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Making a Beat-Frequency Oscillator Unit—See pages 5.

Olympia Afterthoughts

When the excitement and interest of the Radio Exhibition have died down, many interesting facts emerge from the confused “first impressions,” which the ordinary visitor obtains. So many items are presented to his gaze during the few hours that he is able to be present, that it is difficult to isolate, afterwards, those items which are of the greatest value to the individual. When one is able to go round the Exhibition day by day, and collect various catalogues, the task is much simpler, but no doubt there are many who afterwards remember some particular feature which they intended to inspect during their visit and slipped from mind owing to the interest created by other exhibits. In this issue our popular contributors, the Experimenters, have collected those details which most impressed them during their visits on different days, and consequently their notes will prove of value not only to those who were fortunate enough to be able to visit this national exhibition, but to those who from force of circumstance were unable to make an inspection of the exhibits which were housed this year at Olympia. Turn to page 12 and see what the Experimenters were housed this year at Olympia. Turn to page 12 and see what the Experimenters were housed this year at Olympia.

New Commercial Radio Station

It is announced that Radio-Toulouse will join the list of commercial stations being used for English sponsored programmes from October 1st next. An English announcer has been engaged so that programmes, and “Gypsy Melody,” will be broadcast on October 17th. The B.B.C. announces that Eric Maschwitz, former Director of Variety, is preparing a programme of gypsy folk lore and music called “Gypsy Melody,” which will be broadcast on October 17th. When Mr. Maschwitz relinquished his post of Variety Director, it was arranged that he should continue to contribute to programmes, and “Gypsy Melody” will be his first programme since his departure. Gypsy Fulumengro is providing the folk lore and will also take part in the broadcast, while Rae Jenkins is responsible for the music, and is forming a gypsy orchestra to play in the programme.

“Private View”

Hunger does not always make for politeness, and catering for snack appetites is not the least exacting of summer duties. On September 20th, in the West of England programme, a waiter who makes his living behind the Snack Bar will describe to listeners a few of his customers.

National Band Festival

On September 25th, the National Brass Band Festival is to be held. Formerly the Crystal Palace was the scene of this annual event, but due to the fact that this was ruined during the recent fire, the event will now have to take place at the Alexandra Palace. Northern listeners will be given an eye-witness account of the event by a northern journalist, as the majority of the contestants are from the north of England.

Speedway Broadcast

One of the most exciting of sports enters broadcasting news again on September 18th, when Bernard Gray will give a running commentary, from Belle Vue, Manchester, on part of the speedway match North versus South.

PROMENADE CONCERTS

On Tuesday, September 21st, the firm of Foden’s Motor Works Band—for many years now the holders of a proud place in the front rank of the brass band army—are to broadcast on September 21st, in the Northern and Regional programmes, under the conductorship of Fred Mortimer, himself as famous as the band. The name of Mortimer can hardly be separated from that of this band, and in the broadcast concert Alse Mortimer figures with a euphonium solo.

Autumn Broadcast Talks

Daytime talks will include Mr. C. H. Middleton’s popular Sunday series, “In Your Garden,” practical talks on some of the elements of housewifery under the title, “For the Young Housewife;” a series of talks on children, and varying points of view; and another series entitled, “Before They Go to School,” dealing with children between the ages of two and five.
ROUND the WORLD of WIRELESS (Continued)

A “Baby” Presented to a Centenarian!

On the eve of Radiolympia Mr. Henry Cook, of Charndon, Bicester, Oxon, who is seen in the accompanying illustration, reached his 100th birthday, and to commemorate this very auspicious occasion he was presented with a Pye “Baby” Q.

For such a presentation to take place at this stage of his life is, of course, quite an event, and for the first time Mr. Cook listened with obvious enjoyment to a Baby which spoke many languages, in a natural and unassuming voice, was most obedient, and could be taken anywhere without any trouble. This midget portable is Pye’s smallest receiver. It has a four-valve circuit and moving-coil speaker, and is ideal for use in the home, on the river, by the sea, or in the car. Mr. Cook received numerous other gifts and telegrams—one from His Majesty the King—with congratulations and best wishes.

He is one of a family of 22 and with his brother-aged 81—is the joint survivor. Most of his time now is spent in his country cottage, so that the Baby Q will be a constant source of entertainment, and will help to pass the time very pleasantly for himself and his two daughters.

Cabaret Show

Western Cabaret will be broadcast from the Royal Bath Hotel, Bournemouth, on September 22nd. This will include: Rudi Grasl, “the amazing young man from Vienna,” who imitates all kinds of instruments; Jack and Eddie Eden, in light comedy, and dancing to Harry Roy’s “Lyricals,” directed by Maurice Kasket, with Mona Brandon and John Harris.

Value of Empire Broadcasts

The value of the B.B.C. short-wave transmissions as a medium for British propaganda throughout the Empire was stressed by Mr. M. J. Railing, Vice-chairman and Joint Managing Director of the General Electric Company, during a visit to Radiolympia. He stated that since the Show opened the G.E.C. had received messages from towns and villages in all parts of the world as far apart as Nairobi, Rangoon, Penang, Singapore and Durban—to mention a few—praising the broadcasts during Radiolympia, and showing the keenest interest in British affairs. “In these

Oscar Robin, and his popular Romany Band, who were heard recently in the late night dance music programme.

short-wave transmissions,” he said, “we have a powerful weapon, which so far has perhaps not been fully appreciated, to combat anti-British propaganda disseminated by other countries. Since the messages we have received reveal a preference in these overseas countries for pro-

grammes from Britain, we ought to develop this aspect of short-wave radio if we are not to be crowded off the air in our own possessions.”

Dance Music from Germany and America

British listeners will hear relayed in the Regional programme for half an hour on the night of September 15th dance music from Germany. Eugen Wolff and his Orchestra, playing in Berlin, will have their programme relayed to Britain from the Deutchlandsender station. Immediately the relay ends Germany will take, on the same line, a relay from this country of Henry Hall and his Dance Orchestra.

On September 29th Benny Goodman and his Band will be relayed from New York in the “swing” series, “American Dances.”

Jack Strachey’s Music

A programme devoted entirely to the music of Jack Strachey, well-known composer, to be broadcast in the National programme on September 17th, are several songs which will be broadcast for the first time. Two of them are “Thank You” and “Toujours,” both of which have lyrics by Rex Newman and Clifford Grey. The second of these will be sung by Patrick Waddington, accompanied by Jack Strachey himself at the piano. Another item in the programme will be a song which Strachey wrote with Eric Maschwitz, former B.B.C. Variety Director, for last year’s Christmas Revue—“Paris is not the same”—which seems likely to become a worthy successor to their “These Foolish Things.”

Variety from Bath

In the feature “Theatres of Variety,” a programme will be broadcast from the stage of the Palace Theatre, Bath, on September 24th. This is the opening week of the rebuilt theatre: the original hall opened in 1886 as the “Pavilion”: it later became the “Lyric,” and in 1903, the “Palace” Theatre.
To get the best out of a push-pull system, the two valves used should, ideally, have identical characteristics, and if a pair of valves are to be purchased for a push-pull stage, it is very advisable to specify a “matched” pair. If there is any appreciable imbalance between the two valves, compensation by grid-bias adjustment is desirable. When carrying out the first stage of the push-pull test on the two output transformers, a second milliammeter check should be made of the two anode D.C. values. They should be equal. The fact of their proving to be or not necessarily indicates that the valves are perfectly matched over the whole range of voltage swing, but it is important to see, at least, that the mean secondaries are balanced up. The output transformer should be electrically symmetrical about the centre tap, and the input transformer, or resistance capacity feed system, if such is used, should also be electrically balanced on the two sides.

As with all output stages, the question of load impedance must be gone into thoroughly. From Fig. 5, it should be apparent that the two valves are effectively in series as far as the A.C. component of anode current is concerned. This means that the two valve impedances are acting in series and, therefore, that the optimum load, which must be set up by the specified output transformer combination is twice the value suitable for one valve. To take the normal resistance load specified for one of the valves and to double it to obtain the optimum load (plate to plate) for the two valves in push-pull is correct enough up to a point. The only difficulty is, if the limit of output power is being aimed at, that the “normal load” specified for a single valve is largely governed by the mean current peaks run momentarily to high values must be kept to a minimum. By keeping down the second harmonic content, if the limit of output power is being aimed at, it should be appreciated that there is no absolutely “matched” pair.

Q.P.P. (Quiescent Push-Pull)
At the outset it must be understood that Q.P.P. has very marked differences from normal P.P. (push-pull). A theoretical diagram of a Q.P.P. output stage may appear to amount to two valves (generally pentodes) in push-pull, but there is a great difference in operation between the two systems.

To consider the Q.P.P. transistors, as opposed to those used in P.P., although the two grids of two Q.P.P. valves are supplied with signal voltages in anti-phase and each valve supplies half the total power output to the speaker, the two valves do not work simultaneously as in normal P.P. world. The mean anode current taken by the stage is more or less constant during reception. It makes no difference whether a local or a distant station is being tuned in, whether the depth of modulation is great or small, or whether the volume control is turned up or down. There is thus the same mean anode current being taken all the time. Even during a pause in the broadcast being received, there is still the same mean anode current being drawn from the H.T. battery.

With the Q.P.P. system, however, the mean anode current varies with the amplitude of the signal voltage applied to the output stage. With no signal the “quiescent” current is very small indeed, three milliamps. Of no signal current for a push-pull output stage giving a maximum power output of over 1 watt being quite a normal figure. Compare this with a typical triode output valve rated at less than 1 watt output and taking a mean anode current of nearly 20 milliamps.

Anode Current Fluctuations
With increasing applied signal voltage, the mean Q.P.P. anode current rises. Thus, during reception, the mean anode current goes through very considerable fluctuations. On a strong signal and at a moment of deep modulation, the mean current can be up to 30 or 40 milliamps, but—one is this the whole point of Q.P.P. working—taking an average over a period, the total drain on the H.T. battery is remarkably low, considering the power output which is obtainable. Furthermore, the user can imagine that the more he turns down the wick the less will be the H.T. consumption of his receiver. It is amusing to think of the number of people who think that this is so with any type of receiver, but it is certainly the case with Q.P.P., or Class B output.

With regard to Q.P.P. it is a common fallacy among the non-technical to imagine that the anode current is always high. Considering the mean output obtainable with Q.P.P., it would indeed be a miracle if this were the case, but the existence of such an idea has led many people to make the mistake of using unsuitable H.T. batteries with Q.P.P. receivers. The fact that the anode current peaks many moments running over and under, must not be disregarded, and the H.T. battery chosen must be capable of delivering these current peaks without appreciable voltage drop output stage.

Triode output valves may be used in Q.P.P., but although such a system gives the ideal Q.C. conditions of good power output with economy of H.T. consumption, it is probable that the designer will pass triodes in favour of pentodes, as the latter give much greater efficiency. Triodes, however, used for Class B working. The general popularity of pentodes in Q.P.P. has led the valve manufacturers to give us the four Q.P.P. valves which really consists of two matched pentodes in one bulb. The connections of a standard 7-pin Q.P.P. valveholder (viewed from above) are shown in Fig. 6. Note that the two secondary screens are internally joined together so that there is only one screen terminal.

The connections of a standard 7-pin Q.P.P. valveholder.

Resistance-capacity input to a push-pull output stage must be considered under certain circumstances, but we will deal with this under the heading of L.F. voltage amplification, as it is a matter more immediately concerned with the pre-output stage.

