DOES YOUR AERIAL PICK UP TOO MUCH?

Amateur Wireless

and Radiovision

Every Thursday 3d

Vol. XVII. . No. 430 Saturday, September 6, 1930

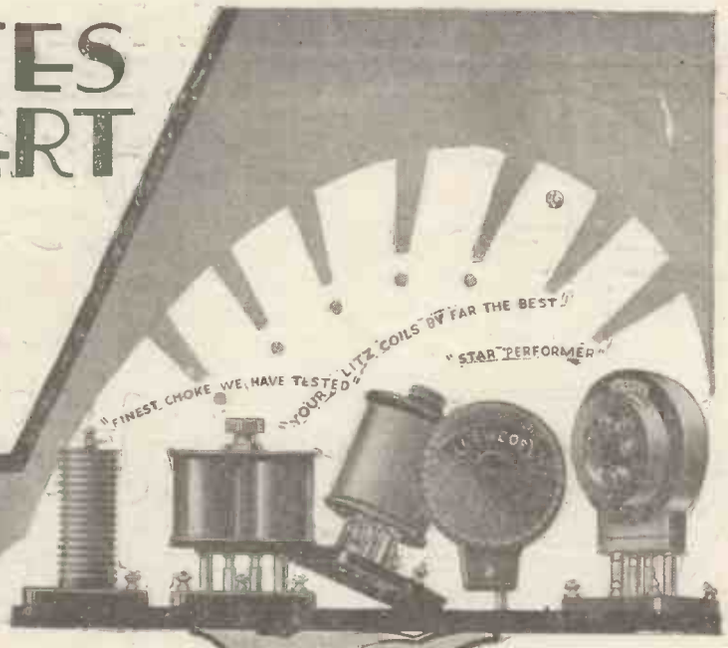
The Art of USING a PICK-UP

TWO SPECIAL FEATURES IN THIS ISSUE

TESTING THROUGH YOUR SET

Registered at the G.P.O. as a Newspaper

FAVOURITES WITH EXPERT AND AMATEUR ALIKE



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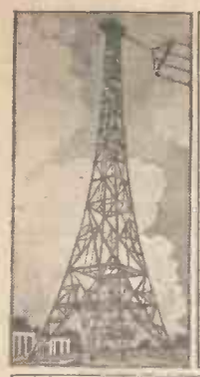
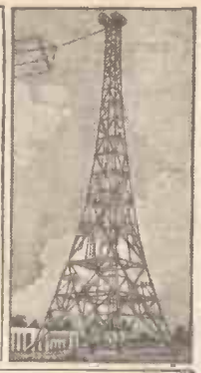
Don't Forget to Say That You Saw it in "A.W."

No. 430. Vol. XVII. SEPTEMBER 6, 1930



Amateur Wireless and Radiovision



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NEWS · & · GOSSIP · OF THE · WEEK

ANOTHER SHOW

THE Berlin Wireless Exhibition is now in full swing, and there are busy scenes both inside and outside the exhibition building, beneath the shadow of the Witzleben aerial mast. Unlike our own show, there is an outdoor section and there is music and typical Continental gaiety as an added attraction.

EINSTEIN SPEAKS

THE picture below shows Professor Einstein, of "relativity" fame, speaking before the "mike" at the opening of the Berlin Show. It was not without difficulty that the famous man was induced to speak, and when he did so he produced a mild upheaval by giving a short talk on wireless, reproaching non-technical wireless enthusiasts. He started off by saying "There are millions who thoughtlessly use wonders of science and technology without having grasped them intellectually any more than a cow understands the botany of plants it chews," which only shows that even Einstein realises that wireless is now an everyday thing!

Einstein, of "relativity" fame, was induced to speak at the opening of the Berlin Wireless Exhibition. Here he is seen in a characteristic attitude before the "mike"

BEING PATRIOTIC

THE broadcasting of British dance music in certain periods by Jack Payne has already started. At present these British dance-music half-hours are given in the afternoon, but later they may appear in the evenings, too. Of course, no one wants to be too patriotic in these things at the expense of quality (and there is plenty of room for improvement in dance music, no matter whether it comes from America or from Timbuctoo), and if listeners become keen on these "British" features, then it may mean that the standard of our own dance music will be improved. Jack has been counting up the number of tunes he has played, and for just over one month he finds 336 American tunes, 110 British, and 18 of Continental origin.

FOR HOLIDAY-MAKERS

AN "A.W." representative, who (lucky man!) is now touring Switzerland, writes for the benefit of other holiday-makers about the supposedly difficult business of taking a portable set abroad. The Swiss officials are politeness itself, he says, and they ask that you deposit only a sum of 50 francs, which they give back—also very politely—when you leave. If you are staying for a long time, and can give a permanent address, you must take out a licence immediately and deposit the equivalent of about only 15s. 6d.

PRINCIPAL CONTENTS

OFFICIAL PRONUNCIATION

HOLIDAY-MAKERS who want to appear "refained" while in strange parts should take with them the new "Broadcast English" book, published at Savoy Hill, giving the recommended pronunciation of more than 1,500 place-names. Sir John Reith has an introduction to this, and he pays tribute to the work of the late Poet Laureate, the late Dr. Robert Bridges. He also expresses gratitude to Mr. Bernard Shaw, which is hard to understand until one knows that "G.B.S." is the new chairman of the B.B.C. Advisory Committee on spoken English. Does "G.B.S." agree with these pronunciations?

HIGH-BROW VAUDEVILLE HOURS

"CAN'T somebody teach the B.B.C. the proper meaning of the word 'vaudeville'?" writes a South London reader. "Some of the recent vaudeville hours (which last only three-quarters of an hour) have been too high-brow for words and, apart from the lightening influence of such artistes as Mr. Flotsam and Mr. Jetsam, the entertainment is as heavy as the Promenades." Our low-brow correspondent should take up the gloves with our programme critic, who, some say, has high-brow fancies! But it is true that one or two recent vaudeville hours have had the "educational" touch about them.

NEXT WEEK: LOOKING FORWARD TO THE SHOW—THE SECRETS REVEALED

NEWS & GOSSIP OF THE WEEK —*Continued*

A.C. OR D.C.

CAN'T this question be settled once and for all? Which *is* better for radio work, A.C. or D.C.? Alternating-current mains are slowly spreading over the country, and many old-fashioned D.C. supplies are being changed—which causes those in the change-over districts to moan at their misfortune. But A.C. has its advantages. It is so "adaptable," and can be stepped up and down for H.T. and L.T., and even for grid bias, without power loss: which is more than can be said for D.C.

ANNOUNCERS AND SEX-ATTRACTION!

MANY tales are told at Savoy Hill anent the presents sent by elderly spinsters to "those dear announcers." Are those same ladies pleased at the new idea of having women for some announcements? We think not! Yet it is a good idea, and adds to variety. The masculine B.B.C. tones were getting too refined and too familiar to our ears, and a change was overdue. Without disrespect, have you noticed how *same-ish* women's voices seem to be on the wireless? Broadcasting loses the character of the feminine tones.

BROADCAST GRAMOPHONE RECORDS

OUR programme critic has remarked on the skilful way in which gramophone records are worked into radio-play "effects" to give the impression of an orchestra. That is so. Probably you've noticed it.

Miss Beatrice Harrison the famous 'cellist, and her sister Miss May Harrison who broadcast recently from the Queen's Hall. The photograph was taken at their home at Oxted, Surrey.

The B.B.C. engineers have greatly improved the Savoy Hill arrangements for record broadcasting, and the quality is infinitely better. Also it is easier now to "fade" the pick-up in and out: which accounts for the extensive use of records in radio drama. But there should be a Society for the Prevention of Broadcasting One Record Dozens of Times! One record, which had best be nameless, sounds well overdue for the scrap-heap!

THOSE JOKES

THE question has been raised as to why so many jokes are broadcast in which wireless or listeners are made the butt, on the same lines as mothers-in-law, and kippers. Can any vaudeville artiste say, please? Jokes on wireless (not wireless jokes) share with jokes on small cars the prejudice of people who know nothing of either. The small car has saved and rejuvenated the motor industry, and wireless listening is one of the greatest boons of the age. There is nothing humorous or ridiculous about either.

IS IT A CONTROL?

PLENTY of set makers are adhering to the old plan of labelling the reaction knob "Volume." This is quite a fallacy. A volume control should be able to tone down the strength to a mere whisper, or bring it up to maximum without any distortion. Reaction controls don't do that.

"SLAYTHWAYTE" or "Slathwaite"?

A Puzzle for the Announcer

"CASSLE STREET, Caasleford," said the announcer.

I heard him broadcasting an S.O.S. from one of the north of England stations recently. Castle Street, Castleford, was the address.

Had the B.B.C.'s new handbook of English place-name pronunciations then been in existence one would have said that the announcer was making an ingenious effort to please two masters—the B.B.C. Advisory Committee on Spoken English, who have decided that castle is pronounced "caasle," and the Northcountryman, who says "cassle."

The differences between pronunciation in the north of England and in the south appear to have caused the Committee on Spoken English some little trouble. The Committee (one presumes that its opinions are reflected in Mr. A. Lloyd James's introduction to the new handbook) favours the southern pronunciations for place names. In Yorkshire the first part of Glass Houghton rhymes with "mass," but Mr. Lloyd James writes that: "Glass Houghton will be pronounced 'Glaas Howton' in the southern way, but if the announcer happens to be a native of the place and pronounces it in the native way, he will be forgiven."

That is comforting for northern announcers. But does it help them out of the quandary into which this handbook must have landed them? On the one hand the Committee recommends the southern pronunciations. On the other, Sir John Reith writes in a foreword to the handbook that the B.B.C. is seriously concerned in this inquiry into the question of pronunciation because "It is at least desirable that these names, when they have to be pronounced, should be pronounced in such a way as to be immediately recognised by inhabitants of the places mentioned."

A Northern correspondent suggests that the new B.B.C. handbook of English place-name pronunciations has placed the announcers in a quandary

North v. South

"Glass Howton" will be more instantaneously recognised by Glass Houghtonians than the drawling southern "Glaas Howton"; "Newcassle" than "Newcaasle"; "Slathwaite" than "Slaythwayte"; but the Committee is inconsistent with the main idea of the inquiry (as expressed by Sir John) and recommends the pronunciations least familiar to local inhabitants. It vindicates this recommendation with the ingenious argument that North of England place name pronunciations are "peculiar to northern English," and "announcers are not required to use northern English."

To add to the announcer's unhappy lot, the Committee is not even consistent in its inconsistency. It favours "Slaythwayte," not because southern English is (in its opinion) standard broadcast English, nor on considerations of "immediate recognition" by local people, but simply because the word looks like "Slaythwayte."

"So long as she looks like Slaithwaite," writes Mr. Lloyd James, "she must be content to be called something like it."

Certainly, the handbook lays down no rigid rule. It gives alternative pronunciations to many of the 1,500 place names listed. Slaithwaite bids fair to become as familiar a name as Daventry (for similar reasons), so the Committee helps the announcer by publishing the following pronunciations of the name:

Slaythwayte
Slathwayte
Sloit
Slowit

Well, what do the announcers propose to do about it?

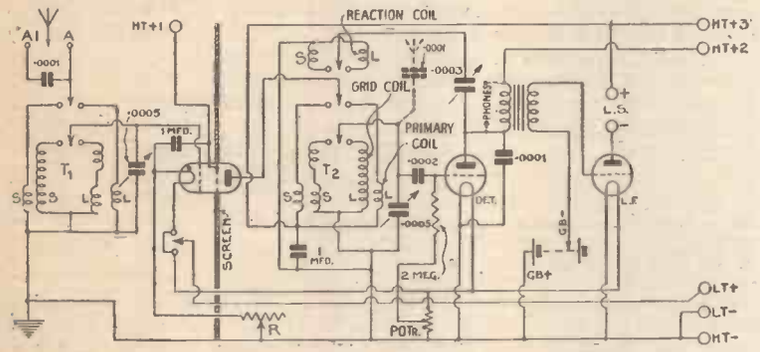
"NORSEMAN"

TESTING THROUGH YOUR SET

How to Localise Faults in any Receiver and Ensure Efficiency—By L. A. Chapman

THERE are quite a number of amateur constructors who, having built up a receiver, are unable to find and remedy a fault in it.

I should like to show how, using the simple set tester described last week, it is possible to test an up-to-date type of three-valve set, localise faults and then also test individual components. For the purpose I have chosen a very popular receiver—the James "Everybody's Three." I will assume that an amateur has made this set and fails to get satisfactory results from it.



This is an example of a typical 3-valve circuit showing the connections for stage-to-stage testing

copper two feet square, buried some three feet in the ground, with the earth wire soldered to it, makes a good earth. I will assume that the receiver has been wired properly and that suitable valves have been chosen, having impedances as originally suggested by the designer. The valves, by the way, govern the type of H.T. supply to be used.

Choose your valves and add together the anode current consumption of each. Then choose your H.T. supply. Below, I give the normal (recommended) discharge rates of the different forms of batteries used for H.T. supply :—

Type of Battery	*Maximum Discharge Rate*
Standard capacity dry-cell	6 to 7 m/a
Double capacity dry-cell	10 to 12 m/a
Triple capacity dry-cell	17 to 20 m/a
Accumulator, 2,500-m/a-hour capacity	12 to 13 m/a
Accumulator, 5,000-m/a-hour capacity	20 to 25 m/a
Accumulator 10,000-m/a-hour capacity	45 to 55 m/a.

If the valves, batteries, aerial and earth are beyond suspicion, turn attention to the receiver.

There are three valve stages in the receiver, the screen-grid H.F. stage, the detector stage, and the L.F. amplifying stage. The best course is to test each stage individually.

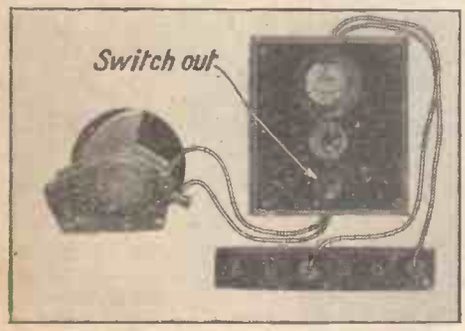
The way to cut out the H.F. stage is to connect the aerial, through a fixed condenser of small capacity, to the grid end of the detector-valve tuning circuit. The rheostat, controlling the filament current for the H.F. valve, should be turned to the "off" position. To cut out the L.F. valve, connect a pair of phones across the primary terminals of the L.F. transformer and pull the L.F. valve from its holder.

The Detector Stage

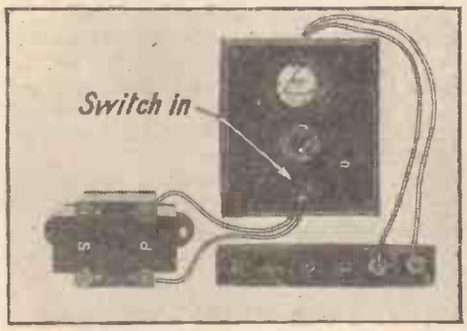
The receiver is now reduced to a single valve detector, with reaction on the aerial. If the set does not work now, rotate the reaction condenser to its maximum. If the set squeals, it shows that the valve and reaction circuits are working. Therefore, suspect the grid condenser, grid leak, potentiometer, and the H.F. (now aerial) tuning coil and condenser. If the receiver does not squeal, try changing over the L.F. valve into the detector valve holder.

If even this valve will not give rise to a squeal, suspect a fault in the detector valve holder. Failure to trace a fault by inspec-

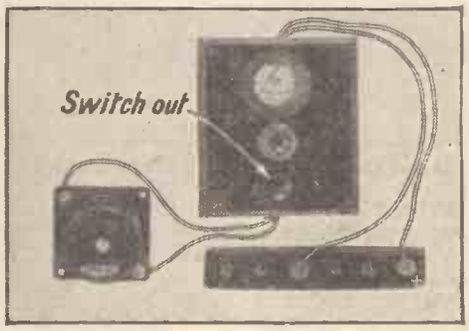
(Continued on next page)



Test of variable condenser for shorting between plates



The windings of a transformer can be tested in the manner shown above



A simple continuity test of an H.F. choke

Some Notes on Present-day Short-wave Conditions

Around the Short-wave Dial

By M. BARNETT

WELL, it is certainly not safe to prophesy anything about short-wave wireless, nor is it safe to be optimistic when receiving conditions happen to improve for a short time! The sudden strong improvement in short-wave conditions mentioned in the last of these notes died down almost as suddenly as it arrived. At the time of writing, W2XAF is very poor and unreliable, W8XK has died down to a mere whisper and it is only possible to distinguish W2XAD's carrier wave with difficulty. The lesser lights on the short-wave dial have practically disappeared. 7LO, once a strong signal, has not been heard at all and even the transatlantic telephone stations have been much weaker than usual. The stations below about 20 metres have remained about the same, it is true, and PMB on 14.5 metres has been very good, so has its sister-station PLF.

Well Down!

By the way, PMB is the lowest 'phone station that the writer can ever hear, although plenty of code stations are heard. There should be stations to be heard below this, for there are several in some of the published lists. Have any readers heard G5SW on about 11.5 metres? It is rumoured that this station is experimenting on this wave. Zeesen has been much the same as usual, although the time of its fade-out is now getting earlier as the evenings get darker. To the newcomer to short waves, it is rather mystifying to know that European stations get *fainter* as darkness approaches because of course on the broadcast receiver they become stronger as the night becomes darker. An American correspondent has been making some observations on the strength of our own short-wave station, G5SW. He states that this station was at its best in the autumn of last year and that from the end of last year signals gradually became worse until at the present moment, he says, it is practically impossible to bring G5SW up to a really audible signal. A slight improvement in the spring of this year was not maintained.

I suppose that the average short-wave receiver in England is a three-valver and possibly, in many cases, consists of a broadcast receiver which has been adapted for short waves by means of special coils, etc.

Larger Receivers?

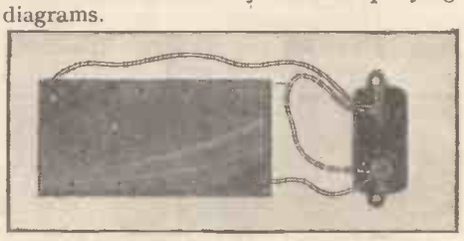
It would be interesting to know the results readers have had using larger receivers, because an extra stage can make all the difference between weak signals and loudspeaker strength. It really is worth while to build an extra receiver, especially for reception on the short waves, and this also has the advantage that one can experiment with the short-wave receiver without interfering with the family receiver! Of course, there is always the higher cost of the extra battery consumption if a large short-wave receiver is used, but if each stage is properly biased and due care is taken in the design, there is no reason why the four or even five-valve short-wave receiver should not be an economical and very useful proposition.

Despite the very erratic conditions prevailing at present, there is generally plenty to listen to on the short waves.

"TESTING THROUGH YOUR SET"

(*Continued from preceding page*)

tion means that each component must be individually tested. The Novel Set Tester, described in last week's issue of AMATEUR WIRELESS, will be of practical use in this respect. The various components can be tested through for continuity or short-circuits as illustrated by the accompanying diagrams.



A test of the insulation of a fixed condenser

The photographic illustration in the heading of this article shows the method and connections for testing an anode resistance or grid leak.

If there is no fault in the detector valve circuit, either the S.G. valve or the L.F. valve can be brought into use. Add the L.F. valve first, for this valve will give the volume for the final testing of the complete three valver.

Replace the L.F. valve in its holder, disconnect the phones from across the primary of the L.F. transformer, and connect up the phones or the speaker across the L.S. terminals of the set.

The set still refuses to work? First test through the windings of the L.F. transformer for continuity. Defects in this component cannot be rectified by the amateur. Return it to the manufacturers for repair or replacement. If there is no fault traceable to this instrument, look to the valve holder, especially the spring contacts between the terminals and the sockets.

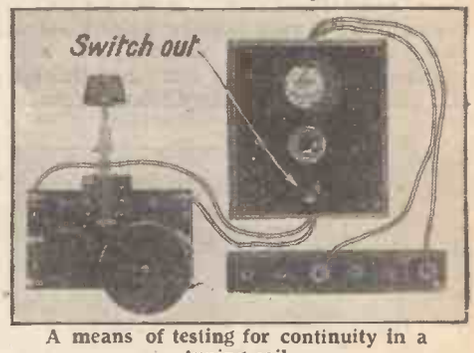
Take particular notice of the fixed by-pass condenser, shown connected between the anode and filament of the detector-valve. If this condenser has a short circuit, it will cause the H.T. battery to run down.

To test a fixed condenser, use an H.T. battery and connect one battery terminal to one condenser terminal. Now connect a length of flexible wire to the other condenser terminal and allow it to make contact with the other end terminal of the battery. Leave the condenser for a few minutes and then "short" it with the flexible wire. A spark should be seen as soon as the condenser is "shorted." Failure to get a spark means that the condenser is defective.

The S.G. Stage

There being no other components in the L.F. stage, we will assume that the Det. and L.F. part of the set is working properly. It remains now to test out the S.G. stage. Connect the aerial to the aerial terminal on the set and switch on the filament current to the S.G. valve by means of the rheostat.

If, by adding this valve, the receiver stops working, test through the aerial-tuning coil for continuity. Test also the primary winding of the H.F. transformer for continuity. The aerial-tuning condenser should be tested for breaks between the moving plates and the moving plate terminal and for short-circuiting between the two sets of plates. The aerial fixed condenser and the screening-grid by-pass condenser should be tested by means of the



A means of testing for continuity in a tuning coil

H.T. battery process as previously explained. If the receiver still refuses to work, use the test unit milliammeter and connect it in the anode circuit of the valve. Afterwards connect it in the screening-grid circuit, and determine, by the milliampere readings, whether the valve is working as it should.

The whole receiver has now been systematically checked through and very little has escaped notice. Any constructor who takes his time checking through a receiver in a like manner, should experience no difficulty in tracing a fault. Should he not do so, the best thing to do is to write to the Information Bureau, explaining what tests and results have obtained.

A Northern Complaint — THE RADIO LINK

The radio link is used between Northern stations and 5XX on many occasions, and how the poor reproduction obtained in this way is causing dissatisfaction is explained by Kenneth Ullyett

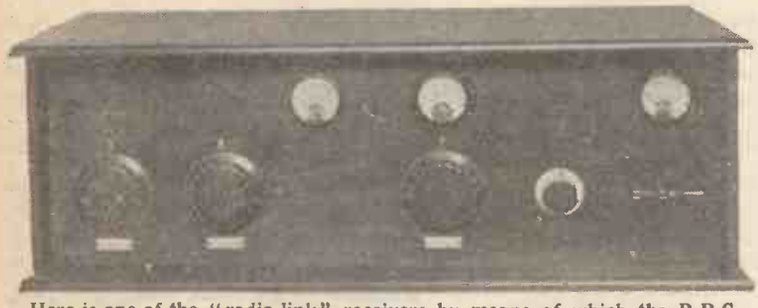
A bird's-eye view of the top of the 5XX aerial masts

THERE was a time when every B.B.C. station had a rebroadcast receiver, sufficiently powerful to tune in 5XX, and which could be used for picking up Daventry's programmes for rebroadcast should the connecting land-lines break down.

Now, it is true that these rebroadcast receivers came in handy on several occasions; for instance, in the gales at the early part of last year several cross-country Post Office lines were blown down and, to prevent a total cessation of broadcasting, rebroadcast receivers were brought into use.

For Economy

What Northern listeners are grumbling about is that these receivers are not now only used in cases of emergency, but are frequently used on ordinary occasions because of the economy resulting from the saving of land-line expense. For instance, when the Thanksgiving Service in St. Paul's Cathedral was recently transmitted all over the country, some of the Northern stations used the radio link, and a number of pleas were made about the quality—a thing which should not have occurred in such an important broadcast and when no cuts should have been made for economy.



Here is one of the "radio link" receivers by means of which the B.B.C. guards against land-line breakdowns

It is, of course, inevitable that, owing to the difficulties of reception on the medium-wave band, it should be 5XX which is relayed, and not one of the medium-wave stations. It is very doubtful whether a reliable radio link service can be obtained by relaying any station below 1,000 metres, for there is always a certain amount of jamming and fading.

Even the long waves do not offer a complete cure, for, apart from atmospherics, which in summer months are particularly noticeable on the long waves, listeners in the early evening to provincial broadcasters often notice a great deal of interference from Post Office stations.

Land-lines are not perfect, and the average listener would be surprised if he could know what an immense amount of technique there is in the balancing-up of lines to suit broadcasting. A difficulty is that, while the B.B.C. has an arrangement with the Post Office, it does not always have the same land-lines, and constant rebalancing is necessary to get proper results from new lines.

Improving Poor Lines

A land-line may not successfully carry the lower frequencies; perhaps it will be "dead" below 100 cycles. So, what happens is that a frequency-changer is connected on the line at the transmission end (generally Savoy Hill) and the whole tonal range is shifted up so that the line can carry it. A tone corrector on the other end of the line brings the frequency range back to its normal status. A great deal can be done in this way to get good results out of poor lines, and there is certainly no doubt that lines are better than the radio link, although, doubtless, this was not always the case.

It cannot be said that the radio-link receivers are out of date, although they were designed several years ago. The receivers used are six-valvers having three H.F. stages, with one screen-grid valve, a "Kirkifier" detector, and three R.C.-coupled L.F. stages. To these is connected a "B" type B.B.C. amplifier. The rebroadcast receiver is usually kept at one of the engineers' houses some few miles away from the transmitter and is operated from the control-room of the station by a private line. To bring the whole receiver into action it is only necessary to place a plug in a jack in the control-room and this switches on the whole of the battery supply. Accumulators are used both for H.T. and L.T.

The Last of the Link

After taking into account the cost of the installation of these receivers and their maintenance (for the accumulators have to be given regular attention and charging), the overall expense is still less than that of the hire of a land-line.

As the Regional scheme progresses it will, doubtless, spell the doom of the radio link; but it may be some years before the scheme is completed, and Northern listeners are in the interim agitating for the abolition of the radio link—at the best, a makeshift arrangement.

For Emergency

There is no reason why rebroadcast receivers should not be kept at all stations to guard against a national emergency and a general breakdown of the land-lines. One can never tell that there will not be another General Strike, and in such an event the radio link is much more difficult to disturb than the line link.

But one does not look forward to national emergencies, and there is no doubt that for everyday working the rebroadcast receiver is an anachronism. Northern listeners are not getting proper service when the radio link is in use.

SETS OF DISTINCTION

THE OSRAM "MUSIC MAGNET 4"

Good though the original Osram Music Magnet was, it has been entirely eclipsed by this year's production

FROM a modest though highly efficient "three," the Osram "Music Magnet" has blossomed forth as a "four" that sets a new standard in kit-set construction. I happen to know how peculiarly susceptible is the G.E.C. to listeners' needs; with branches all over the country it gets a wide view of broadcasting conditions; it has been seen how powerful stations, as at Brookmans Park, have rendered obsolescent sets that would, but for the Regional scheme, have continued to be used for a long time; it has visualised the opening of the Northern Regional; of a recrudescence of the troubles we Southerners have had to overcome; and the result is a courageous step forward—the production of the "Osram Music Magnet 4."

Here is a fine new kit set that, as a completely assembled "four," can compete in performance with many of the best factory-built sets. The new "Osram Music Magnet" is vitally different from its two predecessors in having two stages of screen-grid high-frequency amplification instead of one.

Do my readers realise what a vastly more difficult problem it is to design a set with two screen-grid valves instead of one? To that fundamental difficulty is the added handicap—from the designer's point of view—that the set must be capable of simple assembly by non-technicians. Well, I take off my metaphorical hat to the G.E.C.; for they have turned a handicap into an asset, utilising the need for simplicity to produce as fool-proof a set as any I have tested.

I was favoured with the very first model of the "Osram Music Magnet" submitted to the Press; so AMATEUR WIRELESS readers get first impressions! My test was of an "Osram Music Magnet" already assembled, but a look over the constructional chart reassured me that there are no snags. Much of the wiring is done below the metal base-plate.

Externally, the "Osram Music Magnet" resembles last year's model; the same sort of oak cabinet carrying a crystalline-finish front panel is employed. Most of the subsidiary controls have been removed from the panel and fixed at each of the cabinet ends.

A Remarkable Achievement

Opening the lid, I really was thrilled at the interior. Three large aluminium boxes range themselves in line at the back. Each one contains long- and short-wave coils and a valve, leaving only the power valve uncovered.

Just behind the panel on the left is another fine piece of work—a three-gang condenser unit; projecting from its right-hand end is the tuning dial, calibrated in medium and long wavelengths.

So, in spite of the three tuning circuits associated with the two screen-grid valves, there is only one tuning dial—a remarkable achievement. I say remarkable because the three circuits do keep in tune, and no subsidiary knobs have to be turned. True, there are small trimmers on top of the condenser unit, but they only have to be adjusted once.

With such enormous amplification before detection, some form of volume control is essential. In the "Osram Music Magnet" it is provided by including a variable condenser in the aerial lead. This cuts down the volume of the locals with more complete success than I had thought possible by this method. And there is the additional advantage that the volume control is also a selectivity control.

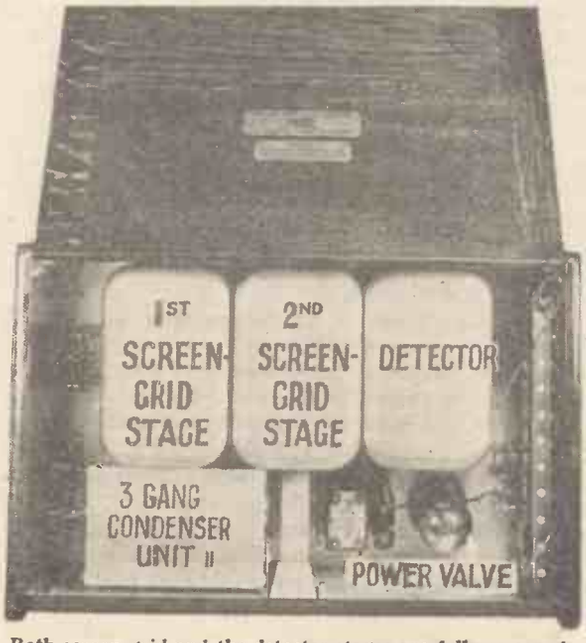
At the right-hand end of the cabinet is mounted the reaction knob, and near by the wave-change knob. A rod runs right along the underside of the base plate, smoothly actuating switches under each of the three coil boxes.

Starting at 9.45 p.m. one recent evening, I was sufficiently late to experience a "lively" ether. I suppose we all have our favourite stand-by foreign stations; mine include Rome, Milan, Turin, Toulouse, Budapest, Vienna, and Cologne. If a set can get these at full loud-speaker strength there is not much wrong.

It is a striking compliment to the Osram "Music Magnet 4" that I did not have to single out these stations to test its ranging powers. What happened was that, starting at Budapest, 95 degrees, I came down the tuning scale through a succession of loud, clear, interference-free stations, the logging of which seemed like a recital of the Prague Plan!

Seldom on a battery set have I been able to travel through such a uniform range of signals. Brussels, Oslo, Langenberg, Lyons, Rome, Madrid, Dublin, Toulouse, Hamburg, and Turin are a few of the definitely good stations logged. The Regional and National stations came in and went out again with a satisfying rapidity—only five degrees for the Regional, which I consider extraordinarily good.

I could say much more of the Osram "Music Magnet 4"—of its good quality and good qualities—this new kit will make such a stir for itself. SET TESTER.



Both screen-grid and the detector stages are fully screened

The exterior of the Music Magnet is of particularly neat appearance

On Your Wavelength!

A REVELATION

I AM not trying to be superior when I say that I don't often work with less than three valves and usually have a four-valver in operation. It so happens that it is part of my business to know what foreign reception conditions are like and to pick up foreign programmes in order to be able to criticise them and to be able to compare them with our own. The big set is therefore a very necessary part of my equipment. Recently, though, I have been trying out a number of two-valve circuits, and I must say that I am enormously impressed with the possibilities of these little fellows using modern components in modern circuits.

A GOOD PROPOSITION

NATURALLY, the two-valver containing a detector and a note-magnifying stage is not designed primarily as a DX set, and it cannot hope to give either the same volume from a particular foreign station as its big brother or to reproduce its programmes with equal quality. For long-distance work the small set must often be somewhat "pressed," and tight reaction means that there must be a certain amount of high-note loss. Still, on a good aerial I have been able to obtain reproduction of quite astonishing excellence from stations such as Hilversum, Huizen, Radio Paris, the Eiffel Tower, Motala, Rome, Stockholm, Toulouse, Turin, Nürnberg, and several others. Another wonder is the selectivity of the up-to-date tuner, which even on an outdoor aerial of full size allows the two Brookmans Park stations to be separated without any trouble at all. The two-valver is, of course, exceedingly economical to operate and inexpensive to buy or to build. The quality of the reproduction from the local station is every bit as good as that obtainable with a big set, and the simplicity of the tuning arrangements is a very great attraction. Now that two-valvers have become so efficient, I foresee an increase in the popularity of this type of set in the near future.

A NEW BIG VOICE

QUITE a number of friends have asked me recently why the tuning of Rome had suddenly altered. The facts of the case are that they weren't receiving Rome at all, but the new Stockholm station, which has an output rating of 75 kilowatts. Stockholm operates on 436 metres, and is therefore the next-door neighbour of Rome on 441 metres. So strongly does the Swedish station come in that on some not over-selective receivers he may completely wipe out Rome. My abode is sixteen miles from Brookmans Park and forty-five from Daventry. The five strongest stations that I now receive are 5XX, "Raucous Reg," "Noisy Nat," 5GB, and Stockholm. If you haven't discovered Stockholm yet, try for him without delay. You will be surprised to hear what a big voice he has and how easily he is received even on a two-valve set.

OSLO

IF Sweden is now to the fore, Norway is suffering a temporary eclipse, for Oslo has dropped down to a mere half-kilowatt during reconstruction operations. Soon, though, he will be back again, and the probability is that he will be stronger than ever. A good many other European stations are shortly to increase their power considerably, and if the Regional Scheme will give us a chance we should be sure of any number of first-rate alternative programmes.

IN AMERICA

AMERICA has already eight stations rated at 50 kilowatts, and it is predicted that there will be at least twenty by Christmas-time or a little later. If long-distance conditions continue to improve as steadily as they are doing now, numbers of medium-wave American stations should be easily receivable in this country during the winter. Amongst the U.S.A. stations now rated at 50 kilowatts are WGY, WENR (Chicago), WTIC (Hertford), WEAF (New York), KDKA (Pittsburgh), and WBAP (Fort Worth). Newcomers shortly to the big power rating will be WLS, KMOX, WFAA, and WOAI. The increase has already been authorised in their cases and constructional work is proceeding.

AN INTERESTING POINT

IN connection with the increase in the power of American stations some very interesting information has just reached me from America. The average American receiving set, as readers know, is a large one, and it usually obtains its selectivity by means of the filtering effects of three rather high-loss tuned high-frequency circuits. This system worked well enough so long as it was a question of separating local half-kilowatt stations from one another at short range. With the coming of high power, though, any number of sets have been found to be insufficiently selective. To meet the new conditions many super-selective circuits have been designed, but these are not catching on, since users complain that the quality is not what it should be.

WHERE WE LEAD

AMERICA got a year's start of us in broadcasting, and in the past we have learned many lessons from her. It is particularly interesting to hear, as I do from a correspondent, that she is now turning to us for aid in the matter of selectivity. He tells me that a cordial invitation has been sent to Dr. Robinson to visit America and to demonstrate the possibilities of the Stenode receiver. Whether the inventor will be able to spare the time to do this I have no idea, but if he can he should have a very interesting time, for America wants to know all that there is to be known about the apparatus, and with her enormous number of broadcasting stations he would have very ample opportunities of demonstrating what it can do in the matter of separating powerful transmissions at short range from one another.

OUR WEEK-ENDS

I HAVE referred before to the unsatisfactory nature of our Sunday broadcast programmes, and I shall probably do so again, for it is only by hammering away at them that there is any hope of getting something done. I had a rather humiliating experience last week-end when a Continental wireless enthusiast was staying with me. He was keenly anxious to hear our programmes at close quarters, and on the Saturday the receiving set was as hard at work as it could be. The first blow fell after lunch, when he suggested that a little music would be pleasant with our coffee and cigarettes. I had to explain shamefacedly that nothing was sent out from our stations on Saturdays between 2 and 3.30 p.m. However, I was able to offer him a choice of several foreign stations on the long waves. "But," he said, "the British week-end is proverbial with us as a holiday time. Surely the lack of entertainment must be exceptional." I had to tell him that it was unfortunately the rule. In the evening he was electrified when the London and Midland stations closed down at 10.30 p.m. "With us," he said, "Saturday night is especially a time when entertainment of the best kind is given from all stations until late at night."

WORSE STILL

HIS astonishment, already great, was increased on the Sunday, when I could offer him nothing of any kind except a weather forecast at 10.30 a.m. until 3.30 p.m., nothing again except services or other religious broadcasts between 6 and 8.50 p.m., and nothing of any kind whatsoever from British stations after 10.30 p.m. Actually, we seemed to be listening to music from foreign stations during a very large part of his visit, simply because there was nothing home produced to offer him. He did not want to hear dance music on Saturday night, so that home stations were of no use after 11 p.m.

THE RESULTS

THOUGH the B.B.C. may view the position with its customary complacence, it is, for all that, highly unsatisfactory, and it is certainly having very curious effects upon the wireless industry. To begin with, Saturday is not early-closing day in the provinces; on the other hand, it is the chief spending day of the week, and Saturday afternoon is a time when many wireless sets would be sold if it were possible to demonstrate them during

On Your Wavelength! (continued)

the early hours of the afternoon. When a man or a woman goes into a wireless shop after lunch at two o'clock, asks for a demonstration, and is told that there is nothing on the air, two things happen. Mindful of the advice so frequently given not to purchase a receiving set without having heard it, the would-be customer does not conclude a deal. It is probably not convenient to return at 3.30 p.m. The second result is that the erstwhile intending purchaser says to himself: "Well, hang it all, if I buy a wireless set and pay for a licence, I do expect to be able to receive music at any reasonable time of the day. Now that I come to look into matters, I see that the early afternoon on Saturday is always a dead time, and the same applies to the whole of Sunday with the exception of something under three hours. Since I am working all the week, my only real spare time is at the week-ends, when there is very little in the way of entertainment. On second thoughts, I think a gramophone would probably be of more use to me."

FOREIGN LISTENING

AND there is something else besides this. The majority of those who buy a set nowadays insist upon an assurance that they are able to receive a considerable number of foreign programmes. This means, too often, that the circuits of the set have to be arranged to give more magnification than is desirable, and it must certainly confront designers with many intricate problems that need not come their way. In the past the B.B.C. has done all that it could to discourage foreign listening. To-day evidence is accumulating that listeners are indulging more and more in reaching out simply because the home stations do not supply their needs.

