp. at 2 volts, or 10 milliamps at 200 volts. But the amount of power consumed in the valve filaments is generally a large percentage of the power consumed by the set as a whole. In the old days, the power in the anode circuits was negligible compared with that in the filaments, but then those were the times when we thought nothing of 1 amp. per valve for the bright emitters.

Power Efficiency.

Everybody knows a set considered as a whole is very inefficient from the *power* point of view, that is to say, the power output in the form of sound from the loudspeaker is only a small fraction of the total power consumption in the set. This is really the main factor which makes it difficult for us to reduce filament and anode currents much below their present values.

If we could improve the efficiency of the valves, transformers, and so on, we should be able to get the same power output with a smaller consumption. We have to consider the wireless set, including valves, transformer, loudspeaker and all, as an *electrical machine* (just like a power transformer) where the power efficiency is reckoned by the relationship of the output to the input.

The Worst Offender.

One of the worst offenders of the various components in the set, from the point of view of power efficiency, is the loudspeaker. In a loudspeaker (or an ordinary telephone receiver) the power which is turned into sound is only something like 1 per cent of that which is passed into the instrument in the form of electrical energy. I forget the exact percentage, but it is something very low, of this order.

So here is a point to which designers and experimenters could well devote attention. I dare say it is roughly true to say that if the power efficiency of the loudspeaker (ratio of output to input) could be doubled, in other words, if *two* per cent of the input energy could be transformed into sound instead of *one* per cent as at present, the high-tension current used in the set could be reduced to half, or at any rate something like half.

Room for Improvement.

So you see that, in spite of the very wonderful improvements which have been made in the different components for radio receivers, and especially in loudspeakers, there is still enormous scope for further improvements in regard to power efficiency. Hitherto very little attention has been paid to power efficiency, as naturally the first consideration is quality of reproduction.

Modulation Hum.

I said something a short time ago about modulation, and in that connection I might perhaps have mentioned the *hum*, sometimes called modulation hum, which occasionally sets up in a receiver which uses one or more stages of high-frequency amplification. When modulation hum sets in it is often difficult to see any reason for it, but I think you will find that, as a rule, there is some trouble in the electrodes of the high-frequency valve. What makes it still further difficult to locate the cause of modulation hum is that it is only present when the set is tuned in to a station, and if you cut out any part of the high-frequency circuit you cut out the trouble at the same time, so that does not help you.

Change the Valve.

This suggests that you might have a better chance of locating it by connecting the aerial to some part of the coil in the detector grid circuit. This does not always do the trick, because in some cases you can only trace the modulation hum when the signals are very loud.

The simplest and best plan I have found is to assume—at any rate, in the first instance—that the source of the trouble is in the high-frequency valve, and to take out this valve and replace it by another one. In nine cases out of ten, you will find that this puts things right, and the only answer is to do away with the offending valve and stick to the new one.

Manufacturers' Mistakes.

A friend of mine who recently bought himself a very nice radiogram told me that there was only one thing the makers of the set had forgotten and that was to show how to connect a distant loudspeaker on a separate aerial. I examined the set—I'd better not tell you the name of it—and right enough there were terminals provided for an extension speaker and, of course, a terminal for a separate aerial and terminal for earth.

But, believe it or not, whilst these were inside the cabinet it was impossible to get at them without removing the entire back of the cabinet (which involved removing a number of large screws), and even then no provision was made for the wires connected to these terminals to pass out through the back. In other words, by the time you had the wires attached to the extension speaker terminals and a wire to the aerial or earth terminal, you could not

(Continued on next page.)

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TECHNICAL JOTTINGS

(Continued from previous page.)

get the back on again unless you nicked holes in the wood for the wires to pass out.

Inspection and Test.

I can hardly believe that this was an error in design of the cabinet, because surely some of the original models must have been tested by the makers with these various extra attachments in use. I can only conclude that the makers of the *cabinet* had not carried out their instructions and provided the necessary holes in the back, and that this had been overlooked by the inspection department of the manufacturers of the set.

I suppose it is no use complaining unduly; these things *do* happen even in the best regulated factories, but I must say that a small omission of this kind can be very irritating to a customer and does an amount of harm which is cut of all proportion to the fault itself.

Full-Wave or Half-Wave?

People often get the idea that a full-wave rectifier is twice as good as a single-wave rectifier, in the sense that it delivers twice as much power. It is quite a mistake to suppose this, because like many other things "it all depends," as the saying goes. It depends in this particular case upon what is the peak voltage of the single-wave rectifier and what is the peak voltage of the double-wave rectifier.