With a push-pull output stage there is some risk of “parasitic” oscillations at very high frequency occurring in the system, and it is generally advisable to take precautionary measures. Fortunately, although the effects of parasitic oscillations are troublesome enough, the cure is neither difficult nor expensive. “Stopping” resistances at each grid will normally be effective and values of 1,000 to 5,000 ohms should be sufficient. Alternatively, or possibly additionally, resistances of some 100 ohms or so at each anode can be tried.
PRACTICAL AND AMATEUR WIRELESS

THE AMATEUR SET DESIGNER (Continued from previous page)

September 18th, 1937

decoupling than one using normal push-pull.
The fact that, at any instant, the signal current is one half the plate-to-plate load is a "transformed provision."
the grid voltages can be allowed to run right into the grid current range and no trouble is caused, with one most important of the signal voltages. When using a triode operating point grid bias lead (try .2 meg).
or, alternatively, a resistance in the common filter connected between the ends of the pentode output, and a capacity-resistance measures to prevent rise of load impedance output.
"dead" while valve type.
thing of the order of 400 to 800 ohms representing what is required. The maximum permissible value is dependent upon the valve type.
The input transformer of a Q.P.P. stage must have a higher ratio than that suitable for P.P. The necessity for large signal voltage transformers secondary (1000:1) is input transformer should be apparent when it is considered, first, that one valve is "dead" while the other is supplying power to the speaker and, secondly, that the biasing back of the valves to the foot of the anode current-grid volts characteristic gives a much greater length of characteristic to be covered for full output.
It is necessary to adopt corresponding measures to prevent rise of load impedance as we found to be necessary with single pentode output, and a capacity-resistance filter between the ends of the output transformer primary is a usual feature of a Q.P.P. stage.
Grid stoppers should be used (try .1 meg.) or, alternatively, a resistance in the common grid bias lead (try .2 meg).

Class B Output

Class B is closely allied to Q.P.P. In the case of Class B, however, two small triodes are used with characteristics such that the operating point (near the foot of the characteristic with Q.P.P.) is obtained either with zero grid bias or with a very small negative bias, according to the particular Class B valve used. A Class B valve, of course, consists of two matched triodes in one bulb. Fig. 7 gives the connections of the standard 7-pin valveholder, viewed from above. Any connection may be used with any type of valve.

valve is kept negative so that grid current is never established we can regard the grid circuit as one of no power consumption, but once grid current is set up it imposes a power demand which has got to be met somehow or other. With Class B the difficulty is met by placing in front of the output stage an L.F. stage which is primarily intended to supply the power requirements of the grid circuits of the Class B valve. We usually refer to the pre-output valve as the "driver valve," and it must be remembered when planning the receiver that the Class B output stage is essentially a power-consuming load on the driver stage. The driver valve will either be a small power valve or a valve of the L.F. amplifying type, according to the actual power demand of the Class B valve.

Before proceeding with further details it will perhaps be advisable at this juncture to deal with the "Q.P.P. or Class B

| GRID (2) |
|———|
| ANODE (2) |
| O O |
| ANODE(1) |
| O O BLANK |

Fig. 7—Connections of a standard 7-pin Class B valveholder.

THE EXIDE MYSTERY

LAST week we published an illustration of a mystery exhibit on the Exhibit stand at Radiolympia. This consisted of what was apparently a perfectly standard 2-volt cell which was reading on any voltmeter of 6 volts. Visitors were very interested in this exhibit and many experts were heard to give their opinion as to how it was done. It is, of course, well known that the voltage of an ordinary single low-tension cell is round about 1.5 volts. It is, therefore, quite clear that the battery in accumulator design has not yet arrived, and the exhibit was merely a stunt to show what can happen to a cell under certain service conditions, and demonstrates how deeply the Exide people go into these things. 'A minute inspection of the cell gives no indication of the reason for the extra 4.4 volts and the Exide experts tried to explain that it is possible for some such condition to arise accidentally in service—although the possibility is very remote.'
The terminal pillars were purposely broken and compound put in the top of the cell so that a space was left between the "breaks," forming cavities round the broken ends. These cavities were filled with acid and the broken ends became "formed" by the passage of current on discharge and charge, and so became definite positive and negative electrodes. Although the two cavities possess very little capacity they furnish just as high a voltage on open circuit as the rest of the cell, and as the whole circuit is composed of three independent cells connected in series, the resultant voltage is six.

under certain circumstances, influence the designer against this system and that is the necessity for incorporating a driver stage in the receiver. The driver stage, however, must not be looked upon as a source of heavy current consumption for the gas. The power demand of a Class B valve is not heavy, and normally the driver valve can be operated without difficulty. On the other hand, the driver stage must not be regarded in the light of a normal amplifying stage, contributing considerably to the over-all sensitivity of the receiver. From the point of view it is best to disregard the driver stage. Its job is to meet the grid power load of the Class B valve and no more should be expected.
The output transformer for Class B, like that for Q.P.P., must have a low primary resistance, something of the order of 400 to 800 ohms. As with Q.P.P., the plate-to-plate load is four times that for one valve. When a Class B valve is used (as distinct from two separate sections of a tube), the primary plate-to-plate load is readily ascertainable from the makers' data, and the output transformer ratio should, of course, be chosen accordingly. The point which the triodes work in a Class B stage are responsible for a rise of effective load at the upper frequencies causing shear to occur. The driver transformer shall be low. A capacity shunt may be used across each half of the output transformer or, secondly, that the secondary resistance of the driver transformer shall be low. The latter requirement must never be disregarded. About 300 ohms is a usual value.

Only one-half of the driver transformer secondary is carrying grid current at any particular instant, so the centre-tapped secondary acts as a half-wave rectifier, just like the centre-tapped primary of the output transformer. Thus, the effective load across the whole secondary shall be four times the actual grid circuit load of one triode. N times the effective load across the whole secondary must equal the optimum load for the driver valve, where N is the over-all ratio (whole primary to whole secondary. Usually a 1 to 1 ratio will be suitable, but sometimes the ratio required will be one to two. The amateur may save himself some trouble by consulting the valve manufacturer, for the latter can advise him as not only as to the best type of driver valve to use, but also as to the correct driver transformer ratio.

Grid-stopping resistances must not on any account be used in conjunction with the Class B stage. Parasitic oscillations will, however, be prevented by the capacity-resistance filter between the half primaries of the output transformer.
The tendency for high pitched reproduction may necessitate employing a capacity-resistance filter between the driver transformer secondary, in addition to the anode shunts. There will be room for a little experimenting here.
Building a Beat-Frequency Unit

Constructional Details of a Useful Accessory Which May be Added to Most Types of Superhet for the Reception of C.W. Signals

Many amateurs are now using commercial or other types of superhet receiver and will no doubt have found that it is not possible to tune in a C.W. signal on this type of receiver. If you are anxious to pick up amateur transmitting stations using code signals, or if you wish to improve your Morse speed, you will, of course, require to pick up high signals and to make use of some form of back-coupling in the second detector stage you can receive these signals, and one of the simplest plans is to connect a wire from the grid anode of the second detector back to some part of the grid circuit. The position of the wire, and the coupling obtained, will govern the degree of feedback or build-up, and will thus control the pitch of the signal as well as the interfering station.

Alternatively, you can connect a very small neon tube condenser between anode and grid and use this for the purpose. This arrangement—whilst it works very well in the majority of cases—is not completely satisfactory, and a much better plan is to make use of what is known as a beat frequency oscillator. In its simplest form this consists of a valve arranged somewhat after the manner of an ordinary detector with reaction, and the anode circuit is connected through a small capacity to the grid circuit of the second detector. If the circuit is chosen to oscillate at a frequency slightly different from that to which the second detector circuit is tuned, then a beat note will be set up, and if the beat-frequency oscillator (abbreviated to B.F.O.) is provided with a variable condenser so that the resonance frequency can be altered, then the pitch of the note given by the code signal will alter, and this will prove of great value.

Cutting Out Interference

Sometimes it will be found when listening on the amateur band that another signal will be heard in the background of the particular signal you wish to hear, and it may be noticed that the note is very similar in pitch. If your receiver is provided with a variable B.F.O. you will be able to adjust this so that the beat note set up by the required station will vary, and it will be possible to make such a difference in the note of that and the interfering station that it will be quite a simple matter to receive the desired signal. This circuit is, therefore, well worth the trouble of building, if you are keen to get more fun and experience out of your superhet.

The requirements for a B.F.O. are a valve, preferably of the type which will oscillate fairly easily, and a tuned circuit covering approximately the band covered by the I.F. transformer, and this may be done with enamelled and copper wire. The tuning adjustment may be carried out either by a microadjuster of very small capacity, or by a small condenser made up from a dismantled reaction condenser, and using two or three plates only with a fairly wide separation. A circuit of a suitable arrangement is given in Fig. 1, but there are several variations of this device which may be regarded here as in its simplest form. It is imperative to keep all of the wiring and components of this unit well clear of the remaining wiring of the superhet, and the coupling between the set and unit must be made by means of an extremely small capacity. By building the entire unit inside a screening can these requirements may easily be satisfied, and the following will no doubt be found the best means of making up a suitable unit.

Construction

Obtain from B.T.S., or any other firm specialising in the components, one valve with a coil-screen, complete with lid. To the inside of the lid a standard valveholder of the chassis-mounting type should be bolted so that when a valve is inserted the remainder of the screen will fit over it and remain in position. A convenient point will have to be found on the chassis near the connections wire generally be found most suitable.

The Coil

The most important item in the circuit is the tuning coil, and this may be home-made, or one of the latest Wearite coils, designed especially for the purpose, may be used. This is known as a no-tap coil and costs Is. 6d. Alternatively, if you have on hand an old I.F. transformer of the frequency used in your receiver, you can take this down and use one of the windings—either primary or secondary. It would be preferable to use a tapped-secondary transformer winding, as this would enable you to make use of the tapping for the reaction winding. If this is not provided you will have to make a tapping, and to save unwinding the coil you can locate a suitable point by carefully scraping points on the edge of the coil until you locate a suitable one. Connection may be made temporarily and afterwards soldered. For those who wish to make their own coil the following details will suit you.

For the former a 1½ in. diameter tube is needed, and this may be a simple paxolin tube or a ribbed ebonite former. Three slots are cut in the latter, each ½ in. wide and about the same depth, in which to wind the wire, but if the solid or smooth surface tube is employed three rings will have to be cut from paxolin or cardboard to enable the winding to be split into three heaps. Into each slot or section forty turns of 36-gauge d.c.o. wire should be wound. If desired, enamelled wire may be used, but in this case care must be taken not to damage the enamel surface and thereby introduce short-circuits. The tap should be made at two or three points so that the best connection may subsequently be found, and the most suitable tapping points are at the centre of the complete winding at the end of one section (40 turns) and half-way through that section (20 turns).

In use, the tap is simply switched on, and the condenser on top of the can adjusted to produce the required pitch or note. If desired, of course, it may be so mounted that the condenser remains in a fixed position, and in which case the condenser is always available should it be found that a great deal of listening on the amateur bands is indulged in.
LOUD SPEAKER EXPERIMENTS

A Few Interesting Modifications Which can be Carried Out Without Difficulty and Which May Prove Worth While

It is now possible to obtain quite cheap loudspeakers from certain dealers in surplus stocks, and in many cases it will be found that the diaphragm has been seriously damaged—hence the low cost of this type of surplus component. In some cases, amateurs also have a spare loudspeaker lying idle—perhaps because they have become dissatisfied with the results and have obtained a new one. These spare speakers may be used as a basis for some interesting experiments and may prove capable of giving really good results when modified in certain ways. If the cone is destroyed, it will be necessary, of course, to fit a new one, and practically any good stiff paper may be used for this purpose. The method of joining the two edges of the cone may form the first basis for experiments, and it will be found, if a good amplifier is employed, that the reproduction obtained when the seam in the cone is straight as in Fig. 1, will not be so good as when the seam runs across the cone as in Fig. 2. Various forms of joint may be tried in this connection.