STRAIGHT FROM THE SHOULDER

I READ recently a criticism of our programmes by a foreigner, which seems to me to hit the nail smack on its little head. What he said in effect was this. Your B.B.C. is concerned with turning out programmes which individually are excellent, but collectively are killed by their monotony. He pointed out, too, that in view of the enormous revenue received by the B.B.C.—a revenue far in excess of that reaching the coffers of any other broadcasting organisation in the world—the programme hours were absurdly short. This is, I think, the result of the nationalisation of broadcasting. Somehow or other, even the best men, when they become servants in Government departments, tend to grow "staffy." Staffiness always tends to a take-it-or-leave-it attitude—and to monotony. There was, I suppose, a no finer example than that of the soldiers' food in pre-war days and the early days of the War. Until temporary soldiers outnumbered their professional brethren, the food supplied to the troops was excellent in quality, but absolutely soul-killing in its monotony. Our broadcast fare falls nowadays into just the same category.

A BAND-PASS DEVELOPMENT

I SAW one of Mr. Reyner's new stunts at his laboratories the other day. It will make its appearance at the Show and, of course, I must not say too much about it until then. I do not think I shall be giving away any secret, however, if I mention that the idea is a development of the band-pass filter, which seems to have rather good possibilities. Now, a band-pass filter seems, on the face of it, rather a snappy idea. Whenever I have tried one, however, I have come to the conclusion that the results are not so good as one is led to suppose. In order to obtain the right order of selectivity the coupling has to be so weak that the signal is almost lost. At any rate, I have always found a very marked reduction in signal strength with a band-pass filter as against the single coil. On the other hand, if you tighten the coupling and try to push the strength up, the arrangement simply goes up the loop, and tunes all over the place.

DIFFICULTIES OVERCOME

I GATHER that our Technical Editor has overcome this difficulty and produced a circuit, which he demonstrated to me, in a most efficient fashion. He has arranged a switch which puts the filter in or out of circuit, so that its effect can clearly be seen. He had it tuned in to Langenberg with a very strong background of the Midland Regional programme. On throwing the switch over, Langenberg came up quite clear and 5GB vanished. Moreover, the strength was hardly any weaker than before.

I asked him if the arrangement was difficult to build or critical in adjustment, and he said that, so far as he could see, there should be no difficulty whatever. The extra circuit is linked up with the ordinary tuning circuit; so that there is no extra tuning control, and the arrangement, indeed, proved very neat, both from the construction and operation point of view.

This, by the way, is only one of the many stunts which the Technical Department have up their sleeves, and readers may expect some really hot developments during this coming season.

COLOUR TELEVISION PROPOSALS

THE application of the needs of one industry to the requirements of another crops up frequently, and, as a case in point, mention may be made of the work of W. H. Peck, a New York expert in colour analysis. He has produced what is termed a colourcraft process, which is said to have application in colour television. Actually the process is based on the breaking up of the light or colour into the component colours by means of a prism. The resulting rainbow of light is then "passed across" a special highly sensitive photo-electric cell. Now, since each colour, no matter how faint, has a different effect on the cell, it causes a current variation in the cell circuit.

This method, it is stated, has been applied successfully for colour films, but up to the present anything in the nature of a practical colour-television transmitter has not been described. For the receiving end, however, definite proposals have been made.

RECEIVING EQUIPMENT

IT is well known that one of the difficulties in a vision receiver arises from the relatively small amount of light which is available. One light spot after another follow each other in order, either horizontally or vertically, until the image is built up. Finally, in a fraction of a second, while the onlooker at any one instant sees only a faint dot of light, owing to visual persistence and the rapidity of the process, a complete image is conveyed to the mind. Mr. Peck proposes to rectify this "fleeting impression" by throwing his point of light on to a magnetic plate, so that it will stay there in magnetic form until it has covered the entire plate and impressed a complete image.

This is to be done in the space of one-sixteenth of a second, and the onlooker will then have a complete image shown to him sixteen times in one second. It is claimed that this suggestion, if practicable, would result in a greater concentration of light at one time, thus giving a stronger image and increasing the possibility of enlarging it to dimensions bordering on a cinema screen size. This scheme is intriguing, but complicated. In spite of this, however, its practical possibility should be explored before anything in the nature of a final verdict is given.

THERMION.

DO YOU KNOW—

that when it is desired to work phones in conjunction with a speaker, the two should not be simply connected in series? A separate little choke or transformer output circuit should be provided for the phones. A tapped transformer is an advantage.

that when shielding your set with metal, the material should be as thin as possible, consistent with sufficient mechanical strength? It is a great mistake to use stout-gauge aluminium or copper, with the idea that the thicker metal provides better shielding.

that when a metal panel is used the greatest care must be taken to prevent short-circuiting of some of the panel components to the conducting surface of the panel? Some switches have only a very small ebonite bush, which does not give safe insulation. You should watch this point.

that the Pope's new broadcasting station at the Vatican is now putting trial messages "on the air," and broadcasts can be heard both on the broadcast and short wavelengths?

W. JAMES EXPLAINS

HOW TO GANG CIRCUITS

A Simple Explanation of the Fundamental Principles

WHEN one first tries to gang the tuning condensers of a set the results are usually not very satisfactory. Difficulties crop up when changing from the medium to the long waves. Adjusting the reaction sometimes affects the tuning, and as a rule there is some little difficulty—at first, any way—in keeping the circuits in tune over the whole of the medium or the long wavelength ranges.

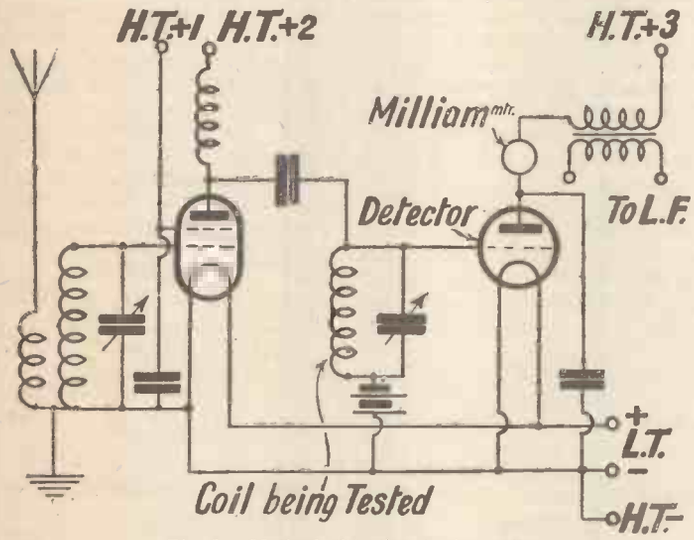


Fig. 1. Method of testing tuning coils

Most readers will have noticed that over the top parts of the tuning ranges the tuning condensers normally keep in step. It is at the lower end that the readings of the condensers tend to differ. With some sets the aerial tuning condenser is tuned to zero when the other tuning condensers are at about 20 degrees of a 180-degree scale. This indicates a wide difference in the electrical values of the circuits.

Merely to replace the separate condensers and to fit a multiple tuning unit would be foolish, as good results would not be obtained over at least a fraction of the tuning range.

In order to obtain the correct results with a ganged set it is necessary to appreciate the various factors which affect tuning. We can start off by making sure the tuning coils are satisfactory.

All coils used in the set should have equal values of inductance. It may seem an easy matter to provide coils of identical value, but actually it is not so easy as you might think. Coils having equal numbers of turns will not necessarily have equal inductances. If the formers are of the same diameter, if the material used is of the same thickness throughout its length, and if the coils are all wound with the turns spaced by an equal amount, then the coils will be satisfactory.

But in practice wire is rarely of uniform thickness. Formers are not always of exact diameter and the winding pitch is not always uniform. It is, therefore, useless to assume that coils wound on formers of the same nominal size are of equal inductances merely because they have equal numbers of turns of the same gauge of wire.

Personally, I do not trust coils of any sort; I test them and measure their inductances. It is perhaps not always convenient to do this, but a test of some form or other is essential. A fair degree of accuracy is to be obtained by a substitution test. Thus we could connect one of the coils to the anode circuit of a high-frequency stage of a set and note the exact tuning point at which the local station is received.

A milliammeter should be connected in the anode circuit of the detector to indicate the point of exact tune. If there are two local stations, such as the London listener enjoys, then two readings can be obtained. If now the coil is taken out and the second one is connected, and readings are obtained, we can judge whether the coils are alike.

It is of no use making this test with an unstable set or if the tuning condenser is not a good one. Normally, however, a very good idea can be obtained.

In Fig. 1 is a suitable circuit including the milliammeter. Anode-bend detection is shown. A signal will, in this instance, increase the reading. The normal (no signal) reading will be small, such as .1 milliampere, and a signal will increase the reading to perhaps .5 milliampere or more. This depends upon the strength of the signal, the particular valve used, and the values of the anode and grid-bias voltages.

If the detector is of the leaky-grid type, the anode current will decrease with a signal. The normal (no signal) reading might be 2 milliamperes, and a signal will decrease the current to perhaps 1.5 milliamperes.

I would rather use the anode-bend detector when making tests of coils, as the tuning is sharper and it is usually much more easy to obtain an exact reading. The leaky-grid detector is, of course, satisfactory as well, but the reading may not be so accurate.

Having tested the coils in this way, and perhaps adjusted them to give equal readings, the next question is: How and where are they going to be used in the set? It is possible that as they are placed in the set their actual inductances are different from the values obtained when they are measured separately outside the set.

Metal will reduce the inductive value of a coil. Therefore, when screens are used and other parts, such as tuning condensers, transformers, or chokes, are situated near the coils, it is wise to suspect that the

(*Continued on page* 251)

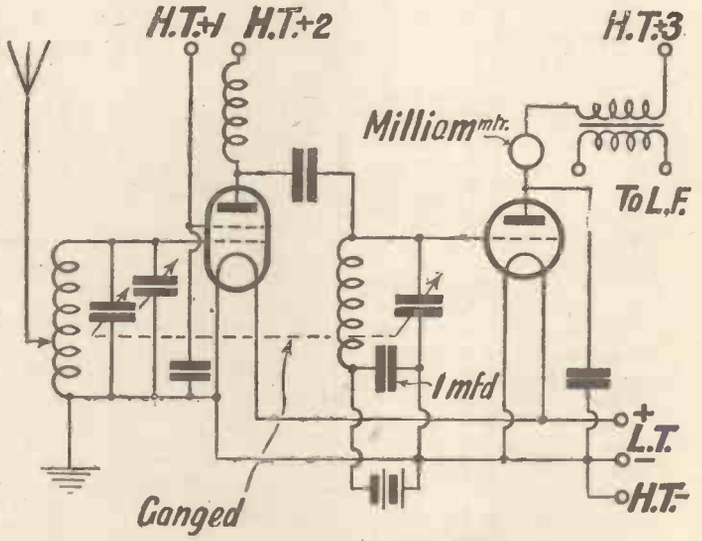


Fig. 2. A simple two-gang tuning circuit

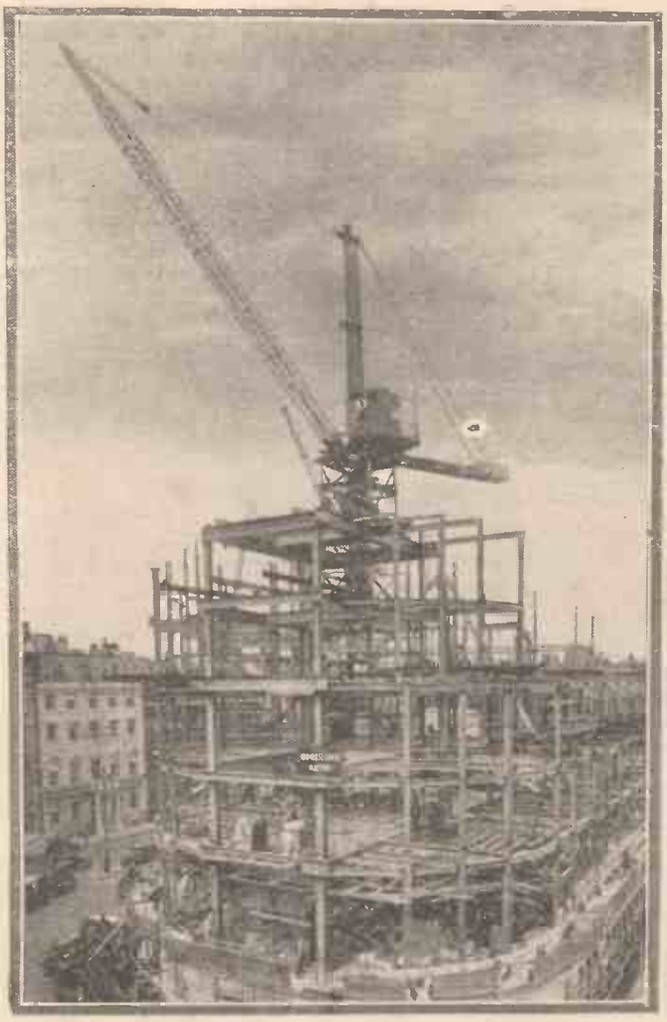
USING 25-CYCLE MAINS

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

THE number of people who have electric light in this country is still only a relatively small portion of the total population. The present schemes of electrification are undoubtedly assisting in the development of all-electric houses, but we are still a long way from the ideal condition of affairs where everyone is possessed of electrical supply.

Even among those who have electric-light mains some difficulty still exists. Those who are on 50-cycle alternating current are in the most satisfactory position of all. Those who have D.C. at 200 volts or more are also reasonably well off, but there is still a fair percentage of people who are equipped with 25-cycle A.C. The whole of the West of England and such large areas as Glasgow come within this category, and it is for such people as this that the present article is principally written.

An A.C. supply is one in which the current flows first in one direction and then in the other a relatively large number of times every second. Fifty variations or cycles per second has been chosen as the standard frequency or periodicity, and all new apparatus is being made to suit this standard. In the early days of electrical engineering, however, there were some conflicting opinions. Up to a point it is cheaper to make generators in which the frequency is low, and indeed for power purposes, such as railways, frequencies as low as 16⅔ have been used and still are in certain parts of the country. This low frequency, however, is not satisfactory for domestic purposes. Lamps supplied with current of this nature, for example, show a distinct flicker which is very trying to the eyes, and 25 cycles was adopted in certain localities as a fair compromise. Even with this frequency a small amount of flicker is observed, but it is not too bad; and, of course, for heating and cooking the frequency is of relatively small importance.



The present aspect of Broadcasting House—the new B.B.C. Headquarters. Work on the new building for the British Broadcasting Corporation has now reached an interesting stage and the network of steel towers high above the other buildings in Portland Place, W.

Wireless and 25-cycle Mains

What is the position when it comes to radio apparatus? Can apparatus designed for 50 cycles be employed satisfactorily on 25-cycle supply? The general impression is that it is not possible, because few firms will rate their apparatus as being suitable for any frequency lower than 40. This, however, creates a misleading impression for, as a matter of fact, the principles of A.C. working as applied to 50-cycle supplies are equally applicable to 25 cycles, provided that suitable precautions are taken.

The most important alteration necessary is in the transformer itself. It is customary to connect a transformer between the mains and set, or the eliminator, partly for purposes of safety and partly to provide the various voltages ranging from 4 or 5 volts for the filaments of the valves up to several hundred for the high-tension voltages. The principle of operation of a transformer is simple; the number of turns on the secondary winding is made a certain multiple or fraction of the number of turns on the primary, and the voltage developed is exactly proportional to the ratio between the secondary and primary turns.

This, however, is not the whole story, owing to losses which are set up. The iron core of the transformer is continually being magnetised, first in one direction and then in the other, and the molecules of material object to being continually displaced in this manner and oppose a definite resistance to the action. This shows itself in the form of loss, the transformer iron heating up and power being absorbed from the circuit, even when the transformer is not supplying any load. This loss depends upon the maximum magnetisation in the iron of each cycle.

Now, the number of turns on the secondary windings of the transformer are determined relatively to the turns on the primary, so that we get the required step-up or step-down ratio. What controls the number of turns on the primary? Actually, the determining factor is the magnetisation of the core, which, in turn, is dependent upon the number of turns on the winding. This is so proportioned that the maximum magnetisation of the iron, or the flux density, as we call it, does not exceed a certain predetermined figure, depending upon the type of iron used for the core.

Now, the lower the frequency, the more the number of turns which must be put on the primary in order to keep this flux density within safe limits. In the case of a 25-cycle transformer we require twice as many turns for the same sized core. Alternatively, one can use the same number of turns and twice the area of core, but it will be clear that either method involves considerable increase in the size of the transformer. Which method is adopted depends upon the manufacturer's facilities, and to some extent upon the cost. In certain cases a compromise is adopted, both the iron area and the number of turns being increased by a small amount, but the net result is the same in all cases, namely, that a 25-cycle transformer is virtually twice as big as a 50-cycle one.

Modifications Required

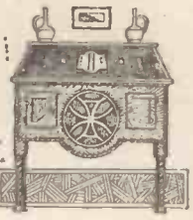
This is the principal alteration which has to be made in mains equipment for working on this low frequency. If a 50-cycle transformer is used, the iron loss will be excessive and the transformer will heat up; also the waveform will be distorted; and there will not be the same ease in smoothing. Nevertheless, I have on several occasions used transformers designed for 50 cycles on 25 cycles without any difficulty whatever. This was in cases where the transformer had originally been generously designed and had not been skimped.

The cost of the 25-cycle transformer is, of course, considerably more than the 50-cycle equivalent; but I cannot help feeling, from my experience, that manufacturers are a little too chary of this 25-cycle problem and that, if the matter were really looked

(*Continued in third column of page 234*)

SYDNEY MOSELEY'S WEEKLY PROGRAMME CRITICISM

WITHOUT FEAR OR FAVOUR



A Visit to the Berlin Exhibition

The Ridgeway Productions

Time Signals

American Dance Tunes

RUSHED over to Berlin for the Radio Exhibition. The thing that strikes me is the fact that a whole department is given up to television, and the apparatus was the first in the building to be surrounded by fussy engineers who worked day and night. I suggest it is of national importance to us in England to ask ourselves why a similar exhibition in England has not a corner to spare for an invention in which we lead.

It shows both lack of enterprise and a spirit of fair play. Listeners and lookers-in should demand to know why.

◆ ◆ ◆

The first persons I barged into in the hotel at Berlin were Sir John Reith and Mr. Noel Ashbridge (chief engineer of the B.B.C.). At any rate, this *is* enterprise. Strange, however, that once again John Baird—who came with me—has to go to Germany to show his invention. Nevertheless, the honour which Germany had of being the first to broadcast television daily is offset by the fact that even to-day only sight is put over—not sound and sight simultaneously.

◆ ◆ ◆

Philip Ridgeway's "Music-hall in 1950" was perhaps the most unimpressive of his "Period Vaudeville" series, very little being done to convey an impression of twenty years hence. And what a deplorable outlook for us, because, according to Mr. Ridgeway, we shall all be speaking with an American accent!

The singing was good, if a little too robust at times, and there was plenty of life in the show. A big fault, however, was one which has been evident all through the series—and that was the artificial enthusiasm of the "audience." It was overdone, and after a while the yelling and roaring became painful.

◆ ◆ ◆

As a general summing up of Mr. Ridgeway's recent efforts, I would say that he has shown plenty of originality and he certainly has the gift of making things go with a swing. I see that a new series, entitled "The Ridgeway Parade," or some such name, is being devised, and I am looking forward with interest to these productions.

◆ ◆ ◆

Is the B.B.C. attaching too much importance to the time signal, or is it necessary to give it as often as is done, regardless of what else is going on?

I am prompted to raise this point by remarks which have been made to me by listeners, and also by my own experiences.

The "pips" from Greenwich have no respect for anybody, these days. They intrude cheerfully upon Mozart, Jack Payne, and this week's tame professor, setting one's teeth on edge, especially if the intrusion comes in the middle of an exceptionally fine piece of music. On the other hand, of course, it is a splendid thing to know that we have a time-giving service which is as regular as the sun itself.

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There are people who are cross with the B.B.C. on account of the large preponderance of American dance music broadcast. English work, they say, should be given a better chance, and although Jack Payne features it a great deal, the O.B. dance bands neglect it and are not taken to task over the fact.

One correspondent in particular writes: "I would point out to the cross ones that, so far as that type of thing goes, the average English dance tune is a rather dull affair. An English fox-trot with a good melody and lilting rhythm is a rarity. Our composers appear to concentrate their efforts on 'comedy' foxtrots, which insult one's intelligence, and maudlin waltz tunes. As much as we of the older generation dislike the wails and what appear to be discords of the modern dance tune, we must admit that, so far as rhythm is concerned, the Americans get away with it."

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And while on the subject of dance music, here is a note from "Harold": "After a poor start, Billy Mason's Capheans are proving themselves to be good dance musicians. Their trouble at first was the fact that their combination of instruments was not as it should have been. Now they have introduced more brass, but not too much, and this reshuffle has improved them greatly."

◆ ◆ ◆

In his same letter my correspondent discusses the tendency of the broadcast play. "This habit of broadcasting hours and hours of murder, violence and deep tragedy, and sin is growing a little wearisome. There is no denying that the technique of broadcast plays has improved, and is improving greatly, but those responsible for the selection of them must get rid of their tragedy complex. There is no excuse for not broadcasting plenty of the lighter stuff, as there is a large source from which to draw. I would suggest that more use is made of the works of P. G. Wodehouse, W. W. Jacobs, and Ian Hay, to mention only a few."

◆ ◆ ◆

A most pleasing programme was given recently by Andrew Brown's Octet, with Hardy Williamson as vocalist. Every item was a worthy one and well rendered. Hardy Williamson sang splendidly.

◆ ◆ ◆

Well, the "Proms" go on, and I suppose listeners will soon be complaining of too much of a good thing.

Why not vary it by putting over a whole opera, as Rome and Berlin do periodically. If it is doubted whether listeners would stand for it, my answer is that the Strand season by the Carl Rosa Opera Company had to be extended.

◆ ◆ ◆

"Winter is on the way," writes M.O.J. (Windsor), "and I consider this is a good opportunity to revive the ever-recurring question of early-morning broadcasts. Don't you feel that something cheery, early in the day, would prove popular with everybody? A bright greeting and some tactfully-chosen music would be appreciated by the thousands who have to rise early on a cold morning, when the kitchen fire is not yet alight, and cold blasts shriek round the house. Of course, the music would have to be just so; we are far more critical and apt to grumble when the day is young."

Our cartoonist's impression of Florence McHugh

IN MY WIRELESS DEN

WEEKLY TIPS— CONSTRUCTIONAL AND THEORETICAL

By W. JAMES.

S.L.F.'s and Logarithmics

VERY little is heard these days about the capacity law of tuning condensers. A year or two ago we had straight-line frequency types, logarithmic types and various others, the difference between them being in the shape of the vanes, both fixed and moving.

If you tuned in, say, a dozen stations with a set having the different types in turn, you would find the dial readings varied. The readings might be well spread out in one instance and fairly close together in another.

Some people consider that with the broadcast stations spaced apart by a given number of kilocycles the ideal tuning condenser would be the one which tuned in stations at equal intervals round the dial.

As a matter of fact, the best tuning condenser for most practical purposes is not one having this tuning law at all. We use in these days condensers approximating to the logarithmic type, the chief reason being that reception of the worth-while stations is made a trifle easier because of the greater separation on the dial where they come in.

Testing those Terminals

I wonder how many amateurs make a point of testing the tightness of all terminals before screwing down the parts. Much annoyance is saved if this rule is followed, as there is generally at least one loose terminal in, say, three or four valve holders.

A hot soldering iron invariably seems to loosen an already loose contact, and when connecting wires are being tightened down by screwing home the nut of a terminal the least slackness will allow the terminal to work loose.

Wiring-up Small Parts

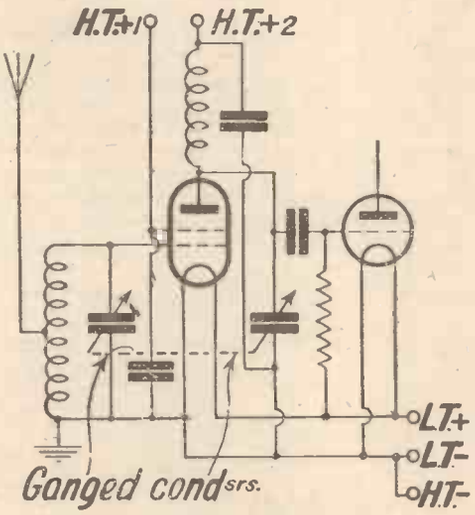
One of the disadvantages of including parts, such as fixed condensers and grid leaks, in the wiring instead of using fixing screws and holders is that vibration may, after a time, cause the part to break away from the wiring.

This is, perhaps, not so likely to occur with sets built at home as with manufacturers' sets, which must travel a distance between the factory and the purchaser's place. At the same time, I doubt whether the practice is a good one, especially as most parts are made to be held down in some way.

A "Metal-panel" Circuit

A tuning circuit often used when the panel is of metal is that shown in the accompanying diagram which shows the two tuning condensers ganged.

That used for tuning the anode coil is actually joined from the anode of the screen-grid valve to the negative side of the high-tension battery. Therefore, the full voltage of the high-tension is across it. A break-down of the condenser would short-circuit the supply and damage it if not protected by a fuse.



Here is the simple circuit, often used in a receiver incorporating a metal panel, referred to in the accompanying paragraph

It is, therefore, advisable to employ a fuse in a circuit of this type. At the same time a good condenser must be used. If a fixed condenser is included between the anode and the tuning condenser, a fault in the tuning condenser will not blow the fuse, and for this reason a fixed condenser is sometimes recommended. It should have a capacity of several times that of the tuning condenser so that the tuning will not be affected. Tuning condensers having their plates not properly held are liable to be bent and therefore to touch and should always be avoided, as it is often a difficult job to correct a faulty component.

Stray Capacities

The anode of a screen-grid valve is very carefully shielded from the grid of the valve by the makers in order that the anode-grid capacity shall be as small as possible. So small is the capacity, in fact, that it is a difficult one to measure.

Actually, of course, the shield or screen is fitted round the grid, so it is the grid which is really shielded from the anode. The anode, generally consisting of two plates arranged one on each side of the screen, is therefore not screened from parts outside the valve.

Thus if we held a piece of metal near the bulb it would have an effect, and the capacity of the anode to the metal would be a measurable one. This piece of metal might, in practice, be the plates of a tuning condenser, so that if the condenser is connected to another circuit there will be a reaction effect.

The result of the coupling may be to increase or to decrease the amplification, but, in any case, it ought not to be allowed to exist. The valve should, therefore, either be placed in a suitable position with regard to other parts, or else be shielded from them.

"USING 25-CYCLE MAINS"

(*Continued from page* 232)

into, 25-cycle transformers could be obtained at a price not prohibitively in excess of the 50-cycle market.

Regarding the remainder of the set, one may require a little extra smoothing. Whether this is the case or not depends upon how efficient the smoothing is in the first place. I have a number of standard designs of amplifier, and whenever I require one for a particular job I choose the particular standard which best suits the purpose. These amplifiers have been tried as a matter of interest on 25 cycles, and all worked perfectly satisfactorily on this frequency. On the other hand, a very simple amplifier with barely sufficient smoothing for 50 cycles may conceivably give rather more hum than is desirable on 25, although it must be remembered that few loud-speakers will reproduce the hum which is obtained from 25-cycle supply, and this very largely offsets the need for extra smoothing. In general, one may take it for granted that a system which is satisfactory for 50 cycles will also be satisfactory for 25 cycles, as far as smoothing is concerned.

DOES YOUR AERIAL PICK UP TOO MUCH?

Some suggestions for cutting out interference. By C. A. Oldroyd

"ERECT your aerial as high as possible, to get good range!" has been the advice given us during the past few years. In the meantime, screen-grid valves have revolutionised set design, and extreme ranges can now be covered with modest

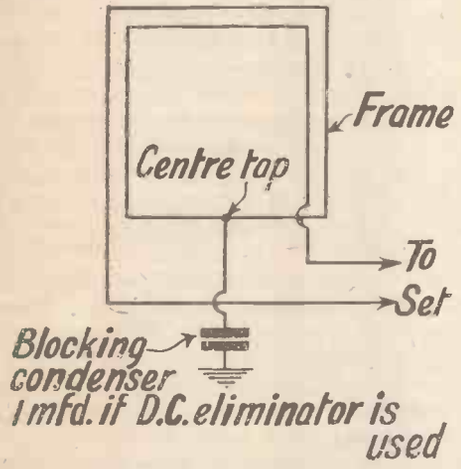


Fig. 1. Interference can be reduced by earthing the frame aerial centre tap via a blocking condenser

aerial-equipment. We are, however, unable to let a very sensitive set "all out" when working in a city or town, as man-made interference sets a barrier.

A Frame-Aerial Case

A friend of the writer's had purchased what he believed the last word in receivers, and proudly demonstrated its possibilities. Three S.G. stages provided enormous amplification, but as soon as the volume control was advanced beyond a certain point, all sorts of interfering noises issued from the loud-speaker.

The set worked from a frame aerial, but even with this small collector it picked up motor noises, etc., from considerable distances. Crackling, hissing, and frying noises sometimes got the upper hand over the signal, and under those conditions listening-in was scarcely a pleasure.

Part of the interference was definitely traced to electric motors and an electric fan. The worst interference, however, came from electric trams which passed close to the house. The overhead wires seemed to act as aerial, for the interference was not always worst when a tram passed the house, but when climbing a hill a few hundred feet away.

After many fruitless attempts, the tram interference was very much reduced by earthing the frame centre tap (Fig. 1). A blocking condenser of about 1 microfarad was inserted in the earth lead, as the set took its H.T. from a D.C. eliminator.

A second, less sensitive set, a four-valver, was run off an aerial. This set reacted more strongly to tram interference than the more sensitive receiver. The cause of this was the position of the aerial; Fig. 2 shows the position relative to the tram system in plan view. Originally, the aerial was stretched between points A and B, A being the main chimney of the house and B the kitchen chimney. The earth connection was above reproach, a large copper plate being dug 6 ft. into moist soil.

A Simple Remedy

At first it was suspected that the interference was brought in via the mains, for this set too took its H.T. from an eliminator. Yet when aerial and earth were disconnected the speaker was perfectly silent. Although the case seemed hopeless, a very simple remedy was discovered; the aerial was too efficient, its pick-up too great for the position near the tram lines.

A new aerial was roughly rigged up in the garden, as shown in Fig. 2. The new aerial runs practically at right angles to the tram system and is only about 12 ft. high. The total length is around 50 ft., and, despite its very screened position, excellent results are obtained with a sensitive four-valver.

Naturally, the volume is not so great as with the high aerial from chimney to chimney, but ample for a living-room. The old friends amongst the Continental stations continue to come in with slightly less

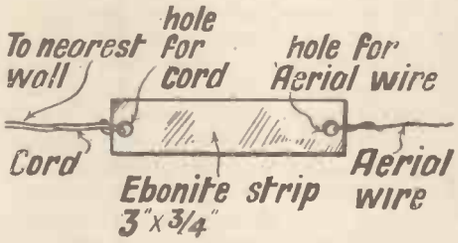


Fig. 3. An improvised aerial insulator

volume, and the tram interference is definitely cut out. At first it seemed too good to be true. Careful listening with phones showed, however, that only severe "kicks" came through; with the loud-speaker in use the casual listener will scarcely notice them.

If you suffer from similar interference, perhaps your aerial is too efficient for the district. To make sure that a low aerial will be an improvement, a rough-and-ready aerial from 8 ft. to 10 ft. high can be rigged up very quickly. Scraps of ebonite

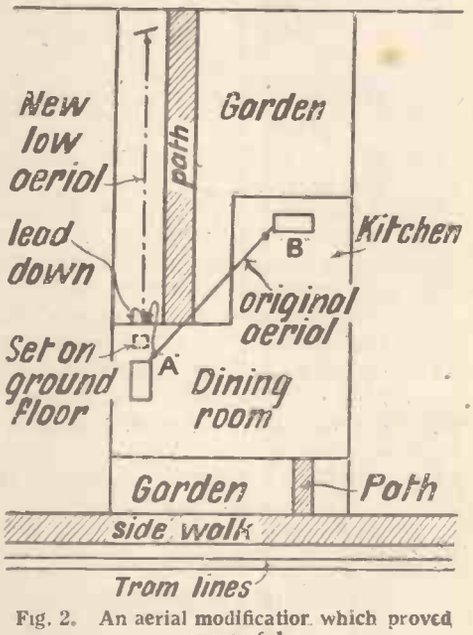


Fig. 2. An aerial modification which proved successful

with two holes in them will do for insulators while the test lasts. Such an insulator is shown in Fig. 3. Make sure, however, that the aerial will not touch any trees or walls, else the energy collected will leak away. Any sort of wire will do for test purposes. The writer used No. 26 d.c.c., and it is still up and working.

If the scheme works it is certainly worth while to make a job of the low aerial, using preferably enamelled stranded aerial wire.

Erection of a new Russian broadcasting station in Vladivostok is expected to boom radio business in North Manchuria, where the station will have its reception area.

The 16-note interval signal used by Naples has only been provisionally adopted. The Italian broadcasting authorities are offering prizes in an open competition with a view to suggestions for suitable interval signals to be allotted to the various studios in that country.

The ART of USING a

HOW TO ADAPT A SET FOR GRAMOPHONE WORK

Close-up of filter and coupling arrangements of the amplifier

EVERYONE who has a wireless set should be able to use it with a pick-up for reproducing gramophone records, for the greatest pleasure of radio is not to be obtained unless one has the convenience of the gramophone as an alternative programme; and on the other hand, the best results are not to be had from gramophone records unless one can give them the light and shade and control of volume which can only be done with electrical reproduction.

It can be argued logically that as most records nowadays are electrically recorded, they must be electrically reproduced in order to get true life.

This is better appreciated when it is realised that recording nowadays is done with apparatus which works almost in exact reverse to the electrical reproduction—that is, a small amplifier is used and the pick-up, instead of picking-up the sound vibrations from the record, transfers them from electrical vibrations into engravings on the disc of "soap" from which the master record is made, and in which the thousands of records are moulded.

Amplifier or Wireless Set?

Now the problem is: Is it better to make up a special amplifier for gramophone work, or is it advisable to use the L.F. side of the ordinary wireless set? Naturally, it is cheaper to use the existing side and merely to have a pick-up switching arrangement.

The other side of the question is that many sets and particularly simple two- and three-valvers, do not give anything like the good results which can be obtained from a properly made up amplifier. The parts needed for an amplifier solely for gramophone work are not very expensive. Generally speaking the valves in the wireless set can be plugged into the gramophone amplifier when required.

Now, as an example of what can be done in the way of a special amplifier for gramophone work, the photographs shown here illustrate a four-valver made up in the AMATEUR WIRELESS Laboratory for test purposes.

This novel Clarion cabinet houses set, gramophone equipment, power supply and speaker

A Typical Instrument

It is not suggested that readers should follow this design in its entirety, for this amplifier represents a degree of perfection to which the average man does not desire to attain. Moreover, it is comprehensive and works entirely from A.C. mains, can deliver three watts of undistorted power and can be switched over to a microphone for public-address work on a small scale.

Amateurs who want to make a small amplifier for gramophone work can quite conveniently cut out one of the L.F. stages preceding the final push-pull stage and they could, of course, eliminate the public-address microphone arrangements.

Furthermore, if battery drive is preferred, then the whole of the mains section can be cut out, and this can be done without upsetting the basic circuit. The amplifier as it stands consists of two L.F. stages and one final push-pull stage, transformer-coupled both input and output.

Values

The values used in this amplifier can be copied by anyone making up a similar job and it should be particularly noted how efficient L.F. filtering enters into each stage. The coupling resistance of the first stage has a value of 100,000 ohms and the coupling condenser is a .01 job.

The 1-megohm grid-leak is a potentiometer forming the volume control and the slider is, of course, taken to the grid of the following valve.

The filter resistance for the first L.F. stage has a value of 50,000 ohms, for it is in series with the 100,000-ohm coupling resistance. The second L.F. stage is filtered by means of a 10,000-ohm resistance, and this is in series with the primary of the push-pull transformer. In both cases, the stabilising condensers have a value of 2 megohms, which is usual.

The switching arrangements for the pick-up (which is coupled by means of a

A composite picture of the ar complete instrument is show

PICK-UP

ING

transformer) and the public address microphone circuit are neatly arranged, but gramophone - users will not need to bother about the microphone circuit.

The push-pull stage needs matched valves for proper working, and most valve-manufacturers will supply pairs of valves, such as the LS5A, for push-pull work. A feature

No electric gramophone is complete without an electric turn-table drive. This is the Paillard induction motor for A.C. mains

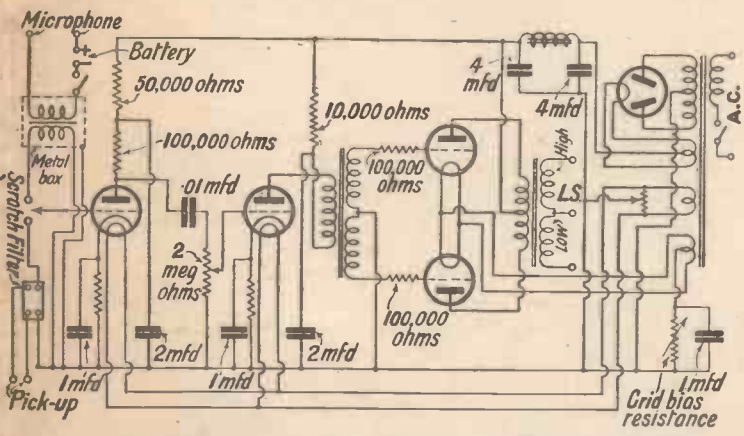


Fig. 1. The circuit of the amplifier. Full details are given in the text

of this stage is the inclusion in each grid circuit of the 100,000-ohms resistance. These prevent a rather common trouble in push-pull stages in preventing self oscillation.

The coupling and main filter resistances are wire-wound, but the resistances in the push-pull valve grid leads can be ordinary composition components.

An MH4 type valve is used in the first stage, an MHL4 valve in the second stage and two LS5A's (ordinary three-electrode valves) in the push-pull stages. Valves taking a fairly heavy current, such as the LS5A, work quite satisfactorily on "raw" A.C. A U8 type valve is used for rectifying H.T. work and the values of the components in the rectifying and smoothing circuits are shown in the accompanying circuit diagram of the amplifier, Fig. 1.

From this amplifier, which is as near to perfection for gramophone working as most amateurs will wish to approach, much can be learned which will assist those making up smaller amplifiers on the same lines.

Using the Receiver

For example, if the existing set is to be used and it happens that it does not work properly with a pick-up, then alterations of the values of some of the components to comply with those of this "A.W." amplifier may improve matters.

In two- and three-valve receivers it will be essential to use a detector stage as an L.F. amplifier when a pick-up is switched into circuit. An accompanying diagram, Fig. 2, shows a convenient switching arrangement by means of which the pick-up can be brought into the detector circuit and the necessary bias value can be put on the grid of the detector.