If you use the same transformer secondary and connect it for single-wave rectification you use the whole voltage, whereas for double-wave rectification you will use a centre-tapping and half the voltage each way. The result in this case will be pretty much the same as regards output, whichever way you use it, because the single-wave arrangement will supply enough power during each half-wave to bridge over the intervening half-wave period. The fact is that you can make either a double-wave or a single-wave rectifier to give you just whatever power you want.

The Transformer Secondary.

There is perhaps just one way in which there may be something in the argument, and that is in the case where the double-wave arrangement is made quite independently of the secondary of the transformer. You can, for example, by means of what is known as the Gratz arrangement of four rectifiers, or a rectifier divided suitably into four sections arranged in a proper way, get full-wave rectification from the whole of the transformer secondary, whereas a single rectifier giving half-wave rectification from the *same* secondary would give you only about half the power.

A Question of Smoothing.

No, the real advantage of full-wave rectification is not so much in getting more power as in getting a very much *smoother* output. One of the foremost essentials in modern radio sets for A.C. mains is to get rid of the A.C. hum, and anything that makes this easier is so much to the good. It is much easier to smooth the output from a full-wave rectifier than that from a half-wave rectifier; this is really the most important reason why the full-wave rectifier is favoured.

I must admit that on the face of it you would think that the full-wave rectifier was twice as good as a half-wave rectifier; so it is—or so it can be—but only under special conditions, and in the ordinary way you don't need to worry about that. What you have to bother about is the smoothing.

No Electric Supply.

There is still a vast section of the public who have no electric light supply and have to depend upon batteries for the operation of their radio sets. A few years ago efforts were made to utilise the principle of thermo-electricity and to make some kind of commercial version of the old thermopile, which would enable people without electric supply to generate the electricity by means of a gas-heater or something of the kind, so as to have handy a perpetual source of electric power for their sets without having to use batteries.

Thermopiles may come in again—efforts are being made to develop them further. But I shall have more to say about this next week.

THE NEW AVO OSCILLATOR

Messrs. The Automatic Coil Winder and Electrical Equipment Co., Ltd., makers of the well-known Avo testing instruments, inform us that the price of the new Avo Oscillator, which is being exhibited at Olympia, has been fixed at £5 10s. 0d.

Book of Practical Radio 2

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S S.

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All communications should be addressed to Advertisement Department, "Popular Wireless," John Carpenter House, John Carpenter Street, London, E.C.4.

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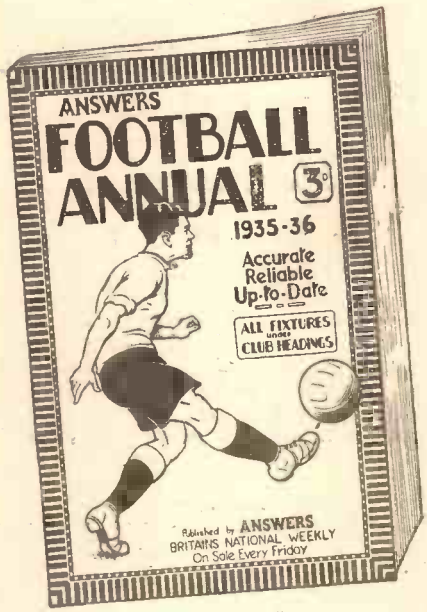

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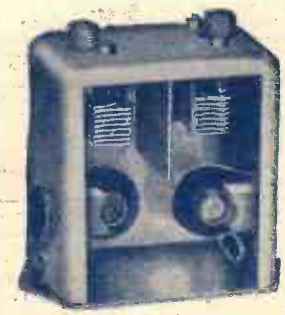

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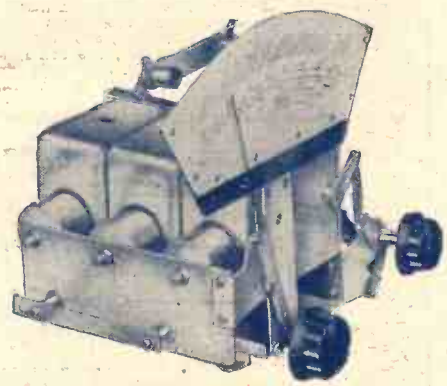

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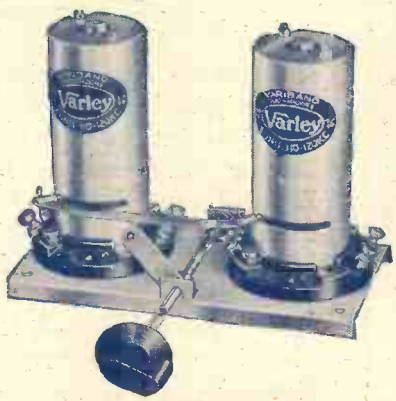

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