Split Cones

A feature which is now being more commonly employed is to use two separate cones for the reproduction of the high and the low notes. One very simple manner in which this arrangement may be adopted, and which will provide hours of interesting experiment, is to cut round the cone and to join the cut together again with a very thin, flexible material such as ordinary silk. In some cases thin paper may be used, but I have found that there is a distinct tendency to buzz when this is used and some form of silk or thin linen is preferable. In some earlier experiments ordinary thin rubber (obtained from a child’s balloon) was employed but again this was inclined to buzz or give rise to chatter. The method of cutting and joining the cone is shown in Fig. 3, and the two cut edges should be separated by a very slight gap. If the joining material is too thin the cone will not be held central in the gap, and thin strips of paper may then be joined at equal distances round the gap in the cone as indicated in broken lines in Fig. 3.

Dual Cones

The Philips receivers are this year fitted with a speaker which has a small narrow-angle cone attached to the centre and a paper cone of this type can easily be affixed to an existing speaker for experimental purposes. The attachment should be made by means of some form of cellulose adhesive, or alternatively a bottle of the special Speaker Repair Cement, supplied by Messrs. Holiday and Hemmerding, of Holme Works, Dalefield, Bridge Street, Manchester, may be used. In experiments which I have carried out with this type of cone I have found that much better results were obtained when the centre of the cone was closed. A flat disc produced a peculiar form of lifelessness in speech, but a richness was imparted to music, whilst a shallow cone, fitted in with the apex pointing outwards as shown in Fig. 5, improved speech but did not seem so good for musical items. No doubt a compromise can be found and the shape of this will perhaps depend upon the angle of the small cone. The best length in the tests which I carried out was half the depth of the speaker cone.

Speaker Cabinet Designs

If the speaker is correctly designed it may even then fail to produce the best results due to the wrong design of cabinet. A great deal depends upon the air loading on the cone, and it will be found that in many cases the advantages of a really good baffle—produced by a nice large cabinet—are offset by the large radio or amplifier chassis which is enclosed within it. This obviously means that a separate cabinet for the speaker is required, and this will, in
THE perfect ultra-short-wave receiver has yet to be designed, nevertheless, slowly but surely ultra-short-wave technique is evolving its own particular type of receiver, somewhat different from that used in normal broadcast practice. During the last few weeks the writer has been receiving the B.C. television signals at a distance of over 100 miles from the Alexandra Palace, and has there been an ample opportunity to study the effects of comparatively long-distance reception on the ultra-high frequencies.

In view of the above remarks it would appear that ultra-short-wave reception is by no means confined to within optical or quasi-optical, distances from the transmitter; reception of amateur signals across the Atlantic on 5 metres definitely proves this, though naturally such reception may be put down to freak conditions. Even so, a receiver of sufficient sensitivity it should be possible to tune in the television signals from the Alexandra Palace almost anywhere in Great Britain. This reception does not apply to vision but only to the super-high frequencies, where it is desired to amplify the superhet principle of receiving superhigh frequencies, though no impedance is offered to the radio and supersonic frequencies. The curve of such an I.F. stage will be comparatively flat, and will cover a wide range of frequencies. The amplification that is obtained will entirely depend on the values of the coupling components, and is not a function of frequency as in the case of transformer-coupled I.F. stages.

The reason for this type of I.F. amplification is particularly adapted for use in an ultra-short-wave superhet, using resistance coupling all the way through, and it is predicted that this type of receiver will become very popular before long, owing to its excellent D.X. possibilities.

R.C. Coupled Stages

Here, a word of explanation is necessary, as it may not be apparent how the heterodyne principle of amplifying at an intermediate frequency is obtained. The connecting of the R.C. I.F. stages is similar to ordinary audio R.C. coupling, but the capacity of the coupling condenser is much smaller so as not to pass the audio frequencies, though no impedance is offered to the radio and supersonic frequencies. The curve of such an I.F. stage will be comparatively flat, and will cover a wide range of frequencies. The amplification that is obtained will entirely depend on the values of the coupling components, and is not a function of frequency as in the case of transformer-coupled I.F. stages.

First of all a little more amplification can be obtained than with the resistance-coupled method, and also it is very easy to add regeneration to the second detector, if necessary, by means of the usual coil and condenser, and, hence, both amplification and selectivity may be controlled to a certain degree. It will be seen that the two I.F. valves are H.F. pentodes, which type of valve is, of course, absolutely necessary here. Any make can be used, though there are one or two specimens on the market which have a very high mu and are particularly suitable.

It will be observed that the I.F. and second detector stages only of an ultra-short-wave superhet have been considered here. There are several first detector oscillator circuits suitable for ultra-short-wave reception, and these will, no doubt, be familiar to the experimenter (making use, for instance, of a triode-hexode valve), but as these circuits require special treatment, they will not be dealt with here. As a matter of fact, an autodyne will give very good results on the ultra-short-wave superhet; that is to say, a simple reaction circuit which will act as a combined oscillator detector.

Noise Silencing

One interesting feature of an ultra-short-wave superhet is the noise level, which, unfortunately, is apt to be rather high in a receiver using air wavelength. However, when a signal is tuned in, a certain amount of this background noise disappears, even at D.X., and gives an impression that...
SHORT-WAVE SECTION
(Continued from previous page.)

League of Nations Broadcasts

In September 18th and October 3rd, during which period the League of Nations will be holding an Assembly, the Frangins transmitters will broadcast daily, in various languages, a precious news bulletin in which will be fully described the work which is being carried out. The stations to take this service are HBF, 31.27 m. (8.59 mc/s); HBP, 38.45 m. (7.75 mc/s), to which will be added HBB, 15.83 m. (18.85 mc/s); HBZ, 20.04 m. (14.38 mc/s), and HBO, 26.31 m. (11.49 mc/s). These, so far as broadcasting is concerned, have only been brought into operation for the relay of programmes from European centres to the United States of America and other distant parts of the earth.

Transmissions from the Normandie

Arrangements have now been made to carry out broadcasts from this crack trans-Atlantic liner on the following dates: September 18th, 22nd, 25th; October 2nd, 6th, 7th; November 3rd, from G.M.T. 16.00-16.30. On September 20th, and on October 4th and 18th, special transmissions will be made between G.M.T. 11.00-11.30. According to circumstances and conditions prevailing at the time two of the following channels in regular use by the Normandie will be chosen, namely 65.72 m. (4.55 mc/s), 33.98 m. (8.83 mc/s), or 22.29 m. (13.45 mc/s). As these are the frequencies adopted for ordinary traffic with Pontoise (France) or on before the dates mentioned above, listeners will, no doubt, be interested in picking up experimental tests. Communications between the French land station and the liner is carried out regularly on 71 m. (4.225 mc/s), 38.96 m. (7.70 mc/s); 35.10 m. (9.04 mc/s); 24.56 m. (12.51 mc/s), and 23.08 m. (13 mc/s). The broadcasts will be passed over for re-transmission to French and other European listeners through the P.T.T. network.

New South African S.W. Stations

It is reported that a 5-kilowatt transmitter has been installed at Pretoria and that tests are now being made at irregular intervals on 33.71 m. (8.9 mc/s). It is also stated that the African Broadcasting Corporation along with the new short-wave transmitter at Cape Town; the channel is 49.83 m. (6.02 mc/s).

WIXAL'S Twin-beam Transmissions

WIXAL, Boston (Mass.), owned by the World Wide Broadcasting Corporation, is endeavouring to obtain a permit from the U.S. Federal Communications Commission to operate an additional 10-kW station to supplement the 20-kW transmitter already in existence. Two of WIXAL’s channels with new equipment of a series of beam aerials will be brought into operation as soon as possible, for the relay of programmes to the South American continent.

Plethora of Italian Signals

On the short-wave bands, listeners now pick up experimental tests. Communi-
cast aerial will bring in signals, there is a 60 per cent. increase in signal strength when using a tuned aerial system. When erecting experimental aerial systems, it is generally convenient to use ordinary lighting flex for feeders, instead of the more expensive concentric cable or spaced feeders. When using the twisted flex an increase in signal strength can be obtained by tapping the feeders on at the low potential end of the grid coil. One end of the feeder is taken direct to the earth side of the coil, while the other should be tapped about half a turn up the coil. The best results can easily be determined by experiment, of course, as the tapping point will vary with the detector circuit used. (Fig. 1.)

There is no doubt that for long-distance listening one ultra-short waves a superhet of the type already outlined has many advantages, and if progress is to be made in breaking down the distances that can be covered on the ultra-high frequencies, the simple super-regenerative type of receiver must give way to specially designed superhet of high sensitivity, as ultra-short-wave transmission and reception represents radio in its most advanced form.

Leaves from a Short-wave Log

PRACTICAL AND AMATEUR WIRELESS
September 18th, 1937

Mr. William Jones, of Calayan Bay, recently broke the British transmission record for a two-way contact on the ultra-short wavelength of 5 metres. With the assistance of three companions Mr. Jones operated his transmission station GW60K on the summit of Snowdon in connection with a series of special tests organized by the Radio Society of Great Britain. Contact was established with several 5-metre stations and the tests are proving of great value. The illustration shows the radio enthusiasts at work on the summit of Snowdon.

RADIO FROM MOUNT SNOWDON

New Aerials for Boundbrook

The N.B.C. short-wave transmitter at Boundbrook (New Jersey) is being equipped with new directional aerials which should mean much better reception of the broadcasts by European listeners. The power of the signals now transmitted by this station on 16.87 m. (17.78 mc/s), and 49.18 m. (12.00 mc/s) is already much improved, and in the near future a considerable increase in strength should be noted.

Egypt Wants a Powerful Short-wave

The Egyptian Government is considering the installation of a 15-kW short-wave transmitter in the immediate neighbourhood of Cairo for the purpose of relaying the Arabic programmes broadcast from the Egyptian station to all parts of the world. One of the most popular features of the day is the reading of ex-corps from the Koran, and it is believed that for this portion of the programme alone the construction of a special transmitter would be justified.

Mr. Jones, Calayan Bay, has also recently broken the British transmission record for a two-way contact on the ultra-short wavelength of 5 metres.
New President of the B.L.D.L.C.

BEHOLD in me, the one and only 'Thermion,' the new President of the British Long Distance Listeners' Club, at your service and ready to turn a willing hand to any job which comes along in connection with it. Its members, I see, are located in all quarters of the globe, and I shall welcome letters from every member and, moreover, promptly reply to them. Everything within my power which can be done to further the interests of a club, which has a larger membership than any similar organisation in the world, shall be done. I have been approached on many occasions to become President of this, that, or the other society, and I have for various reasons had to decline the honour. This particular Presidency I accepted with alacrity, for it is a national organisation and one to which I propose to devote considerable time and attention. So I should like to make your acquaintance, and if you have time to drop me a letter I hope you will do so.