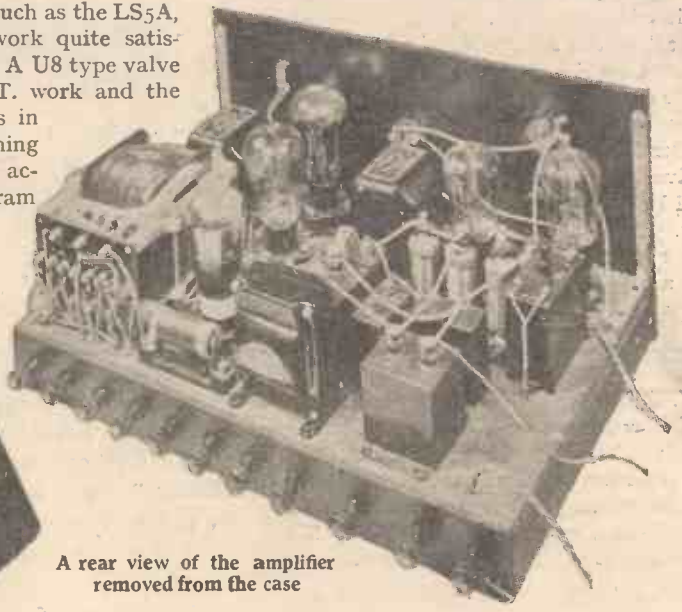
To get the best results in gramophone work with an ordinary set, at least 150 volts H.T. must be used, and the power valve must be capable of standing up to this with adequate grid bias.

Sets including a pentode in the last stage will give rather shrill reproduction with most pick-ups because steel needles tend to accentuate the higher tones and that, too, is the characteristic of pentodes, which are often deficient in the bass notes. If this trouble is experienced, then fibre needles, such as the Burma Colour needles, may effect a cure. Many types of needle are available apart from the ordinary loud-tone steel needle, which is the favourite of ordinary gramophone users, and which is by no means best suited to electrical pick-ups.

A great improvement in an electric gramophone is the fitting of an electrically-driven turntable, for this does away with

plifier—the in the rear

A pick-up with a balanced tone arm is an advantage—the picture shows the Igranic



A rear view of the amplifier removed from the case

"THE ART OF USING A PICK-UP" (*Continued from preceding page*)

the tiresome job of winding. Motors for A.C. and D.C. supplies are now available. D.C. motors are of the usual commutator type, but A.C. motors are frequently of the induction type, which has numerous advantages for gramophone work, for the regularity of an induction motor overcomes that tendency to drop in speed when the gramophone needle is passing over a loud, deeply-engraved passage on the record, and when there is thus an extra load on the motor.

Induction Motors

Induction motors, such as the well-known Paillard, work in a novel way.

Instead of the ordinary armature and commutator a non-magnetic drum is used and the rotation is produced by currents induced in this drum by windings and magnets placed both inside and outside the drum. In most arrangements a pair of poles energised from the A.C. supply induce circulating currents in the rim of the drum. These currents react with the flux of another magnet pair, and this causes the drum to rotate. The great advantage is that there is no commutator.

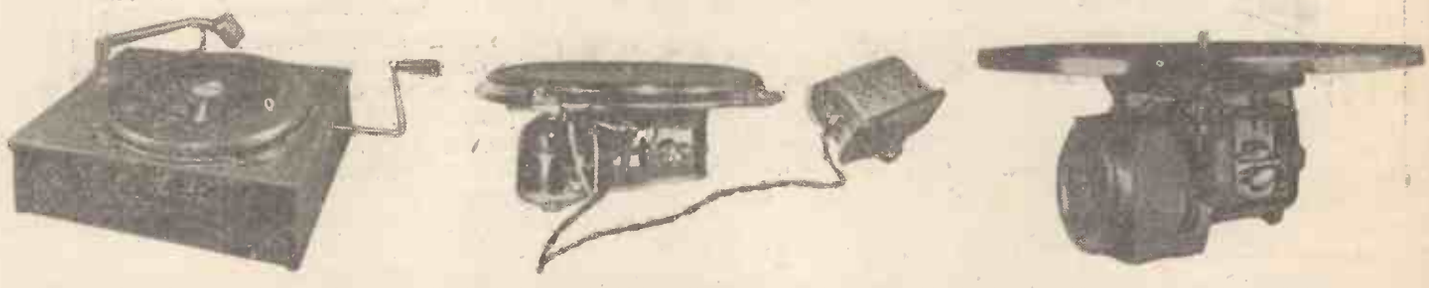
A deal of the success obtained with an electric gramophone and when using a pick-up with an ordinary set is the way in which the electric gramophone drive, pick-up and amplifier are arranged. The pick-up is very sensitive to A.C. currents and so the leads should be kept well away from the electric motor. Even when a D.C. motor is used, slight sparking at the commutator can cause a rippling which is audible in the speaker.

It is a good plan to use a length of lead-covered wire, obtainable from most household electricians' stores, for connection between the pick-up and the first stage of the amplifier. In any case, this lead should be as short as possible.

There are many cabinets on the market which are suitable for housing the set, pick-up and turntable in an efficient way, and there is much to be said for cabinets such as the Clarion, illustrated here, in which there are separate and handy-to-reach compartments for the set, gramophone equipment, speaker and mains supply arrangement or H.T. batteries.

Many other firms manufacture suitable cabinets for radio-gramophone work.

It costs so little to convert a set into a first-class radio-gramophone outfit which will give better results than quite expensive mechanical gramophones. Why don't *you* do something on these lines for the coming season?



Here are three motors suitable for a gramo-radio outfit. The unit on the left is a complete turntable and pick-up chassis, made by Pickett's, which can easily be connected up to a set. The motor in the centre is the Garrard Universal, suitable for A.C. or D.C., controlled by the separate resistance unit, while the Rothermel Blue Flyer induction motor for A.C. is on the right.

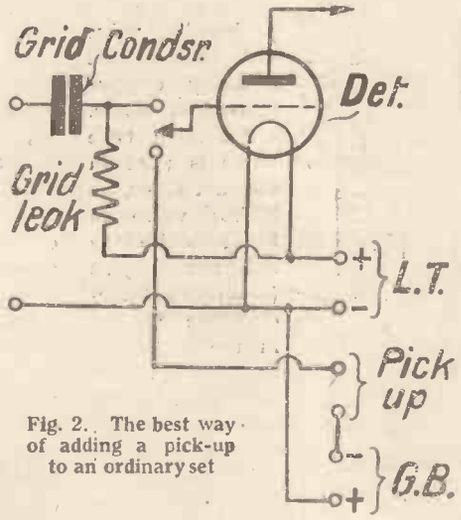


Fig. 2. The best way of adding a pick-up to an ordinary set

The Limit tone arm, which can be used with any pick-up

TESTING VALVES

EVERY valve before being placed on the market is naturally subjected to a series of tests designed to eliminate any faults in the process of manufacture. In certain cases these tests are carried out by hand, whilst in others the process is automatic. The latest type of automatic machine is capable of testing 5,000 valves per hour.

The valves are inserted in a rotating carrier, where L.T. and H.T. voltages are applied to the electrodes by pick-up brushes. Relays are operated to release any valve that is "dud" or "gassy" or where emission is low, or where the plate current is too high or too low. Each type of "fault" falls on to a separate conveyor belt by which it is led to special analysis and correction departments. Only valves which successfully emerge from all these tests finally reach the automatic wrapping and packing machines.

B. A. R.

DUNDEE Town Council has refused to follow the example of several English municipalities in permitting the installation of a radio relay service in the city, the City Engineer stating that it was not desirable to have wires, except those erected by the Post Office, crossing the city streets.

"Serious" listeners in the Greenock and Gourock areas of the Firth of Clyde are being troubled just now by a discriminatory form of interference. It is found that so long as vaudeville or jazz is being broadcast, all is well, but if the programme be a classical concert or recital, a very powerful oscillatory "howl" frequently develops.

On Mondays, between 9 and 10 p.m. B.S.T., short-wave experimenters may pick-up transmissions from Belgrade (Yugoslavia) on 30 metres; as an interval signal, a metronome striking 50 beats to the minute is used.

Paris Experimental has suspended its daily broadcasts until September 15. When the transmissions are resumed, on greater power, they will be simultaneously made on 40 and 299.5 metres.

The Spanish studios at Cadiz, Salamanca, Almeria, and Bilbao have been temporarily closed down pending a complete reorganisation of the Spanish broadcasting system.

NEW

IMPROVED & INCREASED RANGE OF THE FAMOUS TELSEN COMPONENTS

To the already famous range of Telsen Transformers, we have now added this series of New Components, each embodying many new features which at their prices represent the finest range of their kind upon the market.

Only Telsen could produce Components of such technical perfection and beauty of finish—components that are worthy of any circuit—that you can rely upon with the utmost confidence to do their job and do it well, and at their prices—well anyone can now afford the best—by test they are far the Best. Don't hesitate, build your new season's Set with Telsen famous Components, "Radio's Choice for Better Radio Reception."

Telsen Variable Condensers (Bakelite Dielectric). Particularly designed for use as a reaction condenser may also be used as a neutralising condenser where large capacity is necessary.
All vanes are insulated with Bakelite which eliminates the possibility of a short circuit between the moving and fixed vanes.
Made in three capacities: .0005, .0003, .00015, supplied complete with pointer knob with one hole fixing for panel mounting. Price 3/- each.

Telsen "Radiogrand" Transformer, new model, shrouded in genuine Bakelite, with new windings and core, fitted with earth terminal. Made in ratios 3-1 and 5-1. Price 12/6 each.
Telsen 7-1 Super Ratio "Radiogrand" Transformer, giving enormous amplification with perfect reproduction, shrouded in genuine Bakelite, with new windings and core, fitted with earth terminal Price 17/6 each.
Telsen "Ace" Transformer, the ideal model for all Portable Sets and where space is limited, gives perfect reproduction throughout the musical range. Shrouded in genuine Bakelite, with new windings and core, fitted with earth terminal. Made in ratios 3-1 and 5-1. Price 8/6 each.

Telsen H.F. Chokes, designed to cover the whole wave-band range from 18 to 4,000 metres, extremely low self-capacity, shrouded in genuine Bakelite. Inductance 150,000 microhenries, resistance 400 ohms. Price 2/6 each.

Telsen Valve Holders. Pro. Pat. No. 20286-30. An entirely new design in Valve Holders embodying patent metal spring contacts, which are designed to provide the most efficient contact with the valve legs, whilst allowing the valve to be inserted or withdrawn with an easy movement instead of being subjected to undue strain which often causes damage and loss of efficiency, to the valves. Low capacity, self-locating supplied with patent soldering tags and hexagon terminal nuts. Price 1/- each

Telsen Fixed (Mica) Condensers, shrouded in genuine Bakelite, made in capacities up to .001 mfd. Pro. Pat. No. 20287/30, supplied complete with Patent Grid Leak Clips to facilitate series or parallel connection. Can be mounted upright or flat. Price 1/- each.

for

BETTER RADIO RECEPTION

TELSEN COMPONENTS

Advt. of Telsen Electric Co., Ltd., Birmingham

A question raised by Alan Hunter in giving details of the latest developments in Western Electric transmitters

WHILE congratulating ourselves upon the perfection of our latest broadcast receivers, we are apt to overlook the fact that, in the intricate sequence of electrical changes between the microphone and loud-speaker, the receiver is but a link.

I cannot avoid repeating this truism, since it has been rather forcibly illustrated to me by recently issued facts about the Western Electric transmitters.

Every detailed improvement in reception is lengthily recorded, but we always seem to take the transmission end for granted. That we can all help to improve reception, while only a very few can contribute to transmitter improvements, is not sufficient excuse; for is it not conceivable that a point of perfection in reception may be reached where, owing to transmission limitations, any further receiver improvement would be futile?

The answer to this question is shown by the simple curves in Fig 1. Curve No. 1 shows the frequency characteristic of the latest 50-kilowatt Western Electric transmitter. Now look at curve No. 2; it shows the 500-watt transmitter of 1924, very much less perfect in its frequency response.

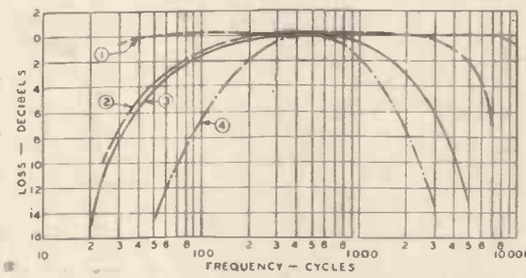


Fig. 1. These curves show that present-day receivers are not so good as the 1924 transmitters

But the biggest surprise is yet to come; for curves Nos. 3 and 4 are respectively of typical present-day and 1926 receivers. It will be noted that the response of present-day sets is, even now, not quite so good as that of the 1924 transmitter!

From these curves, upon which I think we may justifiably rely, it becomes clear that faithfulness of reproduction still depends upon the receiver. We can go on improving our sets for quite a long time before they approach in perfection of characteristics the modern transmitter.

Some of the factors contributing to the general improvement in transmission are of great interest. At the present time, apparatus can be designed to transmit almost any required range of frequencies, high or low. But, owing to the congested state of the ether, the frequency band transmitted has to be limited.

On each side of the carrier wave two equally wide side bands are created, and as the total frequency channel permitted for each station is, at the most, 10 kilocycles (only 9 kilocycles under the Prague Plan), a limit of 5,000 cycles is abitrarily imposed on all transmissions.

Because of this limitation, we might wonder exactly how any improvement can be claimed in transmission quality. Probably the greatest appreciable improvement is the reduction of background noise. When a weak station is tuned in it can only be made strong by amplification; but, unfortunately, the signal is not the only thing amplified.

What happens is that the hundred and one sources of background noise are also amplified. In other words, the ratio of signal to noise remains unaltered, but becomes more unbearable as the signal itself is amplified.

The only way to increase the ratio of signal to noise is to increase the signal's transmitting power; then not so much receiver amplification is needed, and so background noises are not brought up to an unbearable level. All the big European stations are therefore helping to improve reception at long distances by greatly increasing transmitting power.

Quality and High Power

For reasons of quality of reproduction alone, a high-power station is therefore desirable—for all except those living close to the transmitter! The idea that transmitting power is useful only for increasing the range of a station is not comprehensive enough.

In America last year the phrase "hundred-per-cent. modulation" was on every radio man's lips; the Western Electric transmitters in use over there were, I believe, the first to utilise this system. In the early days the modulation of the carrier frequency by voice or musical frequencies was about 40 per cent. But the new 50-kilowatt, and even the 5- and 1-kilowatt Western Electric transmitters modulate the carrier 100 per cent.

The diagrams in Fig. 2 illustrate the effect on the carrier wave of the two different degrees of modulation. But they do not indicate a very great advantage gained in reception—namely, the further reduction of interfering noises.

Any electrical interference having a frequency differing from the frequency of the carrier wave by an audible amount, produces an audible noise on detection. It happens that this noise is proportional to the power of the carrier wave; so for any desired strength of signal it is obvious that the less the power of the carrier wave needed to produce this signal, the less will be the interference.

With 40 per cent. modulation the side-band power is less than one-quarter of what it is with 100 per cent. modulation.

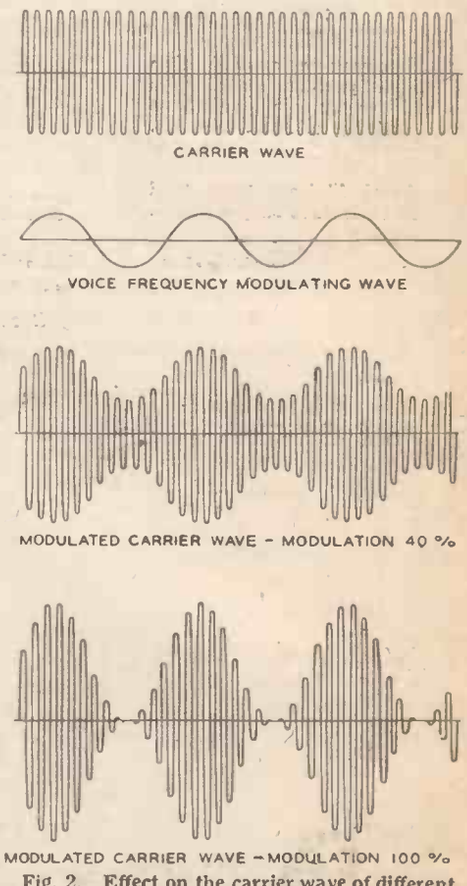


Fig. 2. Effect on the carrier wave of different degrees of modulation

In effect, then, with 100 per cent. modulation, a greater signal strength is gained for a given carrier-wave strength than with 40 per cent. modulation. In fact, the ratio of signal to noise at the receiver is *more than twice as great* for 100 per cent. modulation as for 40 per cent. modulation. This clearly shows how 100 per cent. modulation helps to cut down extraneous noises.

(*Continued on page 244*)

RADIOGRAMS

DURING the month of September the National stations will relay the Promenade Concerts from Queen's Hall on 4th, 6th, 8th, 11th, 12th, 16th, 17th, 19th, 24th, 25th, 27th and 29th; the Regional transmitters will broadcast them on alternate dates. In October National listeners will hear "Proms" on the 1st and 3rd, as well as the final Concert on October 4, and Regional on October 2.

On September 9 Marcel Dupré, the organist of Notre-Dame, Paris, will be the soloist in his own composition for organ and orchestra.

The Path of Glory, a satire on modern war, by L. du Garde Peach, will receive its first broadcast early in 1931. A repeat performance (by request) of *Ingredient X*, by the same author, will be given on September 9 (National) and on September 8 (Regional).

Before the Party, a short story by Somerset Maughan, has been specially adapted for the microphone; it will be produced towards the end of November by Val Gielgud.

It is reported that women outnumber men three to one as radio singers in the United States; sopranos predominate, and following in order are tenors, baritones, contraltos and basses.

London will present a "Diversions" programme every month during the winter; the first one is down for transmission in October.

A repeat performance of *Alice Through the Looking Glass*, adapted for the microphone by Cecil Lewis from Lewis Carroll's story, has been arranged for September 15. London Regional listeners may hear it again on the following evening.

As a result of prolonged investigation into the methods of lining studios, and rendering them sound and echo-proof, the B.B.C. experts are introducing at the new Edinburgh station some fresh technical developments. A layer of felt—one inch thick—will be placed on wooden strips about three feet apart, and over that will be stretched decorative fabrics. When this new scheme is completed, the echo will be reduced to almost imperceptible proportions—in fact, from four and a half seconds to half a second.

A fire that broke out on Marquess Marconi's yacht *Elettra* while at anchor at Civita Vecchia on August 11, damaged some of the valuable radio equipment by which most of the important experiments have been carried out. Before assistance arrived the yacht received serious damage.

Miss Cissie Woodward, pianist, will broadcast a recital from the Midland Regional on September 7; she recently played at Bergen, Stockholm and Oslo.

The International Music Festival which takes place at Venice on September 8 to 15 next, will be relayed to the Rome, Milan and associated stations.

Even China possesses a lady announcer. Miss Amy Wong—no relation to the film artiste—acts in this capacity for Station ZBW, at Hong-Kong. She speaks both Chinese and English, both languages being used for programme announcements.

"ARE TRANSMITTERS AHEAD OF RECEIVERS?"

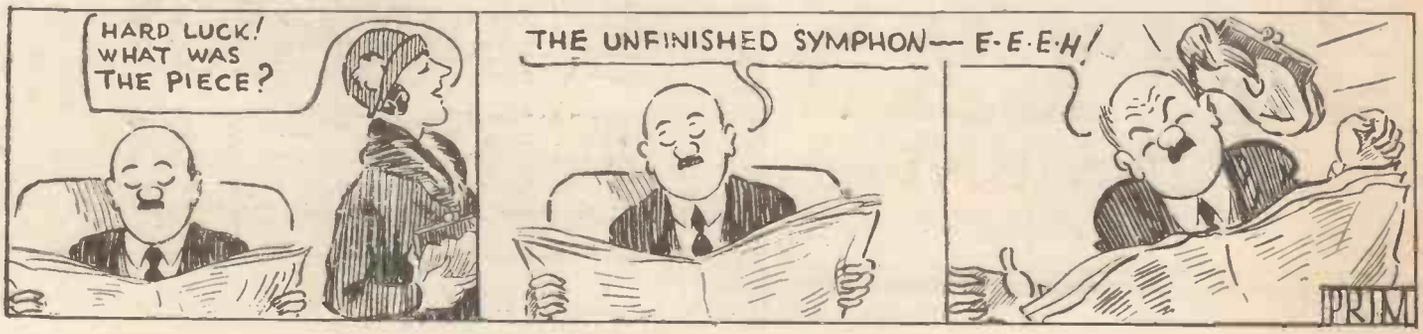
(*Continued from page* 242)

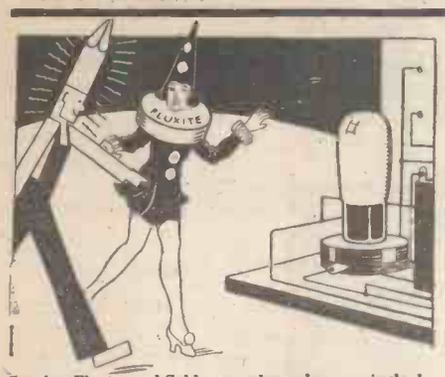
Another transmission improvement of equal importance to reception is the accurate control of the broadcasting station's assigned frequency or wavelength. We are all familiar with the high-pitched whistling noise that so often occurs when two stations on adjacent frequency bands allow their carriers to "drift" up or down. But it is often very difficult at the broadcasting station to detect the very small deviation that causes the interference. Nevertheless, the problem has been almost completely solved in transmitters whose carrier frequencies are rigidly controlled by piezo-electric crystals.

The development of high-power broadcasting is going on in all countries; but our receivers are not all being designed with this fact in mind. High-percentage modulation and high-power signals generally imply certain necessary alterations to our receivers, such as the inclusion of power detectors and until set designers catch up with the transmissions we shall not fully benefit from their improvements.

MR. FLEX DOESN'T GET MUCH SYMPHONY—

—OR SYMPATHY EITHER.





"We're Fluxite and Solder—
The reliable pair,
Famous for Soldering,
Known everywhere!
If you're fixing up Wireless,
There's no need to fret,
Let US join the connections—
Then Perfection you'll get!

See that Fluxite and Solder are always by you—in the house, garage, workshop—anywhere where simple, speedy soldering is needed. They cost so little but will make scores of everyday articles last years longer! For Pots, Pans, Silver and Brassware; RADIO; odd jobs in the garage—there's always something useful for Fluxite and Solder to do.

ANOTHER USE FOR FLUXITE. Hardening Tools and Case Hardening. Ask for Leaflet on improved method.

All Hardware and Ironmongery Stores sell Fluxite in tins, 8d., 1/4 and 2/8.

FLUXITE SOLDERING SET. Simple to use and lasts for years in constant use. Contains special 'small-space' soldering iron with non-heating metal handle; pocket blow-lamp, Fluxite, Solder, etc; and full instructions.

COMPLETE 7/6, or LAMP only 2/6.

FLUXITE LTD.,
(Dept. 326)
ROTHERHITHE, S.E.16

ALL MECHANICS *WILL* HAVE

FLUXITE

IT SIMPLIFIES *ALL* SOLDERING

A good item on any programme

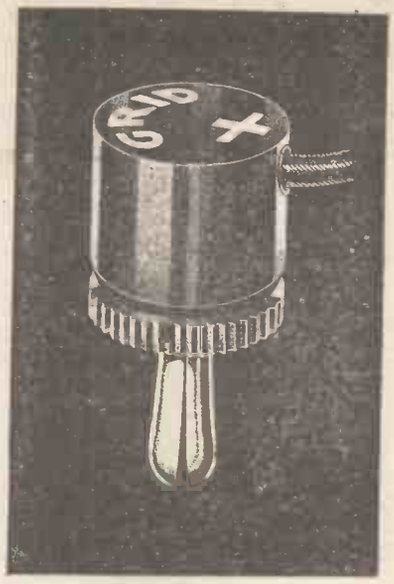
Player's Please

It's the Tobacco that Counts

N.C.C.899

FITS EVERY BATTERY SOCKET

— and it stays put



Years ago Belling-Lee were already marketing the famous Terminals which manufacturers are standardising to-day.

Belling-Lee products are ahead of their time. Last year's favourites will be this year's favourites too — Terminals, Plugs and Sockets, Wander Plugs, Spades, Anode Connectors and Battery Cords.

TWO NEW COMPONENTS

The Belling-Lee Bakelite Terminal Mount takes any pair of Belling-Lee Terminals or Plugs and Sockets: can be mounted vertically or horizontally, on your baseboard, your window-ledge—anywhere.

Price - 8d.

The new "Wanderfuse" takes no more headroom than a Wander Plug—though it's a fuse as well! Price - 1/6.

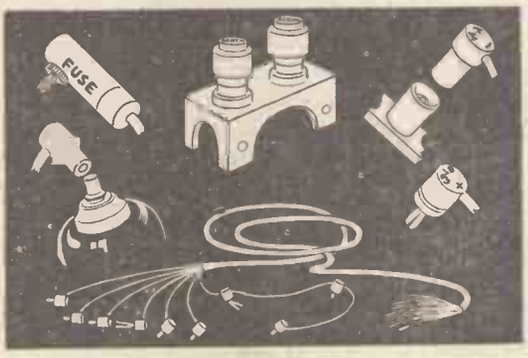
Spare Fuses (150 m/a) - 9d.

BELLING-LEE TERMINALS

Type "B"	6d.
Type "M"	4½d.
Type "R"	3d.
Wander Plug	3d.
Twin Plug and Socket	1/6
(Panel Portion 6d., Flex portion 1/-)	
Indicating Spade Terminal ..	4½d.
S.G. Anode Connector	6d.
Battery Cords, 9-way	5/9
(also made in 5-, 6-, 7-, 8-, and 10-way)	

STAND No. 134

NATIONAL RADIO EXHIBITION—OLYMPIA



BELLING-LEE
FOR EVERY RADIO CONNECTION

Advt. of Belling & Lee, Ltd., Queensway Works, Ponders End, Mdx.

WE TEST FOR YOU

A weekly review of new components and tests of apparatus.

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

B.G. Triumph Transformer

THE British General Triumph L.F. transformer is housed in a bakelite container and has four terminals at the base. Both primary and secondary windings are placed on a single bobbin, and a fairly substantial iron core is used. The instrument was tested on our standard inductance bridge with a small A.C. current flowing through the primary in addition to a D.C. polarising current. This small alternating current is similar in value to that passing through the winding when used under practical conditions.

With no D.C. polarising current, the inductance of the primary proved to be 10.2 henries, and with 5 milliamps 8 henries. At 10 milliamps the inductance had fallen to 6 henries. These figures show that there is no premature tendency for the iron to saturate, and the transformer should operate effectively after medium- or low-impedance valves.

It may be used after a higher impedance valve, provided that the amplification of the frequencies below 200 cycles is not of importance; this is the case with certain horn and cone loud-speakers which do not normally reproduce the lowest frequencies.

British General Triumph L.F. transformer

Polar Pre-set Condenser

THE Polar pre-set condenser made by Messrs. Wingrove & Rogers, of Liverpool, is one of the neatest of its type that we have seen. The plates are enclosed in a moulded bakelite casing, with two accessible lugs for use in screwing down to a baseboard. The capacity is altered by rotating an external knob either by hand or with the aid of a screwdriver. The capacity may be set in any position by tightening a locking nut on the spindle.

Internally the condenser consists of phosphor-bronze strips with mica separations. A heavy piece of brass attached to the first plate takes the pressure imposed by the spindle and distributes it over a portion of the top plate. In the minimum position

A useful component—the Polar pre-set condenser

the increase of capacity is very gradual, due to the fact that the initial movement takes place in one plate only.

Towards the end of the movement the remaining plates are compressed. Such an arrangement gives a more even capacity range and prevents over-crowding of the variation in one small portion of the movement.

The range, as tested in our laboratories, extended from .00008 to .00045. The component is strongly made, and is not susceptible to distortion from over-tightening, partly due to the thickness of the under plate and partly to the provision of a positive stop on the spindle. This component can be recommended.

Burma Colour Needles

MOST readers have probably used their sets for electrical reproduction of gramophone records, and indeed it seems likely that in the near future electrical gramophones will be as popular as wireless sets. The control of tone and volume can easily be accomplished on a gramophone amplifier, but it is not generally realised that the insertion of special needles into an amplifier can considerably affect the tone.

Burma Colour needles have particular characteristics of their own, which modify the reproduction and have the great advantage of being made in material much softer than steel, and therefore, are less liable to damage a record, and also reduce scratch to a marked extent. After playing a record once or twice the needle may be re-sharpened with a special gadget and used many times afterwards. Being made of a harder material than ordinary fibre, they do not decrease the output strength of a pick-up as much as the usual fibre needle.

We have used these needles on normal gramophone records. Some of the brilliance is cut down, but also there is very little scratch. In some cases this alteration in tone may be an advantage, and the reduction of scratch is certainly acceptable.

Those readers who are interested in gramophone reproduction are advised to obtain a packet of these needles and carry out some experiments for themselves. There are two types, and for electrical reproduction we recommend the loud tone.

BACKGROUND NOISE

IF a persistent background noise or crackle develops, see first if it is due to static by switching off or disconnecting the aerial. If the trouble persists after the aerial has been disconnected, it must be somewhere in the set. The first suspicion should be directed to the H.T. battery. Test this with a voltmeter whilst it is still feeding the valves. If it registers less than two-thirds of its rated strength it is probably the culprit.

Noise may also be produced by a faulty or microphonic valve, more especially the detector. Finally, very pronounced crackles are often the symptom of a break in the windings of one of the L.F. transformers, or of an intermittent contact in the wiring of the set. B.

When the new 36-kilowatt transmitter is erected at Brno (Czechoslovakia) the present broadcasting plant will be transferred to the Komarov Aerodrome.

At the present time only approximately 20 per cent. of the aeroplanes in the United States are equipped with apparatus for receiving beacon signals, and practically all of the unequipped are privately owned craft. The majority of the commercial and passenger-carrying 'planes have, in addition to beacon apparatus, an operator for carrying on communication with the ground stations.

Let "A.W." Solve Your Problems

AT THE QUEEN'S HALL

THE Bach night on Wednesday, August 27, was a fine concert, and the size and the keenness of the audience was a demonstration on that hot night of indifference to physical discomfort in a great cause, though the discomfort was, perhaps, mitigated by the presence of four large blocks of ice in the Promenade!

The programme compiler, in sympathy with Nature, arranged for Dorothy Silk to sing "Rest ye here, wearied Spirits" and then for Keith Falkner to sing "Slumber on, ye weary Spirits." Dorothy Silk's rather soft voice could hardly be heard behind an excessive oboe obligato, but she sings this type of song delightfully; Keith Falkner sang well, too. Harriet Cohen played in two pianoforte concertos; she played well, but her piano lacked tone.

On Monday I chiefly enjoyed the songs, "Senta's Ballad" from *The Flying Dutchman*, and "Wotan's Farewell" and the "Magic Fire Music" (*The Valkyrie*), sung by May Blyth and Horace Stevens respectively, and on Friday last there was a fine performance of the "Emperor Concerto" by Katharine Goodson.

Do not miss the Beethoven night on September 5, under any circumstances. The programme for that evening includes four of the composer's greatest works.

L. R. J.

"THE MODEL ENGINEER" EXHIBITION

THE annual small-power engineering and scientific exhibition organised by *The Model Engineer* will be held at the Royal Horticultural Hall, Vincent Square, Westminster, S.W., from Thursday, September 4, to Saturday, September 13. This will be the twelfth exhibition of the series and promises to be as full of technical interest as its predecessors. A number of very fine entries have been received for the competition section, in which the championship cup and numerous medals and prizes are awarded. This year the exhibition opens on the Thursday instead of the Saturday, and will remain open till the following Saturday week, from 11 a.m. to 9.30 p.m. daily.

OUR INFORMATION BUREAU

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

Erecting a New Aerial

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

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

When Asking Technical Queries

PLEASE write briefly

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

Queries cannot be answered personally or by telephone.

Adding H.F. Valve

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

A.—Your original set probably had reaction coupled into the aerial system, and this enabled you to overcome the effects of resistance in your aerial and earth system. Now that you have added an H.F. unit, you have no doubt cut off the reaction from the aerial and the aerial-earth resistance is causing you poor reception. By attending to the aerial and earth, reducing resistance as far as possible you should be able to improve your reception. Another thing, your H.T. battery may have been suitable for the working of a three-valve set, but is not capable of working four valves. If you are using a standard-capacity dry-cell H.T. battery for your four valves, replace it with a double- or triple-capacity dry-cell H.T. battery. In this way you will ensure that all valves get sufficient current for efficient working.—L. C.

Postcard Radio Literature

Twin Chokes

THE craze nowadays is all for binocular H.F. chokes, and Watmel are well-known makers of these. The two most popular Watmel types are the DX2 and the DX3. Many sets can be improved by the fitting of a good choke, and you should get the literature describing these Watmel winners. **29**

A New Wates Speaker

I have heard some very good results from the new Wates Star speakers, and a very handsome new job is a pedestal-type cabinet speaker in veneer walnut. This houses a 20-in. double-cone chassis. It matches up with the Wates four-valver, but can be used with any receiver. **30**

A Good Transportable

Electrocets make a very low-priced table model three-valve set which works from the mains, includes a Westinghouse metal rectifier, and which sells at £18. This seems to justify the Electrocet slogan, "The set that costs less than it should." You can get a pamphlet describing this. **31**

Radio Satisfaction

Burndepts have just sent me a very handy booklet, "Radio Satisfaction and How to Achieve It." This is not really a catalogue, for it is full of useful tips on components and sets, and I can recommend it to all readers. **32**

Cheap H.T.

Philips are specialising in selling their excellent mains eliminators on hire-purchase terms. You can now get a Philips "juice box" for 10s. down. If you want to go into the matter, then write for the leaflet available describing the hire-purchase terms. **33**

Columbia Radio-gramophones

The Columbia transportable receiver unit, described recently in AMATEUR WIRELESS by "Set Tester," forms the nucleus of the Columbia radio-gramophone. That should be sufficient recommendation, for the Columbia transportable is a great success. An illustrated folder showing and describing these gramophones can be obtained from Columbia. **34**

The "Presentation Two"

It is surprising how a firm with a high reputation, as has Pye Radio, can produce a good table-model transportable set at a price of £12, inclusive of speaker, valves, and all batteries; also royalties. Yet it is done, as you can see from the latest Pye catalogue. **35**

For Mains Users

Mains users will be glad to have a booklet produced by the Loewe Radio Co., Ltd., which gives details of resistances, condensers, with values suitable for eliminators. Very useful technical details are given, and home constructors need not be in doubt over the values of any components. **36**

Charging Accumulators

A little booklet which has just been sent me by the C.A.V. people will appeal to all battery users, although the instructions given relate particularly to C.A.V. H.T. and L.T. accumulators. Many battery users would charge their cells at home if they knew how, and this booklet tells how it is done. **37**

The Marconiphone Portable

A cheap portable enjoying the Marconiphone Company's good reputation should be very popular, which indeed is the case with the latest Marconiphone Model 55—a five-valver. Readers who write for the literature describing this will see that it is quite suitable for indoor or outdoor use. **38**

Reliable Parts

Ferranti components are always of the kind in which you can put a trust so far as dependability and value for money are concerned. Here is a booklet describing the more useful components in the Ferranti range. I can recommend this booklet to constructors who know the value of good parts. **39**

Those H.F. Chokes

The Faraday House Testing Laboratories have issued a very good report on the new Trix H.F. choke. So you are quite safe to buy a Trix choke! But if you want to investigate its characteristics you can, as a first measure, get literature describing it. **40**

The New Dynamics

Have you yet had an opportunity of hearing one of the new Inductor Dynamic speakers made by S. A. Lamplugh, Ltd.? If you have not yet done so, write for a folder giving full technical details—and then you will want to hear one of these speakers all the more! **41**

"Old Friends and New"

This is the friendly title given to a new catalogue booklet produced by H. Clarke and Co., the well-known Atlas people. Some of the components illustrated are old friends, and there are also some new ones which will interest all set constructors. **42**

GET THESE CATALOGUES FREE

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

BROADCAST TELEPHONY

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

Metres	Kilocycles	Station and Call Sign	Power (Kw.)
GREAT BRITAIN			
25.53	11,751	Chelmsford (5SW)	15.0
*200	1,500	Leeds	0.13
*242	1,238	Belfast	1.0
*261	1,148	London Nat.	45.0
*288.5	1,040	Newcastle	1.0
288.5	1,040	Swansea	0.13
288.5	1,040	Stoke-on-Trent	0.13
288.5	1,040	Sheffield	0.13
288.5	1,040	Plymouth	0.13
288.5	1,040	Liverpool	0.13
288.5	1,040	Hull	0.13
288.5	1,040	Edinburgh	0.35
288.5	1,040	Dundee	0.13
288.5	1,040	Bournemouth	1.0
288.5	1,040	Bradford	0.13
*301	995	Aberdeen	1.0
*310	968	Cardiff	1.0
*356	842	London Reg.	30.0
*377	797	Manchester	1.0
*399	753	Glasgow	1.0
*479	626	Midland Reg.	25.0
1,554	193	Daventry (Nat.)	25.0
AUSTRIA			
*246	1,220	Linz	0.5
*283	1,058	Innsbruck	0.5
*352	851	Graz	9.0
*453	666	Klagenfurt	0.5
*517	578.5	Vienna	15.0
BELGIUM			
206	1,460	Antwerp	0.4
212	1,415	Binche	0.3
216	1,391	Chatelineau	0.25
216	1,391	Brussels (Conference)	0.25
243	1,235	Courtrai	0.1
244.7	1,226	Ghent	0.25
247	1,213	Schaerbeek	0.5
338.2	887	Forest	3.0
*509	590	Brussels (No. 1)	1.0
CZECHO-SLOVAKIA			
*263	1,139	Moravska-Ostrava	10.0
*279	1,076	Bratislava	12.5
293	1,022	Kosice	2.0
*342	878	Brunn (Brno)	12.0
*487	617	Prague (Praha)	5.0
DENMARK			
*281	1,067	Copenhagen	0.75
1,153	260	Kalundborg	7.5
ESTONIA			
401	748	Reval (Tallinn)	1.5
FINLAND			
*221	1,355	Helsinki	10.0
*1,796	167	Lahti	40.0
FRANCE			
210	1,430	Radio Touraine	0.5
222	1,351	Fécamp	0.7
235.1	1,275	Nimes	1.0
237	1,265	Bordeaux (Radio Sud-Ouest)	1.0
240.4	1,248	Béziers	0.3
249.5	1,202	Juan-les-Pins	0.5
256	1,171	Toulouse (PTT)	1.5
265	1,130	Lille (PTT)	0.7
*272	1,102	Rennes (PTT)	0.5
286	1,046	Montpellier	0.3
*286.8	1,040	Radio Lyons	0.5
295.4	1,015	Limoges (PTT)	0.5
306	980	Bordeaux (PTT)	1.0
308.9	971	(Vitus) Paris	1.0
316	950	Marseilles (PTT)	0.5
328.2	914	Grenoble (PTT)	0.5
329	911.8	Poste Parisien	0.5
345.2	869	Strasbourg (testing shortly)	15.0
368.3	813	Radio LL (Paris)	0.5
385	779	Radio Toulouse	8.0
447	671	Paris (PTT)	0.8
466	644	Lyons (PTT)	5.0
1,446	207	Eiffel Tower	12.0
*1,725	174	Radio Paris	16.0
GERMANY			
*218	1,373	Flensburg	0.5
*227	1,319	Cologne	4.0
*227	1,319	Münster	3.0
*227	1,319	Aachen	0.35
232.2	1,292	Kiel	0.35
*239	1,256	Nürnberg	2.0
246	1,220	Cassel	0.25
*253	1,184	Leipzig	2.5
*259	1,157	Gleiwitz	2.0
*270	1,112	Kaiserslautern	0.25
*276	1,085	Königsberg	2.5
*283	1,058	Magdeburg	0.5
*283	1,058	Berlin (E)	0.5
*283	1,058	Stettin	0.5
*316	950	Bremen	0.35
*319	941	Dresden	0.25
*325	923	Breslau	1.5
*360	833	Stuttgart	1.5
*372	806	Hamburg	1.5
*390	770	Frankfurt	1.5
*418	716	Berlin	1.5
*453	662	Danzig	0.25
*473	635	Langenberg	15.0
*533	563	Munich	1.5
560	536	Augsburg	0.25
*566	529	Hanover	0.35
576.1	520.7	Freiburg	0.35
*1,635	183.5	Zeesen	26.0
1,635	183.5	Norddeich	10.0
HOLLAND			
31.28	9,599	Eindhoven (PCJ)	30.0
*299	1,004	Huizen (between 11.40 a.m. and 5.40 p.m. B.S.T.)	6.5
*1,071	280	Huizen	0.5
*1,071	280	Scheveningen-Haven	5.0
*1,875	160	Hilversum	6.5
HUNGARY			
210	1,430	Budapest (Csepel)	1.0
550	545	Budapest	20.0
ICELAND			
*1,200	250	Reykjavik (shortly testing)	16.0
IRISH FREE STATE			
*225	1,337	Cork (1FS)	1.0
*413	725	Dublin (2RN)	1.0
ITALY			
25.4 and 80		Rome (3RO)	9.0
247.7	1,211	Trieste (testing)	3.0
291	1,030	Turin (Torino)	7.0
332	905	Naples (Napoli)	1.5
381	788	Genoa (Genova)	1.0
*441	680	Rome (Roma)	50.0
453	662	Bolzano (IBZ)	0.3
*501	599	Milan (Milano)	7.0
LATVIA			
*525	572	Riga	7.0
LITHUANIA			
*1,935	155	Kaunas	7.0
NORTH AFRICA			
363.4	825	Algiers (PTT)	16.0
416	721	Radio Maroc (Rabat)	10.0
1,250	240	Tunis Kasbah	0.6
NORWAY			
364	824	Bergen	1.0
369	813	Frederiksstad	0.7
453	662	Nidaros	1.2
455	659.3	Porsgrund	0.7
*493	608	Oslo	1.5
POLAND			
214	1,400	Warsaw (2)	2.0
234	1,283	Lodz	1.5
*313	959	Cracow	0.5
*335	896	Poznan	1.2
381	788	Lvov	2.0
385	779	Wilno	0.5
*408	734	Katowice	10.0
1,411	212.5	Warsaw	8.0
PORTUGAL			
240	1,247	Oporto	0.25
320	937.6	Lisbon (CTIAA)	0.25
ROMANIA			
*304	761	Bucharest	12.0
RUSSIA			
720	416.6	Moscow (PTT)	20.0
800	375	Kiev	20.0
824	364	Sverdlovsk	25.0
1,000	300	Leningrad	20.0
1,060	283	Tiflis	10.0
1,103	272	Moscow Popoff	40.0
1,200	250	Kharkov	25.0
*1,304	230	Moscow-Stchelkovo (C.C.S.P.)	100.0
1,380	217.5	Bakou	10.0
1,481	202.5	Moscow	20.0
SPAIN			
251	1,193	Barcelona (EAJ15)	0.5
266.7	1,125	Barcelona (EAJ13)	5.0
*349	860	Barcelona (EAJ1)	8.0
368	815	Seville (EAJ5)	1.5
407	737	Madrid (España)	1.0
424	707	Madrid (EAJ7)	2.0
460	652	San Sebastian (EAJ8)	0.5
SWEDEN			
135	2,222	Motala	60.0
230.1	1,304	Malmo	0.6
*257	1,160	Höby	10.0
299.3	1,002	Falun	0.5
*322	932	Göteborg	10.5
*435.4	689	Stockholm	1.5
*542	554	Sundsvall	1.0
*770	389	Ostersund	0.6
1,223.5	244	Boden	0.6
*1,348	222.5	Motala	30.0
SWITZERLAND			
318.8	943	Basle	0.5
*403	743	Berne	1.0
*459	653	Zurich	0.63
678.7	442	Lausanne	0.6
760	395	Geneva	0.25
1,010	297	Basle	0.25
TURKEY			
*1,220	245.9	Istanbul	5.0
1,595	188	Ankara	7.0
YUGOSLAVIA			
306.7	978	Zagreb (Agram)	0.7
432.3	694	Belgrade	2.5
579	518.2	Ljubljana	2.5

All wavelengths marked with an asterisk have been allotted according to the *Plan de Prague*.