Service Charges

In our issue dated September 4th I published a letter from C. H. R. N., of Kington, Herefordshire. I am asked by Messrs. S. G. Brown, Ltd., the makers of the well-known headphones, to state that they have not charged the sum of 12s. 6d., either to this reader or his dealer, for the repair of his earpiece. They have carefully checked their records and they are able to offer proof beyond all doubt that if C. H. R. N. is under the impression that this charge was made by Messrs. S. G. Brown, Ltd., the impression is erroneous. Perhaps C. H. R. N. will communicate direct with Messrs. S. G. Brown, Ltd., or get his dealer to do so, as a mistake seems to have occurred somewhere.

A Generous Offer

I HAVE received a very generous offer from Lt.-Col. Puck-Beresford. Since 1921 he has been an enthusiastic set constructor, but as he is moving to a new district he has on hand a great deal of wireless apparatus, much of which is perfectly sound and usable. He wishes me to find a suitable home for it, and I cannot do better than suggest that wireless clubs, or boys' institutes, or working men's clubs should write me a letter setting forth particular reasons why they should receive it. I will consider each letter and act accordingly.

Incidentally, Lt.-Col. Puck-Beresford, who called at the Stand for me at a time when I was not there (the inner man has to be satisfied sometimes!) tells me that he is one of the few people who does not want to meet me, as he is content to read my articles each week and enjoy them, except when I rant against subjects with which he is in disagreement.

The "Practical and Amateur Wireless" Stand at Radiolympia—a popular meeting-place for all constructors, where all their technical needs were satisfied. "Thermion," was in regular attendance, and stood at the left-hand side, behind the front counter. No attempts were made upon his life and his copy appears, as usual, this week.
Show Attendances

ALTHOUGH the official figures indicate that the daily attendances at the Exhibition are fewer than last year, it is significant that the attendance at our Stand was greater. Does this indicate a revival of home construction this season? Judging from the sale of blueprints and issues in which construction is dealt with I should say that it does; and I hope that this great increase in business will not catch the manufacturers of components unawares, as it has done in the past. The complaints regarding lack of delivery and long delays has been chronic during the past year. The manufacturer can now make amends. In any case he should not accept orders which he cannot execute within a few days. I hope also that there will be fewer complaints of wrong parts being supplied, and that the standard of inspection will be even higher than it has been hitherto.

Publicity

ALTHOUGH some new artistes complain of the lower pay they receive from the B.B.C., it is my opinion that many of them are grossly overpaid, particularly the unknown ones, for the B.B.C. does them a good service in lifting them from obscurity and providing them with opportunities, and publicity which the stage would never accord them. Their voices may be good and their patter excellent, but their stage appearance and deportment are simply abominable. You can prove this by comparing the number of successful B.B.C. artistes who have deserted broadcasting and gone on to the variety stage. Very few of them are really successful. They draw a crowd for a couple of nights, but the crowd does not go to see them because of their ability as artistes but merely out of idle curiosity to see what they look like. Nearly always the public is bitterly disappointed. What is going to happen when television is the accepted form of radio entertainment? Surely many of those artistes who have only their voices upon which to rely will be driven out of engagements. The fact that they continue to broadcast indicates the truth of the old adage that anything will succeed if you plug it enough. You can make the public believe that a thing or a person is good even when it is rotten. A band leader will announce that he is going to play "That very popular number ...", whether it is popular or not. Having told you that it is popular you believe it without question. What the band leader really means is that he has received a nice fat fee from some music publisher to plug the song, and because he continues to play it you presume that it is popular. If he took the trouble to take a census of popular opinion he would find that the public hates the song. If a song is popular it does not quickly die, and the average life of the so-called popular number is only a few weeks. You cannot say that songs which are so ephemeral are popular. If the songs are popular why don't you define to me an unpopular song? And what is the essence of un-popularity? A short life, surely! Another point: Why should I be compelled to listen to a song which the conductor says he has been "requested" to play. Because one person asks him to play a particular number, has the conductor any right to presume that everyone wishes to hear it? And why should one person be specially favoured in this way? And ought not we to be told who has made the request? It may be just a subtle way of saying that he has been requested to do so by the music publisher, who has complained that it has not been sufficiently plugged. And do, please, save me from the conductor who says, "We will now play you another number." I do think that before a conductor is allowed to announce he should be given some lessons in English and elocution; perhaps electrocution is the word I should have used.

Band conducting is the most over-rated, overpaid occupation in the world. I will not call it a profession, as I should have to apologise to all the other professions. The average bandman is a person attracted to the job by a desire to do as little work as possible for as much money as possible. The sort of person who likes dancing because it puts him amongst the ladies, and who plays tennis because it enables him to dress up in flimsy, feminine attire and play pat-ball with the ladies. Tennis, like crooning, is just an occupation for the effeminate. Rude letters relating to this paragraph will be dropped into the W.P.B., for all intelligent people will agree with me.

Problem No. 259

WE were surprised by the number of incorrect solutions that were received in connection with this problem. Readers were asked to decide the disadvantages of using A.C. values in place of the A.C./D.C. type, and the component substitution necessary when making a modification of his nature. A very large proportion of readers stated that the value of the mains dropping resistance 'would have' to be increased owing to the increase in current consumption of the valves! In practice it is not advisable to use A.C. 4-volt 1-amp. values in place of the normal A.C./D.C. type. The latter have a consumption of 0.2 amp., for most makes, and, therefore, if the values are connected in series the total wattage dissipation will be one-fifth of the mains voltage considered as watts, plus the H.T. consumption. With 4-volt 1-amp. values in use the L.T. consumption is increased five times. This increase in current consumption necessitates a reduction in the value of the heater dropping resistance, and the valve used must, of course, be capable of carrying 1 amp. Apart from the fact that the use of 1 amp. valves increases the consumption, the heat dissipated is excessive and the cabinet is likely to be damaged.

The Oracle Coil Unit

SOME readers are experiencing difficulty in operating the wave-change switch on the Oracle. With this type of switch the position of the locating plate with respect to the switch contacts inside the coil unit must be correctly adjusted before the plate is locked. For example, if the coil switch is set at the short-wave position, the spring contact must rest in the corresponding groove of the locating plate. After the correct position has been found, the plate must be securely locked, by means of the fixing nut, to the component bracket, and when the spindle is rotated the locating plate must remain quite rigid.

Class B, Q.P.P., or Push-pull?

IF best quality of reproduction is desired from a battery-operated receiver, a straight push-pull output stage should be used—preferably two power valves. The current consumption is somewhat high when this circuit arrangement is employed, however—about 15 m.A for the output valves if two power valves are employed. H.T. current economy can be effected by using a Q.P.P. or Class B arrangement, but the quality will be definitely inferior to that obtainable from straight push-pull.

Another Record Broken

I AM told that among the records broken at Radiolypnia this year is the amount of technical literature carried away by visitors. More than 60,000 brochures and leaflets were taken from the G.E.C. stand alone. Literature concerning the £35 television unit was in the greatest demand.
A Clock-dial Tuning Indicator

THE accompanying sketch, Fig. 1, shows how a clock-dial tuning indicator can be made from a cheap watch which has ceased to function as a time-keeper.

First of all, the back plate screws are slackened a little, and the balance wheel and intermediate pinions are removed. A slot is cut at the bottom of the casing to allow the cord to pass through, as shown in sketch.

In the watch I used, when the mainspring drum was rotated, the hands of the watch turned through four hours per revolution, so I made the driving drum on the condenser spindle three times the size of the mainspring drum.

The cord is passed over the mainspring drum, crossed over, and then passed twice through four holes in the drum and tied together, as indicated. A small pin under which the cord is passed can be inserted into whichever hole is suitable.

To ensure that the cord shall not run off the drum in the watch it is desirable that a piece of rounded tin be inserted at the back of the slot in the watch and rounded off to prevent wear on the cord, which can be made to bear lightly against it by adjusting the position of the drum on the condenser spindle.

A graph, showing the relation between the reading of the dial to the wavelength to which the condenser is tuned, can be drawn, as in Fig. 2. Taking any two stations of known wavelength and marking their position on the graph by means of the position of the hands of the watch when they are tuned in, a straight line drawn through these two positions will show at a glance the setting of the dial for other wavelengths.

Initial setting of the hands of the watch can be carried out by the ordinary working of the timepiece.—J. H. Mann (Bathgate, West Lothian).

A Simple Meter Stand

THE simplicity and attractiveness of this idea will be evident from the accompanying sketch. I have adapted this fitting to meet many requirements which would otherwise be difficult, and with an element of danger to an unmounted aerial, the whole is self-explanatory, but with regard to the weight, this should be constructed of thick steel plate or lead, allowing, of course, sufficient room for the locking nuts of the terminals, that slip under which, in my case, are cut down low. Owing to the moulding being reinforced where the weight-fixing screws are fitted, this must be drilled to accommodate the nuts to avoid fouling the base edge, and possibly causing the fitment to be unstable.—S. H. CHARLES (Morden).
SHOW AFTER

"The Experimenters" Look Back at the Show and Describe the Attraction. Naturally. Most of their Time was Spent in Examining...something new—the Milnes thermo-charger, which operates from the gas supply.

In short, there must now be a new wave of technical publicity. At the same time, we consider that the time is ripe for a new era in home construction. There are fewer manufacturers of components than there were, but those which remain are able to supply the most exacting requirements of the public. You might call it a survival of the fittest, for the component people who are still in active production are certainly "fit," and we see no reason to suppose that they are other than prosperous. They merit our support—and yours.

Electricity from the Gas Pipe

If we were asked what item in the whole of the exhibition fascinated us most, we should find it difficult to give an answer, but there was a unit on the Milnes Radio stand which was definitely intriguing. For years there has been talk of operating a wireless receiver from the gas supply. In most instances any such suggestion has been derided, but at last it has been shown that what might be called a foolish dream has come true. It is a long time since Milnes introduced their special H.T. accumulator, which is the L.T. accumulator, and this unit has proved its value. But even the L.T. accumulator has to be charged; and that means that a source of electrical power is needed. Thus, a person living out in the wilds was still dependent on a charging station.

But now (or at least very soon, for the device is not ready for marketing in numbers at the moment) you can buy a generator of electricity, which operates from the ordinary gas supply. The output is up to 3 amp., which is adequate for charging a large-capacity battery. Thus, you light the burners and charge the L.T. accumulator, and then use that to heat the filaments and also to keep the H.T. unit fully charged. Sounds incredible, doesn't it, but it's true. The principle is that of the thermo-couple, which some of you will remember from your school days. Two strips of dissimilar metals are placed together and heat is applied to their junction; as a result, a potential difference is set up between them.

Thermo-couple

In the school experiments, it was shown that if the metals were connected to a very sensitive galvanometer a reading could be obtained when the metals were exposed to a source of heat. But the principle has always been extremely difficult to apply in practice, because of the infinitesimally small current and voltage which could be produced. By using a number of thermo-couples of special design, Milnes have been able to obtain just the effect which has been sought for at least fifteen years.

By the way, please do not write to ask us for constructional details of a device such as this. If we wanted, we could not possibly tell you how to make one. It has taken a very long time to perfect, and a patent has been applied for in connection with it.

Your Own All-wave Coil

On the Wearite-Polar stand we "met" an attractive line in the form of miniature, high-efficiency unscreened coils. They are about \( \frac{3}{4} \) in. overall diameter and less than \( \frac{1}{2} \) in. total length, and can be obtained in eight sizes to cover all wavebands from 12 to 2,000 metres. Moreover, the price is only 1s. 4d. for the smallest sizes, up to 1s. 9d. for the largest.

They certainly merit our consideration. They are sought for at least fifteen years.