TUNING FRAME-AERIALS

WHEN a frame is required to cover both medium- and long-wave stations, the total number of windings is usually made sufficient to cover the long-wave programme, and a switch is provided for cutting out the unnecessary turns when changing-over. The same effect can be secured by separating the windings into two sections, and switching these into series connection for long-wave work and into parallel for the medium-wave stations.

If it should be found necessary to use a loading coil, this should be inserted at the centre-point of the existing frame windings, rather than at either end. The grid lead to the first valve should then be tapped off from the centre point of the added coil.

M. B.

BODY "STATIC"

RECENT investigations have shown that the human skin is the seat of surface charges of electricity which are disturbed at different potentials relatively to earth. There is also a recurrent "charge" which is found to vary in synchronism with the beating of the heart. Finally it has been shown that a definite electrical field surrounds the body as a whole, and is maintained in a constant state of fluctuation from causes that have not yet been definitely ascertained.

M. A. L.

"HOW TO GANG CIRCUITS"

(*Continued from page 231*)

actual inductances of the coils are at least a trifle different from their normal values. There are ways of testing for this, but I will not go into them now. All I need say is that if screens are used, see that the coils are symmetrically placed about them so that each is affected by equal amounts, so far as possible.

Let us now assume that the coils are of identical inductive values, and also that their self-capacities are alike. We connect a properly matched tuning condenser and note how the set tunes at various points over the wave range.

Capacity Effects

Over the upper part the tuning may be fairly good and it might be a long way out at the bottom. Clearly, the total effective inductance and capacity of the circuits is not equal. And this is not surprising when we remember that valves have capacity, and so have valve holders. Wiring has inductance and capacity as well. Then, one valve is the detector with a grid condenser and leak connected to it, or perhaps it is of the anode-bend type.

In any case, the effective capacity of the detector circuit is almost certain to be different from that of a screen-grid circuit. Finally, the aerial, having inductance and capacity, is connected to the first circuit. We have to deal with these various factors in order to balance the circuit at all points. The use of a trimming condenser across each circuit will not always straighten the problem out. We can try this by tuning to the local station and obtaining the strongest signal in the detector circuit as indicated by a milliammeter.

If our ganged circuit is as in Fig. 2, it may be necessary to add to the capacity of the circuit L1 C1. This will depend upon the position of the aerial tap as well as upon the capacity of the aerial. With the aerial connected near the top of the coil the capacity of the circuit L2 C2 will have to be increased, but it is better to connect the aerial fairly low down the coil, for then its effect will be reduced.

To test for the accuracy of the tuning it is well to tune to three or four stations and to note whether the signal strength is improved by further adjusting the trimming condensers. With luck the circuits will be found to tune together. It must be remembered that if differences are noted at various points that the inductances may be out, and do not forget that a long wire will affect the results. With care and attention, and using a meter in the anode circuit of the detector, very good results may be obtained and all the benefits of one-knob tuning experienced.

Search around 1,200 metres, at odd times during the evening as the new 16 kilowatt transmitter at Reykjavik (Iceland) is reported to be testing.

The last word in modern broadcasting plant is being erected at Cesky Brod, to the east of Prague. Its power will be 120 kilowatts and the station will act as the Czecho-Slovakian National transmitter.

Considerable extension has been made in the programmes broadcast by Radio Normandie at Fécamp (France), of which the transmissions are well heard in the United Kingdom. Once weekly, concerts are given after midnight.

At a recent demonstration given by the Western Electric Company at their studios in New York, of their new recorded electrical transcribing apparatus for broadcasting stations, trained members of the staff were unable to tell the difference between the original artiste and the recording. The use of recorded programmes enables the smaller stations to draw talent that would otherwise be hopelessly expensive.

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General Correspondence is to be brief and written on one side of the paper only. All sketches and drawings to be on separate sheets. **Contributions** are always welcome, will be promptly considered, and if used will be paid for. **Queries** should be addressed to the Editor, and the conditions printed at the head of "Our Information Bureau" should be closely observed. **Communications** should be addressed, according to their nature, to The Editor, The Advertisement Manager, or The Publisher, "Amateur Wireless," 58-61 Fetter Lane, London, E.C.4.

MORE RADIOGRAMS

FINLAND has decided to extend her broadcasting system, and for this purpose proposes to erect four 7-kilowatt transmitters. In the meantime the Tartir relay station is testing on 286 metres with a power of 600 watts in the aerial.

Scottish listeners, in a petition to the B.B.C., are demanding the broadcasting of television similar to that in operation in London. The petition, which has been drawn up in Glasgow, states that the present transmissions are inadequate for successful reception in the North. These, it is declared, are definitely unreceivable in Scotland in daylight hours with reasonable apparatus, and the service on the nights allotted is subject to such interference as is usual in all long-distance reception.

There exists in Spain two main groups possessing licences from the government, and a few individual stations, also privately owned, which are rapidly disappearing. The tendency is to centralise activities in a single group. There is a system of licence fees not strictly enforced. Revenue is realised partly by voluntary contributions and partly from the broadcasting of sponsored programmes.

FULL-SIZE BLUEPRINTS

When ordering, please send Postal Order, NOT STAMPS

CRYSTAL SETS (6d. each)

B.B.C. Brookman's Park Set	AW206
Regional Crystal Set	WM176

ONE-VALVE SETS (1s. each)

B.B.C. Official One	AW208
Hartley Single-valver	WM198

TWO-VALVE SETS (1s. each)

Talisman Two (D, Trans)	AW194
Wavelets Two (D, Trans)	AW229
No-battery A.C. Mains Two (D, Trans)	AW230
No-battery Gramo-radio 2 (D, Trans)	AW238
1930 Talisman 2 (D, Trans)	AW239
Easy Tune Short-wave 2 (D, Trans)	AW242
Searcher Two (D, Trans)	AW245
Brookman's Two (D, Trans)	WM168
New Crusader (D, Trans)	WM182
Radio-Record Two (SG, D)	WM187
Gleaner Two (D, Trans)	WM201
Music Monitor (D, Trans)	WM208

THREE-VALVE SETS (1s. each)

All-wave High-mag. Three (D, 2 Trans)	AW199
Knife-edge Three (D, RC, Trans)	AW201
Talisman Two-three (D, RC, Trans)	AW203A
Wide World Short-wave Three (HF, D, Trans)	AW207
Everybody's Three (SG, D, Trans)	AW209
1930 Ether Searcher (SG, D, Trans)	AW211
New All-Britain Three (HF, D, Trans)	AW214
Best-by-Ballot Three (SG, D, Trans) Price 4d. free with copy of "A.W."	AW217
Brookman's By-pass Three (D, 2 Trans)	AW220
Everybody's All-electric Three (SG, D, Trans) —A.C.	AW221
1930 Clarion Three (SG, D, Trans)	AW223
Beginner's Regional Three (D, 2LF)	AW232
Britain's Favourite Three 1930 (D, 2 Trans)	AW243
Car Three (D. R.C. Trans)	AW244
Standard Coil Three (HF, D, Trans)	WM117
Brookman's Three (SG, D, Trans)	WM161
Community Three (D, RC, Trans)	WM164
Brookman's Push-Pull Three (SG, D, Trans) 1/6	WM170
All-nations Three (D, 2 Trans)	WM178
Inceptordyne (SG, D, Pentode)	WM179
Brookman's A.C. Three (SG, D, Trans) 1/6	WM184
Music Marshal (D, 2 Trans)	WM190
Gramo-Radio D.C. Three (SG D Trans)	WM196
Concert Three (D, 2 Trans)	WM199
New Lodestone Three (HF, D, Trans)	WM205
De-Luxe Three (D, RC, Trans)	WM209

FOUR-VALVE SETS (1s. 6d. each)

Clarion All-electric Three (SG, D, Trans—A.C. Rectifier)	AW200
Music-Lover's Gramo-radio (SG, D, RC, Trans)—1s. 6d.	AW202A
Music-Lover's Gramo-radio (Loud-speaker) 1s.	AW202B
Horizon Four (SG, D, 2 Trans)	AW237
1930 Monodial (2SG, D, Trans)	WM158
Electric Four (All A.C.—SG, D, RC, Trans)	WM162
Brookman's Four (2SG, D, Trans)	WM174
Transportable Four (SG, D, 2 RC)	WM180
Super Q (SG, D, 2 Trans)	WM189
Lodestone Four (HF, D, RC, Trans)	WM193
Searcher's Four (SG, D, RC, Trans)	WM194
Invitation Four (SG, D, RC, Trans)	WM200

FIVE-VALVE SETS (1s. 6d. each)

James Quality Five (2SG, D, RC, Trans)	AW227
All-wave Lodestone Five (HF, D, RC, Push-pull)	WM146
1930 Five (2HF, D, RC, Trans)	WM171
Dual-screen Five (2SG, D, RC, Trans)	WM185
Radio-Record Five (SG, D, Trans-parallel)	WM188
Overseas Five (3SG, D, Trans)	WM191

AMPLIFIERS (1s. each)

"A.W." Gramophone Amplifier	AW205
Brookman's Separator (HF Unit)	AW212
Two-valve Amplifier	AW216
"Mag" Gramo Unit	AW224
Radio-Record Amplifier (DC Mains)	WM183
Selecto Amplifier (HF, Unit)	WM210

MISCELLANEOUS (1s. each)

Short-wave Adaptor (1 v.)	AW183
Simplest H.T. Unit	AW197
By-pass Unit (Wavetrap)with copy "A.W."—4d.	AW218
"Twin" Brookman's By-pass (6d.)	AW222
"A.W." Paper Loud-speaker	AW231
James H. T. and L.T. Charging Unit	AW232
Simplest H.T. Eliminator for D.C. Mains	AW234
Simplest H.T. Eliminator for A.C. Mains	AW236
Choke Output Unit	AW240
Simple Tester Unit (6d.)	AW246
A.C. Mains Amplifier	WM149
H.T. Unit for A.C. Mains	WM159
"W.M." Linen-diaphragm	WM172
Brookman's "Wipe-outs"	WM186
Short-wave adaptor for Overseas Five	WM192
Staminator Unit for A.C. Mains	WM202
Universal Push-pull Amplifier	WM204
Outspan Short-wave Adaptor	WM207

PORTABLE SETS

Music Leader (SG, D, RC, Trans) with copy "A.W."	AW203	-/4
Sunshine Three (SG.HF.SG.D, Trans)	AW235	1/-
Continental Portable (SG, D, Trans)	AW241	1/-
Pedlar Portable Two (D, Trans)	WM195	1/-
Pedlar Portable Three (D, 2 Trans)	WM197	1/-
James Portable SG3 (SG, D, Trans)	WM203	1/-
Foursome Portable (SG, D, 2 Trans)	WM206	1/-

Copies of the "Wireless Magazine" and of "Amateur Wireless" containing descriptions of any of these sets can be obtained at 1s. 3d. and 4d. respectively, post free. Index letters "A.W." refer to "Amateur Wireless" sets and "W.M." to "Wireless Magazine."

AMATEUR WIRELESS 58-61 FETTER LANE, LONDON, E.C.4.

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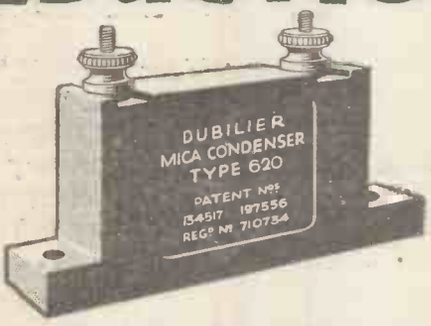
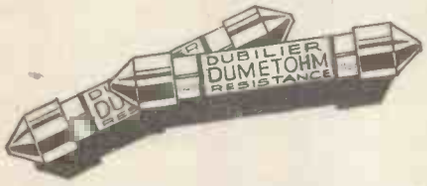


OF CONDENSERS



AND RESISTANCES *from*

SEPT 1ST 1930

Product	Old Price	New Price
K.C.	12/-	11/-
Midget Condenser ...	5/6	4/-
Dumetohms	2/6	1/9

Various reductions

FIXED CONDENSERS

Type	Old Price	New Price
610 and 620		
.00005 to .0009	2/6	1/8
.001 and .002	3/-	2/-
.003, .004, .005 ...	3/-	2/3
.006	3/-	2/6
.01	4/-	3/-
B775		
.01	4/-	3/-
.02	5/6	3/6
.05 ...	no reduction	
.1	8/6	8/-
.2	15/6	14/6
.25	19/-	18/-

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Type	Old Price	New Price
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.01 to .09 ...	2/-	1/9
.1	2/-	1/10
.25	2/5	2/3
.3	2/5	2/3
1.0, 2.0 } 3.0, 4.0 } 5.0, 6.0	no reduction	
8	12/-	11/9
10	15/-	14/6
500 v. D.C. Test		
	no reduction	
800 v. D.C. Test		
.1	3/3	2/3
.25	3/3	2/9
.5	3/3	3/-

RESISTANCES

Type	Old Price	New Price
10,000— 40,000 ohms	6/6	4/6
50,000 ,,	6/6	5/-
60,000 ,,	6/6	6/-
70,000 ,,	6/6	6/6
80,000— 100,000 ohms	6/6	6/6
150,000 ,,	9/6	9/6
200,000 ,,	9/6	9/6
250,000 ,,	11/3	9/6
300,000 ,,	13/-	11/-

Prices complete with holder.

DUBILIER

CONDENSER CO. (1925) LTD.

We are exhibiting at Stand 50,
THE NATIONAL RADIO EXHIBITION,
Olympia (New Hall),
September 19—27th, 1930.

Dubilier Condenser Co. (1925) Ltd.,
Ducon Works, Victoria Road, North Acton, London, W.3

THE LEADING COIL MANUFACTURERS FOR TEN YEARS AND STILL THE FOREMOST IN DESIGN & QUALITY

To lead the field of coil manufacturers is an achievement. But to maintain that position for over ten years in face of fierce competition is a performance of which we are justly proud. The use of "Wearite" Coils and components assures the constructor's success in his work, as every "Wearite" product carries our guarantee of perfection.

Dual Range TALISMAN COILS (*Patent applied for*)

Aerial	Range	Anode or H.F.
10/6	200-550 1000-1800	7/6

BINOWAVE COILS 1930 (*Patent applied for*)

A type Unit, Aerial - } 17/- *EACH*
C or D type Unit, Anode } *Sold separately*

Sole manufacturers under licence.

SOMETHING REALLY NEW FOR YOUR SET

AN ENTIRELY NEW L.F. COUPLING UNIT

which will make a remarkable difference to your reproduction

STAND NO. 250 RADIO EXHIBITION OLYMPIA

Complete with Switch for tone control

PRICE 20/-

Write for special leaflet.

Have you a copy of our new Illustrated List. Send for it now.

WEARITE

COMPONENTS

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740, HIGH ROAD,
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OLYMPIA—AND THE SEASON'S OUTLOOK

POINTS ABOUT THE NEW VALVES

Amateur Wireless

and Radiovision

Every Thursday 3d

Vol. XVII. No. 431 Saturday, September 13, 1930

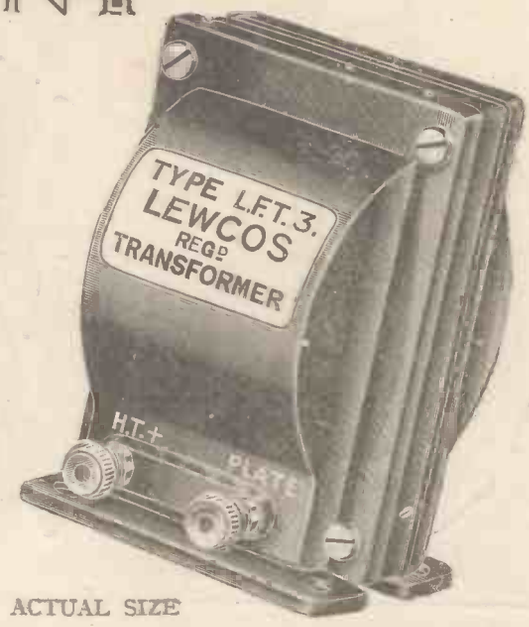
LOOKING FORWARD TO THE SHOW 1930

SPECIAL ARTICLE

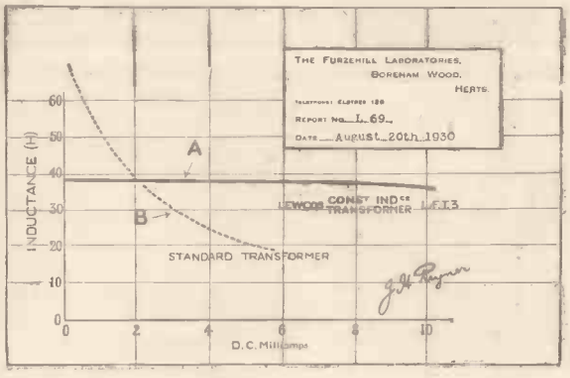
DEVELOPMENTS THAT WILL INTEREST YOU

Registered at the G.P.O. as a Newspaper

PREDOMINANT IN ITS OWN SPHERE



ACTUAL SIZE



The LEWCOS L.F. TRANSFORMER 3

TYPE 22 - PRICE 20/-

Another Lewcos Achievement!

The Lewcos L.F.T.3 Constant Inductance Transformer has a constant inductance for different values of anode current.

If a valve takes a mean anode current of, say, 2½ milliamperes, it is quite possible that this current may fluctuate between ½ and 4½ milliamperes when the valve is working on a loud passage of sound. With an ordinary transformer the inductance of the winding is considerably different in the two cases. (See Curve B.)

In other words, the two halves of the low-frequency wave are not amplified equally, introducing marked distortion. This is the reason for the failure of the average radio set to reproduce loud passages clearly, since the transient effects are particularly affected by this lack of symmetrical amplification. If the inductance is constant, however, the amplification remains the same, irrespective of signal strength (see Curve A), so that an instrument such as a piano, which is notoriously difficult to reproduce with standard apparatus, regains its natural tone where the Lewcos Constant Inductance Transformer is employed.

The Lewcos Constant Inductance Transformer maintains its inductance at a high figure up to 10 milliamperes D.C. It will be seen, therefore, that there is no trouble experienced from saturation. This transformer can be used after any normal valve, whether in the first or second stage, since the inductance is high enough for good first-stage working, whilst it is capable of carrying the large anode currents likely to be encountered in the later stages. The turns ratio is 3 : 1, and the Curve A, which is reproduced, has been independently taken by a well-known radio engineer.

STOCKS HELD AT THE FOLLOWING BRANCHES

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BIRMINGHAM
CARDIFF
DUBLIN
GLASGOW
LEEDS
LIVERPOOL
LONDON
MANCHESTER
NEWCASTLE
NOTTINGHAM

THE LONDON ELECTRIC WIRE COMPANY AND SMITHS LIMITED

CHURCH ROAD
LEYTON
LONDON, E.10

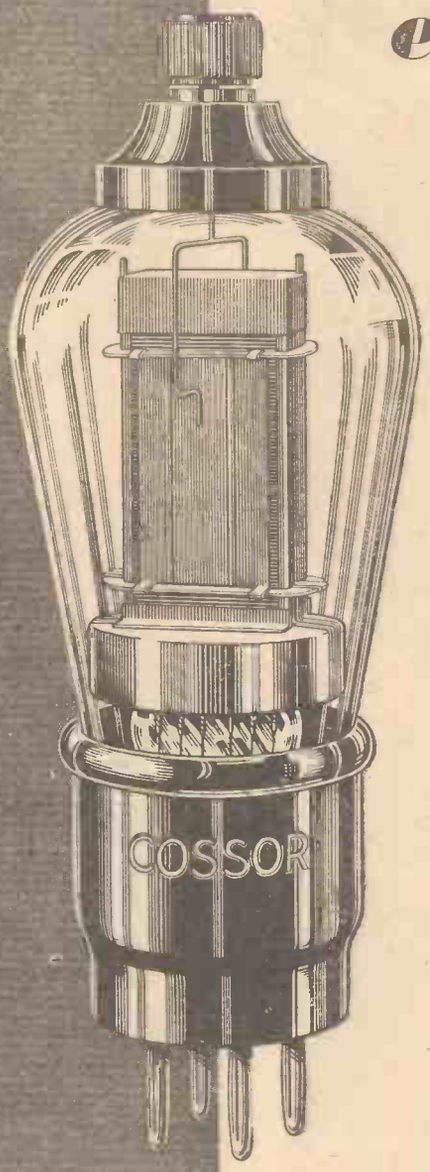
WE ARE EXHIBITING AT

THE NATIONAL RADIO EXHIBITION
OLYMPIA (SMALL HALL)
SEPT 19th—27th 1930

LEWCOS RADIO PRODUCTS FOR BETTER RECEPTION

Highest *effective* amplification

yet attained with a Screened Grid Valve



Radio technicians know that it is useless to expect a substantial stage gain from any Screened Grid Valve—however good its other characteristics—which has a high inter-electrode capacity. Cossor engineers have been striving for months past to reduce the self-capacity of Cossor Screened Grid Valves to a negligible figure. So successful have they been in their efforts that the new Cossor 215 S.G. has an inter-electrode capacity of only ·001 micro-microfarads—so small, in fact, that none but the most elaborate and specially-designed apparatus can measure it. As a result, this new Cossor Valve permits a degree of effective amplification which a year ago would have been considered utterly impracticable. No other make of Screened Grid Valve has such a low inter-electrode capacity or can, therefore, equal the remarkable stage gain which it permits.

THE NEW

COSSOR 215 S.G.

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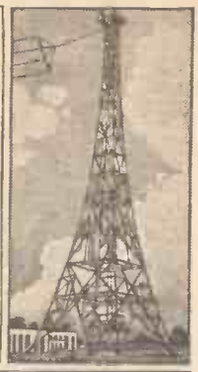
No. 431. Vol. XVII SEPTEMBER 13, 1930

Amateur Wireless and Radiovision



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NEWS · & · GOSSIP · OF THE · WEEK

THE "SHOW"—

THE National Radio Exhibition at Olympia opens next week on September 19, and ends on the 27th. Every amateur who can conveniently do so should make an attempt to visit the Show during one of the eight days, for there will be seen the latest and best in radio. And when you go, tuck in your pocket a copy of next week's "A.W."—a special Show Number, which is a complete guide, with plans of the stands—and all complete for the usual price of 3d. !

—AND THE HOME-STAYERS

THERE is a big consolation for the home-stayers who cannot go to Olympia. It is the Show Report Sections in the first and second special issues, and the after-Show news in the third issue. There will be a big rush for these special Show Numbers, so order your copies now.

THE NEW FIGURES

THE B.B.C. has adopted, in common with broadcasters on the Continent, a new power rating for its transmitters. The actual power of all B.B.C. stations is the same as before (*note that, please* !), though the method of computing the power rating is changed to comply with the new international definition. Thus, while the actual power transmitted from the National station at Brookmans Park remains unaltered, its power rating will be changed from 30 kilowatts to 45 kilowatts. Different broadcasting organisations have used different methods of measuring the power of their transmitters, and the introduction of a common system of power rating removes the confusion that has existed. The new system takes account of modulation, which the method formerly used in this country did not.

Another "Test" broadcast! Jack Hobbs made the acquaintance of the microphone last week at Savoy Hill when he broadcast a talk about cricket. That is the kind of talk we DO want!

THE END OF THE "PROMS."

THERE are more concerts yet to be heard in the Promenade series, but make a note of the fact that in October listeners to the National stations will hear "Proms." on the 1st and 3rd, and the final concert on October 4.

FOR ORGAN LOVERS

THERE are people who say that they do not like the organ on the wireless, but maybe that is because the technical arrangements of some organ broadcasts have to be made so quickly that there is not time to find the proper positions for the "mikes." Nevertheless, organ lovers should make a note of September 9, when Marcel Dupré, the organist of Notre Dame, will be the soloist in his own work, a new symphony for orchestra and organ. This is a new idea, and it is the first time it has been broadcast.

WHEN THE MAINS CHANGE

IF you know that in the near future your mains will be changed from D.C. to A.C., then be prepared for surprises! In some districts—as in the Leytonstone (London) district, which is now changing over—a six month's notice of *intention* to change is given, but only a few hours' notice is given on the actual day when the A.C. comes along.

NEW ELIMINATORS!

THIS extremely short notice may upset the plans of radio users who rely on the mains. When Leytonstone changed over, the authorities made up for this unbusiness-like dealing by installing, in most cases, very good A.C. eliminators.

Will the Crystal Return?

This question is answered by Kenneth Ullyett, who suggests some simple arrangements which can easily be given a trial

"MY wireless running costs are absolutely nil," said a friend to me the other day and if he had suggested a petty wager as to the reason, I'm afraid I should have been caught.

On pressing him for explanation, I discovered that he had scrapped his almost pre-historic two-valver and had gone back to a crystal set with phones. I have heard of several similar instances and, of course, there is no reason why the crystal set should not return to a limited degree of popularity.

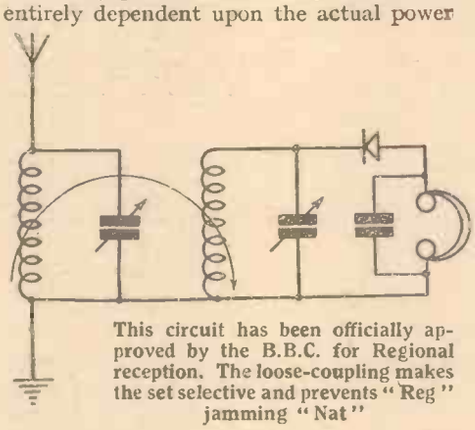
Programmes—and £ s. d.

My friend, who has tastes similar to those of many thousands of listeners, does not pay great tribute to the B.B.C. programmes and he has not the small amount of skill needed to get foreign stations; therefore he listens in on the average only two or three hours every week, and the continued running cost of a valve set is barely justified.

There must be a fair proportion of listeners in the regional area who, now that they can get good phone strength from the new high-power station, with a crystal set, would be willing to forego the advantages of a loud-speaker and to put up with phones for occasional listening. They, too, would thus entirely eliminate radio "expenses."

It would be surprising if crystal sets did not return to popularity, for the Regional scheme was designed in the first place for crystal users, the idea being that with Regional and National stations all over the country the B.B.C. programmes could be received on the simplest type of set. The trouble with many pre-Regional-scheme crystal sets was that they were very inefficient, and while crystals themselves have not improved we now know much more about aerials and tuning systems.

If you are prepared to give a crystal set a trial do not overlook the aerial, which may work well on the existing valve set but which may need "spring-cleaning" before the crystal set comes into action. With the reaction effect of a valve set you can compensate to an extent for a poor aerial and for a very poor earth, but crystal sets are entirely dependent upon the actual power which the aerial and earth system receives from the ether.



This circuit has been officially approved by the B.B.C. for Regional reception. The loose-coupling makes the set selective and prevents "Reg" jamming "Nat"

So you can't blame a crystal set if it fails to work properly on an aerial having dirty insulators, poor connections or a leaky lead-in tube. The earth is just as important, and of much greater importance than when valves are used.

With your crystal set you should certainly be able to get both the medium and the long waves, because one must look forward to the future when 5XX will give a different programme from the medium wave stations. Don't, however, rely on the cumbersome old tapped tuners which were fashionable in 1920.

There is no reason why you should not use an ordinary dual-range coil of the type suitable for the aerial tuning of a valve set; but if it has a reaction winding, which is the case with some aerial coils, then this should be unwound so that it does not exert a "dead-end" effect on medium-wave reception.

Try to get selectivity by the use of a good coil because the tip of inserting a series of pre-set condensers to get sharp tuning cuts down the strength of the crystal receiver, and there is no means of boosting it up again. Beware of freak crystal circuits, for the ordinary straightforward arrangements generally give the best reception.

Suitable Phones

You will need really high-resistance phones and some of the 1,000 ohm jobs used for testing valve sets are far too insensitive. Phones having plenty of wire on the magnets and a resistance of about 4,000 ohms are to be recommended. There are few more inefficient arrangements than the use of low-resistance phones with a step-down transformer—a more expensive arrangement anyway, and one not to be recommended.

Crystal Types

It is difficult to give advice on the crystal itself, for there are so many types on the market and it is almost impossible to arrive at their exact chemical composition. Most of the better-known makes of crystal are of the iron sulphide type, and almost any metal can be used for the cat-whisker. A deal of money was wasted in the old days in the purchase of fancy cat-whiskers which did not improve reception an iota. What matters much more than the cat-whisker itself is the pressure it exerts on the crystal and the point at which it touches. There are several makes of semi-permanent detector having a crystal-to-crystal contact, and these are generally very good.

Everyone should have a crystal set, because even if it does not entirely replace a valve set in districts close to a B.B.C. station, it is always a stand-by receiver against the day when a valve gives out in the middle of a speciality item.

Points about the New Season's Valves

by W. JAMES

VALVES seem to be improved—or should we say modified?—at frequent intervals. The result is that we are liable to make mistakes in using them, for it is

Valves have undergone considerable modification of late and it is important that you should understand how results are affected in consequence.

to the electrical goodness of a valve, and valves are being improved in this respect.

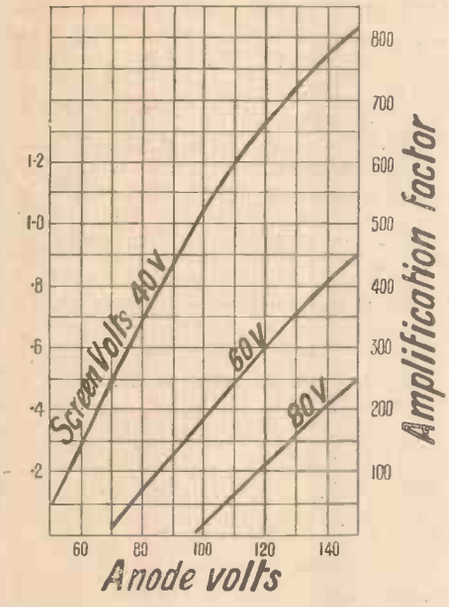


Fig. 1. Curves showing the effect of screen-grid voltage on the characteristics

surprising how sensitive to grid bias, screen voltage, and anode voltage some valves are.

Unfortunately, some of the changes made in the characteristics of valves make matters a little difficult for users. Let us take screen-grid valves as an example. We see here in new valves rising impedances, with bigger slopes.

Valve Impedance

Impedance is a term well understood and is a figure obtained by dividing a change in anode voltage by the resulting change in anode current. Thus, with a high-impedance valve the anode current changes but little with variations in the anode voltage.

Slope is perhaps not so easily explained, but we may say that the greater the slope of a valve, the larger is its magnification factor for a given impedance.

A valve having an impedance of 1,000,000 ohms and a slope of 1 would have a magnification factor of 1,000. If the slope were 2 the magnification factor would be 2,000. Slope, therefore, refers

Screen-grid Troubles

With screen-grid valves the increased slope is likely to give trouble to users. There are two chief reasons why this is so.

The first is that an effect of raising the slope or the impedance is to reduce the

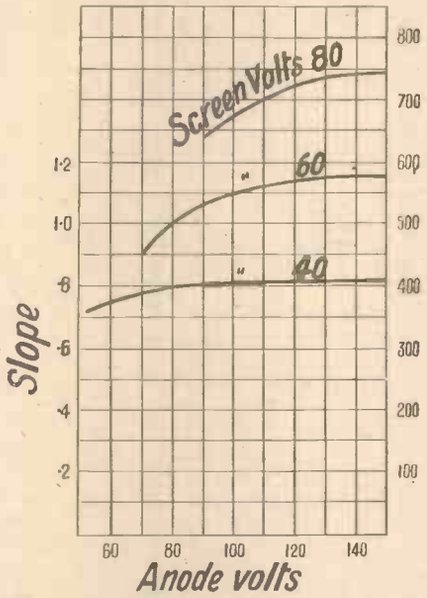


Fig. 2. The impedance is lowered by increasing the screen voltage

grid base of the valve. Therefore less grid bias can be used and a strong signal is likely to overload the valve.

This is a serious matter, for we normally receive relatively strong signals from at least the local station. If, then this big signal is applied to the valve grid current will flow, and a form of rectification will occur. The signal is, therefore, distorted in the first stage of the set, and no volume control in a later stage is of any value.

The second point referred to above is that when a valve having a greater impedance is placed in the screen-grid stage, the magnification is likely to be reduced, even though the slope of the valve is more. Valves having a large slope are also sensitive to grid bias, with the result that if the set has grid bias for this stage included it might be too much for the new valve. The position is one full of difficulties.

We face, if we are not careful, reduced amplification, distortion, and inability to control the magnification, all because the grid bias of the screen-grid valve has been reduced. We should, therefore, always use the maximum value of screen-grid voltage.

The curves of Fig. 1 show that the screen-grid voltage plays a most important part in fixing the characteristic curves of the valve, while changes in the anode voltage do not affect the grid base very much.

At the same time, the impedance of the valve is lowered by increasing the voltage applied to the screen. This is shown by the second and third sets of curves of Figs. 2 and 3, which also show how the slope and impedance are affected by the anode voltage.

It will be seen that the most favourable results are likely to be obtained with the maximum screen voltage, and for this reason the maximum ought always to be used. Incidentally, the effect of varying the screen voltage, as is sometimes done for the purpose of controlling the amount of the amplification, can be seen.

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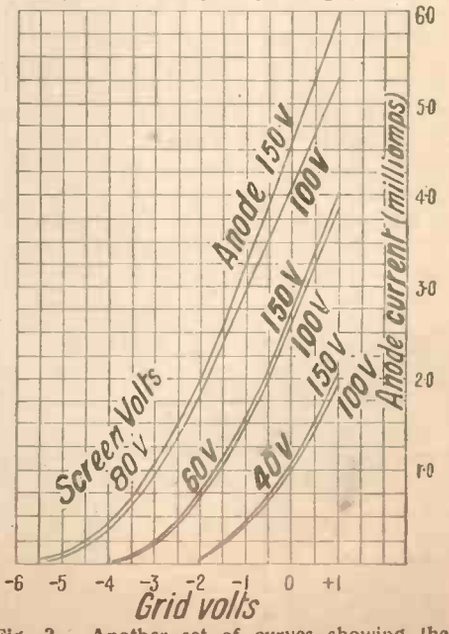


Fig. 3. Another set of curves showing the effect of screen voltage

USING A PICK-UP WITH TELEPHONES

ONE is accustomed to use a gramophone pick-up with an amplifier of some sort, so that the music may be reproduced through the medium of the loud-speaker normally employed for wireless work. As a matter of fact, it is a very easy matter to connect a pick-up directly to a pair of telephones, when the music may be received at excellent strength without any amplification whatever.

If, for example, one wishes to listen to some gramophone records at a time when other members of the family have gone to bed, or perhaps are otherwise occupied in such a manner that the noise of the normal reproduction would be unpleasant, one can merely connect the pick-up to a pair of telephones and play records to one's self, as it were, without any difficulty.

The telephones should be approximately of the same resistance as the pick-up. Most pick-ups have a D.C. resistance of the order of 2,000 ohms, and therefore the customary high-resistance 'phones are satisfactory. It does not follow that results will not be obtained if the pick-up and 'phones are not matched, but it is not desirable to use low-resistance 'phones, owing to the large discrepancy in the internal and external resistance of the arrangement. The strength on low-resistance 'phones would be somewhat poor.

The quality of reproduction will be found to be excellent, and you will be quite surprised at the amount of bass present. The whole system is so simple, that both the bass and treble are reproduced effectively, there being no opportunity for either end of the scale to be lost by the wayside. Indeed it makes quite an interesting test on one's amplifier to listen to a record in this manner, and then to reproduce it on the amplifier to see whether the quality is equally good. In many cases it will be found not to be up to the standard of the telephone reproduction. J. H. R.

The new television station at Chicago, W9XAP, is now undergoing the final tests before regular programmes are inaugurated. Television images will be transmitted on a frequency of 2,800 kilocycles, with a power of 1,000 watts. Simultaneous sound accompaniment will be sent through station WMAQ.

For the Newcomer to Wireless: HYDROMETERS

I HAVE often been told that I ought to use a hydrometer for testing my accumulator. Would you kindly tell me why?—and you might at the same time explain just what a hydrometer is.

Perhaps I had better begin with that explanation. The form of hydrometer that we use for accumulator testing consists of a glass tube drawn out to a nozzle at one end and provided at the other with a rubber bulb. Inside is a small float marked off into the degrees of specific gravity that are to be met with in testing accumulator electrolytes.

How does it work?

By means of the bulb a quantity of the electrolyte from the cell under test is drawn up into the tube. According to the gravity of the solution the float swims deep or high in it. Clearly the greater the gravity of the solution the higher the float will swim.

I have been told that the gravity for a fully charged accumulator should be about 1.250. What exactly does this mean?

It means that value for value the solution is 1.25 times as heavy as distilled water.

An accumulator is run down—isn't it?—when the gravity has fallen to about 1.170?

Yes, that is the usual figure.

The solution then becomes lighter during discharge, doesn't it?

That is so. What chiefly makes it heavier than distilled water is that it contains sulphur. During discharge this sulphur combines with the lead on the plates to form sulphate. The electrolyte thus contains a smaller and smaller proportion of sulphur as the battery runs down and so its weight grows nearer and nearer to that of distilled water.

The hydrometer you described had a graduated float. But I have seen much simpler affairs than this.

I expect you mean those which contain simply a small pellet.

Yes, that's what I had in mind. How do they work?

The pellet consists of paraffin wax weighted with lead chips until it is just afloat and no more when the gravity of the solution is 1.250. As soon as the gravity becomes reduced by discharge, the pellet sinks deeper and deeper. The pellet thus indicates the state of charge, and no careful measurement is needed.

"POINTS ABOUT THE NEW SEASON'S VALVES"

(*Continued from preceding page*)

An effect of reducing the screen voltage to weaken a strong signal is to reduce the grid base at the same time, and distortion is likely to occur. The user having a set designed for a fairly low impedance valve —and some of those issued last season were of the order of 100,000 ohms with a slope of 1—must therefore be cautious when first trying a new valve, or poor results will be obtained.

Ordinary valves, improved by having their impedance lowered and their slope increased, are not so difficult to deal with, but here again it is necessary to avoid overloading, distortion, and motor-boating. With improved valves a set may not be stable, and it is likely that precautions will have to be taken to obtain the best results.

When a more sensitive power valve is used in the last stage, for example—that is, a valve having a greater slope and a higher magnification factor—it will be more easily overloaded. The effects of slight overloading, too, will be more noticeable than when an old type valve having about the same impedance, but less slope, was used.

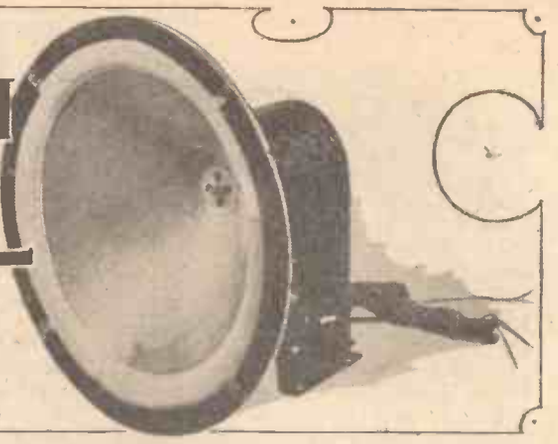
Screen-grid valves having a lower value of anode-grid capacity are obviously better than valves having similar characteristics but with a very much greater anode-grid capacity.

More magnification with stability can be obtained, for one thing, and a second point is that more uniform magnification over the band of wavelengths can usually be obtained. To secure the full benefits of new valves having very small anode-grid capacities the circuit must be well arranged.

It is of no use having a good valve if the circuit has large stray couplings. These can be avoided by using suitable coils and screens. Where a high magnification is aimed at the supplies to the circuits of the valve should be filtered.

Failure to screen properly is the usual reason for no benefit being obtained from a valve having a lower value of anode-grid capacity. It is possible, in fact, that less good results will be obtained from the improved valve.

RESONANCE IN MOVING-COIL SPEAKERS



Dr. N. W. McLachlan discusses some of the maladies to which moving-coil speakers are prone

SOME years ago, when investigating resonances in moving-coil loud-speakers, I took the trouble to measure the current through the coil at various frequencies in the musical scale. The curve showing the relation between current and frequency was fairly smooth, excepting at one point where the current suddenly decreased. This decrease in current indicated that something unusual had happened, and it is this effect which I want to discuss briefly in the present article.

The apparatus for measuring the current is illustrated diagrammatically in Figs. 1 and 2. A valve generator delivers sine waves of different frequencies to a resistance-capacity amplifier. The amplifier is connected *via* the usual condenser to the loud-speaker, which has a low-resistance coil and is transformer coupled to the power valves. An ammeter is connected in series with the loud-speaker, so that the current at various frequencies can be read off.

The voltage applied by the generator to the grid and filament of the first amplifier valve is kept constant at all frequencies, and corresponding readings are taken of the current through the moving coil.

The results of a test on a certain moving-coil speaker are plotted in Fig. 3. At 75 cycles there is a sudden dip in the curve and the current is reduced to one-quarter its value at 100 cycles.

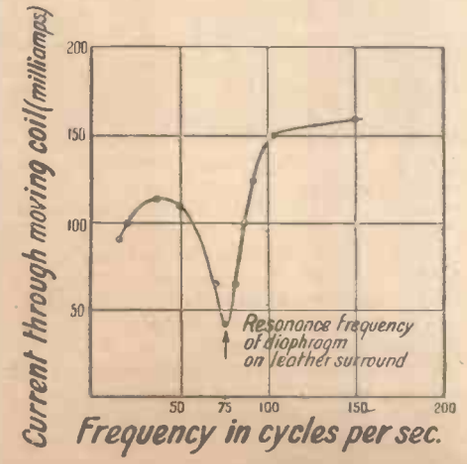


Fig. 3. Curve showing alternating current in moving-coil loud-speaker when a constant voltage was supplied to the grids of a bank of power valves in parallel (5-LS5As). Notice the resonance frequency, i.e., 75 cycles due to the "spring" effect of the diaphragm surround

We have now to find the reason for this sudden drop in current. During experimental work conducted on the loud-speaker it was noticed that the sound output was much greater at 75 cycles than at any other frequency. Clearly this points to a resonance somewhere in the speaker. The resonance was found to be due to the leather surround used to mount the cone at its periphery. In fact, the leather played the part of a spring upon which the cone vibrated, as illustrated in Fig. 4. Also the amplitude or axial excursion of the cone was much greater at 75 cycles than anywhere else.

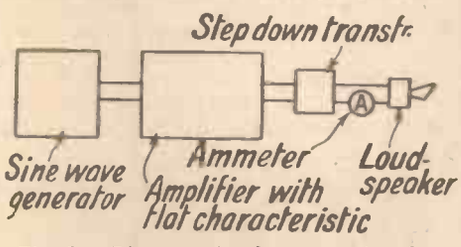


Fig. 1. Diagram showing apparatus for supplying current for testing the resonance of a moving-coil speaker

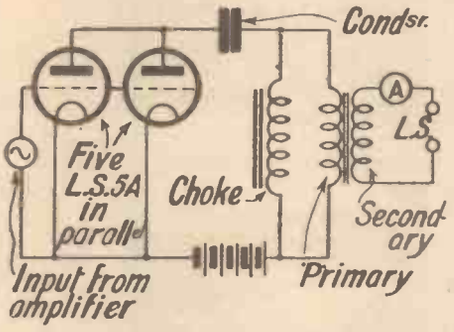


Fig. 2. Diagram showing arrangement of power valve circuit of Fig. 1

When the speaker coil moves in the magnetic field of the pot it cuts the lines of force of the field. In so doing it causes an electromotive force to be created. This electromotive force acts in an opposite direction from that which sends the current through the coil. Thus the "back" e.m.f. opposes the "forward" or current-sending e.m.f., with the consequence that the effect of the latter is considerably reduced. The result of such a reduction in current is exhibited clearly by the "vee" in the current curve of Fig. 3. Moreover, the reduction in coil current at 75 cycles is due to the large movement of the coil in the magnetic field, causing a much greater back e.m.f. than that which occurs at other frequencies where no resonance exists.

The power valves used were several LS5A's in parallel, which combination had a low internal resistance. If, however, the valve had been a pentode, its high resistance would have prevented the large reduction in current, as shown in Fig. 3, and this would have resulted in a much greater sound output and a more prominent resonance.

The reader will now be wondering whether his loud-speaker suffers from this distressing malady of "surround-resonance." Here is a simple experiment which he can perform to find out whether his worst fears are justified.

Take a standard frequency gramophone record of 80 to 100 cycles, or thereabouts, the best value being found by trial. Pass the output from the pick-up through a speech amplifier to the loud-speaker, complete with baffle (to get the desired effect the input to the speaker should be fairly large). Vary the speed of the turntable (increase or decrease) until the sound output from the speaker passes through a maximum value. Ascertain the speed of the turntable and calculate the resonance frequency as shown in the following examples.

Speed of turntable to give standard frequency of 80=78 revolutions per minute.

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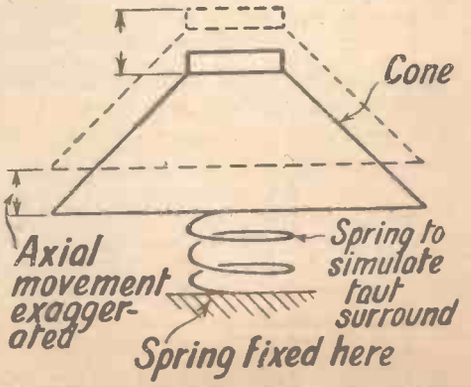
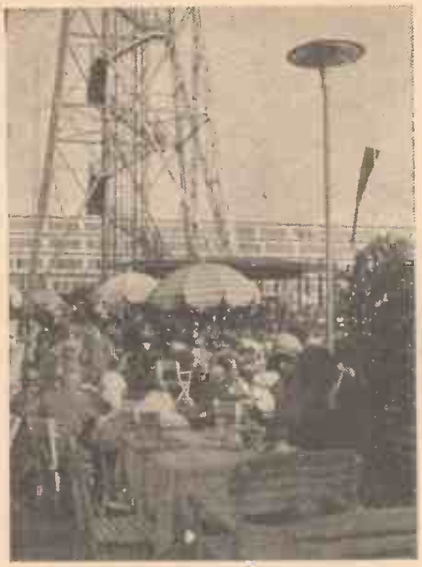


Fig. 4. Diagram illustrating spring effect of the diaphragm surround of a moving-coil speaker

AT THE BERLIN EXHIBITION

An Eye-witness Account by Dr. Alfred Gradenwitz



In the gardens of the Exhibition, underneath the shadow of the Witzleben aerial mast

THE great German Radio Show, which has just closed its doors, has been an unprecedented success. Owing to adverse economic conditions, it had been suggested that the annual exhibition should be discontinued for a year or two. However, the majority of those responsible for its promotion felt that it should at all costs be kept up; how well-advised they were is abundantly proved by the record number of visitors (about 50 per cent. more than last year) who daily thronged the exhibition halls on the Kaiserdamm. This year the Radio Show has for the first time been combined with a Gramophone Show, thus showing the intimate union of the two industries.

Gramophones Too

There are not many strikingly new things to be seen at the Exhibition. The radio industry has been following paths already open and while steadily improving and perfecting, has been creating but little in the way of actual novelties. All firms are now manufacturing sets operated from the mains, though of course there are still numbers of battery-operated receivers. In most mains sets the heating current is derived from the mains direct; in fact, in the case of alternating-current supply, indirectly-heated valves still predominate.

While neutrodynes are still very popular, a large number of superhet receivers could be found at the Exhibition, particularly for use in short-wave work.

The majority of receivers now cover a range of from 200 to 2,000 metres; in fact, there are some high-grade sets covering a range from 10 to 2,000 metres, without any necessity of change of coils. The general ideal is single-knob control. Many ultra short-wave receivers were on show. Drum drives are greatly in favour, a special feature being the use of very large scales.

German Valves

As regards valves, there were some new types of screen-grid valves and super-power valves for large outputs. The new Telefunken Rods (outside grid valves) which have already been described in AMATEUR WIRELESS, are an absolute novelty.

Loud-speakers, both magnetic and moving-coil instruments, have been further developed.

Considerable attention has been given by the industry to devices for preventing interference; many types of safeguard for this purpose were on show.

Greatly increased attention is being paid to television and many photo-electric cells and neon lamps for use in connection with televisors were exhibited.

The German Post Office again demonstrated the progress accomplished in the field of television, a combination of speech and vision being demonstrated for the first time in Germany. The firms exhibiting under their auspices are the Fernseh-A.G., who are using the Baird patents, the Telehor A.G., exploiting the Mihaly system, and Telefunken, with their own system developed in conjunction with Prof. Karolus. In addition to these, the Post Office showed the results of its own work.

The Reichs - Rundfunk-Ges. (German Broadcasting Corp.) had a most comprehensive show illustrating the interior workings of broadcasting stations.

A view inside one of the halls of the Berlin Show—strangely different from the Olympia so familiar to British amateurs

"RESONANCE IN MOVING-COIL SPEAKERS"

(*Continued from preceding page*)

Speed of turntable where loud-speaker resonates=65 r.p.m.

Resonance frequency of loud-speaker, 65/78×80=67 cycles, which is in a nasty position for good speech reproduction. Slackening off the surround will lower the frequency. When it is below about 30 cycles little harm can result.

If an ammeter is available for inclusion in the loud-speaker circuit, a curve can be taken showing the current at various frequencies and the "vee" shape of Fig. 3 obtained. It must be remembered, of course, that the e.m.f. from the pick-up will fall away as the speed of the turntable is decreased.

Some pick-ups will not stay on an 80-cycle record. This can be rectified to an extent by using a 150-cycle record run at about half speed. The output from the pick-up to the amplifier is reduced, but this loss can be overcome by additional valve amplification.

NEXT WEEK

A REALLY SIMPLE THREE-VALVER

THE GRID LEAK

MOST of the new receivers rely on grid-leak rectification, which is fast coming back into favour with the experts. Whatever defects the method originally had, in comparison with anode-bend rectification, were due to using too large a condenser, too high a leak resistance and, generally, insufficient plate voltage. Properly adjusted, the grid-leak can give results quite as free from distortion as anode-bend rectification, and it is considerably more sensitive on weak signals. B.

NEXT WEEK

A complete Show Guide and Stand to Stand Review.

On Your Wavelength!

A PUZZLER

I CAME across a real teaser in the way of faults the other day, when a friend asked me to have a look at his two-valve receiving set. One would have thought that in such a simple piece of apparatus as this no fault could possibly occur which could not be located in a matter of minutes. But this particular one would, I guarantee, baffle many readers for a good deal longer than that. The circuit was absolutely straightforward, consisting, as it did, of a grid-leak-and-condenser detector with a well-known type of tuner coupled on the resistance-capacity method to a super-power valve in the output holder. All that my friend could tell me was that horrible distortion was noticeable and that his high-tension battery seemed to be running down very quickly—the only instrument that he possessed was a simple moving-iron voltmeter. These particulars were given me over the telephone, and, following my usual custom, I slipped Miss Milly Ammeter into my pocket before setting forth to stalk the trouble.

STRANGE READINGS

THERE was no doubt about the distortion when the friend switched on—horrible was too mild a term. I stuck Milly into the high-tension negative lead, and her pointer promptly hit the stop at the far end of the scale with a bump. The next part of the proceedings was not a little curious. I pulled the output valve from its socket and obtained what looked like a normal sort of reading for the detector—say, about 2 milliamps. Then I pulled out the detector and put in the super-power valve. This time Milly's needle hit the stop with a bigger bump than ever. Wanting to see what the current was, I went home and got Milly's big sister, which reads up to 100. I forget now exactly what the current was, but it was something pretty enormous. Then we tried with both valves out of their sockets. There was a slight—a very slight—flow of current indicated. But the strange point is that the current for the detector alone *plus* the current for the output valve alone *plus* the current when both valves were out added up to a much bigger total than the current flowing when both valves were in their sockets.

THE CAUSE OF THE TROUBLE

HOWEVER, we left that poser for the moment, and the actual fault did not take long to locate when we had drawn the circuit on the back of an old envelope, as I will ask the reader to do now. Don't bother about the tuner. Just put in the filament and plate of the detector valve, and then the R.C. circuit with a 50,000-ohm resistance, a .25-microfarad coupling condenser, and ¼-megohm grid leak. Stick in also the grid of the output valve and from the filament of the detector draw a line representing the filament negative busbar. Show the high-tension positive busbar also sprouting from the top of the 50,000-ohm anode resistance. Now you will see that with both valves removed the only possible path for current from H.T. positive to H.T. negative (which is, of course, the same thing as L.T. negative) is *via* the anode resistance, the coupling condenser, and the grid leak. Therefore, the condenser is clearly not doing its duty by acting as a barrier to D.C. In other words, the condenser has broken down. We verified this by removing the anode resistance, when the needle of the milliammeter immediately dropped to zero. The same thing happened with the anode resistance in place when the grid leak was removed.

ANOTHER TROUBLE

THE obvious cure was to replace the broken-down condenser. This we did, previously subjecting the new condenser to strict tests to see that its insulation was perfect. But still all was not well; the distortion persisted and the milliammeter now showed that far too little current was flowing between the filament and plate of the super-power output valve. The valve, in fact, had lost its emission. A fresh super-power valve was placed in the holder, and this time the set worked as it should. But why had the first super-power valve been wrecked?

THE REASON

LOOK again at your pencilled circuit and put in some values. Call the anode resistance 50,000 ohms and the D.C. resistance of the broken-down condenser 100,000 ohms. The grid leak, as already mentioned, is 250,000 ohms. But with the filament of the detector switched on there is another path to earth from the bottom of the anode resistance—that between the plate and filament of the detector valve. Call the value of this path 30,000 ohms. What we therefore have is one resistance (the 50,000-ohm anode component) in series with two parallel resistances, one of which has a value of 30,000 ohms (that between the filament and plate of the detector valve), whilst the other has a value of 350,000 ohms (that composed of the 100,000 ohms of the leaking condenser *plus* the 250,000 ohms of the grid leak). By the ordinary formula you can find the total value of these parallel paths, and from this you can discover that in round figures the voltage drop across the anode resistance is in the neighbourhood of 65 volts—this is not exact, but it is near enough. The drop across each arm of the two parallel resistances is therefore 35 volts. A further simple calculation shows that the voltage drop across the grid leak is twenty-five thirty-fifths of 35 volts, or 25 volts. In other words, so far as the H.T. battery is concerned the grid of the output valve is 25 volts positive. The negative grid bias applied from the G.B. was 15 volts. Subtracting 15 from 25 we arrive at the actual bias placed on the output valve owing to the leaky condenser. This works out at 10 volts positive.

CURIOUSER AND CURIOUSER

NOW, 10 volts positive on the grid of a super-power valve with 100 volts on the plate is bad enough and the current driven through the valve is quite enough to wreck the emission in a very short time. But just think what happens if you pull out the detector. There is now only one path from H.T. positive to H.T. negative, and this has a value of 400,000 ohms. Between the grid of the output valve and negative the resistance is 250,000 ohms. Therefore the grid potential is twenty-five fortieths of 100 volts, or 62.5 volts positive. Subtract from this the 15 volts negative of the grid battery and you are left with a positive bias of 47.5 volts. Ye gods!

THE MORAL

THE moral is, of course, not to use for coupling purposes in an R.C. circuit a paper dielectric condenser of ordinary quality. The insulation of these is apt to break down and the very slightest leak will completely upset the grid bias on the following valve. To be on the safe side, use a condenser specially made to withstand high voltages or, better still, a condenser with a mica dielectric. In addition to the hateful distortion that arises from the tiniest leak in the condenser, the possibility of doing in a power valve and a high-tension battery is one that must never be forgotten.

THE VALVE OF THE FUTURE

I HAVE been very interested to read in an account of the German Wireless Exhibition references to an entirely new type of valve which shows very great promise. In place of the ordinary filament heated by a flow of low-tension current, this valve employs a photo-electric element. The photo-electric cell has the remarkable property of passing an electric current when light falls upon it. The amount of current depends upon the intensity of the light, and cells may be made to respond to light of different colours. A set fitted with what we may call a photo-electric valve requires no switch. Like a canary, it sings when you uncover it and admit light, and goes out of action when you cover it up. It is reported that sets using these valves have been able to work loud-speakers, and I don't for a moment doubt the statement. Yet I can hardly believe that a point has been reached at which good volume combined with quality can be produced from the loud-speaker. The emission from a photo-electric cell in its present form is tiny, and it will probably be some little time before anything like a satisfactory photo-electric power valve is evolved. Still, the idea is a very promising one, and it is more than likely that it contains the key to the development of the wireless valve of the future.

On Your Wavelength! (continued)

RADIO "COPS."

EQUALLY interesting is the announcement that the police are to be equipped with minute wireless receivers by means of which they can keep in touch with headquarters whilst on their beats. These tiny sets, I take it, are of the crystal variety, and there is nothing particularly novel about making them up in vest-pocket size. In the early days of broadcasting many people made up crystal sets in midget boxes, and I think I am right in saying that you could buy them at some of the novelty shops. With a short-wave transmitter no great power will be needed to keep in touch with all the "crystal-controlled" bobbies in a large area.

A NEW SIDE OF THE PROGRAMME QUESTION

AT the moment I am spending a brief holiday at the seaside. Since I came down to Sandville-on-the-Mud I am not sure that I have not changed my views on the subject of week-end programmes hour. You see, there are wireless enthusiasts in the houses on either side of mine, as well as in those across the road, and all of them have the loudest of loud-speakers. One fellow begins regularly shortly after eight o'clock in the morning with Croydon, and he and all the others switch on their loud-blarers the moment the National programme starts and keep them switched on until it stops. Your "Thermion" has found it just a thought trying. The week-ends, though, have been a glorious time of rest, for there is nothing doing, as you know, until the afternoon on either Saturdays or Sundays, and except for dance music—of which, fortunately my loud-listening neighbours do not seem fond—there is nothing to be heard after 10.30 at night. I profess that I really have been thankful to Sir John Reith and his merry men for the short hours of the week-end programmes.

THE ANSWER'S IN THE NEGATIVE

SOME queer queries come my way from correspondents from time to time, and here is one of them. "I am just going away for a holiday," wrote a Lancashire lad, "and before I go I want to feel quite sure that my earthing arrangements are all that they should be in case a thunderstorm should occur whilst I am away." He then went on to tell me that the aerial lead-in came through the window frame to an earthing switch. The earth wire was carried from the window sill round the skirting of the room, then out through the door and along some thirty feet of passage, where it lay snugly under the lino. Leaving the passage, it entered the bathroom, passing again round the skirting board, and finishing up at one of the taps. One cannot imagine any much better (or worse!) way of "asking for it" than this. No thought is needed to see that the only effect of such an earthing arrangement is to provide a path for lightning currents straight through the in'ards of the house. It is always best to use an outdoor earth for safety purposes, and to my way of thinking the earthing switch itself should also be outside the house and, if possible, well away from it.

FLOP!

IF human beings were flattened out by the recent heat wave, so were wireless waves. The thermometer began, if you remember, to touch high records on the Tuesday in the last week in August. Until that day the reception of foreign stations had been really first-rate. It wasn't too bad on the Tuesday night, though there was a very distinct falling off. But the Wednesday was the very worst night for reception that I have ever known in the course of a long career as a wireless enthusiast. Something very queer must have happened to the Heaviside layer, for even the powerful stations from abroad that one tunes in as a rule with the greatest of ease simply were not there. My big set, in fact, with its two screen-grid stages, was of less use on that night than a little set without any H.F. amplification is in the normal course of events.

LOCAL FADING?

FADING is often experienced on foreign stations, but it is not often that one encounters this phenomenon on the local station. Indeed, most people would say that fading with a station only ten or twenty miles away was impossible. They would shake their heads and talk knowingly of ground waves, skip distances, and such like, and would declare the phenomenon to be impossible on broadcast wavelengths at anything under seventy to a hundred miles.

Nevertheless, I did experience fading on my local station only the other day. At first I thought it must be due to some peculiar electrical condition of the atmosphere which was giving me a real fade of some sort. The signal strength waxed and waned in a slow manner, sometimes fading out altogether and then gradually coming back again. In fact, the reception had all the characteristics of a foreign transmission from a considerable distance.

A CURIOUS REASON

I WAS rather puzzled, because I did not believe that fading really could occur at such a short distance, and I went over to another set and listened on this. To my surprise, I found that there was no sign of a fade, and that when my normal receiver had died out completely the other receiver was still bringing in the signal at full strength. Therefore, I diagnosed that there must be something at fault in my original receiver, and began to examine it for defects.

To cut a long story short, I found that the trouble arose from a switch. The change-over from long to short waves was carried out with a switch of the type in which a blade is forced into contact with a spring point. Many switches are of this type, and in the general course of events they are satisfactory. Here, however, due to what appeared to be a weak pressure at the actual point of contact, the joint was not a good one, and a certain high resistance developed at the actual point of contact. Clearly, this resistance was varying in a periodic manner. Possibly some heating up was occurring which caused the contact to become gradually worse and worse, so that the signal died away altogether. This enabled the contact to cool down again, so that the signal gradually came back to its normal strength, and so the effect of a fade was produced.

THE REMEDY

WHETHER this explanation is sound or not I do not know, but the fact remains that the trouble undoubtedly lay in the switch, because when I opened and closed the contact from the gap the trouble entirely disappeared and reception became quite normal. If, therefore, you obtain a fade of this kind you will know exactly what to do to clear it. Simply change over the switch and change it back again so that the contact is re-made afresh, and this will get rid of the fault without any further difficulty. It does not entirely cure the fault, because it may recur after some time, and the real remedy is to stiffen up the contacts of the switch in some way, but for a momentary removal of the fault this method is perfectly satisfactory.

THERMION.

DO YOU KNOW—

that the Post Office oscillator and radio-pirate detecting van has started off on another tour? It has only just come back from the Newcastle area, and a Post Office official states that, following the van's visit, there was a noticeable rush to the local offices to take out licences!

that if your accumulator comes back from the charging station with signs of acid on the top near the terminals, then it is probable that the vent holes have become clogged up? This means that when the accumulator is charged, and gas is formed, it cannot escape through the vent holes and so some of the electrolyte is forced out to the top of the cells, where it may do harm by corroding the terminals. It is advisable occasionally to run a prod down the vent holes to make sure that they are not obstructed. This is particularly important with small H.T. accumulators.

that the conventional values of 2 megohms and .0003 microfarad for the grid leak and condenser respectively are not always the best? With some detector valves you will find that much better sensitivity is obtained by the use of a .0001 grid condenser and a 3-megohm or even 5-megohm grid leak. The only point to watch is that such a combination may cause overloading if the grid voltage is high.

SETS OF DISTINCTION

THE NEW AMPLION PORTABLE

Two screen-grid high-frequency valves are employed, as well as a new Amplion balanced-armature loud-speaker

Maker: Graham Amplion, Limited. *Price*: £24 15s. 0d.

A set of a particularly compact type

AFTER I had tried the new Amplion portable for a short week-end, like Oliver Twist, I asked for more, so Graham Amplion, Ltd., kindly loaned me a model for a further week; during that time I learned to appreciate all the good points of an outstanding product, without finding anything to which I could take serious exception.

First of all, it is a suit-case portable. The leather covering is of good quality and looks well, especially as the metal parts of the handle and catches are oxidised. There is a waterproof cover to slip over the case, a useful protection I appreciated when carrying the set from one place to another.

As the picture shows, the Amplion portable has a remarkably "clean" layout, with its three main controls arranged in a line at the front of the case. The loud-speaker and frame aerial are, as is usual, contained in the lid.

Tucked down in the right-hand side of the case is a tuning chart, which I have almost completely filled in with the dozens of stations picked up during tests.

Two H.F. Valves

Trust Amplions to be different; of the four valves in their portable two of them are high-frequency amplifiers. As both of them are of the screen-grid type, the amplification is naturally immense. To avoid undue complication in operation, one of the screen-grid stages is untuned.

There are only two tuning controls, one for the frame aerial and the other for one of the screen-grid stages. The centre and right-hand dials are for tuning and the left-hand dial for reaction. Near this reaction control is a neat switch with three positions: long, medium and off.

All the controls are smooth in action—the dials delightfully so. Because both tuning dials have similar readings for any given station, tuning is quite a simple process. The following extract from my log proves this point.

Good Strength

Huizen, at full loud-speaker strength without reaction, came in at 84 degrees on the left-hand dial and 85 degrees on the right-hand dial. Radio Paris 78 and 77 degrees, Konigswusterhausen 74 and 73 degrees, Daventry 5 XX 70 and 68 degrees, Eiffel Tower 60 and 58 degrees, Motala 52 and 50 degrees, Kalundborg 40 and 35 degrees, and Hilversum 30 and 27 degrees.

All these stations were full-strength alternatives to the local and only Konigswusterhausen suffered interference—from Daventry. On the medium band the Amplion portable is just as easy to operate, the dial readings being even more closely similar. For examples I quote Rome 75 degrees on both dials and the National 28 and 26 degrees.

Many stations I have brought in on this portable have been too strong. Not that the loud-speaker cannot handle considerable volume—it can, and with a fine-quality output. But to cut down the volume to a reasonable strength I had to de-tune the centre dial. I think Amplion's would have done better to have called their reaction control "range" instead of "volume." As a volume control it is naturally very effective, but it cannot decrease the strength of powerful stations.

As the frame aerial is directional, one can also decrease strength by rotating the portable so that the lid is nearly at right-angles to the incoming signal. But this is rather a tedious procedure.

Quality

Quality of reproduction is, I find, definitely good in the Amplion portable. I think the new loud-speaker unit is partly responsible; but as the makers have explained to me, the pentode power valve matches the winding of this particular unit. I imagine that on its own the unit tends to be low-pitched, but the pentode maintains a crispness of tone particularly appreciated during speech. Musical reproduction comes through with a warmth of tone rather rare in portables.

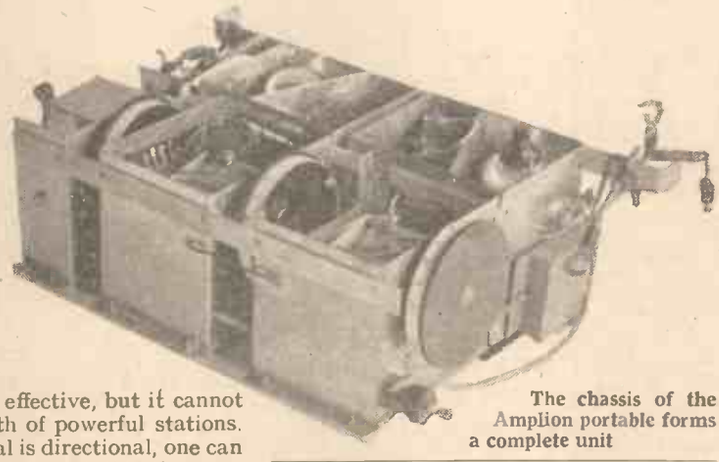
Battery Economy

I found it hard to realise that only a 108-volt high-tension battery is included to run the four valves. Quality was more of the timbre I associate with a 150-volt supply. The two screen-grid valves, detector valve, and pentode power valve together take just over 10 milliamperes from the high-tension battery. Its life would therefore be two to three months with average use.

In keeping with the general neatness of the design, the batteries fit snugly into the battery compartment without the need for packing to hold them in position.

From my tests, I can confidently recommend the Amplion portable, which would be specially useful to listeners remote from a broadcasting centre. And those living in a B.B.C. service area would find a welcome relief from their local station by tuning in some of the numerous continental stations within loud-speaker range. I found the long-wave stations just as good as the local, both in strength and quality. That is more than a compliment to Amplion's; it is a reminder that, just now, long waves offer the best continental reception available.

SET TESTER.



The chassis of the Amplion portable forms a complete unit

GRID-LEAK OR ANODE-BEND?

POPULAR opinion seems to be veering back in favour of the grid-leak rectifier, after a period in which the "experts" had little good to say of it in comparison with its rival, anode-bend rectification. There is one point of difference between the two methods that is not always fully appreciated. When using a grid-leak, rectification takes place in the grid circuit, so that the signals are first detected and then amplified across the valve. With anode-bend the received oscillations, both high frequency and low, are first amplified across the valve before rectification occurs. M. B.

Concerts from the Bucharest studio are transmitted every Wednesday and Saturday evening on 21.5 metres; the power of this experimental short-wave station is roughly 300 watts in the aerial.

A bill has recently been passed in Louisiana, KY., to prohibit slander by radio. A fine of 100 dollars or imprisonment for thirty days is the penalty.

SHORT-WAVE DEVELOPMENTS

An account of some novel applications of the ultra-short waves

By MORTON BARR

THE increasing use of ultra-short wavelengths points the way to many new and interesting developments in the near future. The Beam system, for instance, is at present transmitting messages to the Antipodes on wavelengths of from 10 to 30 metres. This is done as efficiently and at much less cost than any high-powered station operating on a 5,000 or 10,000-metre carrier.

But a wavelength of 10 metres by no means represents the limit of what can be done in this direction. Long-distance signalling is already being carried out between 3 and 5 metres, whilst in the laboratory wavelengths varying from half a metre down to a few centimetres in length are constantly in use.

Short-wave Reflection

The significant feature of such wavelengths is that they can be reflected from a suitable surface in much the same way as light is reflected from a mirror. Long waves cannot be so treated because it is physically impossible to set up a reflecting surface of sufficiently large area.

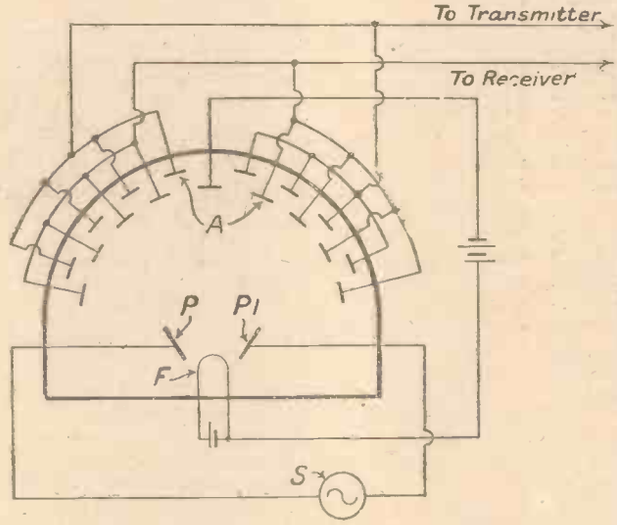
The success of the Beam system is entirely due to this fact. The radiated energy is concentrated along a definite direction by a reflector—which although it must be at least several wavelengths long to be effective, is still of practicable size and can be erected at relatively small cost.

Any conducting surface will reflect wireless waves. In most short-wave directional systems, the reflecting surface consists of a metallic network placed behind a series of energised wires forming the radiator proper.

One of the peculiarities of short-wave transmission is that the waves do not travel along the ground, as do long waves, but strike an upward path. Luckily there is another reflecting surface, in the shape of the Heaviside layer, to send them back again to earth. Otherwise they would escape into empty space.

The Heaviside layer acts as a reflecting surface because it is a region of ionised air. Wherever there are free ions, it is possible for a current to flow, i.e., there is a conducting medium—not so good of course as a metal rod, but still a conductor of sorts, and therefore a reflector.

The reflecting properties of the layer vary from time to time according to its state of ionisation, which depends in turn upon the time of day and the season of the year. There also seems to be a limit to the size of the waves which can be reflected. Below 10 metres, reflection from the layer becomes very erratic, and there is a greater tendency for the waves to break through into interstellar space.



The valve "switch" for measuring distance

This irregularity in reflecting power is the chief cause of "fading," and, at present, sets a limit to the size of wave which can be used for commercial long-distance communication.

As a matter of fact, quite apart from long-distance signalling, there are some interesting possibilities attaching to the shorter waves, particularly those in the neighbourhood of one metre or less.

It has already been proposed, for instance, to use a concentrated wireless ray to explore the surface of the earth for hidden minerals. A large mass of conducting or semi-conducting ore even when deeply buried will reflect back a considerable proportion of any wireless energy directed upon it. By measuring the angles of the incident and reflected rays, the location of the ore can be ascertained.

It will be remembered that Fizeau measured the velocity of light by finding the time taken for a ray to travel from a given source to a distant reflector and back. As the time involved was very short the exact interval was difficult to determine.

The problem was finally solved by using a toothed wheel, and rotating it at such a speed that the outgoing ray of light passed through one "gap" between the teeth, whilst the returning or reflected ray passed through the next gap. The time taken for the double passage of the light ray is then identical with that taken by the wheel to rotate through the small arc between two successive gaps. This is, of course, easily calculated from the known speed of the wheel.

A Wireless Distance-measurer

A very similar "wireless beam" method has been suggested for measuring the distance of an invisible body—either a ship or aeroplane hidden by fog, or a buried mass of metal. Here the place of the rotating toothed wheel is taken by a thermionic-valve "switch," of the kind indicated in the figure.

The deflecting plates P, P1, are connected to a source S of alternating current so that they sweep the electron stream emitted by the filament F rapidly around a semi-circular series of anodes. These are alternately connected to a wireless transmitter and receiver respectively, so that when the former is in action the latter is cut out, and vice versa.