By the way, please do not write to ask us for constructional details of a device such as this. If we wanted, we could not possibly tell you how to make one. It has taken a very long time to perfect, and a patent has been applied for in connection with it.

The J. B. "Lincore" tuning unit, which has a station-calibrated scale.

Besides being made in "ordinary" types for serial and inter-valve tuning, they can be obtained as H.F. transformers or as superhet oscillator coils. In every case complete sets can be matched with complete accuracy by means of midget trimmers, which can be soldered directly to two of the connecting tags. They certainly open up interesting possibilities for the constructor and experimenter.
Thoughts

Some of the Exhibits that they Found of Particular Interest at the Autumn Home-constructor Components and Accessories Show

10-Metre Tuning

While on the subject of all-wave tuners (and this subject seemed to permeate the show this year) we must mention the new Bulgin unit which covers the five bands of 5-10 metres, 12.85 metres in two sections, and the two broadcast bands. The chassis is small, and fitted with high-efficiency rotary switch bases, these tuners cost 21s. net. As every unit is accurately trimmed and adjusted before leaving the works, the construction of a highly-efficient modern receiver is as easy as it could be.

Calibrated Tuning Pack

Jackson Bros. have always been friends of the home constructor, so we could not resist going over to their stand. Most important of their new components is the Linacore all-wave tuning pack. It is for use in superhet circuits, and comprises a complete screened coil assembly, tuning from 16.5 to 51, 200 to 650, and 800 to 2,000 metres, a double-gang condenser, and a rotary switch. It has a full Vision tuning scale of ample proportions, and this is station calibrated. It is designed for the popular I.F. of 465 kc/s. As every unit is accurately trimmed and adjusted before leaving the works, the construction of a highly-efficient modern receiver is as easy as it could be.

Varleys had their usual wide range of components, but here again we were struck by the new double-gang three-band superhet coil unit, which costs 10s. 6d. The short-wave range is from 18 to 45 metres, this being additional to the two broadcast bands. There is a neat chassis-mounting I.F. transformer for use with it, and this is fitted with convenient chassis flexible-lead connectors.

Stopping Static

After spending a considerable amount of time at the Belling-Lee stand we found that there were still many items that we had not seen. Anyhow, we did come to the conclusion that they have devices for preventing any and every form of electrical interference that could possibly be experienced, even if the set had to be used in the Barking power station. By means of a cathode-ray tube, they showed you just what interference is, and what effect the various suppressor devices have. This firm tackled the "man-made static" in a very thorough manner, and they can be considered as among the foremost experts in this branch. But they still make millions of small connectors, spade terminals, and wrench plugs which you and we have used ever since we took up radio.

Super Anti-Vibration

On the Cossor stand we came across an item of interest. We noticed that the gang condenser on a particular receiver chassis was mounted on a baseplate by means of soft-rubber bushes, the base-plate being attached to the chassis itself by means of similar bushes. Why double-flexible mounting? we asked. In answer we were shown what would happen if the condenser were mounted rigidly. When the set is packed for despatch a metal bracket is used to protect the condenser, and it holds this firmly against the box. The set was switched on without removing this bracket, the wave-change switch being set to S.W.; result: unbelievable howling. Next the bracket was removed, as it is intended to be when the set is in use. The set was as docile as it could be, and there was not the slightest suggestion of a howl.

Just shows what a trace of vibration of the condenser varies can do, doesn't it?
IF the above title sounds dull and rather uninteresting, I can only say that the subject which it introduces is by no means dull, nor is it confined to technical considerations. The importance of the ratio between the strength of the signal impules and the H.F. currents representing noise, or interference, cannot be overstressed, for the most sensitive receiver which it is possible to produce might be no more effective in bringing in weak signals than the simplest two-valve if the ratio is low.

Let me explain that point more fully. Suppose you have a highly-sensitive superhet, the sensitivity of which is given as 5 micro-volts. Without going into the minute details of the position, that means that the set will give a certain 'standard' output when the signals applied to the aerial-earth system have an H.F. voltage of 5 micro-volts. A receiver of that type would be classed as extremely good for long-distance reception. Nevertheless, if the "signal strength" of local interference were equivalent to 10 micro-vols, the proper signal would be "swamped." In consequence, the weak, long-distance signal could not be utilised to produce anything approaching entertainment. In fact, a receiver of lower sensitivity would be just as good, if not better, for the purpose.

On the other hand, if the strength of the interference were, say, 5 micro-volts, the signal could probably be picked up satisfactorily on the sensitive receiver, whereas it would be unintelligible when using a receiver of lower sensitivity. For example, if the receiver had a rated sensitivity of 20 micro-volts, it would probably not respond to the signal; even if it did the resulting reception would scarcely be of entertainment value.

Aerial—Good or Bad

This brings us to the important question of a suitable aerial system. It is generally considered that a sensitive modern receiver will operate with perfect satisfaction when fed from a short length of wire thrown across the room. Of course, the sensitive receiver will bring in a large number of transmissions when operated in this manner, brought up to good strength with the volume control in about its midway position. Next, replace the extended aerial with a length of wire loosely placed around the skirting board. Turn up the volume control, and re-tune if necessary, until the same signal is brought back to approximately its original volume.

The test may prove deceptive, because it might appear that the original volume is not restored even when the control is turned to its maximum point. The reason will probably be that in this case there is so much background noise that signal is partly obliterated. If a few tests are made in connection with the position of the indoor aerial, it is by no means unlikely that it will be found that when the wire is in some positions reception is almost as good as when using the outside wire. In any case, before erecting a permanent indoor aerial it is a good plan to gauge the performance of the set when connected to an outside wire isolated as far as possible from the building.

If an indoor aerial must be employed, it should be placed at the highest convenient point, and preferably just below the roof. The reason will probably be that in this case there is the greatest distance from electrical leads and devices in the house.

Interference Pick-Up

Even a good outdoor aerial will not necessarily be free from interference, but it has the best chance of not being acted upon by interference originating on your own premises. The only part of it which is likely to be within a strong "interference field" is the downlead, and this can easily be screened by using one of the special metal-braided lead-in connectors. This will reduce the signal strength of most stations to a certain extent, but it will be still more effective in eliminating "interference signals," so that the signal-to-noise ratio of the H.F. impulses applied...
A 50,000-MILES TOUR

A 50,000-MILES TOUR

As a result of orders for sets taken at the Radiolympia, Mr. Moxham, G.R.O. radio engineer, is undertaking a 50,000-miles tour, and the main object of his trip will be to give instructions and advice on several topics to G.R.O. engineers in parts of the world. Wherever new business is being done by G.R.O. Mr. Moxham will visit the area, no matter how remote it may be.

"We claim that we can give service after sales in any part of the world," said Mr. Moxham. "My trip is intended to ensure that that claim is literally true."

The journey will not be a new experience for him, for he carried out such a tour a few years ago. In seven months he travelled 50,000 miles (10,000 of them by air) and visited Palestine, Egypt, East and West Africa, India, Burma, Malaya, and Dutch East Indies. As well as instructing service people, Mr. Moxham will also test reception under all conditions.

**Signal-to-Noise Ratio**

(Continued from previous page)

to the receiver will be noticeably increased.

There are, of course, many special anti-interference aerial systems on the market, and the installation of one of these is amply worthwhile in many situations, especially when the house is near to such sources of interference as picture houses, electric signs, trolley buses and trams. In passing it should be mentioned that certain progressive municipalities have fitted their public-service vehicles with interference-suppression devices.

### Impedance-Matching Devices

One principle which has been widely employed in the design of anti-interference aerials is that of fitting a step-down transformer between the horizontal span of the aerial and the aerial lead-in, and a corresponding step-up transformer between the lead-in and the set. The lead-in is screened, but signal loss due to the proximity of the screen is infinitesimally small because of the low voltage of the signal arriving at the set. In seven months he visited Palestine, Egypt, East and West Africa, India, Burma, Malaya, and Dutch East Indies. As well as instructing service people, Mr. Moxham will also test reception under all conditions.

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One principle which has been widely employed in the design of anti-interference aerials is that of fitting a step-down transformer between the horizontal span of the aerial and the aerial lead-in, and a corresponding step-up transformer between the lead-in and the set. The lead-in is screened, but signal loss due to the proximity of the screen is infinitesimally small because of the low voltage of the signal arriving at the set. In seven months he visited Palestine, Egypt, East and West Africa, India, Burma, Malaya, and Dutch East Indies. As well as instructing service people, Mr. Moxham will also test reception under all conditions.

**Signal-to-Noise Ratio**

(Continued from previous page)

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The W.M. A.C. Short Waver

Mains Short-wave Super (SG, D, RC, Trans)

Two-Wave : Blueprints, 1st. ed., 1936

Consoelectric Two (D, Pen) A.C.

£5 5s. Three : De Luce Version

PRACTICAL AND AMATEUR WIRELESS

A. Modern Two-valver

Three-Valve : Blueprints, 1st. ed., 1935

PRACTICAL WIRELESS

A.W. Short-waver

S.W. One-valver (Price 6d.)

Mains Operated.

Home-made Coll Two (SG, D, Trans)

A.W. Short-waver

Home-made Coll Two (D, Pen)

A.W. Short-waver

A.W. Short-waver

A.W. Short-waver

All-Wave Radiogram (Price 1/-)

The W.M. A.C. Short-wave Super

1935 Super Five Battery (Super-regen)

The W.M. A.C. Short-wave Super

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All-Wave Radiogram (Price 1/-)

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SEEN AT THE SHOW

Below is seen the "His Master's Voice" Model 499 A.C., a new six-valve all-world receiver which is being marketed at 14 guineas. This model incorporates many interesting features, including tuning knobs of an entirely new type, and fluid light tuning.

Leonora Corbett, star of "Sarah Simple" at the Gaiety Theatre, wearing one of the "Merry Widow" hats, when she visited the W.B. Radio stand at Radiolympia. Below is the Bush All-wave Console. There are two alternative chassis, the sets being known as models S.U.G. 43 and D.U.G. 43.

Fred Archer was an attraction at Radiolympia. All day long he sat on the H.M.V. stand looking like a wax figure. He has the ability of sitting perfectly still with immobile features, and visitors often wondered whether he was alive or not.
A New 40-Page Booklet—Free

RADIO CLUBS AND SOCIETIES

Club Sponsors should not exceed 200 words in length and should be received First Post each Monday morning to allow ample time for advertising world's time.

The Golders Green and Hendon Radio and Scientific Society

FOR the twelfth year in succession this society recently held a direction finding meeting, culminating in the Annual Open Competition, which was won by the Southall Radio Society, represented by Mr. Swan. This position was very closely contested there being only a difference of 2 per cent. in the marks of the first and fourth positions.

The Judges were Group Captain G. Strange Marshall, R.A.F., Lieut.-Col. H. Ashley Scarlett, D.S.O., and Mr. H. B. Dent, M.P., F. H. Barrett, of the National Physical Laboratories, after watching the operations closely, examined the apparatus used, expressing surprise at the very high standard of workmanship and design exhibited. Elasticity in design was strikingly demonstrated by the fact that the wavelength used was at very short notice altered from 3,750 k.c.s. to 7,500 k.c.s. but the results handed in showed an average error of only 1.20 degrees.

Apart from the increased frequency a new type of transmitting aerial was used, consisting of a single brass rod about 2 ft. in diameter and about 30 ft. high. A short feeder coupled this to the power amplifier tank coil.