The receiver is screened from any direct action by the transmitter, and the speed of the thermionic "switch" is then adjusted until the reflected signal is heard continuously in the receiver. The total time taken by the wireless beam to reach the invisible "reflector" and return is then equal to the time taken by the electron stream in passing from one anode to the next. As the velocity of wireless waves through space is known, the distance of the invisible reflecting body can be found by a simple sum in division.

Another method of measuring unknown distances is to transmit simultaneously two different kinds of signal, one being a wire-

(*Continued in third col. of page 269*)

Every component DEPENDABLE in its PERFORMANCE

Telsen H. F. Chokes, designed to cover the whole waveband range from 18 to 4,000 metres. Extremely low self-capacity. Shrouded in genuine bakelite. Inductance, 150,000 microhenries; resistance, 400 ohms. Price 2/6 each.

Telsen Valve Holders. Pro. Pat. No. 20286/30. An entirely new design in Valve Holders, embodying patent metal spring contacts, which are designed to provide the most efficient contact with the valve legs, whilst allowing the valve to be inserted or withdrawn with an easy movement instead of being subjected to undue strain, which often causes damage and loss of efficiency to the valves. Low capacity, self-locating. Supplied with patent soldering tags and hexagon terminal nuts. Price 1/- each.

Telsen "Radiogrand" Transformer. New model, shrouded in genuine bakelite, with new windings and core, fitted with earth terminal. Made in ratios 3-1 and 5-1. Price 12/6 each.

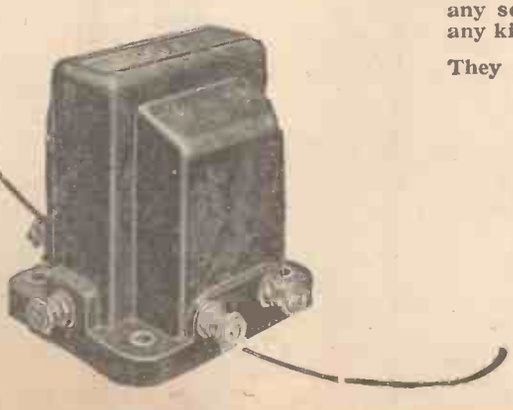
Telsen Variable Condensers (bakelite dielectric). Particularly designed for use as a reaction condenser. May also be used as a neutralising condenser where large capacity is necessary. All vanes are insulated with bakelite, which eliminates the possibility of a short circuit between the moving and fixed vanes. Made in three capacities: .0005, .0003, and .00015. Supplied complete with pointer knob, with one-hole fixing for panel mounting. Price 3/- each.

Now is the time for every radio enthusiast to commence building his new season's set—or perhaps, in many cases, it will only need revising to bring it up to present "Regional" requirements.

In the Telsen range of components, you are assured of the finest technical perfection it is possible to obtain. Each component is the outcome of research into the "cream" of radio component design.

No finer range of components could possibly be specified for any set; no finer range could be chosen for replacements of any kind; no finer range could be selected at any price!

They are "Radio's Choice" for "Better Radio Reception"



Telsen "Ace" Transformer. The ideal model for all portable sets and, where space is limited, gives perfect reproduction throughout the musical range. Shrouded in genuine bakelite, with new windings and core. Fitted with earth terminal. Made in ratios 3-1 and 5-1. Price 8/6 each.

TELSEN COMPONENTS

ADVT. OF TELSEN ELECTRIC CO., LTD., BIRMINGHAM.

IN MY WIRELESS DEN

WEEKLY TIPS— CONSTRUCTIONAL AND THEORETICAL

By W. JAMES.

The New Flexible Resistances

I HAVE lately been using flexible wire-wound resistances, and very handy they are too. These resistances comprise a core of insulating material (which looks something like string), over which is wrapped the fine wire comprising the resistance.

This is covered with a length of Systoflex, connecting tags are fitted to the ends, and the value of the resistance is marked upon one of the tags. The lengths of the units depend upon their resistances and current-carrying capacities. Being flexible and having ends suitable for fixing to terminals, these resistances are easily joined between two points without further wiring.

The diameter being about one-eighth inch, a resistance unit resembles an ordinary connection in Systoflex when it is joined in circuit. I have used resistances of this pattern in various circuits with success.

The current-carrying capacity of the resistances varies according to the type, but there are available many sizes for all positions in receivers, such as anode resistances, filter resistances, and stoppers. They are quite cheap to buy.

A Matter of Appearance

The fronts of some wireless sets look very odd, what with knobs and dials of various sizes and shapes and some having scales or indications and others being plain.

The truth is, I suppose, that it is difficult to match knobs and scales. Nothing looks worse than lettering of different sizes and a number of odd knobs. Yet, with spindles of varying diameters and lengths, it is not too easy to arrange for that uniformity which we all like to see.

It is usually possible, however, to find knobs of similar pattern which will fit. Sometimes a liner in the form of a split tube, having a wall $\frac{1}{32}$ in. thick is necessary when the knob is drilled for a $\frac{1}{4}$-in. spindle and that in the part fitted is $\frac{3}{16}$ in.

Accumulator Care

I suppose that most amateurs in these days understand the care and charging of accumulators. Many have trickle chargers for use with alternating-current supplies and others have a means for charging from direct-current supplies.

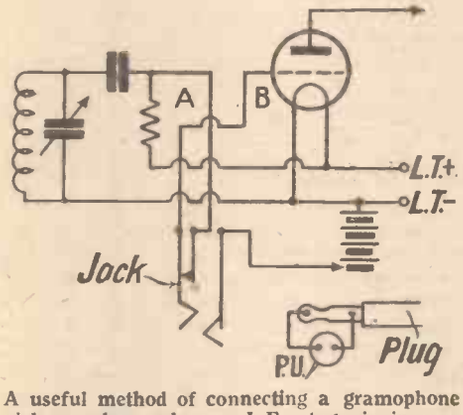
The point most frequently overlooked is that both over- and under-charging are harmful. Eventually a cell that is not properly charged will deteriorate. When out of condition it will not hold a charge for any period and is likely to sulphate.

The addition of tap water instead of distilled can only result in trouble, as can failure to maintain the level of the electrolyte as directed by the makers. It is a good idea to have fresh electrolyte put into a cell every now and again, particularly when the cell is hard worked.

All-day trickle charging, with a discharge to the receiver every night, while suiting some cells very well, means that the addition of distilled water ought to be a regular matter, or the level of the electrolyte will fall. And then trouble commences.

Connecting a Pick-up

The usual method of connecting a pick-up to a set having only a single low-frequency or power stage is to break the detector circuit and to join the pick-up between its grid and grid bias. Often a jack is used with a plug for the pick-up, as indicated in the accompanying diagram.



A useful method of connecting a gramophone pick-up when only one L.F. stage is in use. This is described in the accompanying paragraph

The grid circuit, it will be seen, is completed through the grid leak when the plug is withdrawn. When the plug is inserted the pick-up is connected between the grid and the grid bias.

This switching arrangement is satisfactory and effective, but care must be taken to avoid too lengthy grid wires. The wires referred to are marked A and B. If they are very long and run together with the grid-bias wire, the capacity across the tuned circuit will be increased and probably the signal strength will be less than it would be if the jack were not used.

Filament contacts may be included in the jack for the purpose of switching off the high-frequency stage when the plug is inserted.

Slow Motions

Some slow-motion condensers are too highly geared and others are just the reverse. For the best results the ratio of the movement of the knob and that of the condenser should suit the circuit.

If the circuit is fairly broadly tuned a very slow motion is not required. A ganged circuit, tuning, as it does, relatively sharply in comparison with single circuits should be provided with a very good and accurate dial.

Slip, in a dial driving a multiple condenser is annoying, as the tuning is difficult. The fault would be more noticeable than when the same dial was driving a single condenser.

Ordinary dials are good enough for broadly-tuned sets. The use of slow-motion dials in such sets only increases the difficulty of tuning. I remember using 70/1 slow-motion dials—and very good they were, too—fitted to my short-wave set. But nowadays 7/1 or 10/1 is a big enough reduction for most broadcast sets.

That Lost Voltage

The other day I bought a dry-cell battery and found that its voltage was several volts in excess of the value marked upon the battery.

This may be good or bad. It depends upon when the battery is bought and put into use.

I do not object to using a battery giving rather more than the nominal voltage. But I should object to buying a battery which showed by voltmeter test a voltage equal to that marked upon the battery when all the time its voltage when freshly made was higher.

If the makers add a few cells so that when the battery is run down a little it gives a voltage equal to that marked upon the battery, then the user who buys that battery is not getting his money's worth.

The trick is a pretty smart one, for the user might consider he had a fresh battery because its voltage agreed with that on the label, whereas a fresh battery would provide a higher voltage.

"SHORT-WAVE DEVELOPMENTS"

(*Continued from page 266*)

less and the other an audible signal. The average velocity of sound through air is approximately 332 metres per second, whilst the velocity of wireless waves is 300 million metres per second.

Suppose one ship, approaching another in the fog, transmits a wireless and sound signal simultaneously. Then the wireless signal may be regarded as having travelled instantaneously, and serves merely to notify the distant ship of the time when the sound signal was released.

ARE BAND-PASS FILTERS WORTH WHILE?

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

The question of band-pass filters is very much to the fore at the present. Many readers will have wondered whether the benefits accruing from this special form of circuit are worth the extra trouble involved. In this article our Technical Editor discusses the question and leads up to a special form of circuit which he has evolved

THERE is considerable talk these days of band-pass filters. In some circles this arrangement is spoken of as the only satisfactory method of tuning. Others express doubts as to the practicability of the scheme, however attractive it may appear on paper. What is the truth of the matter?

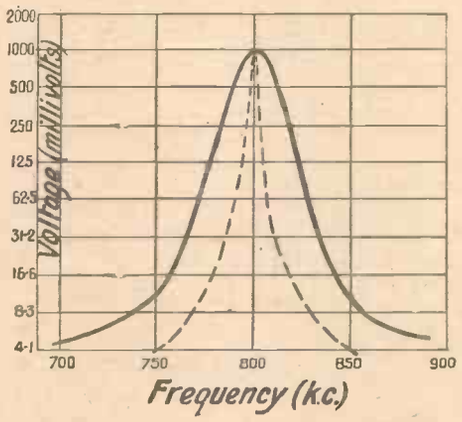


Fig. 1. Resonance curve showing the properties of circuit

In an endeavour to obtain practical information on this subject, a series of investigations was put in hand at the Furzehill Laboratories some months ago. The theory of the band-pass filter is well known, and the questions to be decided were, first of all, whether the practical forms of circuit came up to theoretical expectations and, secondly, how such circuits could best be constructed, assuming they did prove to be satisfactory.

Band-pass Filter Theory

The theory of the band-pass filter may be stated quite simply. In order to obtain selectivity we require a circuit giving a maximum response to the frequency to which it is tuned and very little response at frequencies only a little removed from the tuning point. The problem is aggravated because the interfering station is usually many times more powerful than the station we wish to receive, and the resonance curve of the circuit must, therefore, be exceedingly sharp.

What is a resonance curve? Simply a graphical representation of the response of the circuit to signals of different frequencies. At the particular frequency to which the circuit is tuned the response is very large. On either side of the resonant point a certain current will be set up, but it will not be so great as the maximum. The less this current is in the mistuned condition, the more selective the circuit; and we can obtain a simple idea of the properties of the circuit by plotting a "resonance curve" as shown in Fig. 1. Here it will be seen that a signal 50 kilocycles away from the resonant frequency will only produce a response of one-hundredth of the maximum value.

On the face of it this looks quite a good circuit, but actually it is not by any means sufficient for dealing with modern conditions. We must make our resonance curve fall off very much more steeply, as, for example, the dotted-line curve of Fig. 1. Unfortunately, this does not prove a true solution of the problem, because the circuit then becomes so sharply tuned that it affects the station that we do wish to receive.

It is well known that a signal occupies a certain band of frequencies, stretching for some 5,000 cycles on each side of the actual resonant point on which the carrier is tuned. If our resonance curve is so sharp that it causes an appreciable loss of signal strength 5 kilocycles on each side of the tuning point, then distortion will result. This loss of the upper frequencies is not very noticeable, except in cases where the circuit is really sharply tuned; but therein lies the difficulty, because, in order to obtain adequate selectivity with simple receivers, it is necessary to make the circuit so sharply tuned that the effect on the quality becomes serious.

Double Tuning

The band-pass filter is intended to overcome this difficulty. If we use two tuned circuits, the energy being transferred from one circuit to the next by some suitable means, we obtain our additional selectivity. Moreover, there is a tendency for the system to tune in two places, due to an interaction which takes place between the circuits. If we can arrange that these two tunes occur quite close together, we obtain a double-humped resonance curve as shown in Fig. 2, which has the property of maintaining the amplification around the maximum for a short distance on each side of the resonant point so that we obtain good quality; at the same time,

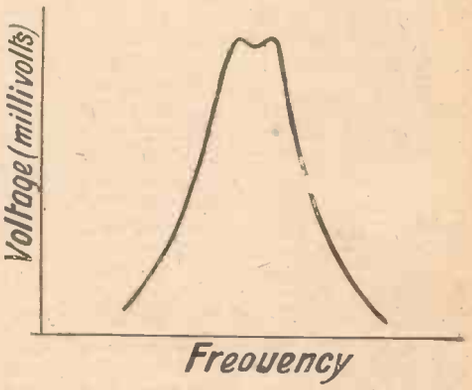


Fig. 2. Doubled-humped resonance curve

there is a very sharp cut-off beyond these points, so that signals 20 or 30 kilocycles off the tuning point are reduced to a small fraction of the maximum response.

This is the basic theory of the band-pass circuit. The two tuned circuits are both tuned with a common condenser, so that there is no extra tuning control, once the arrangement has been balanced up, and, on the face of it, the arrangement seems a very good solution to the problem. Unfortunately, in practice there seem to me to be several difficulties which prevent one from utilising the principle to the full.

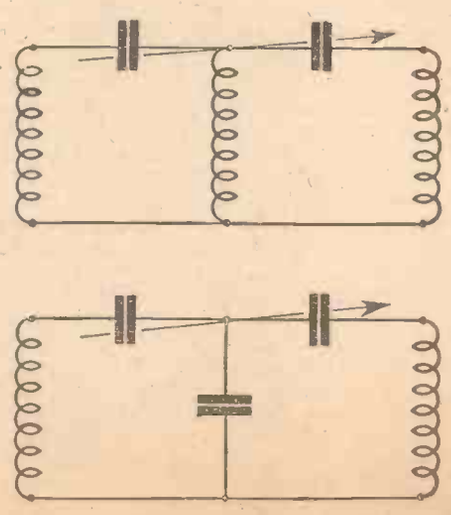


Fig. 3. Two forms of band-pass filter—magnetic and capacitative

Signal Strength

The first question is that of signal strength. Is there any marked drop in signal strength due to the introduction of the second tuned circuit? It is clearly no use to have a very selective arrangement if it only serves to cut out the near-by interfering stations, and does not leave sufficient strength to tune in the distant stations which one requires to receive. Therefore, the device must not result in a very marked drop in the signal strength. This is disadvantage number one, for we found in our experiments that with the correct order of coupling the drop in signal strength was very marked. If the coupling is increased, the two peaks on the resonant curve become too far apart, and one encounters the unpleasant effect of every station tuning in twice, the tuning points being separated sometimes by as much as 20 degrees on the dial.

Disadvantage number two arises from the lack of uniformity in the energy

(*Continued on page* 285)

A Weekly Programme Criticism—By SYDNEY A. MOSELEY.

Without Fear or Favour

The Berlin Exhibition
Thrillers
The "Proms"

ONE final word about my German trip, and that is the enormous interest in the Radio Exhibition. If the forthcoming exhibition at Olympia is anywhere near equally successful, we ought to be very satisfied. The strange thing is I am told there is not that enthusiastic army of amateurs in Germany as there is over here. Nevertheless, judging from the numbers who attended the Berlin exhibition, interest in listening is on the up grade—although, to tell the truth, there was a magnificent open-air restaurant there which was equally as crowded as the show itself.

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I feel, somehow, we are on the verge of developments with regard to British broadcasting. People do not seem to realise that affairs at Savoy Hill have become stabilised and that greater concentration will be given to future programmes.

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Friends at Savoy Hill have suggested that some of the programmes I have permitted to go out from the television studio in Long Acre are not so high-brow as those sent out by the B.B.C. The answer is that actually I have done very little experimenting with these programmes. As a matter of fact, a good many of those who have televised are B.B.C. artistes.

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Take the B.B.C. programmes of the last week or so; not altogether so high-brow, after all. There is *Thread o' Scarlet*, a thriller which is easily assured of popularity. Millions of books of the same sort have recently been sold. Therefore, *Thread o' Scarlet*, with plenty of incident and a gripping dialogue, must have interested listeners; yet here again the effects were overdone. Surely the noise of the wind should be *suggested*, and not emulated to the extent of drowning the dialogue and making our flesh creep.

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Another item which was good, but again not so very high-brow, was "Those Four Chaps." This turn is something out of the ordinary so far as broadcasting turns are concerned, inasmuch as the Four seem to be more concerned with pleasing their public than entertaining themselves. Their skit of a Derby commentary was a bright effort and shows that they can put over some really amusing stuff.

Hetty King I thought was a big stage success as the lady who wore trousers. That rather gives my age away, but not hers, because Hetty, I am told, looks as young as ever. Here again there was an exception, because she is one of the few stage stars who has made good over the ether and, at any rate, proves that, despite the many failures, such success is possible. Her personality was unmistakable, and I hope that her first broadcast will be the forerunner of many more. Hetty King has got pep.

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What is the most popular "Prom." night? At first, Wagner easily led the way; then the Beethoven night drew an extraordinarily large crowd. Personally, I find I am not sufficiently musically educated to appreciate all Beethoven's heavy stuff, but I think I am right in saying that for sheer impressiveness the recent Wagner programmes will take some beating. Sir Henry Wood gets every ounce out of his men, and what a thrill it was to hear Wagner played as it should be!

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Constance Saxer and Baldomero Zapater will have to speed up their performance somewhat before they can hope to become a popular variety turn. Miss Saxer's way

Bruce Belfrage in cartoon

Dance Band Vocalists
The Sports Bulletins
Intervals

of addressing her unseen audience is rather naive. Added to this, there is the fact that the music chosen by her and her partner, while pleasant, was hardly striking.

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Edwin Styles is a comedian who, I believe, is new to the microphone. As it happens, he was at the Coliseum at the time of the television show, and this fact has given me an opportunity of judging him from two angles. He puts over practically the same show as he does on the stage, and so good is he that, although bereft of the artifices of the stage, he comes over just as well on the radio. He is certainly versatile, and he has a way with him that must gain the goodwill of his listeners at once.

◆ ◆ ◆

I think I have already suggested to the News Department at Savoy Hill that the horse-racing results take up a lot of time while appealing to comparatively few people. Your horse-racing public likes first to read all about it.

I append a letter from a correspondent backing up my view: "Here is a point which deserves the full consideration of the B.B.C. Why should so much time be wasted on giving out horse-racing results? Horse-racing is essentially a money matter, so far as the man in the street is concerned, and does not deserve the time spent on it as much as do those sports in which we take an interest purely from the sporting point of view. The long strings of names of horses which are read out are only of interest to the man who backs horses, and you may be sure that he isn't going to wait for the Sports Bulletin."

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By the way, what interest to those living in the south of England is there in the results of Scottish and Irish football matches? In my opinion, all this is a waste of good time.

◆ ◆ ◆

There is a bad habit growing, and it threatens to beat some of the most badly run Continental stations. I refer to the practice of having long intervals after a particular broadcast has finished before time. On a recent Saturday I noticed that the news was over a good ten minutes before it should have been. This was followed by complete silence for ten minutes. There was nothing to fill the gap, and no apology or explanation.

LOOKIN FORWA TO T SHO

A FORECAST OF THE NEW

NEXT week Olympia opens its doors to the ninth Radio Exhibition since the inception of broadcasting.

Already the newspapers are beginning to talk of "miraculous" portable receivers, of "everlasting" batteries, and of "amazing" new valves. These superlatives are the prerogative of newspaperdom and real amateurs want to know just what are the "secrets" held by the forthcoming National Radio Exhibition. Amateurs—you who regard radio not so much as a means of entertainment, but as a king of indoor hobbies—are now getting ready for the new season and here is a brief review of the progress which has been made during the past year.

The trend of design is shown by this Ferranti all-enclosed set

Think what the position was at Show-time last year.

Mains eliminators which are really safe and are housed in non-hum metal cases had by then become popular. Portable sets, of course, were in great demand, but the Exhibition of 1929 did not produce what many people hoped it would, namely, portable sets which are light in weight, which are free from battery troubles and which can be used extensively indoors as well as out.

Safe non-spill accumulators are now available. This is the C.A.V.

So far as complete sets were concerned three-valvers were on the peak of popularity, followed closely by rather more elaborate four-valvers. Sets having a detector and two L.F. stages had already given place to the now almost universal "three" having a screen-grid H.F. valve, detector and one L.F. stage.

In many sets the pentode was being used in the power stage but, to be frank, there were one or two set manufacturers who plunged straight into pentode pitfalls without ensuring that such receivers could work properly in the hands of non-technical users. There was, even in 1929, an atmosphere of doubt about the pentode.

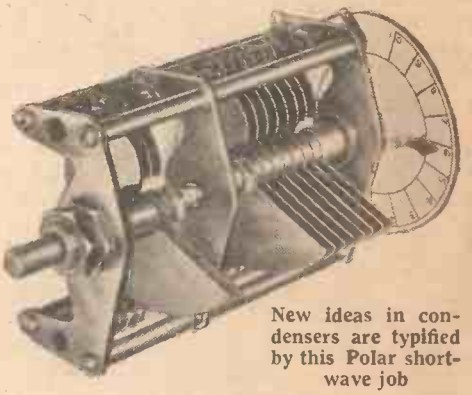
Moving-coil speakers had caught the public eye and there was a start of the reaction now general for true reproduction rather than merely good results. Set designers such as Mr. W. James were still crying out for better manufacture in the smaller parts such as valve-holders, while the universal demand among set designers was for good ganged condensers of robust construction. Frailty in manufacture was still evident, particularly in imported parts and in panel-mounted components such as drum-control condensers, some of which were lamentably shoddy in detail work.

The Home Constructor

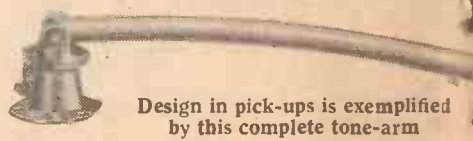
And now, at the start of the new season, what is there for you? Home constructors must not be disheartened by first impressions at Olympia this year, which undoubtedly will show, more than ever, a large proportion of complete sets. It does not mean that home builders are not so well catered for as in previous years, but rather that there is a growing army of designers who want to buy sets complete even if they subsequently alter them and perhaps later build their own.

Much is to be learned from these complete receivers on show. Quite half of the best sets to be seen work from the mains, either A.C. or D.C. Look closely at these, note the way in which the mains section is carefully shielded from the receiver itself, and particularly from the H.F. side. Note, too, that the introduction of new-type mains components has reduced the need for extensive metal shielding. Some older mains transformers, for example, had a large external field which caused all manner of interaction troubles and which was a more or less easy-to-read indication that the transformer was not so good as it might be. The new transformers are more compact, even more efficient, less liable to break down, and up to a point do not need so complete shielding. Compactness is also evident in other mains parts and particularly in high-voltage condensers.

A surprising thing is that the portable problem has been solved. The old difficulty was that if batteries big enough to work a portable for a long time both indoors and out were fitted, then the weight of the whole set was excessive. This has been overcome by a number of enterprising firms manufacturing special eliminators which fit into the battery compartment of a portable set and provide H.T. from the mains when the set is used indoors. In some models a trickle charger is also provided so that the small non-spillable accumulator with which most portables are



New ideas in condensers are typified by this Polar short-wave job



Design in pick-ups is exemplified by this complete tone-arm

A FULL GUIDE AND REV

SEASON'S DEVELOPMENTS

fitted can be kept at tip-top charge.

The use of such an eliminator, which can be obtained for A.C. or D.C. mains, makes a portable set as economical in use as a normal indoor set. Then when it is wanted to take the portable for an outdoor trip the eliminator is removed, quickly disconnected by means of its plugs, and a light-weight small-capacity H.T. battery substituted for this temporary work. Everyone will concede that this will, during the next season, revolutionise the utility of portables, which are bound to become more popular than ever.

Components

When at the Show, examine the small components. At long last our much-desired sturdy panel-mounting gang condensers have arrived. Some really good jobs are now available which, used in conjunction with matched coils, make one-knob control a practical proposition; and yet, paradoxical as it may seem, there is a temporary lull in the demand for these ganged condensers, for the craze for one-knob control, which was at its height at Show-time last year, has ebbed a little.

Maybe this is because you home-builders of sets were discouraged during the past season by the dearth of good condensers suitable for one-control sets, and therefore you turned to designs having separate tuning condensers and two or three tuning knobs. Now that proper condensers are to be had, the pendulum is bound to swing in the direction of one-knob control.

Good ganged condensers are of no use without good coils. They are here in screened, dual-range and plug-in types. Plug-in coils have definitely returned; they are better made than they were, and amateurs are realising that by the judicious use of coils of the lower size the greatest efficiency is obtained for each tuning range.

Valve holders and parts such as supports for resistances, and fixed condensers, show detail improvement, while resistances themselves are better than ever. Wire wound resistances are obtainable for all purposes.

Loud-speaker Improvements

This year at the Show you will see many new permanent-magnet coils for which remarkable claims are made, and as these are backed by manufacturers of high repute, these claims can be taken for granted.

Other manufacturers have gone ahead with the design of balanced-armature speaker units and double diaphragms, and have produced also a new speaker idea, the dynamic action.

While many great changes have been made in speaker units these are more readily obvious in performance than by inspection of the units themselves. On the whole, though, speakers for the next season are more sensitive, give a greater volume for a given input power, and reproduce the high notes as well as the low. Last year there was a temporary boom in low note reproduction but now people realise that notes around the fifty-cycle range are not all that matter; the "highs" are just as important.

It is impossible in the small space available to do justice in mention to the many other sides of radio. Batteries improve every year; there is no doubt about that.

Home-constructors of mains units are catered for by parts such as this Atlas safety box

The pentode has come to stay and a mains-driven version is now to be had. Mains-driven valves of all types have been improved and amateurs who have A.C. mains can now work screen-grid, detector and pentode valves directly from the power supply, so far as L.T. is concerned.

New "A.W." Sets

AMATEUR WIRELESS has some real winners in hand. The AMATEUR WIRELESS Technical Staff has produced a three-valver which is as simple and efficient as any "three" can be for the 1931 season,

Radio-gramophones are well to the fore, and the latest practice is shown by this handsome Dubilier instrument

and the Technical Editor is now concluding tests on a two-valver employing a novel tuning principle, the salient feature of which is selectivity without loss of strength. This is described elsewhere in this issue.

The AMATEUR WIRELESS Technical Staff receiver has been designed with the salient features in mind of high performance, low cost and simplicity. It is a "three" incorporating a screen-grid stage in a very useful circuit, a detector and one L.F. stage.

The reasons why you should build this set are to be found in the overall high performance it gives, and in the detailed improvements which it has over previous three-valvers.

To take just two or three examples, the selectivity is definitely controllable, and is, at its maximum, of the "knife-edge" variety; there is a *real* volume control (not only a filament rheostat) on the panel; a gramophone pick-up can be used without any alteration to the wiring, for the pick-up leads are simply plugged in to a jack on the panel.

The simplest possible method of wiring is used in this set and there are no elaborate joints to be made. Even soldering is not necessary and there are no wires which have to be carefully bent to shape, and the angles carefully set.

In next week's issue a full description of this set will be given and on no account should you miss what will undoubtedly be one of the "stars" of the National Radio Exhibition.

IEW IN OUR NEXT ISSUE

A Complaint from Scotland

SIR,— I note in a recent issue a question as to whether land-lines distort, and the B.B.C.'s reply to this.

It is rather amusing and, at the same time, exasperating to read the B.B.C.'s reply, especially when it states that it has only had complaints of bad transmission during the past month from 1 per cent. of listeners. Is this not due to the fact that old listeners to land-line transmission have for years worn themselves out writing and complaining without getting the least satisfaction from the B.B.C.?

If anyone has the slightest doubt as to whether land-lines distort transmission or not, let him bring any set he likes to Edinburgh and listen for a few minutes to what is doled out to us as music. I doubt very much if there is any other country in Europe where so much "mush" is foisted on to listeners as music, and yet the B.B.C. brags about its transmission being the best in the world.

Only a week ago we had a call at my wireless shop from a visitor from the outskirts of London who had taken the trouble to bring his portable with him to listen to Scottish programmes. He brought his set in for us to look over, as he was certain something had gone wrong with the "works." We tested it and handed it back as in perfect order, and asked him what had led him to think something was wrong. His reply was that he had been listening to the Edinburgh programme the previous evening and got a lot of distorted noise with the high and low registers cut clean off.

England is comparatively well served with stations. In Scotland we have to depend upon Glasgow and Edinburgh, as Aberdeen's wavelength has been reduced to a figure that clashes with Edinburgh and Dundee. Except for powerful sets that can get Daventry (static permitting), we have no alternative programmes. I feel certain that if any of the political parties at the next election promised to wash out the B.B.C. dictatorship and give us the service to which we are entitled, they would get many thousands of votes in Scotland, if not elsewhere.

"EDINBURGH WIRELESS TRADER."

A Speaker Problem

SIR,—I have a moving-coil speaker and a linen-diaphragm speaker, and wish to work these two together. Would you kindly suggest a way of doing this so that one speaker does not affect the satisfactory working of the other? I ask this because I have learnt that, in some cases, one speaker will interact with the other, to the detriment of both.—B.C. (Middlesex).

The following information will enable you to arrange your two speakers in such a way that one will not interact with the other and cause trouble. An output transformer, to suit the moving-coil speaker, should be connected up in the ordinary way. Now connect one terminal of a fixed condenser of 2 microfarads capacity to the terminal marked "Plate" on the output transformer.

The other terminal of the fixed condenser should be taken to one terminal of the linen-diaphragm speaker, the other terminal of this speaker being connected to negative H.T. This arrangement provides for a transformer output for the moving-coil speaker and a choke-filter output system for the other speaker.—ED.

The Children's Hour

SIR,—I think many listeners, including myself, would be very sorry if the Children's Hour were scrapped. There is a sameness about most dance bands, and they would be a poor substitute for that "unofficial" three-quarters of an hour, with its jolly aunts and uncles and its varied programmes.

Some of the plays are perhaps a little high-brow, but the older children like them. Beyond the fact that Mr. Howland is at times inclined to be serious, I think he is an ideal organiser for the Children's Hour, and he is certainly popular, as are the other aunts and uncles, with the children—and with the grown-ups, too.

A. M. H. (Coventry).

NEXT WEEK:

AN ENTIRELY NEW LINEN-DIAPHRAGM LOUD-SPEAKER

Grid Bias and Push-pull

SIR,—When using a push-pull L.F. arrangement, I understand that the input voltage applied to the grid of each push-pull valve is halved. If this is the case, does it not follow that the grid-bias voltage for the push-pull arrangement should be double that specified for the valves by the makers, so that each valve works according to the makers' expectations?—F.W. (Cardiff).

On no account should the grid-bias voltage, specified for any particular make of valve, be doubled when using such valves in a push-pull L.F. arrangement. It should be realised that, whereas the signal voltage is applied between the two grids of the push-pull valves, with the centre point of the transformer connected ultimately to negative L.T., the actual bias applied to each valve is definitely arranged between the grid of each valve and the negative L.T. This being the case, it is essential that the biasing voltage in a push-pull arrangement be the same as would be the case were an ordinary straight-coupled L.F. arrangement employed.—ED.

Adding a Screen-grid Stage

SIR,—I have recently added a screen-grid H.F. unit to my existing three-valve set, assuming that I should get an increase in receiving range and volume. Imagine my surprise when exactly the opposite occurs. Instead of an increase, I get an all-round decrease. All of my wiring, I know, is correct, and I am at a loss to account for the peculiarity.—G.V. (Devon).

Possibly you have overlooked several points which have a definite bearing upon the good working of the addition to your set. No doubt originally you had reaction coupled into the aerial system. Did you need to use a fair amount of reaction to get good results with your original set? If so, then by adding the H.F. unit you have automatically cut off reaction from your aerial and the natural damping of the latter prevents your getting satisfactory reception. If you will attempt to reduce the effective resistance of your aerial and earth system you will, no doubt, remedy the trouble. Then, again, your present H.T battery may have just sufficient capacity to supply anode current to a three-valve set. The screen-grid H.F. valve normally consumes about 3 milliamperes (including the screening grid current), and it is possible that your H.T. battery cannot supply this extra demand. The remedy in this instance is to use either a new battery or a larger capacity battery. It is recommended that in all cases where a screen-grid H.F. valve is employed a triple-capacity dry-cell H.T. battery should be used. Only in portable sets, where weight is the big thing, should a smaller capacity battery be used.—ED.

Outdoor Aerials and Portables

SIR,—I have a self-contained portable wireless, and use it, for the most part, in my home. Sometimes I get rather a good programme from a distant station, but the strength of the reception is poor and makes listening-in other than a pleasure. Can I connect up an outdoor aerial to my set, and, if so, how can this be done by one knowing nothing of the internals of a wireless set?—J. McD. (Hampton).

An outdoor aerial can be attached to practically any portable set in the following simple way. Erect an outdoor aerial of the single-wire type and bring the lead-down wire to an ordinary lead-in tube. Now fix up an earth connection and bring the wire to a suitable terminal point near to the aerial lead-in tube. If possible, fit up an aerial earthing device so that when the aerial is not in use it can be joined direct to earth. Now connect a suitable length of insulated flexible wire to the inside fitting of the lead-in tube and suspend the wire overhead till it reaches your receiver. Coil the wire a couple of times around that part of your set housing the frame aerial and, still with the wire in an unbroken state, take its free end back to the earth-terminal point, which is near to the lead-in tube. Connect up the wire to this earthing point and the task is completed. This arrangement provides for a loose-coupled semi-aperiodic outdoor aerial system. It will give a big increase in the range of the receiver, without necessarily upsetting the selectivity of reception. More turns of wire around the receiver will give more powerful reception—up to a certain point. Less turns will give greater selectivity. —ED

THE STANDARD FIXED BY FERRANTI

When you buy an ounce of tobacco, a ton of coal, or a gallon of petrol you get a definite quantity in exchange for a given sum of money. The standard quantities you are due to obtain for that sum are fixed, and you are entitled to recover any deficiency.

In the case of a transformer, however, you have no such protection. No matter how inferior or how deficient in performance a transformer may be you have no redress. There are no legal or fixed standards to determine just what you are entitled to receive in respect of transformer performance in exchange for money paid.

There is one safeguard, however, and that is in the standards fixed by Ferranti. You are entitled to at least that performance, and it can be secured, but only if you stipulate Ferranti. There is no Transformer embodying equivalent skill and knowledge in manufacture. Ferranti Transformers are supreme.

AF4.	Ratio	1-3½	17/6
AF3.	„	1-3½	25/-
AF5.	„	1-3½	30/-
AF6.	„	1-7	30/-
AF7.	„	1-1¾	30/-

FERRANTI TRANSFORMERS

FERRANTI LTD. HOLLINWOOD LANCASHIRE

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WE TEST FOR YOU

A weekly review of new components and tests of apparatus.

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

Telsen Radiogrand Transformer

THE Telsen transformer has been before the radio public for a considerable time, and has already established a reputation. We gather that a number of new Telsen products are in the offing, while the older components are being brought into line with the new range.

The Telsen Radiogrand transformer is a case in point. This component is now housed in an attractive moulded case, the colour of which is a distinctive mottled brown, which we understand is to characterise all Telsen components during this season. The constants of the transformer otherwise appear to be unchanged.

The sample we received for test was the 3-to-1 ratio, which proved to have a primary inductance of the order of 15 henries. Saturation is not marked, the inductance with zero polarising current being 17½ henries, and 13 henries, with 10 milliamps D.C. flowing.

We tested the transformer in an actual receiver and obtained a good signal strength with pleasant quality. The relatively flat saturation curve, no doubt, has something to do with this.

Altogether it makes an attractive component and gives good value for the low price of 12s. 6d.

One of the range of new Telsen transformers. This is the Radiogrand model

A Novel Switch

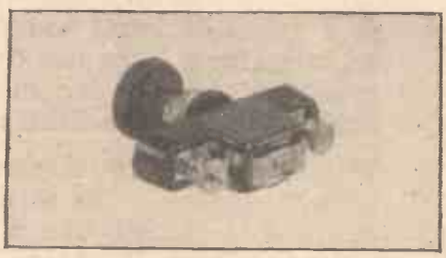
MANY readers will have been irritated at various times with a push-pull switch which has become slightly dirty. On rotating the spindle the contact varies considerably, producing a nasty crackling noise in the speaker, and one often has to rotate the switch two or three times before finding a satisfactory point of good contact.

In an endeavour to overcome this defect a switch has recently been produced known as the Busco. This switch is a most ingenious piece of work. The main body of the switch is a moulding which carries two spring contacts.

Connection is made between these two by a bridge piece which is fixed to the end of the operating plunger. When the plunger is pulled out, this bridge piece is pulled down into contact with the spring and makes a sound electrical contact. On pushing the plunger in the contact is removed.

The motion of the bridge piece is constrained within the moulding so that the spindle cannot rotate at all, while a small spring fitted to the bridge piece rides in the moulding in such a way as to give a definite "click" action to the switch.

Altogether the switch is a very commendable production, and as it sells at only 1s. 3d. we think it should make a good appeal.



This switch has a snap contact with a very definite action

Pertrix H.T. Battery

THE standard Pertrix H.T. battery, manufactured by Britannia Batteries, Ltd., is capable of giving an exceptionally long and consistent life for the size of cell employed. This is borne out by recent tests carried out in these laboratories on two standard-capacity 60-volt Pertrix batteries. These units are made in compact form and are totally encased in a strong cardboard cover measuring 6 in. by 5¼ in. by 3 in. high.

Tappings are taken at 6 volts and 10½ volts to provide grid bias, and at every additional 10 volts up to 60. These tapping points are accessible only through sealed holes in the cardboard container.

A high-tension battery employing a novel chemical principle and giving very efficient results—the Pertrix

In the construction of the cells certain modifications are made from standard practice; for example, no sal-ammoniac whatever is used. During a continuous test carried out under a discharge commencing at 7 milliamps. and falling to 3½ milliamps., the battery lasted 335 hours, giving a useful capacity of 1,750 milliampere hours—quite a fine performance.

The fact that the two samples tested gave the same output indicates their consistency of performance.

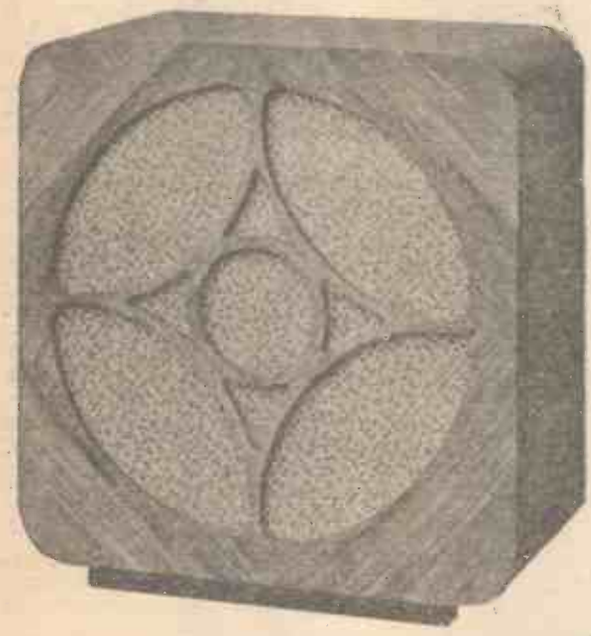
A STAND-TO-STAND REVIEW AND GUIDE NEXT WEEK'S "AMATEUR WIRELESS"

Football has already commenced a new season in Scotland, and is taking its place in the broadcast programmes. Eye-witness accounts after the games are being favoured by the B.B.C. meantime, and each Saturday evening one or other of the most important games is being described by an expert. It is found that eye-witness accounts are more popular with a considerable body of listeners than running commentaries.

A patent has just been taken out by Thaddeus S. Casner of Plainfield, N.J., for a device for correcting clocks in accordance with a code of radio impulses, such as those sent out by the Government time signal stations. The device is electro-mechanical in its operation, being tuned to a particular signal or set of signals and automatically setting a clock accordingly.

TWO OF THE BLUE SPOT RANGE

Blue Spot TRADE MARK

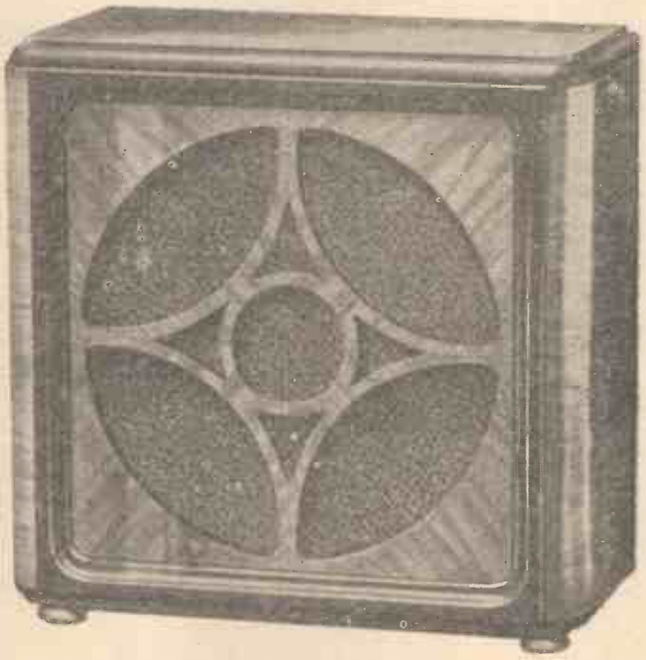


41K This speaker's arrival on the market is a great event in wireless history—accurate reproduction at a popular price. Almost every home in England can now have its Blue Spot speaker. Housed in a beautiful walnut case this fine speaker costs **£2:10:0.**

29R This is quite definitely the best Blue Spot Speaker that has yet appeared. There is no higher praise.

Whatever type of programme you enjoy, you will enjoy it better with this magnificent speaker. If your taste is for chamber music you can now hear it as hitherto you could only hear it in the concert room; if you prefer jazz you can listen to it with all its pep and snappiness.

And the cabinet is a beautiful piece of furniture in keeping with its wonderful output. Price **£6:6:0.**



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Wireless Waves & Their Funny Ways

FUNNY, isn't it, how often there is a catch about things in wireless? When, for instance, the short waves began to be developed and it was found that tiny power was sufficient to convey morse and even spoken messages across huge distances, one of the chief problems in world communication appeared to have been solved. But the short waves soon showed that they were not going to let inventors have it all their own way.

It was soon found that if you adopted a certain wavelength, fading of the most disconcerting kind took place at hours which varied to some extent with the season of the year You could improve matters by having two wavelengths for your station, one suitable for darkness and the other for daylight working, but still strange things might happen.

However, by the use of larger power and the careful choice of wavelengths it became possible to maintain communications day and night at all seasons of the year. But sometimes work has to be slowed down considerably because Dame Nature starts playing one of her little pranks. She makes the conditions so good, that transmitted rays pass from the sending to the receiving aerial, then go on round the world and arrive a second time. If you work out the time that the waves take to travel round the world, moving at a speed of 186,000 miles a second, you will see that this comes to just a little under a seventh of a second. On their second lap the signals often come in quite strongly and the result is that the unfortunate operator at the receiving end is horribly confused by the secondary signals.

Even amateurs using their low power suffer from this effect; in the early hours of a recent morning one friend of mine who was working with South America found that he had to bring his rate of sending down to beginner's speed in order to be understood by the fellow at the other end.

Another Curiosity

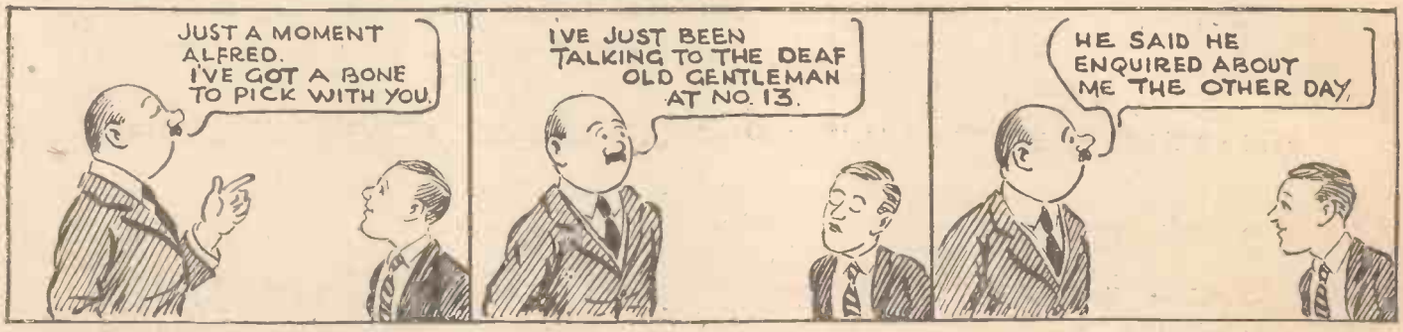
Dame Nature has another little joke which she is quite fond of playing. When you are sending you hope, of course, that the bulk of your radiation will go straight out from your aerial to that of the man with whom you are working. Some must go in the opposite direction, but usually this just fritters away its energy and accomplishes nothing. Or it may happen that conditions are almost equally good both ways round the world. Then what we may call the forward radiation goes straight from aerial to aerial and the back radiation travels the other way round the world, arriving, owing to its longer path, just a little later and again playing pranks.

Even the beams are not free from this kind of thing. By means of a parabolic reflector you can focus light rays into a pencil so that a searchlight is made to send forward all that its arc produces. But you cannot do quite the same by present beam methods with wireless waves. Try as you may, some of the radiation will escape backwards through the reflecting screen, and if conditions are good for travelling the long way round the world, this back radiation will give rise to confusing echoes at the receiving end.

One distinctly interesting manifestation of these echoes was observed recently during beam experiments in television between the United States and Australia. It was found that in addition to the main image another fainter one was to be observed close beside it in the viewing lens. These ghosts, as they are called, are pro-

(*Continued on page* 280)

MR. FLEX HAS A BONE TO PICK WITH ALFRED—



—ABOUT A SLIGHT MISUNDERSTANDING.

1931 "EKCO" TABLE

The accepted Encyclopaedia of All-Electric Radio.

"EKCO-LECTRIC" RECEIVERS

		REMARKS	PRICE COMPLETE D.C.	PRICE COMPLETE A.C.
Model 312	Detector and Pentode Valves	Cabinets of "Tenacit Bakelite" in three tones; dark jade, dark mahogany and medium oak to match any furnishing scheme. Models 312 and L.S.1 or Models 313 and L.S.2 form one symmetrical unit.	£14-10-0	£14-10-0
Model 313	Screen Grid, Detector and Pentode Valves		£22-10-0	£22-10-0

"EKCO" LOUD-SPEAKERS

"Ekcone" L.S.1	Incorporates balanced armature movement		£4-10-0	
"Ekcoil" L.S.2	Incorporates very latest type moving-coil unit		£8-12-6	£11-0-0

ALL-POWER UNITS

MODEL	H.T.	OUTPUT L.T.	G.B.			
C 1. A	60 m/a., 4 tappings S.G.; 0-120 var., 120/150-v. and POWER.	·3 to 1 amp. max. at 2, 4 or 6-v.	7 tappings up to 21-v.	Completely Electrify Your Radio Set with no alterations whatsoever to set, wiring or valves. Westinghouse Rectifier in A.C. Models.	——	£17-15-0
C 2. A	20 m/a., 3 tappings S.G.; 60 and 120 150-v.	·2 to ·5 amp. max. at 2, 4 or 6-v.	5 tappings up to 12-v.		——	£10-17-6
C 2. B	25 m/a., 4 tappings S.G. 60, 120/150 v. and 170-v.	·2 to ·4 amp. max. at 2, 4 or 6-v.	5 tappings up to 12-v.		£6-17-6	——
C P. 1	20 m/a., 3 tappings S.G.; 0-120 var. and 120/150-v.	·25 amp. at 2, 4 or 6-v. (Trickle Charger)	——	Fits quickly and snugly into any Portable Set.	——	£6-0-0
A C V	30 m/a., S.G. and 150-v.		(Raw A.C.) 4-v. from 2 to 4 amps. 6-v. from ·25 to 1 amp.	Can be built in any set to make it "All-Electric."	——	£6-0-0
CONTROL UNIT				Accessory to Model A C V	£1-5-0	

H.T. UNITS

MODEL	CURRENT OUTPUT	VOLTAGE TAPPINGS		
2 F. 10	10 milliamperes. For 1-3 Valve Sets or	60 and 120	£1-19-6	——
2 A. 10	those not requiring more than 10 m/amps		——	£3-10-0
3 F. 20	20 milliamperes. For 1-5 Valve Sets or	S.G.; 60; 120/150	£1-17-6	£3-19-6
I V. 20 (Portable)	those not requiring more than 20 m/amps	S.G.; 0-120 var.; 120/150	£2-10-0	£4-12-6
I V. 30	30 milliamperes. For Multi-valve Sets or those not requiring more than 30 m/amps	S.G.; 0-120 var.; 120/150; 150/170	£2-19-6	£5-15-0
4 T. 60	60 milliamperes. For Multi-valve Sets or	S.G.; 0-120 var.; 120/150; POWER	£3-15-0	——
4 A. 60	those not requiring more than 60 m/amps		——	£8-10-0

OTHER UNITS

T. 500	Trickle Charger	Charges 2, 4 or 6-v. Acc. From A.C. Mains at ·5 amp.	——	£2-12-6
R. A. 20	Rectifier Unit	For attaching to D.C. Units for use on A.C. Mains	——	£3-10-6
L. T. 1	L.T. Unit	2-6 volts from ·3 amp. min. to 1 amp. max.	——	£8-15-0
I. Tr.	Isolating Transformer	For isolating speaker, etc., from set when using a Power Supply Unit	15s. 0d.	

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Receiver Model 312.

EKCO

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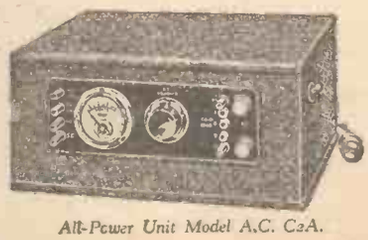

All-Power Unit Model A.C. C2A.

ALL-ELECTRIC RECEIVERS & POWER SUPPLY UNITS

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E. K. COLE, LTD., Dept. K, "EKCO" WORKS, SOUTHEND-ON-SEA.

380

"WIRELESS WAVES AND THEIR FUNNY WAYS"

(*Continued from page 278*)

duced by wireless echoes. In certain conditions a number of ghosts may be produced in the television viewing lens owing to back radiation and to double lapping of the world by the forward part of the beam. The commercial operator suffers from the same kind of thing on occasion and tears his hair.

Strange Echoes

And there are echoes stranger even than those already described. One type, at first vaguely suspected and now definitely recognised, occurs at an interval of rather less than three seconds after the main signal. A brief calculation will show that the waves which are responsible for this kind of echo must have covered the best part of half a million miles in their journey from the transmitter to the receiving aerial. No one can say definitely what it is that reflects them, but it is a curious fact that the distance they travel corresponds pretty exactly with that of a journey to the moon and back. Is the moon responsible for catching waves that have made their way out through the Heaviside layer and turning them back to earth? We cannot say definitely as yet that this is so, though most short-wave enthusiasts will have noticed that the phases of the moon and her position in the sky have a very distinct effect upon long-distance reception.

The three-second echoes are mystifying enough, but there are others far more perplexing. Careful observations have revealed the presence of quite powerful echoes at times as much as from twenty-five to thirty seconds after the arrival of the main signal. The journey here involved for the wireless waves responsible is a matter of five million miles. Until recently it was believed that nothing but the continuous and unchanging ether of space was to be found at such a distance from the surface of this little earth of ours.

A New Theory

The most recent theory, though, argues that there is a kind of secondary Heaviside layer somewhere between two and three million miles away. We know that the earth forms a gigantic magnet whose north and south poles do not coincide with their geographical equivalents. A Norwegian scientist who has investigated the matter of long-distance echoes has advanced the theory that electrons shot out from the sun are marshalled by the earth's magnetic field into a kind of toroid surrounding us. According to him, short-wave signals can and do pass occasionally through the Heaviside layer, travelling outwards into the realms of space. There they encounter the electron layer from which they are reflected back to earth.

An Interference

These very long-distance echoes are seldom powerful enough seriously to affect either hand-operated or automatic wireless. But both morse and telephony do suffer at times in beam radio from the back radiation that takes place through the reflecting screens. The problem of overcoming back radiation is one of the most urgent in wireless to-day, but so far no complete solution has been found. Scientists never say die and before long we may hear that some method of preventing beamed waves from erring and straying has been discovered.

THERMION.

"Amateur Wireless and Radiovision." Price Threepence. Published on Thursdays and bearing the date of Saturday immediately following. Post free to any part of the world: 3 months, 4s. 6d.; 6 months, 8s. 9d.; 12 months, 17s. 6d. Postal Orders, Post Office Orders, or Cheques should be made payable to "Bernard Jones Publications, Ltd."

General Correspondence is to be brief and written on one side of the paper only. All sketches and drawings to be on separate sheets. **Contributions** are always welcome, will be promptly considered, and if used will be paid for. **Queries** should be addressed to the Editor, and the conditions printed at the head of "Our Information Bureau" should be closely observed. **Communications** should be addressed, according to their nature, to The Editor, The Advertisement Manager, or The Publisher, "Amateur Wireless," 58-61 Fetter Lane, London, E.C.4.

RADIOGRAMS

THE National vaudeville programme on September 18 includes a sketch, *My Flight Round Nelson's Column*, by Ralph Neale, which the popular comedian, Leslie Henson, will interpret to listeners. Another original sketch, *The Ordeal of Osbert Mulliner*, by P. G. Wodehouse, is in the same "bill." Extra turns will be given by Cicely Courtneidge, Stuart Ross and Joe Sargent, Paul Schramm, and Diny Soetemeer. This entertainment will be broadcast regionally on September 15.

Artistes taking part in the National vaudeville concert on September 20 are Teddy Brown, "Stainless Stephen," The Fayre Sisters, The Two Pairs, and Philippa Heron and Harold Waldron, two newcomers to the microphone.

National listeners on October 7 are to hear a recital by Albert Sammons (violin) and Keith Falkner (baritone).

The part of Alice, in *Through the Looking Glass*, which will be broadcast on September 15, is again to be taken by Jessis Tandy. Other artistes in the cast are Ben Webster, Hilda Bruce Potter, and Philip Wade. Music will be provided by the B.B.C. Orchestra, conducted by V. Hely-Hutchinson. Listeners will also hear the Wireless Singers, John Armstrong, Esther Coleman, and Olive Groves.

Pedro Morales, the well-known Spanish composer and poet, is to conduct a concert of Spanish music to be given in the Midland Regional programme on September 24.

One of the most successful of broadcast concert parties is the Duds Concert Party from Liverpool. It will provide a programme for North Regional listeners on September 11.

"How the Talkies have Changed Hollywood" is the title of an interesting chat to be broadcast by Mr. Cedric Beefrage in the National programme down for transmission on September 16. Mr. Beefrage, a journalist recently returned to London after a three years' stay at the United States film centre.

A repeat performance of *George Proposes*, a one-act play by James Hodgson, is to be given in the Manchester studio on September 17.

The Healing Herb, a Tyneside comedy by E. A. Bryan, is down for broadcast to the whole of the Northern region on September 20. Newcastle listeners have heard this amusing little play on several occasions.

An extravaganza, entitled *That Reminds Me*, will be produced by Charles Brewer for Midland Regional listeners on September 25.

The Italian authorities have decided to erect a 10-kilowatt broadcasting station near Opcina in the neighbourhood of Trieste; it will be brought into operation before the end of the present year.

Dr. Malcolm Sargent will conduct the Beethoven concert given by the British Women's Symphony Orchestra at the Queen's Hall, London, on September 27. The broadcast is to be relayed to the National transmitters.

In order to ascertain whether listeners were able to detect the difference between the transmission of a gramophone record and the same composition played in the studio by a "live" orchestra, the Frankfurt (Germany) station recently offered prizes in an original competition. The results proved highly satisfactory to the studio engineers, inasmuch out of 16,274 replies, only 52 supplied the correct answer.

What are the Sound Waves Saying?

THE sound of a Hungarian rhapsody by Liszt always provides something of a musical thrill. In 1811 it was said that a large and brilliant comet illuminated the sky. It has always been thought that only the earth's greatest souls are born under a comet. Naturally, I cannot state how many babies contrived to make their appearance under that particular comet, but I do know that Liszt was one of them.

Until he was turned six he was subject to fainting fits of such a nature that his appearance closely resembled that of death. Notwithstanding this, he managed to live to be seventy-five, which, I suppose, must say something for being born under a comet.

His father took him to Vienna when he was nine; Beethoven was living there at the time and Liszt senior sought to effect an appointment with him. Beethoven, you must understand, was not a very genial person and was not fond of strangers; prodigies he detested in any case.

But Schindler, afterwards Beethoven's biographer, managed to work the oracle, and the Liszts were admitted into the great presence. "*Was kann er spielen?*" growled Beethoven, as he cast a glance at the rather wild-looking lad. "What can he play?" he repeated. "Almost anything you can name from Bach to Hummel," said the proud father.

Beethoven snorted. "Can he play this?" he asked, poking out the subject of a piano fugue by Bach in C sharp minor in a careless fashion.

A Question of Keys

The young man was distinctly annoyed. He was only nine, it is true, but he strongly objected to being referred to in the third person. His temper was up and, childlike, he was out to show off a little. "O yes, I can play that," he said quickly. "*What key would you like it in?*"

Beethoven did not quite expect this. "Try it in *D minor*," he said after a moment's thought, knowing well that the transposition would not be an easy one. Liszt obliged and played fluently from memory in that key. This roused Beethoven's interest with a vengeance. "Now do it in E minor," he commanded. Little Franz executed a smart modulation of his own into the key named and began again. He did not get very far. Beethoven dragged him from the piano and kissed him. "You little flash of lightning," he said (*Blitzbube*).

Liszt's career was an amazing one. After travelling extensively he settled for a time in Paris, where he met Victor Hugo and Chopin. His greatest activities were, however, at Weimar. By this time (1849) he had become very friendly with Wagner, and produced several of the latter's operas at the Weimar theatre.

He had now made enough money for his needs, and from 1847 to 1886, the year of his death, he gave away nearly every penny he received. In 1837, when the Danube caused so much damage at Pest, Liszt had given concert after concert to help the destitute. Two years later, when he found that the inhabitants were raising a fund to erect a statue to him, he insisted that the money should be given, instead, to a poor sculptor who had had bad luck.

Surely no pianist ever practised as Liszt practised in his younger days. One day he was questioned on the point. "My dear Carl," he replied, "I never took count of the hours I practised, but I do know that for many years it was never *less* than ten hours a day."

Strelezki's writings on Liszt are interesting. He would have us believe that Liszt's tone was always subdued in character, but I take leave to doubt him. Liszt could, and did, play very softly at times, but he also broke hammers, even wires. When that happened there was usually a scrimmage amongst the ladies in the audience to possess themselves of the broken wires, which they converted into bracelets.

On the other hand, Liszt never produced *bad* tone. Neither could he tolerate it in another player.

An American Joke

The greatest joke about Liszt was when an American woman brought her young daughter, a budding pianist, to play to him. "Our Mamie can knock spots off a pi-anner," she assured him, in the sort of tone one hears on the talkies nowadays. Liszt did not know much English at any time, and this beat him completely. He turned to Strelezki for translation, who gave the good Abbé to understand that the lady wished to acquaint him with the fact that her daughter's technique was of a high order. Liszt accepted the translation, but was a trifle suspicious.

NEXT WEEK

A COMPLETE SHOW GUIDE AND STAND-TO-STAND REVIEW

"Mamie" asked what she should play. Liszt replied that it was all the same to him. "Do you know Mendelssohn's music?" was her next question. "A little," said Liszt, with a wink at Strelezki. "Then I will play you the *Bee's Wedding*," she announced. "No, don't do that," said Liszt. "Play me the *Spider's Divorce*!"

Liszt was everything he wanted to be: a pianist with a technique unsurpassed; a composer with a sure and certain aim. His powers of orchestration were unapproachable; he even became a priest in his spare time. He could never hear a confession properly or say a Mass correctly, but he made up for that by his generous, priestly actions.

WHITAKER-WILSON.

"ARE BAND-PASS FILTERS WORTH WHILE?"

(*Continued from page 270*)

transfer over the whole of the scale. Two forms of band-pass filter are shown in Fig. 3. The first of these uses a magnetic coupling between the circuits. With this arrangement the coupling increases as the wavelength decreases. Hence, if one adjusts the coupling to be correct at the top of the scale it is too strong at the bottom of the scale and serious "double-humping" occurs. If, on the other hand, one arranges the coupling to be correct at the bottom of the scale, then the signal strength is intolerably weak at the top.

With the second form of circuit a capacity coupling is employed, and exactly the same thing happens here, only in the opposite direction, the coupling increasing as the wavelength increases. This defect is to some extent offset, with the capacity-coupled circuit, because the circuits themselves are not so effective on the higher wavelengths, and the increased capacity coupling at 500 metres tends to offset the natural fall in sensitivity of the circuits themselves. This circuit, therefore, is a better arrangement.

Neither circuit, however, is really satisfactory. There is a marked change in the coupling between the two ends of the scale, introducing double-humping to an unpleasant degree at one end or the other, particularly if one endeavours to obtain a strength of coupling which will give a reasonable signal strength.

Many experiments were made in an endeavour to find a satisfactory solution to the problem. All manner of coupling arrangements were tried. Even combinations of capacity and magnetic coupling were adopted in an endeavour to produce a constant energy transfer, but none of them overcame the difficulty that the signal strength was too weak, in my opinion, for the band-pass filter to become really popular.

Towards the end of the experiments, however, a radically different method of coupling was adopted, and the results at once gave promise. Further investigation showed that this system should theoretically overcome the disadvantages referred to, and further practical tests showed that this was indeed the case. The coupling could be increased with this system to such a point that the signal strength, even with the band-pass filter in action, was distinctly good. So much so that one could afford to put in a change-over switch and compare the signal strength with and without the extra circuit. Moreover, with the required degree of coupling, no double-humping was experienced, and the system really seems to be a practicable one. Details of this system will be given in next week's AMATEUR WIRELESS.

When a Houston (Renfrewshire) man was fined £2 in Paisley Sheriff Court for using a wireless set in his house without a licence, the prosecutor read a letter in court from the Postmaster-General explaining the difficulties which were being experienced in tracing such persons, and suggesting, on conviction, the imposition of a substantial penalty.

THE "DOUBLE-TWO" SET

Here is the "Double-Two" receiver complete with accessories recommended—a Sparta H.T. Battery and accumulator, and an Amplion speaker.

ABOVE we show a very interesting product of Hustler Simpson and Webb, Ltd., of 55-57 Tanner Street, Bermondsey, S.E.1. The "Double-Two," as it is called, is an ingeniously constructed two-valve set, selling, complete with two valves, for 50s.

To complete the installation, an Amplion guinea cone, a Sparta 100-volt high-tension battery, and a 2-volt accumulator can be obtained altogether for 29s. 6d.

The "Double-Two" has a straightforward circuit, comprising a detector with reaction and a transformer-coupled power valve.

The tuning coil, wound on a small bobbin, is tapped to provide maximum strength on each of the stations received—National, Regional, and Daventry 5XX.

When the aerial is plugged into the lowest socket on the panel it is earthed, and the filament-current supply is automatically cut off.

The small compact layout of the "Double-Two" provides for extremely short connecting leads, thus improving the performance of the set.

AT THE QUEEN'S HALL

THE "Eroica Symphony" on August 29 was a delight, and so was the "First Pianoforte Concerto, but the finest concert this week has been the Brahms night on September 3. Cyril Smith made a great impression with his playing of the "B flat piano concerto," and later there was the "Third Symphony."

This has been called by enthusiasts for Brahms his "Eroica"; but this name is adventitious, depending on the numbering of the work, and it has more in common with the "Jupiter Symphony." All the movements have a certain all-embracing, classic form; the first two express eternal realities from varying aspects and the last two from all aspects. All symphonies of this type owe their existence to Mozart's "Jupiter" and Beethoven's "Fifth"; these two composers had the greater task of creating this musical expression, but Brahms is in the true apostolic succession. There is a vital, exuberant force in all three composers which marks the great artist.

There was a Wagner overture on Monday, *Faust*, which is interesting as an attempt by this composer to write a first movement of a symphony—also in the Beethoven philosophic tradition; and after the interval there was a very pleasant suite by Dohnanyi in the 1900 manner. L.R.J.

The present Berne broadcasting transmitter is situated at Nuremchen-buchsee, forming part of the wireless telephony and telephony plant operated by the Radio Suisse Company.

NEW TELSEN PARTS

THE present well-known Telsen components, such as the Radiogrand and Ace transformers, have won a wonderful reputation, and now comes news of the introduction of new members of the Telsen family.

Some of these are shown in the accompanying photograph, including an H.F. choke, two valve holders, and a fixed condenser with handy grid-leak clips.

From left to right, the new Telsen valve holder, H.F. choke, fixed condenser and low-frequency transformer

You should note that all Telsen parts for the new season are to be housed in very attractive and high-quality bakelite mouldings in a mahogany colour. This makes the whole range of Telsen parts very distinctive in appearance; they are all "good-lookers."

The Radiogrand and Ace transformers now have this attractive bakelite for the cases, and in the case of the Radiogrand, in particular, a metal shielding (inside the bakelite case) and an earthing terminal are provided.

The new valve holder is a thoroughly satisfactory job, which is certainly a likeable proposition at its low price. The H.F. choke has been put through its paces in the "A.W." Laboratory, and the report is most favourable. A good point, so far as manufacture is concerned, is that wherever lettering and terminal indication are necessary, the moulding in the bakelite is used; this is not so easily erased as is engraving.

A small variable condenser has also been produced, though this is not shown in the accompanying photograph.

The prices of these Telsen parts mark a new low level, and they will undoubtedly meet with a good reception on the part of set builders.

BROADCAST TELEPHONY

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

Metres	Kilocycles	Station and Call Sign	Power (Kw.)
GREAT BRITAIN			
25.53	11,751	Chelmsford (5SW)	15.0
*200	1,500	Leeds	0.13
*242	1,238	Belfast	1.0
*261	1,148	London Nat.	45.0
*288.5	1,040	Newcastle	1.0
288.5	1,040	Swansea	0.13
288.5	1,040	Stoke-on-Trent	0.13
288.5	1,040	Sheffield	0.13
288.5	1,040	Plymouth	0.13
288.5	1,040	Liverpool	0.13
288.5	1,040	Hull	0.13
288.5	1,040	Edinburgh	0.35
288.5	1,040	Dundee	0.13
288.5	1,040	Bournemouth	1.0
288.5	1,040	Bradford	0.13
*301	995	Aberdeen	1.0
*309.9	968	Cardiff	1.0
*356	842	London Reg.	45.0
*376.4	797	Manchester	1.0
*398.9	752	Glasgow	1.0
*479	626	Midland Reg.	25.0
1,554	193	Daventry (Nat.)	25.0
AUSTRIA			
*246	1,220	Linz	0.5
*283	1,058	Innsbruck	0.5
*352	851	Graz	9.0
*453	666	Klagenfurt	0.5
*517	578.5	Vienna	15.0
BELGIUM			
206	1,460	Antwerp	0.4
212	1,415	Binche	0.2
216	1,391	Chatelineau	0.25
216	1,391	Brussels (Conference)	0.25
243	1,235	Courtrai	0.1
244.7	1,226	Ghent	0.25
247	1,213	Schaerbeek	0.5
338.2	887	Forest	3.0
*509	590	Brussels (No. 1)	1.0
CZECHO-SLOVAKIA			
*263	1,139	Moravska-Ostrava	10.0
*279	1,076	Bratislava	12.5
293	1,022	Kosice	2.0
*342	878	Brunn (Brno)	12.0
*487	617	Prague (Praha)	5.0
DENMARK			
*281	1,067	Copenhagen	0.75
1,153	260	Kalundborg	7.5
ESTONIA			
401	748	Reval (Tallinn)	1.5
FINLAND			
*221	1,355	Helsinki	10.0
*1,796	167	Lahti	40.0
FRANCE			
210	1,430	Radio Touraine	0.5
222	1,351	Fécamp	0.7
235.1	1,275	Nimes	1.0
240.4	1,248	Béziers	0.3
249.5	1,202	Juan-les-Pins	0.5
255	1,175	Toulouse (PTT)	1.5
265	1,130	Lille (PTT)	0.7
*272	1,103	Rennes (PTT)	0.5
286	1,049	Montpellier	0.3
*287.2	1,044.6	Radio Lyons	0.5
294.5	1,018.5	Limoges (PTT)	0.5
304	988	Bordeaux (PTT)	1.0
308.9	971	(Vitus) Paris	1.0
316	950	Marseilles (PTT)	0.5
328.2	914	Grenoble (PTT)	0.5
329	911.8	Poste Parisien	0.5
345.2	869	Strasbourg (testing shortly)	15.0
370.4	810	Radio LL (Paris)	0.5
385	779	Radio Toulouse	8.0
447	671	Paris (PTT)	0.8
466	644	Lyons (PTT)	5.0
1,446	207	Eiffel Tower	12.0
*1,725	174	Radio Paris	16.0
GERMANY			
31.38	9,560	Zeesen	15.0
*218	1,373	Flensburg	0.5
*227	1,319	Cologne	4.0
*227	1,319	Münster	3.0
*227	1,319	Aachen	0.35
232.2	1,292	Kiel	0.35
*239	1,256	Nürnberg	2.0
246	1,220	Cassel	0.25
*253	1,184	Leipzig	2.5
*259	1,157	Gleiwitz	2.0
*270	1,112	Kaiserslautern	0.25
*276	1,085	Königsberg	2.5
*283	1,058	Magdeburg	0.5
*283	1,058	Berlin (E)	0.5
*283	1,058	Stettin	0.5
*316	950	Bremen	0.35
*319	941	Dresden	0.25
*325	923	Breslau	1.5
*360	833	Stuttgart	1.5
*372	806	Hamburg	1.5
*390	770	Frankfurt	1.5
*418	716	Berlin	1.5
*453	662	Danzig	0.25
*473	635	Langenberg	15.0
*533	563	Munich	1.5
560	536	Augsburg	0.25
*566	529	Hanover	0.35
576.1	520.7	Freiburg	0.35
*1,635	183.5	Zeesen	26.0
1,635	183.5	Norddeich	10.0
HOLLAND			
31.28	9,599	Eindhoven (PCJ)	30.0
*299	1,004	Huizen (between 11.40 a.m. and 5.40 p.m. B.S.T.)	6.5
*1,071	280	Huizen	6.5
*1,071	280	Scheveningen-Haven	5.0
*1,875	160	Hilversum	6.5
HUNGARY			
210	1,430	Budapest (Csepel)	1.0
550	545	Budapest	20.0
ICELAND			
*1,200	250	Reykjavik (shortly testing)	16.0
IRISH FREE STATE			
*224.4	1,337	Cork (1FS)	1.0
*413	725	Dublin (2RN)	1.0
ITALY			
25.4 and 80		Rome (3RO)	9.0
247.7	1,211	Trieste (testing)	3.0
291	1,030	Turin (Torino)	7.0
332	905	Naples (Napoli)	1.5
381	788	Genoa (Genova)	1.0
*441	680	Rome (Roma)	50.0
453	662	Bolzano (IBZ)	0.3
*501	599	Milan (Milano)	7.0
LATVIA			
*525	572	Riga	7.0
LITHUANIA			
*1,935	155	Kaunas	7.0
NORTH AFRICA			
363.4	825	Algiers (PTT)	16.0
416	721	Radio Maroc (Rabat)	10.0
1,350	222.2	Tunis Kasbah	0.6
NORWAY			
364	824	Bergen	1.0
369	813	Frederiksstad	0.7
453	662	Nidaros	1.2
455	659.3	Porsgrund	0.7
*493	608	Oslo	0.5
POLAND			
214.2	1,400	Warsaw (2)	2.0
234	1,283	Lodz	1.5
*313	959	Cracow	0.5
*335	896	Poznan	1.2
381	788	Lvov	16.0
385	779	Wilno	0.5
*408	734	Katowice	10.0
1,411	212.5	Warsaw	8.0
PORTUGAL			
240	1,247	Oporto	0.25
320	937.6	Lisbon (CTIAA)	0.25
ROMANIA			
*391	761	Bucharest	12.0
RUSSIA			
720	416.6	Moscow (PTT)	20.0
800	375	Kiev	20.0
824	364	Sverdlovsk	25.0
1,000	300	Leningrad	20.0
1,060	283	Tiflis	10.0
1,103	272	Moscow Popoff	40.0
1,200	250	Kharkov	25.0
*1,304	230	Moscow-Stchelkovo (C.C.S.P.)	100.0
1,380	217.5	Bakou	10.0
1,481	202.5	Moscow	20.0
SPAIN			
251	1,193	Barcelona (EAJ15)	0.5
266.7	1,125	Barcelona (EAJ13)	5.0
*349	860	Barcelona (EAJ1)	8.0
368	815	Seville (EAJ5)	1.5
407	737	Madrid (España)	1.0
424	707	Madrid (EAJ7)	2.0
460	652	San Sebastian (EAJ8)	0.5
SWEDEN			
135	2,222	Motala	30.0
230.3	1,303	Malmo	0.6
*257	1,166	Hörby	10.0
299.6	1,001	Falun	0.5
*322	932	Göteborg	10.5
*435.4	689	Stockholm	1.5
*542	554	Sundsvall	1.0
*770	389	Ostersund	0.6
1,223.5	244	Boden	0.6
*1,348	222.5	Motala	30.0
SWITZERLAND			
318.8	943	Basle	0.5
*403	743	Berne	1.0
*459	653	Zurich	0.63
680	442	Lausanne	0.6
760	395	Geneva	0.25
1,010	297	Basle	0.25
TURKEY			
*1,200	250	Istanbul	5.0
1,961	153	Ankara	7.0
YUGOSLAVIA			
306.5	978.7	Zagreb (Agram)	0.7
432.3	694	Belgrade	2.5
574.7	522	Ljubljana	2.5

All wavelengths marked with an asterisk have been allotted according to the *Plan de Prague*.

"BEAM" AERIALS

IN ordinary radiation the waves tend to spread out in all directions, both horizontally and vertically. By using a number of half-wavelength antennæ, arranged side by side, the waves are first concentrated horizontally. The vertical "spread" is then reduced by arranging several "tiers" of similar antennæ, set one above the other, in a vertical plane. The complete aerial array thus forms a curtain of wires which radiate a "sheet" of in-phase current. The beam can be further concentrated by using a back reflector system, similar to the actual aerial array, but not directly energised. The larger the number of wire radiators, the sharper is the directional effect. M. B.

HOMODYNING

THE art of tuning-in to stations below the 50-metre mark calls for a certain amount of finesse. Searching is facilitated when the receiver is set just over the oscillating point. The distant carrier-wave is then first heard as a whistle. By careful tuning through the "chirrup" it is possible to reach the zero point, at which the frequency of the local oscillations is identical with that of the distant carrier.

This is called "homodyning," as distinct from heterodyning or producing a beat note. Under such conditions, telephony is recognisable. Once the zero point is reached, however, the receiver should be coaxed out of oscillation, without losing the signals, to ensure clear reproduction. B. A. R.

Postcard Radio Literature

Atlas Eliminators

CLARKE'S, the Atlas people, make eliminators to suit every type of set, and for A.C. and D.C. mains. Some of the models provide grid bias as well as H.T. and L.T. current, and in this way one can be entirely independent of battery bothers. I have just received a new Atlas folder which gives a wealth of technical information. Mains users should have this. **43**

Webson Moving Coils

Here is something interesting—a new moving-coil speaker, the Webson. There are several models, but I particularly like the small model which works from the mains or, with a special winding, from a 6-volt accumulator. Messrs. The Star Engineering, the makers, have a folder describing this. **44**

A New Transportable

The Electrocet transportable is a self-contained set with only two valves, but which has a very convincing performance.