General remarks on the contest were as follows:

1. A considerable increase of outside interference made observations at times quite difficult.
2. Field strength of signals was greater.
4. Some competitors reported a distortion of time zero when body was close to or in between the transmitter and the receiver aerial; others were unable to note such an effect.
5. Most receivers used one stage of H.F., some using push-pull H.F. amplification.
6. Two groups situated with a main line of telegraph wires running towards the transmitter were unable to pick up any signals whilst so situated.

Wallasey Junior Radio Society

A MEETING of this newly formed society will be held at the address given below on Wednesday, September 18th, at 7.30 p.m. The society is intended for young persons under the age of 18, although the presence of a few “old hands” as honorary members will be welcomed. The society will be a development of that which has been running in the Grammar School here for about a year.—A. M. Wilding, 2, Wallace Road, Wallasey, Cheshire.

Important Broadcasts of the Week

NATIONAL (261.1 m. and 1,500 m.)

Wednesday, September 16th.—Opping "Ulladale", an excursion to the Hop gardens of Kent.
Thursday, September 16th.—The Pursuit of Pleasure: Three centuries of fun, by Lance Stephenson.
Friday, September 17th.—Concert programme, from the Pier Pavilion, Skegness.
Saturday, September 18th.—Promenade concert, from Queen's Hall, London.

REGIONAL (342.1 m.)

Wednesday, September 16th.—Dance Music relayed from Germany.
Thursday, September 16th.—Promenade Concert, from Queen's Hall, London.
Friday, September 17th.—The Belle of New York, a musical comedy.
Saturday, September 18th.—Music Hall programmes.

MIDLAND (296.2 m.)

Wednesday, September 16th.—Choral and Organ programme, from Southwell Minster.
Thursday, September 16th.—Brun—To Come: A non-natural nightmare, by C. H. Averill and Alan Fflem.
Friday, September 17th.—Play That Again—voal programme.
Saturday, September 18th.—Band concert.

NORTHERN (449.1 m.)

Wednesday, September 15th.—A violin recital.
Thursday, September 16th.—A Becksie Chester, We Live, by Uchurin Biggs.
Friday, September 17th.—Children's Variety programme for Grown-ups.
Saturday, September 18th.—Progress: A story.

WEST OF ENGLAND (285.7 m.)

Wednesday, September 15th.—The Children's Art Exhibition at Bath: A talk by Lord Waldengray.
Thursday, September 16th.—The Incorporation of Westow-super-Mare, a recorded summary of the ceremony at Gorse Park.
Friday, September 17th.—Choral programme.
Saturday, September 18th.—West Country Composers: Jack Knapp—Instantial programme.

WELSH (373.1 m.)

Wednesday, September 15th.—Vigil, a radio play, by R. M. Williams.
Thursday, September 16th.—Leslie's Blynfoddo—1897 (A Welsh Scrapbook of 1897).
Friday, September 17th.—Instrumental programme.
Saturday, September 18th.—Concert Party programme, from the Pavilion Theatre, Birkenhead.

SCOTTISH (391.1 m.)

Wednesday, September 15th.—Gaelic programmes.
Thursday, September 16th.—Scotts Songs.
Friday, September 17th.—Programme of piping.
Saturday, September 18th.—Scottish Dance Music.

NORTHERN IRELAND (307.1 m.)

Wednesday, September 15th.—Eye-witness account of Belfast Championship Dog Show.
Thursday, September 16th.—Instrumental concert.
Friday, September 17th.—Band concert.
Saturday, September 18th.—Dance Band programme from the Grand Central Hotel, Belfast.
fact, often prove a worthwhile change. Although we have dealt previously with such details as an inclined baffle, and tone resonators inside the cabinet, there are other features which may not be so obvious. It will be noted, for instance, that the effect of different notes in the musical scale is more pronounced at certain distances, and that the high notes are directed towards the speaker will serve to direct the sound has to issue from beneath the floor may be found by experiment, and in most cases will depend upon the volume of the output which is normally employed. The greater the volume the nearer to the floor must the speaker be to avoid swamp- ing the higher notes which the low notes are made to follow a longer path to the listener than the high notes.

A Cause of Instability

INSTABILITY in short-wave receivers sometimes arises through intervalve coupling between one heater and the next; this can be overcome by earthing the appropriate heater through a condenser to chassis. It is usually sufficient to connect a condenser to a point on the heater chain between the two interacting valves, although it is sometimes necessary to shunt a heater with two condensers in series and earth the mid-point. The heater receiving such attention should be the one where the trouble arises and can only be found by trial. As this type of instability only appears at very low wavelengths, a small condenser must be used; .001 to .001 will be found suitable. It must, of course, be a non-inductive type, preferably flat.

A Television Refinement

At the Manchester Radio Exhibition, which opened at the City Hall, Deansgate, Manchester, on September 14th, remains open till September 25th.

Satisfied with your reproduction?

WAIT TILL YOU HEAR THIS!

Make no mistake—here is no mere superficial alteration in design.

An observant glance at speech coil, centring device, and cone will show you a few of the differences: and two or three minutes of listening will show you many more! Another 600 cycles of top response—complete absence of 300 cycle peaks—slight gain in average sensitivity—it takes a keen ear to analyse this new smoothness and fidelity, but no ear can fail to detect it!

Prices (at present) remain at the old low level—17/6 to 42/-.

Get your new Stentorian speaker now!

NEW PORTADYNE RECEIVER

A VERY interesting model in the Portadyne range is the A58. This is a 5-valve (including rectifier) all-wave superhet priced at 11 guineas. It is fitted with the special Portadyne Rotomatic tuning dial, which has a separate scale for each of the three wave-bands. As only the stations on the particular band to which the receiver is switched are visible on the dial at one time, tuning is greatly simplified. In our issue of September 4th, page 627, we gave a photograph of this receiver, but inadvertently mentioned that it could be seen on Stand 104—this should read Stand 18.

PRACTICAL AND AMATEUR WIRELESS
The Editor does not necessarily agree with the opinions expressed by his correspondents. All letters must be accompanied by the name and address of the sender (not necessarily for publication).

A Fine Log from S. Devon

Sir,—As reports from this district seem few and far between, I am taking the liberty of enclosing my log of stations received on the "American One-Valver," plus pentode output. Between May 25th and August 22nd I have received, among the others, the following stations: SUICH, VE4C2, WA4BRO, WA4EUG, HASN, W3DDD, W3DLL, W8CNY, SU1RO, LXTWX, H1TMM, F3DN, F8PV, SP1HH, O3E6W, W3EWM, O2ELY, W4BR, ALG, SU45O, SU1B5, CTIAY, WJ3OE, W3FAM, W4AZK, W5CO, VE1FU, WS5W, W6GU, WYNQ, W4BMR, W3MD, VE3ED, CO6OOM, W3MB, W4BYY, W4DUS, PAZIN, ON4AS, W3CHE, SPW, Y2BA, W4TO, W4DZB, W9G6D, VE1DC, H1PAC, K8A, SM5E, SM5WK, W4CRA, W4DLH, W3AP0 (Portable), W4CD, W53LN, CO2WW, W4GW, W3EYCLAN, CNX2AX, W3AH, VE1GP, W3FIH, O25J, T2ERQ, C0V7T, J2K, VE1BR, PY2EJ, CE1AR, W5LP, W5E6G, W3BR, VOII, E2ASE, VE2NI, VP3ZP, VE3BR, VE3SU, VE5WJ, WH7X, W4S4, VK2XL, VE4JK, HI5X, HI7G, E0A9H, YV5AK, W3AS4, W8CM4, W8NXQ, W8QGW, W8BA, W8DPD, and W4DQH. I have built two other S.W. receivers but have gone back to the old one each time. Thanks to your fine correspondence, I have many calls from various friends and neighbours who wish to test their valves. I can only do this for filament, and not emission. During my visit to Radiolimpya I observed several instruments, and in particular one for mains and battery valves, but the price was, I thought, a trifle too much for the constructor. So if you can publish details of a cheap instrument to test H.F. pentodes and output pentodes, I am sure you will receive many grateful thanks from a host of the instructors you cater for. The first mains set I made was the Universal Hall Mark 4, and it has been in use until quite recently, when the makers discontinued their .18 amp. valves.—E. T. Taomas (Wapping, E.I.)

A 20-metre Log: Correspondent Wanted

Sir,—I have been a regular reader of your excellent paper for over six months, and I only wish I had taken it years ago. I have not seen a 20-m. log from my district, so I enclose mine:—W1AXA, W4CLO, WIAPA, WICHG, WIDL, WEIXY, W3FHI, WOBMA.

A corner of Mr. J. E. Bowden's receiving station.

Valve-testing Panel

Sir,—With reference to the recent correspondence published in your "Letters from Readers" column, I am in entire agreement with two of your readers, that a blueprint for a valve tester for mains use would be greatly appreciated. I have many calls from various friends and neighbours who wish to test their valves. I can only do this for filament, and not emission. During my visit to Radiolimpya I observed several instruments, and in particular one for mains and battery valves, but the price was, I thought, a trifle too much for the constructor. So if you can publish details of a cheap instrument to test H.F. pentodes and output pentodes, I am sure you will receive many grateful thanks from a host of the instructors you cater for. The first mains set I made was the Universal Hall Mark 4, and it has been in use until quite recently, when the makers discontinued their .18 amp. valves.—E. T. Taomas (Wapping, E.I.)

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BOOKS RECEIVED

RADIO SERVICING SIMPLIFIED. 150 pp., 16 illustrations. Published by the Automatic Cell Winder and Electrical Equipment Co., Ltd. Price 3/4d.

This is the 6th edition of a most useful book for the service man or engineer. It has been entirely re-written for modern apparatus and includes a valuable work of reference. It takes the reader through the whole routine of testing and servicing modern radio and television apparatus in a most simple and comprehensive manner, and in addition gives a wealth of detail relative to the more usual types of fault met with. Commencing with a very lucid explanation of the basic principles of operation, the book passes on to deal with applications of the use of the special Avo apparatus. Every amateur, service man and dealer should obtain a copy of this book without delay.

TELEVISION ENGINEERING, by J. C. Wilson. 492 pp., 276 illustrations. Published by Phimn. Price 30/. This is claimed to be the first work written as a comprehensive text-book on television. Although written primarily from the technical point of view, it covers all the essential details of the modern television equipment and will prove a valuable guide to a proper understanding of the methods of transmission and reception. The theoretical and practical aspects of television are fully dealt with and the book is made as lucid as possible. The book is now used as is now used are exceedingly clear and concise. Among the subjects described are scanning, optics, photo-cells, the various types of television camera, television splitting, synchronising, and amplifying equipment. A foreword by J. L. Baird explains that the new television is growing and television will call for the assistance of skilled technicans and the book will prove particularly useful to those who are anxious to take part in this development of the radio industry.

OUR FREE CATALOGUE SERVICE

If you require technical assistance, we understand to send on extract of the text. Illustrated Bulletins. Rently and recent办学 leave to hand and publishing in order, with Editor, 47, Great Queen Street, London, E.C.4. No address is shewn with applications for separable. No other correspondent whatever should be continued.

Clix Components

Two new season's folders have just been issued by British Mechanical Production, Ltd., one giving a range of the popular Clix plugs, sockets, terminals and connectors, while the other folder gives full particulars and prices of valveholders and connecting strips. In the range of connectors is included a handy plug adapter in which the plug portion gives perfect contact with all types of supply sockets. The plug to take part in low-power circuits up to 5 amp. This plug is fitted with Clix patent self-centring non-collapsible pins, and has single-screw assembly. This plug and switch is the ideal suit for controlling either a set speaker or extension speaker, or both. It is fitted with quick release mechanism in a mounting plate by a slight side movement of the plug. The other folder includes valveholders and chassis mounting strips.

REPLIES IN BRIEF

The following replies to queries are given in abbreviated form either because of non-compliance with our rules, or because the point raised is not of general interest.

W. A. (S.E.11). There would appear to be a short- circuit in the insulation and the set should not get hot as you state. We suggest you have it overhauled by a local service agent.

A. T. (Dundee). The address is Transmitters Ltd., Sturbridge, Surry.

R. H. (S.W.0). The best receiver for your purpose would be the Simplex One-volter described in our issue dated December 12th last.

J. E. (West Molesey). We suggest you check the voltage applied to the anode of the detector valve. Disconnect the decoupling resisances and connect the H.T. direct to the coupling resistance as a first test. Make certain that the connections to the coil are in order, and reverse the connections to the transformer secondary to cut out the L.F. whistle.

M. E. (Bournemouth). We regret that we cannot supply a diagram of a set for long waves only. We believe the makers of your receiver can modernise it by fitting new coils for the purpose.

W. J. McC. (Londonderry). The trouble may be due to the damping of the aerial, or an unsuitable H. F. choke. Try also increasing the value of the grid leak. The fuse, if these can be inserted in the mains leads, should be of the 1 amp type.

M. T. (Pottersham). We cannot supply applications of commercial receivers, and we suggest therefore that you write direct to Messrs. Lissum.

W. D. (Northwich). We often receive applications from readers for back numbers which are out of print, and should be glad to send a copy from your offer to reply to them. We cannot purchase back issues, however, and if you wish to send the complete file we suggest you place one of the periodicals sent of the order. This is contrary to the terms of the ordinary Amateur licence.

K. H. (Warley Park). The 25-watt transmitter would be the simplest one-valver described in our issue dated December 26th and January 2nd last.

W. G. (Sheffield). We do not publish a book on the subject, but a long series of articles dealing with transmitting commenced last November.

AMAZING SET BARGAINS!

Buy your New Receiver from N.T.S. at an amazing Bargain Price! The wonderful offers below cannot be made indefinitely. Stocks are limited and IMMEDIATE ORDERING IS ESSENTIAL!

CLASS ' B' 4 RECEIVER

with 4 Valves, Speaker, Cabinet and Batteries.

LIST PRICE £18 6d.

BARGAIN £5 : 19 : 6

0. 4 BRITISH VALVES of guaranteed performance.

Married back housing.

Amazing performance of powerful all-valve models.

Wide choice of tuning systems.

Speaker, slow tuning, balanced.

Bridged power output, 15 watts.

New type switch, direct connection.

Winged, recessed Cabinet, Walnut finish.

Ahlstrom's patent self-centering system. The set is used as is used is exceedingly clear and concise. Among the subjects described are: Scanning, optics, photo-cells, the various types of television camera, television splitting, synchronising, and amplifying equipment. A foreword by J. L. Baird explains that the new television is growing and television will call for the assistance of skilled technicians and the book will prove particularly useful to those who are anxious to take part in this development of the radio industry.

SPECIAL OFFER!

New light weight super-type HEADPHONES highly recommended.

WAVELENGTH: 200-2,000 metres.

Complete with British Valve and Moving-Coil Speaker in the handsome horizontal-type walnut veneered cabinet. Complete with Valves, Back-control, New type switch, direct connection.

Waves range: 200-2,000 metres. Consumption: 12 watts.

Complete with Moving-Coil Speaker in the handsome horizontal type walnut veneered cabinet. Complete with Valves, Back-control, New type switch, direct connection.

BARGAIN £5 : 12 : 6

WAVELENGTH: 200-2,000 metres. Consumption: 12 watts.

Complete with Moving-Coil Speaker in the handsome horizontal type walnut veneered cabinet. Complete with Valves, Back-control, New type switch, direct connection.

A. C. BANDPASS S.G. 4 RECEIVER

LIST PRICE £8 8:-

BARGAIN £5 : 12 : 6

WAVELENGTH: 200-2,000 metres. Consumption: 12 watts.

Complete with Moving-Coil Speaker in the handsome horizontal type walnut veneered cabinet. Complete with Valves, Back-control, New type switch, direct connection.

D. X. FANS' A. C. 4- SHORT-WAVE KIT

LIST PRICE £5 10:0

BARGAIN 7 5c

WAVELENGTH: 200-2,000 metres. Consumption: 12 watts.

Complete with Moving-Coil Speaker in the handsome horizontal type walnut veneered cabinet. Complete with Valves, Back-control, New type switch, direct connection.

SPECIAL OFFER!

New light weight super-type HEADPHONES highly recommended.

WAVELENGTH: 200-2,000 metres.

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WAVELENGTH: 200-2,000 metres. Consumption: 12 watts.

Complete with Moving-Coil Speaker in the handsome horizontal type walnut veneered cabinet. Complete with Valves, Back-control, New type switch, direct connection.

FREE! Write for free booklet describing the D. X. F. 4 A. C. Short-Wave Kit and Other entirely new N. T. S. Bargain Short-Wave Kit and range of Short-Wave Components. Write to: 122, B. H. (S.W.8).

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NEW TIMES SALES CO., Ltd.

EST. 1924.

ELECTRADIX BARGAINS

- **Rectifier**, 200/1,000 v. 50 ro/a., 2/6.
- **ELECTRADIX BARGAINS**
  - Sets, cheap. Enclosed type, 5/6 and 7/6 each.
  - Remote control, - 17/-.
- **Projection Lanterns**, on Stand
  - Polished Jacobean finish, 13 1/2 in. x 7 in. x 6 1/2 in. deep, oval front, panel, 10 x 7 - x 1 1/2 in., 3/- each.
- **SLOPE FRONT TEAK CABINETS**
  - Transformer, coil, etc., 2/6 each.
- **2-VALVE METAL B. CHASSIS**
  - Drilled and fitted 2 valve holders, panels 24 in. x 24 in. for 5/6, enamelled, 12 in. x 12 in., 3/-.
  - 500 shop-soiled items.
- **ELECTRADIX RADIOS**
  - **M.P.R. CARBON MICROPHONE**
  - **Homely** with plug and socket, 1/6.
- **Wireless Engineering, Building, Government Employment, Motor, Aero, Radio and Television Engineering Courses in PEE.”**
- **NEW PANELS**
  - 31/2 in. pull 1 on, kg, 3.50.
- **SOUND RECORDING A**
  - With plug and socket, 1/6. Govt. 6 ft. headphone cords, with plug, 1/6.
- **M.I.C. concert coils, set of 4, 2/6; aerial, react., long and coils plug-in,** 5 d.
- **NEW PANELS.**
  - Sliding back and. 10 terminal Strip, new, manufacturer’s liquidation with sunk dial, 3-way coil switch and a single plate condenser.
- **NEW PANELS.**
  - **0.100, 17/6 each. E.E. voltmeters, A.C., 240 v., 2.51/6.**
- **Parlophone**
  - **RICHARD TAUBER** heads the Parlophone list this month with two tunes, both of which are sung in English. They are “I've Got Nothing” and “The Old Tree,” on Parlophone RO 20343, sung in typical Tauber style. A number of records have also been added to their classic series. “Vienna Blood,” a selection in two parts, is a remarkably fine record introducing Maria Hesber (soprano) and Herbert E. Groh and Max Schuger (both tenors). These three famous singers are accompanied by a full chorus and orchestra, and sing in German. The number of the record is Parlophone R 2369.
- **Rex**
  - **Gracie Fields** adorns the current Rex list with three records from her new film, “The Show Goes On.” “Smile When You Say Good-bye” and “I Never Cried So Much in All My Life,” on Rex 9095; “We're All Good Pals Together” and “The Song in Your Heart”—Rex 9096, and “My Love for You” coupled with “In a Little Lancashire Town”—Rex 9097. Fine songs these, perfectly presented by the one and only Gracie Fields.
- **Vocalon**
  - Whatever you think about swing music, even if you have never bought a swing record before, I feel strongly that “The Greatest Mistake of My Life” and “When the Harvest Moon Is Shining,” on Decof F 6452. Annies presents his Piano Medley No. 6, on Decof F 6455, and like its predecessors, contains an array of tunes that are popular at the moment, and, of course, Charlie Kunz plays as attractively as ever. The new series of records of popular tunes in strict dance tempo that Josephine Bradley and her Ballroom Orchestra are making for Decof are proving extraordinarily successful. The tunes are played in a straightforward manner and, in fact, are accurate in every way for dancing requirements. Her latest record is “September in the Rain,” coupled with “Toodle-oo,” on Decof F 6441.
- **Decca**
  - The Street Singer, who is at present on a tour of the country, sings two popular numbers, “The Greatest Mistake of My Life” and “When the Harvest Moon Is Shining,” on Decof F 6452. Amyo and his Orchestra have made five new records this month. Decof F 6456 comprises “Sing a Song of London” and “Hometown”—two tunes from the new London Palladium show, “London Rhythm,” which has had a very successful preliminary run at Brighton. “Ten Pretty Girls,” which appears on one side of Decof F 6457, is introducing a new, attractive tune, and Decof F 6447 presents “This Year’s Kisses.” The other records are equally interesting.
- **Brunswick**
  - As mentioned in my last review, Brunswick have now introduced special souvenier records. The artistic labels on these discs take the form of a picture from the film with which the songs recorded are associated. The artists thus featured this month are Bing Crosby and Grace Moore. Crosby sings four tunes from his new film, “Waikiki Wedding,” and “In a Little Hula Heaven”—Brunswick 02443, and “Blue Hawaii” coupled with “Sweet is the Word for You”—Brunswick 02444.

**Impressions on the Wax**

Gracie Moore sings “Our Song” and “The Whistling Boy” on Brunswick 02400, both tunes being from her film “For You Alone.”

The Mills Brothers, who are at present in England, have made their latest record at the Decca London studios. This record, which is Brunswick 02460, features “Organ Grinder’s Swing” and “Let Me Dream.”

The “Before the Crash Swing” is the main feature number of the set, and the Mills Brothers are presenting during their present tour of Great Britain.

Arthur “Ayl” who appears with Dick Powell in the film “On the Avenue,” sings two numbers from the film on Brunswick 02454. The tunes are “This Year’s Kisses” and “Shumin’ in the Avenue.”

**Rex**

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The eminent popular vocalist, Brian Lothian, who is at present on a tour of Australia with Fred Hordern and his Orchestra, has made two new records. Rex 9094 concerns itself with two numbers from “On the Avenue,” the new Dick Powell film. “Sandy, the Detective” on Rex 9091, is the latest humorous sketch made by Sandy Powell for Rex. Sandy as a detective is probably the most farcical gaiety he has yet adopted.

Bob Mallin, the popular singer of cowboy songs, tries two new ones on Rex 9091. Accompanied by his guitar he sings “Prarie Romeo” and “There’s Only Five Bullets in My Old Six-shooter.”

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Using an Eliminator

"I have built your Vitesse receiver but cannot get satisfactory results. There seems to be a lack of punch and stations come in only faintly. I am running the set from an eliminator—make unknown, which has several tappings and these may not be suitable. What is the best way of finding the output and correct voltages for each stage so that I can use this unit?"—G. R. (Wembley).

The only satisfactory scheme is to find exactly what the valves require for best working conditions in your particular case. For this purpose a loudspeaker should be connected to battery—quite a cheap one will do as it will only be used for a short test. Take out separate H.T. leads for each valve and plug these into the battery at approximate values as recommended by the makers of the valves. When satisfactory results are obtained, insert a good milliammeter in each H.T. lead and ascertain the current flowing. The voltage will be approximately that marked at the tapping on the battery, and thus you will be able to ascertain the voltage to be dropped from the maximum H.T. output of your mains unit. From the current flowing you can then work out the value of resistance to insert to drop this voltage—dividing the voltage by the current flowing expressed in amps.

Signal Indicator

"I am anxious to make really good systematic reports upon amateur signals, and as I propose to work regularly with some other amateurs I should like some form of reliable signal strength indicator. I am unable, at the moment, to afford a very expensive one, and should be glad if you could tell me of a simple low-priced signal strength indicator which would answer my purpose."—P. R. (Manchester).

A THOUGH a good output meter is the best arrangement, quite a number of amateurs use an ordinary milliammeter in the anode circuit of the second detector. If you use a superhet—as presumably you will—if you are going in for serious listening on the amateur bands—then the best plan is to use a triode working as an anode-detecto in the second detector stage, and a 0-1 milliammeter in the anode circuit. As you will be working with a small grid-leak bias, you must take care to avoid any danger of the grid and anode coming in contact with each other through the parts of the circuit. It is best to use a 0-1 milliammeter in the anode circuit, however, and to have a switch for the grid-leak bias. A suitable grid-leak bias is obtained, insert a good milliammeter in the anode circuit, and you will be able to ascertain the voltage dropped by the grid-leak bias. This voltage will be approximately that marked at the tapping on the battery, and thus you will be able to ascertain the voltage to be dropped from the maximum H.T. output of your mains unit. From the current flowing you can then work out the value of resistance to insert to drop this voltage—dividing the voltage by the current flowing expressed in amps.

All-wave Coils

"I am building another receiver in which I should like to incorporate all-wave tuning, but am not satisfied with the published RULE.

I have demonstrated the signal indicator to the QST radio club and the results were quite satisfactory. I have also used it in my own receiver and have found that it gives very good results. I am now considering the possibility of incorporating it in my receiver."

I. M. (New York).

"I am now a novice to test up to 9-pin valves, but do not want to unplug the panel and make inside adjustments. Is there yet available a form of adaptor which will enable me to make the tests with various types of valve?"—K. A. S. (Shields).

THE valves specified for this receiver were Hivic types D.210, L.210 and P.215. These are a detector, L.F. and H.F. amplifier and are inserted in that order starting from the left (viewing the chassis from the panel).

Lucerne Coils

"I have been given two coils which are partly stripped, but which are labelled Lucerne models. I should be glad to know what these coils are, how to repair and if they are suitable for modern requirements, and if you have any sets or blueprints in which I could incorporate them. There are two formers in each coil and they are wound with green wire. There have been some letters near the terminals, but these are rubbed out."—F. Y. U. (Kenton).

THE coil is no doubt one of the designs produced by Amateur Wireless, in 1934, to enable full or better advantage to be taken of the Lucerne broadcast plan. They may not be found ideal for modern conditions, although they will certainly give satisfactory results. The instructions for winding are too intricate to enable them to be given in the form of a reply, but we published the circuit and connections in our issue dated 21st May last, and from our Blueprint list you will see that there are two or three sets (three and four-valves) still available for the use of these coils.

Multi-connectors

"I am carrying out some experiments and wish to obtain some multi-connectors. The ordinary seven-pin valveholder and plug is quite good but I need something with more contacts and capable of carrying a higher load. Can you make any suggestions regarding the supply of suitable items for my requirements?"—Y. S. E. (Colwyn Bay).

THERE are two possible solutions to your query. Moser Bulgin can supply a twelve-point plug designed primarily for television purposes, and the plug can be cut to suit your purpose. A socket is also obtainable, and the pins are of the flat type. Moser, Bellings and Lee can supply multi-pin plugs and sockets which may be of use to you. We suggest you obtain catalogues from these firms and examine the specifications of the plugs in order to make your choice.

Tone Control

"I have built a Q.P.P.Stage, but am not satisfied with the tone of reproduction. All the best parts are used, and I have adopted the straightforward circuit enclosed. Can you suggest how to improve the quality?"—F. T. (Cheshunt).

YOUR circuit is devoid of all decoupling and tone-control components, and therefore you may be experiencing instability as well as excessive high-note reproduction from the second pentode. We suggest that you decouple the first and the H.F. stage, and at the same time add a tone control to the output circuit. Probably the addition of a .001 mfd. fixed condenser across the two anodes of the output valves will be all that is needed to reduce excessive high-note reproduction, but if you wish to make a pre-phase-ence control a .01 mfd. condenser may be used in series with a 100,000-ohm variable resistance, the two being joined across the two anodes.
EASILY ASSEMBLED AND ARE SENT OUT SEALED AS FROM THE
FULLY SCREENED, AND SUITABLE FOR ALL TYPES OF CIRCUITS.
BY MEANS OF 5 INTERCHANGEABLE PLUG-IN COILS, SAME ARE
CIRCUIT DIAGRAM, SWITCHING, ETC.
6/3D.
BRAND NEW SURPLUS STOCKS.
YOUR ENQUIRIES FOR ANY PARTS YOU MAY NEED. REMEMBER,
TO THE VALUE OF 21/-, 5/- PER PARCEL.
6/3D.
6/3D.
80 S.
BRUCE MAINS TRANSFORMERS AND CHOKES, STANDING FOR
THE SEASON. THESE TRANSFORMERS ARE BRITISH MADE AND ARE FULLY GUARANTEED FOR 6 MONTHS. A COMPLETE RANGE OF
SUPPLIES IN STOCK. THE PRICES ARE AS FOLLOWS:
6/4D. 250-0-250, 80 mA., 2-0-2 VOLTS, 2.5 AMP.,
15/6.
350-0-350, 150 mA., 2-0-2 VOLTS, 2.5 AMP.,
2/6.
410-0-410, 100 mA., 2-0-2 VOLTS, 5 AMP.,
1/6.
500-0-500, 25 mA., 3-5-3.5 VOLTS, 3 AMP.
6/6.
25 Volts.
4/6.
H.T. TRANSFORMER, 250 VOLS, 0.60 AMP.
BRUCE MAINS CHOKES.
80, 120, 150, 250 OHMS.
5/6.
80, 120, 150, 200 OHMS.
8/6.
6/6.
5/6.
BRUCE MAINS CHOKES.
COIL FORMERS IN FLAT, SQUARE PLASTIC MATERIAL,
3/3D. EACH, 8 PLUS 8 MFD. ALL THE ABOVE, CARDBOARD
CONTAINERS.
37/6.
LISSEN R.C.C. UNITS, 500 AND 1000 OHMS.
3/6.
LISSEN H.F. BY-PASS UNITS. BRAND NEW.
4/6.
JUNIOR CLASSIFIED. FITTED TRANSFORMER, 作品, 20 METRES.
LISSEN 7-11 VALVE. GIVE FREE !
NEW 1ST VALVE SHORT-WAVE RECEIVER OR ADAP-
TOR KIT, 13 TO 86 METRES, WITH COIL AND KIT CIRCUIT
AND VALVE GIVE FREE !
DR. W. MONEY, 14 TO 145 METRES, COMPLETE KIT AND
CIRCUIT, 12/-, 6/-.
SUPERHETER KIT, 12/6. THE LARGEST, 18/6.
A S.B. SUPERHETER KIT, FOR A M.A. RECEIVERS.
NEW 2ND 2-VALVE S.W. KIT, 13 TO 86 METRES WITHOUT VALVES.
COMPLETE KIT AND CIRCUIT, 12/6.
VALVES GIVEN FREE !
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VALVES GIVEN FREE !
DOM LEY MODEL, 14 TO 145 METRES, COMPLETE KIT AND
CIRCUIT, 12/-, 6/-.
S.R. S.W. KIT, 12/6. SET. DET. AND PHONES, 2/-.
VALVES GIVEN FREE !
SNOW-WAVE COILS. 6- AND 6-PIN, 15/-, 20/-, 45/-, 75/-, 10/-.
SNOW-WAVE COILS. 6- AND 6-PIN, 15/-, 20/-, 45/-, 75/-, 10/-.
COIL FORMERS IN PLASTIC, 8/-, 1/-.
AMERICAN VALVES.
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**McCarthy Chassis & Receivers**

**Demonstrated Daily in Our Showrooms**

You are cordially invited to inspect them and hear them for yourselves.

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**Radio interference can be suppressed on all 3 wavebands**

It may be that the low-priced All-wave Set Lead Suppressor will, in two minutes, put an end to your trouble; you may need the All-wave "Eliminoise" anti-interference aerial—which is as easy to erect as an ordinary aerial—or, if yours is a very bad case, both may be required. One way or the other—so long as you do something about it—you can put an end to "flying-pan music."

Set Lead Suppressor, Type 300, £5.5.

"Eliminoise" (Trade Mark) anti-interference aerial, £2 6s.; and 1½ per yard for screened down-lead.

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**Engineers' Guide To Success**

**PRACTICAL AND AMATEUR WIRELESS**

**RECEIVERS, COMPONENTS AND ACCESSORIES**

**HEADPHONES**—Brown, Efismon, G.E.C., M.H., Universal Telephone, Speaker, Western Electric, Sterling, etc., 2,000 ohms, 5 6; £5.00, sc. Postage 6d.

**SPECIALS**—Robertson, 2,000 ohms, as new, 5 6; Telephone, lightweight, adjustable, 75 6.

**CRYSTAL SETS**—Double diode, Guaranteed, 5 6. Ditto, double circuit, 5 6. Sensitve permanent detectors, double diode—diode—triode, complete, 1 s.

**Electrical Supplies**—With silver oxide—vibrator, 6d. Postage 1d.—Post Hail, 2, Coningham Street, London, S.1.

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**BATTERY ALL-WAVE SUPERHET**

**Price**

£6 17s. 6d. (Complete with B.V.A. valves)

This modernity-supplied 7-valve All-wave all-valve receiver utilizes a highly efficient superheterodyne circuit when you purchase it with normal sensitivity at all three wavebands—16-50, 50-100, 100-200 metres.

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**Miscellaneous**

**WANTED**—Batteries and Battery Valves (preferably boxed), Ferranti and Westwell meters, clean, new components and sets for cash. Best prices paid.—Newport Supply Stores, 241, Newport Court, Battersea Cross Road, W.12, Tel. Gre. 5731.

**FREE**—Riteton d.battery, 120 Volts, guaranteed, to purchasers of £1 mower Banjo Blow, from us for 35 6. Post paid. Send no money now.

Wirtz, W. A. S. & S., Berksley Street, Douglas, I.O.M.

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**Situations Vacant**

**WANTED**—Ambitious young men to prepare for well-paid posts in TELEVISION, the great career of the future.— apply for free booklet from BRITISH INSTITUTE OF ENGINEERING TECHNOLOGY, 181, Stafford Place, W.1.
The Osram W.21 is a 2-volt screened Pentode valve with variable-mu characteristics, particularly suitable for economical and sensitive H.F. or I.F. amplification in Battery sets.

An advantage of the new W.21 valve is the high working screen voltage — of similar value to the working anode voltage — thus enabling a common tap in the H.T. Battery to serve for both anode and screen supplies and simplified operation.

A further simplification is afforded by the facility of a 4-pin base and internal suppressor grid connection.

**List Price 11/-**

Fitted with 4-pin or 7-pin base, anode top cap connection.