(Continued on next page)

"POSTCARD RADIO LITERATURE"

(*Continued from preceding page*)

There is also a portable model two-valver which is designed more especially for outdoor use. From the Electrocet Radio Co. you can get a catalogue illustrating these, and also the new Electrocet H.T. and L.T. eliminators. **45**

Selector's Sets

Selector make a good range of sets from a cheap and efficient portable up to a comprehensive radio-gramophone in which nothing has been sacrificed to quality. There is a little folder available describing each of the sets in the range. Those who like the portable will be interested in the all-electric edition, which is made up in a transportable cabinet and is more suitable for home use. A feature of these sets is that they are fitted, in the battery models, with an accumulator capacity meter which gives a good idea of the amount of residual charge. **46**

For Mains Users

From Supremus Specialities, Ltd., you can get an interesting little booklet describing A.C and D.C. eliminators, trickle-chargers and all-electric two- and three-valve sets. There is plenty in this booklet to interest mains users. Supremus eliminators have a very good reputation—which is an important thing when it comes to working from the mains. **47**

GET THESE CATALOGUES FREE

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

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1930 Talisman 2 (D, Trans)	AW239
Easy Tune Short-wave 2 (D, Trans)	AW242
Searcher Two (D, Trans)	AW245
Brookman's Two (D, Trans)	WM168
New Crusader (D, Trans)	WM182
Radio-Record Two (SG, D)	WM187
Gleaner Two (D, Trans)	WM201
Music Monitor (D, Trans)	WM208

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Talisman Two-three (D, RC, Trans)	AW203A
Wide World Short-wave Three (HF, D, Trans)	AW207
Everybody's Three (SG, D, Trans)	AW209
1930 Ether Searcher (SG, D, Trans)	AW211
New All-Britain Three (HF, D, Trans)	AW214
Best-by-Ballot Three (SG, D, Trans) Price 4d. free with copy of "A.W."	AW217
Brookman's By-pass Three (D, 2 Trans)	AW220
Everybody's All-electric Three (SG, D, Trans)—A.C.	AW221
1930 Clarion Three (SG, D, Trans)	AW223
Beginner's Regional Three (D, 2LF)	AW232
Britain's Favourite Three 1930 (D, 2 Trans)	AW243
Car Three (D. R.C. Trans)	AW244
Standard Coil Three (HF, D, Trans)	WM117
Brookman's Three (SG, D, Trans)	WM161
Community Three (D, RC, Trans)	WM164
Brookman's Push-Pull Three (SG, D, Trans) 1/6	WM170
All-nations Three (D, 2 Trans)	WM178
Inceptordyne (SG, D, Pentode)	WM179
Brookman's A.C. Three (SG, D, Trans) 1/6	WM184
Music Marshal (D, 2 Trans)	WM190
Gramo-Radio D.C. Three (SG D Trans)	WM196
Concert Three (D, 2 Trans)	WM199
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De-Luxe Three (D, RC, Trans)	WM209

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1930 Monodial (2SG, D, Trans)	WM158
Electric Four (All A.C.—SG, D, RC, Trans)	WM162
Brookman's Four (2SG, D, Trans)	WM174
Transportable Four (SG, D, 2 RC)	WM180
Super Q (SG, D, 2 Trans)	WM189
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Simplest H.T. Eliminator for A.C. Mains	AW236
Choke Output Unit	AW240
Simple Tester Unit (6d.)	AW246
A.C. Mains Amplifier	WM149
H.T. Unit for A.C. Mains	WM159
"W.M." Linen-diaphragm	WM172
Brookman's "Wipe-outs"	WM186
Short-wave adaptor for Overseas Five	WM192
Staminator Unit for A.C. Mains	WM202
Universal Push-pull Amplifier	WM204
Outspan Short-wave Adaptor	WM207

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Music Leader (SG, D, RC, Trans) with copy "A.W."	AW203	-/4
Sunshine Three (SG.HF.SG.D, Trans)	AW235	1/-
Continental Portable (SG, D, Trans)	AW241	1/-
Pedlar Portable Two (D, Trans)	WM195	1/-
Pedlar Portable Three (D, 2 Trans)	WM197	1/-
James Portable SG3 (SG, D, Trans)	WM203	1/-
Foursome Portable (SG, D, 2 Trans)	WM206	1/-

Copies of the "Wireless Magazine" and of "Amateur Wireless" containing descriptions of any of these sets can be obtained at 1s. 3d. and 4d. respectively, post free. Index letters "A.W." refer to "Amateur Wireless" sets and "W.M." to "Wireless Magazine."

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Vol. XVII. No. 432 Saturday, September 20, 1930

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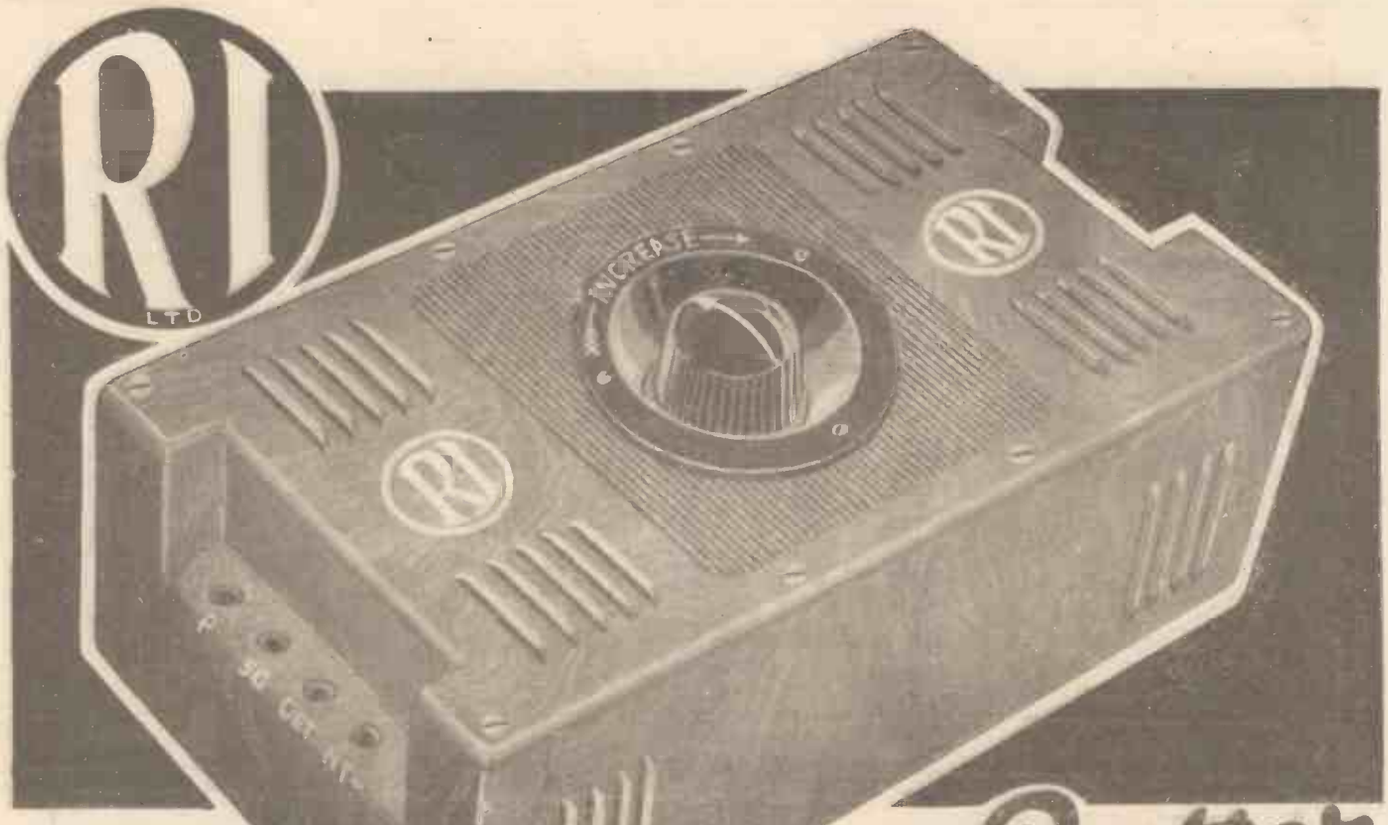

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Sells at a popular price.

A.C. MODEL - £4-15-0
D.C. MODEL - £2-12-6

SEE OUR STAND No. 61
RADIO EXHIBITION,
Ground Floor, Main Hall, Olympia.

NEW ALL-INSULATED H·T·UNIT

Nikalloy—the Marvellous New Metallurgical Discovery—has been applied by R.I. Research Workers and Engineers to a new H.T. Unit.

Absolutely Revolutionary in Safety, Efficiency and Economy, this "Nikalloy" H.T. Unit attains a new achievement for British Radio and R.I. Reputation, equalled only by the performance of the Big 3—the "Hypermu" and "Hypermite" Transformers and the "Hypercore" Choke.

Write or ask your dealer for illustrated descriptive leaflet.

SAFETY & EFFICIENCY NOTE THE MARK

ALL-INSULATED SAFETY FIRST RI LTD H·T·UNIT

R.I., LTD., "MADRIGAL" WORKS, PURLEY WAY, CROYDON.

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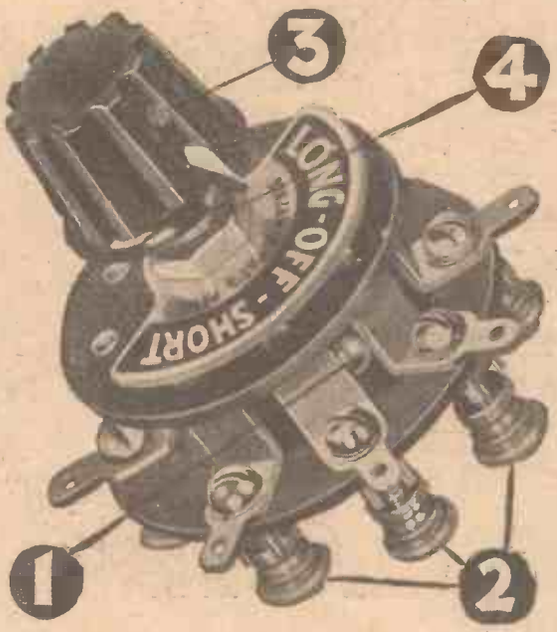


AN ALL ROUND SWITCH

1 2 3 4

1. One of the self-cleaning phosphor-bronze ball contacts is here seen making a firm connection between adjacent strips. On test, it breaks 10 amps. at 20 volts fifty times and shows definite improvement with use.

2. A special feature of this switch is the novel terminal which screws down into a castellated base holding, if necessary, several wires simultaneously in a vice-like grip. Soldering tags and contact strips are in one piece.

3. The Bakelite pointer knob is fixed to the spindle by a grub screw riding in a brass bush—no stripped female thread in the Bakelite!

4. The switch is fixed by drilling a single ¼ in. clearance hole in any metal or insulated panel up to ⅜ in. thickness. The indication dial reads LONG—OFF—SHORT on one side. The reverse is marked OFF only. (Your jeweller will engrave special lettering for a small fee).

Are you a judge of a fine piece of engineering? If so, this new Benjamin Rotary Switch will make an irresistible appeal.

Both electrically and mechanically it is a first-class job, and in appearance it is fit to take its place on the most luxurious panel.

The spindle carries at one end a bakelite pointer-knob and at the other a cross bar of bakelite into which is let two spring-loaded phosphor-bronze balls. As the knob is rotated the balls snick into the gaps between the heavy gauge contact strips and thus for any position of the switch, two pairs of strips are joined by a positive, low resistance, self cleaning connection. The eight terminals, or tinned soldering lugs, can therefore be connected up to your radio circuit in a variety of ways for different purposes, and this switch will perform all the functions of a double-pole change-over switch neatly, efficiently and rapidly.

Diagrams of several typical connections for this switch, and its small brother, the Single Pole switch, are given in our 1931 Radio Catalogue. A post card will secure your free copy by return.

3/6

WITH TERMINALS

WITHOUT TERMINALS

3/-

MAY WE HOPE TO SEE YOU AT STAND 115
WHERE ALL OUR PRODUCTS ARE SHOWN?

BENJAMIN

The Single Pole Rotary Switch is similar in construction to the Double Pole above. With terminals, 1/9. Without terminals, 1/6.

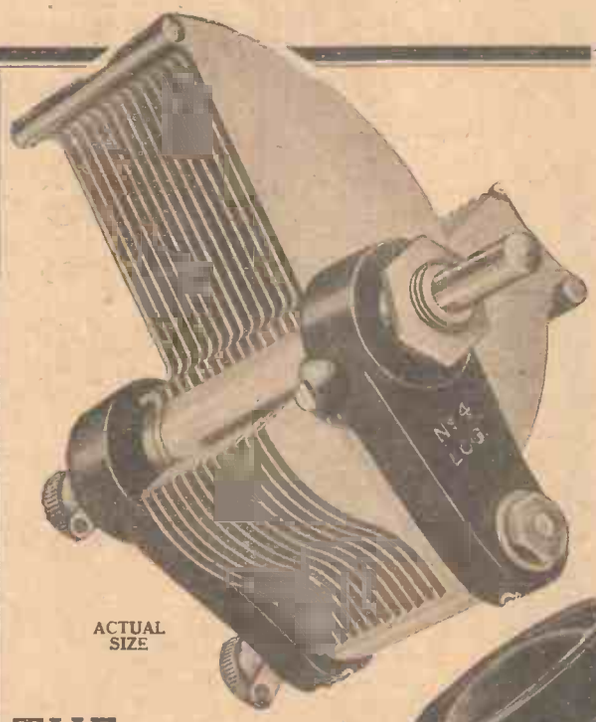
The famous Benjamin Push-Pull Switch, one-hole fixing, sells at: With terminals, 1/3. Without terminals, 1/-.

All Benjamin Switches and Valve Holders are fully illustrated and described in our Catalogue No. 1142. Free on request.

THE BENJAMIN ELECTRIC LTD., Tariff Road, Tottenham, London, N.17. *Tel.: Tottenham 1500.*

COMPACT... STRONG... ACCURATE...

2 New ORMOND CONDENSERS for Modern Radio



ACTUAL SIZE

THE ORMOND No. 4 LOG CONDENSER

Designed to follow the Logarithmic Law, it has such value that it will be found very suitable for use under average conditions in the modern receiver. The vanes are of aluminium, firmly secured to slotted spindles. The condenser ends are of best-quality bakelite, with the greatest possible reduction in size.

This condenser is not supplied with dial.

Capacity,	.00025	Price 4/-
,,	.00035	,, 4/-
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THE ORMOND No. 4 LOG SLOW MOTION CONDENSER

Direct drive is obtained by means of a beautifully finished 2½ inch diameter bakelite dial engraved 0 to 180 degrees. Slow motion ratio approximately 9 to 1 is obtained by means of the upper small knob.

Complete with 2½-inch dial and slow motion control knob.

Capacity,	.00025	Price 6/-
,,	.00035	,, 6/-
,,	.0005	,, 6/-

THE HALL MARK OF QUALITY—ORMOND

SOMETHING quite new in condenser design. Rigid, robust, and amazingly efficient, these new Ormond Condensers of skeleton construction have proved a great advance, both in convenience and efficiency. Most attractive appearance and beautiful finish.

A condenser which can be relied upon to give the maximum performance and the maximum satisfaction always. They are wonderful value.

See them at OLYMPIA
STAND No. 75
New Hall, Ground Floor

ENGINEERING "ORMOND" COMPANY LTD
Registered Trade Mark

THE
ORMOND ENGINEERING COMPANY, LIMITED,
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'Phone: Clerkenwell 5334/5/6 and 9344/5/6.
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THE BIGGEST HIT OF ALL •

THE OUTSTANDING ACHIEVEMENT OF ALL-MAINS RADIO

MODEL A.C. 188

A NEW WONDER ALL-MAINS UNIT

for

THE MULLARD 'ORGOLA'
THE OSRAM 'MUSIC MAGNET'
THE COSSOR 'MELODY MAKER'
AND ANY SET—
STANDARD OR PORTABLE

"CLARKE'S ATLAS" ALL-MAINS UNITS

EXPERTS agree that this remarkable new combined eliminator and trickle charger is the most successful Mains Unit ever produced. It fits the battery space inside most portable and cabinet receivers, and at a touch of the switch ensures constant high-and-low-tension current, year in and year out.

For A.C. Mains 200/250 volts, 40/120 cycles, incorporating the Westinghouse Metal Rectifier. Overall dimensions, 10in. x 5¾in. x 3½in. Two variable Tappings of 0/100 and 0/120 volts respectively, and one fixed of 150 volts. Output 25 m/a. Trickle Charger caters for either 2-, 4- or 6-volt accumulators. Complete with wander plugs and guaranteed for 12 months.

Price £6/0/0 cash, or 10/- down and seven monthly payments of 15/6 each and one of 14/6.

10/- DEPOSIT

For 100/125 Volt, 40/120 Cycle Mains ask for Model A.C.189 at the same price.

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OLYMPIA
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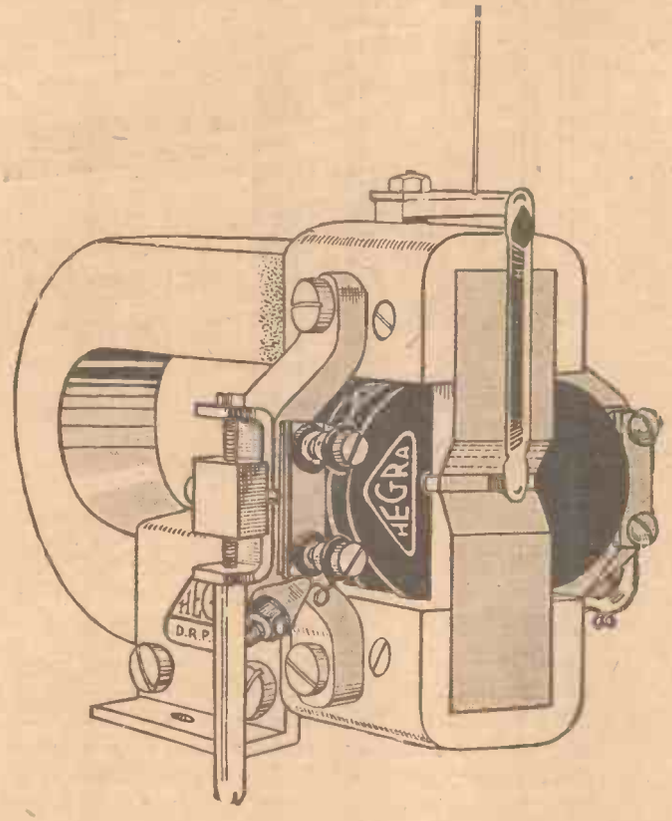
HEGRA

SELECTED BY "AMATEUR WIRELESS"



The Hegra "C" type 4-pole unit has been selected by "Amateur Wireless" in competition with a large number of other loud-speaker units, for incorporation in the range of "Amateur Wireless" single linen-diaphragm loud-speakers, which are on view on Stand No. 1 at Olympia. "Amateur Wireless" are also demonstrators of these speakers.

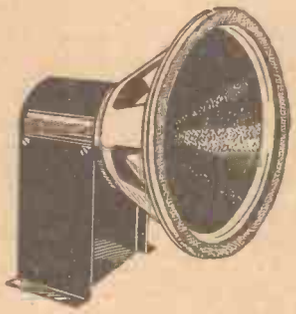
All radio amateurs are cordially invited to hear this speaker for themselves, and to verify the judgment of the "Amateur Wireless" authorities.

The Hegra "C" type unit incorporates a number of interesting features.

There is no terminal polarity. The unit is of stable construction, and is fitted with large permanent magnets, while a setting device is also included. This speaker gives amazingly faithful reproduction over the full range, and is equally well adapted for reproduction in large or small rooms.

Price of Unit, only - - - **19/-**

THE HEGRA TYPE "A" TONE CONTROL
Specially designed volume and tone control for use with gramophone pick-ups, and for any loud-speaker radio receiver. Special induction—free winding, silent in operation, and giving a perfect straight-line characteristic.
Type A: Complete with flex and two plugs, mounted in exceptionally well-finished black moulding - - - - - - - - **9/-**
Type B: Special model for amateur constructors in metal case, with one pole fixing - - **6/9**



HEGRA MOVING COIL SPEAKERS
Now represent the very latest scientific advances in this important branch of radio reproduction.
Model A.1. for battery or D.C. mains operation - **£4/10/0**
Model A.3. for A.C. operation **£6/0/0**

HEGRA "V" TYPE CABINET SPEAKER
Incorporating new "E" type flat unit. Specially designed to eliminate the necessity for adjusting device. Linear distortion has been entirely eliminated, and the resistance is tapped in three places, thus making the speaker suitable for any type of circuit.
Complete in cabinet—walnut finish - - - - - **£3/5/0**

ALL REPUTABLE DEALERS STOCK HEGRA PRODUCTS

HEGRA

M.C.12

A pleasure to assemble and then the BIG THRILL

You will not experience the slightest difficulty in assembling the "OSRAM MUSIC MAGNET 4." You will be directed step by step by a full size instruction chart. Results are certain. Afterwards the big thrill. Station after station you will tune in—whenever you want and whatever you want. This is real radio enjoyment.

SPECIAL FEATURES

1. The two Screen Grid stages give extreme selectivity and sensitivity with an unrivalled range.
2. Enormous amplification with perfect stability is given by the complete shielding of H.F. Circuits.
3. Equal efficiency guaranteed on both wave length bands.
4. Change of wave length is effected by an external switch and the set need not therefore be opened.
5. Maximum ease in tuning with a single knob controlling triple gang condenser.
6. Assembly is the essence of simplicity.
7. Volume control is provided not only to act as such, but to procure extreme selectivity.

You can learn everything that is to be learned about the "OSRAM MUSIC MAGNET 4" from the full size instruction chart that will be sent you POST FREE. Study it carefully. The coupon below is for your convenience.

PRICE £11-15-0 INCLUDING OSRAM VALVES GECOPHONE COMPONENTS AND POLISHED HEAVY OAK CONSTRUCTOR'S CABINET

Price applies only in Great Britain and Northern Ireland.

POST COUPON NOW for free Chart

HIRE PURCHASE TERMS

You can either buy your "OSRAM MUSIC MAGNET 4" for cash or on these attractive HIRE PURCHASE terms:

£1 : 3 : 6 deposit
12 monthly payments of
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BRITISH ISLES

Please send Instruction Chart to—

Name .....

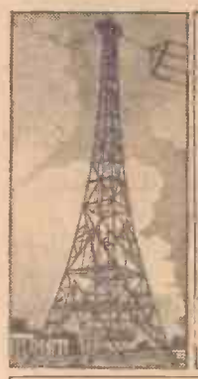
Address .....

The "Osram Music Magnet 4" Instruction Chart, The General Electric Co. Ltd., Magnet House, Kingsway, London, W.C.2. A.W.

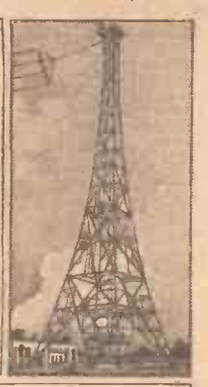
Cut out coupon and paste on postcard or enclose in unsealed envelope. Halfpenny postage in either case.

NATIONAL RADIO EXHIBITION see the "OSRAM MUSIC MAGNET 4" on G.E.C. Stands Nos. 86 and 86 Ground Floor, New Hall

No. 432. Vol. XVII SEPTEMBER 20, 1930



Amateur Wireless and Radiovision



EDITOR: BERNARD E. JONES.
TECHNICAL EDITOR: J.H. REYNER, B.Sc., A.M.I.E.E.
THE LEADING RADIO WEEKLY FOR THE CONSTRUCTOR, LISTENER & EXPERIMENTER.
RESEARCH CONSULTANT: W. JAMES.
ASSISTANT EDITOR: H. CORBISHLEY.

NEWS · & · GOSSIP · OF THE · WEEK

NOW SEE THE SHOW

WELL, here is the National Radio Exhibition at Olympia. Go and see the show, take this copy of "A.W." in your pocket, and make a point of visiting the AMATEUR WIRELESS stand, No. 1. And do make sure of getting the Second Special Show Number—next week.

ANOTHER DAVENTRY 5XX?

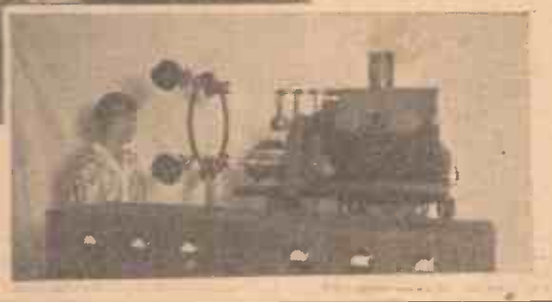
SOME time ago one of our contemporaries suggested that a second long-wave station would overcome the difficulty of giving alternative programmes to listeners whose only station was now 5XX. The B.B.C. emphatically denies the recent newspaper story that a scheme for a 1,000-metre transmitter was under consideration. "We have to fight to keep the present long-wave channel, so there is not much hope of ever getting another long-wave allocation." Still, little countries like Holland have managed to get two long-wave stations!

B.B.C. GOES WEST

BY all accounts, the site for the new West of England regional transmitter has been located. B.B.C. engineers have been prowling around the Quantock Hills, just behind Minehead. They seem to be resting there in the same significant way they did at Brookmans Park and Slaithwaite. With Cardiff only fifteen miles away, Welsh listeners in that city look like having the best reception facilities in the country, for they will presumably pick up the Northern regional transmissions, Brookmans Park transmissions, *and* those from the Quantock Hills.

OTHER REGIONAL DEVELOPMENTS

QUITE soon it is expected that arrangements will be completed for the purchase of a site at Falkirk, where the B.B.C. proposes to erect the Scottish twin-wave station. The Northern regional station is almost ready for engineering tests; it will certainly be on the air before Christmas, so rapid has been progress. The scrapping of several existing stations is being discussed. Bournemouth will be a difficult problem. Will the Quantock Hills transmitter satisfy Bournemouth listeners? That part of the world is an absolute hot-bed of reception.



Television at the Berlin Show. One of the interesting side-shows was a demonstration of the Baird and Mihaly systems of television. Here is the light-spot transmitter and the controls of the German Baird apparatus.

—AND AGAIN NEXT WEEK!

This is the First Special Show Number, containing a complete review of the exhibits and giving floor plans and full details of the Show. Next week the Second Show Number will include a critical survey of the outstanding exhibits, constructional details of our fine new set "The A.W. Exhibition 3," and a description of a new "two" by our Technical Editor.

ANOTHER BIG ISSUE — ORDER YOUR COPY NOW

OUR "BIG NOISES"

HOW many readers have seen what is the present power *rating* of the London 261-metre transmitter? It is 68 kilowatts!—one of the biggest noises in all Europe. The power of the London regional transmitter is also very high, being rated at 45 kilowatts. This compares with the 38 kilowatts of Daventry 5XX. The London National is therefore the most powerful B.B.C. transmitter at present in use.

VERY LOUD SPEAKERS

A MOST tactful hint to listeners making more noise than necessary when receiving B.B.C. programmes was recently broadcast from Savoy Hill. Asked if this procedure was likely to become a habit, the B.B.C. admitted there was a danger of over-doing this sort of appeal. But they will always give prominence in the news bulletins to convictions following disturbances from loud-speakers!

B.B.C. LICENCEES TO PAY

IN addition to helping the Treasury and the Post Office, B.B.C. licencees are now to provide programmes free of charge to the Colonies, through the new Empire transmitter. Asked by the B.B.C. for £34,000 to supply Empire programmes, the Colonial Office intimated that there was "nothing doing." So the B.B.C. has offered to supply programmes free of charge. "But only for five years, after which time," says the B.B.C., with characteristic optimism, "a real Empire audience

NEWS · & · GOSSIP · OF THE · WEEK —*Continued*

will have materialised, and we will then be in a position to suggest that they should pay for their own programmes."

BOLDER TALKS POLICY

IN the September to December programme of talks we note a much bolder outlook. The series on science and religion should create a very big radio audience. On Sundays, from 5.45 to 6.15 p.m., twelve of the most eminent thinkers of the country will discuss and explain their own ideas of the relation between science and religion. The Dean of St. Paul's, the Dean of Canterbury, and Professor Julian Huxley are among the contributors.

Great progress has been made with the Slaithwaite station, and this picture taken recently shows one of the masts in the course of erection. The building is nearly ready for the installation of the bigger plant such as the H.T. generators

"STANDING ROOM ONLY"

THIS intriguing title covers another bold series of talks on the future of the race. Professor Carr-Saunders will discuss the effect of population on unemployment and kindred problems. Leonard Darwin and Mrs. Mary Adams will examine the population question from the eugenic point of view, bringing into the talks the place of the unfit and reasons for the fall in the birth-rate. Such subjects are universally interesting and unreservedly acceptable from such an institution as the B.B.C.

NEXT WEEK:

THE "ARROW TWO"

A Receiver Employing Ohmic Coupling

A WELCOME CHANGE

WE understand from Savoy Hill that the B.B.C. is considering a slight rearrangement of specialised features. The fat-stock prices and Stock Exchange prices are to be tucked away in some less important niche in the programmes. But why go on pandering to the betting community with those wretchedly dragged-out racing results? This is another change that might be made.

B.B.C. AT OLYMPIA

IN addition to interesting exhibits, the B.B.C.'s stand is notable for the apparatus used to supply music to all the speakers operating in the Exhibition. This music may be obtained by the stands from either the National or Regional programmes, or from a gramophone or local microphone, or from the dance band. Sufficient power is available to operate 250 speakers at full strength. The power supplied to the last stage is 1.5 kilowatts.

A SERVICE SCHEME

A NEW service for members of the Radio Association is being offered. This is a national set-maintenance scheme, by which your set can be kept in adjustment by a local representative. Already this has been put into operation in England and Wales, and in one week 1,040 new members joined up. You can get full details from the General Secretary of the Radio Association, 17 Stucley Road, Hounslow ('phone, Hounslow 2949).

A SIGNAL PROBLEM

A COMPETITION has been organised by the Naples station to find a suitable interval signal. Sixteen notes played on a shepherd's flute is the present signal, but this does not seem to be regarded as satisfactory. And they do say that even the B.B.C. is toying with the idea of having an interval signal, and that the engineering department is "experimenting" with metronomes.

TOWARDS PERFECTION

MR. WATSON WATT, in a recent lecture on "What is Wrong with Wireless," regards the loudspeaker as the weakest link in the broadcast chain, because of its failure to reproduce musical notes in their proper perspective. Next in order of demerit comes the output or power valve, closely followed by the microphone at the transmitting end, with its tendency to "blast" on the louder passages.

Mutual interference, or overlap, between the many stations now operating in the narrow band of wavelengths available for broadcasting, is another matter calling for urgent reform. Fading and atmospheric disturbances remain the most difficult obstacles still to be overcome by the radio engineer.

DO YOU KNOW—

that if you use your set in the car and you are having trouble with loud "static" from the plug points, there is a simple cure? Interference from the sparking plugs themselves is best cured by putting a 10,000 or even a 25,000-ohm resistance in series with each plug lead. The resistance should be a wire-wound component, and if this is the case it will not be found to interfere with the intensity of the spark and the running of the engine. But it does cut down interference.

"NO-LOSS" BROADCASTING

CONSIDERABLE losses occur when broadcast waves pass over a densely-populated area, due to the absorption of energy by aerials, and by buildings and conducting structures generally. Such losses are more noticeable on short waves than on long. Inventors are already turning their attention to broadcasting on ultra-short wavelengths, which, by the way, can be concentrated into sharply-defined beams. One inventor, looking no doubt far into the future, proposes to transmit the waves in a horizontal plane some distance above ground-level so as to avoid unnecessary absorption. As the beam passes over each town, en route, a proportion of the energy is diverted downwards, by means of elevated wire reflectors.

Miss Gracie Fields is a listener as well as a broadcaster. Here she is seen at a Mullard Radio-Gramophone enjoying a programme with her husband, Mr. Archie Pitt, just before her trip to America

THE NEW "A.W." LINEN-DIAPHRAGM SPEAKER

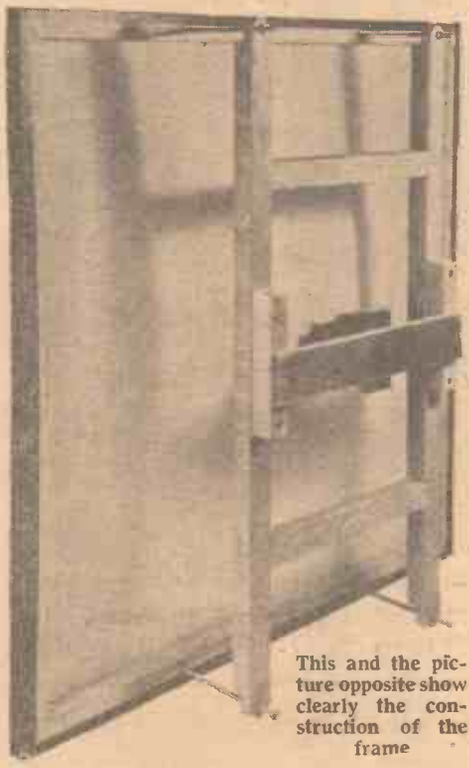
The consensus of opinion is that no type of speaker gives better results than the linen-diaphragm. This article describes a simple and improved model that can easily be made at home

A PIECE of history attaches to this new AMATEUR WIRELESS speaker. As readers for some years back doubtless know, the Technical Staff has, for about a couple of years, been carrying out experiments with speakers having two linen diaphragms.

Speakers first produced and published in AMATEUR WIRELESS about eighteen months ago had one large and one small diaphragm, and the theory was that the larger diaphragm dealt with the low notes and the smaller diaphragm reproduced the higher tones. That this was so, was well proved by results, for these early linen speakers were better than many moving coils. They certainly were a great success.

A Single Diaphragm

Now, the Technical Staff can claim to have real experience in the way of designing these speakers, and a new idea some few months back was the production of a special diaphragm speaker, using special paper instead of linen. This showed what could be done with only one diaphragm.



This and the picture opposite show clearly the construction of the frame

In this new speaker there is, as you see, only one diaphragm, and so the constructional work is greatly simplified. For a long while nothing suitable could be discovered in the way of a tensioner for the single diaphragm. Stranded wire of practically every kind had been tried, and it was found that the weaker wires snapped after a while, and wire stout enough to keep the tension constant either had a muffling effect upon the diaphragm, or else it had a resonant period which was noticeable on some notes, and which was not properly cured even by covering the wire with electrician's adhesive tape.

A suitable tensioner has been discovered, however, and this is simply Bowden cable, as used for the three-speed gears of bicycles. This wire is stranded, has a much greater strength factor than is needed, and—what is more important—is covered with a composition which effectively prevents the wire showing its resonance.

As there is only one diaphragm, construction should not take more than an hour or so, and no amateur need have any fear that he cannot make a proper job of the speaker. One main frame is necessary, of course, and although ordinary white deal is suitable, it is much better to make the frame, and also the back supports, of oak or other hard wood.

The blueprint, which can be obtained, price 1s., post free, from the Blueprint Department, AMATEUR WIRELESS, 58-61 Fetter Lane, London, E.C.4, shows the constructional details of the frame.

The Main Frame

Owing to the greater tension of the linen with this new arrangement, it has been found necessary to dispense with the rubber surround used in some previously produced linen speakers. The linen is simply glued to the frame.

The best-quality Irish handkerchief linen should be used for the frame, and constructors who want to make sure of getting the right material may prefer to purchase a set of parts, including dope and linen, such as is obtainable from Kone-Dope and other firms who specialise in linen speaker manufacture.

When the four sides of the frame have been put together, the linen should be cut to the required size—that is, a few inches larger each way than the frames—and should be firmly glued down along one side. The edge should be turned over the side of the frame so that the strain does not come directly on the glued surface.

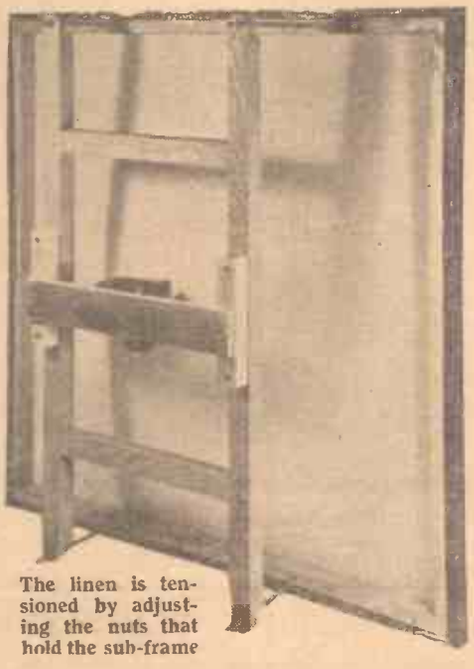
Then stretch the linen across the frame, turn it down the other side, and glue it along that edge. The other two opposite sides can be similarly dealt with. There is no need at this stage to stretch the linen very tightly.

A hole should next be made at the exact centre of the linen and, if possible, this should be made simply by inserting a sharp point between the threads and prising them apart. The usual linen cone washer can then be inserted. The exact centre of the diaphragm can, of course, be found by drawing diagonal lines.

The Sub-frame

The framework at the back of the main linen frame for holding the tensioning wires and supporting the speaker unit should next be assembled If possible, this should also be of hardwood. Two screw eyes should be inserted at the sides of the tensioning frame, as shown, and through these the tensioning wire is placed. This consists of a foot length of the Bowden wire already referred to. This is placed through one of the screw eyes and the end is twisted over and securely soldered.

(*Continued on next page*)



The linen is tensioned by adjusting the nuts that hold the sub-frame

"THE NEW 'A.W.' LINEN-DIAPHRAGM SPEAKER"

(Continued from preceding page)

At about the middle point the wire is twisted once under the chuck of the cone washer on the diaphragm and the other wire is then carefully measured and an exactly similar length to the other is carried up to the second screw eye, inserted through it, and also soldered.

Adjusting the Tension

The tensioning frame is supported away from the main frame on four lengths of 2 B.A. threaded rod. If plain linen is used, it should be given a preliminary coating of "dope"—using one of the many linen-speaker dopes now on the market, or collodion, or Titanine Emmaillaite—and the first tensioning carried out by adjustment of the 2 B.A. nuts.

With some diaphragms it will be found that further tensioning can be obtained by damping the linen with water (only when Kone "dope" is used) and allowing it to dry, when it will again stretch and take up the desired position.

Suitable Units

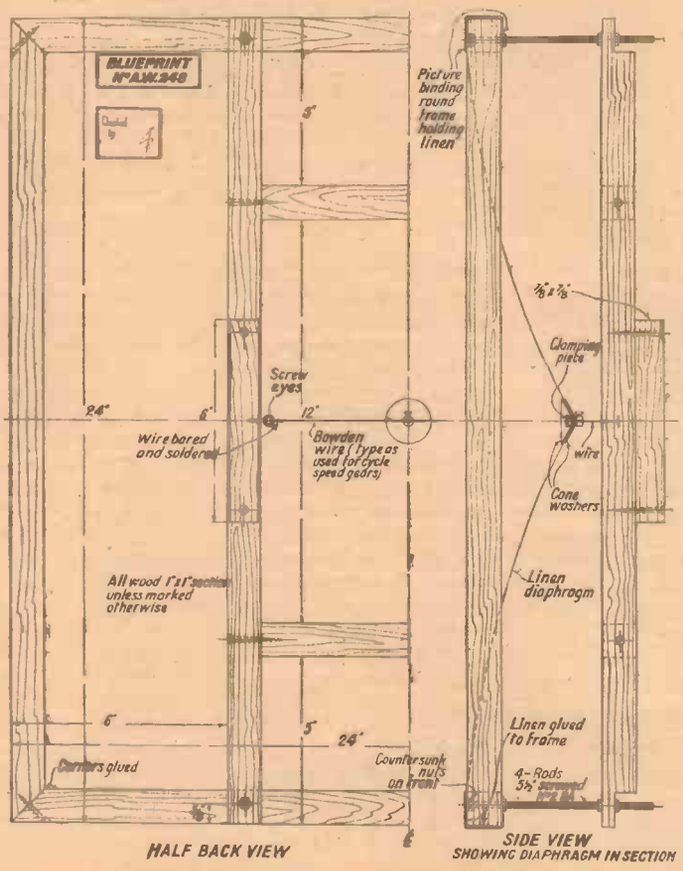
There are many types of speaker unit which can be used with this single-diaphragm speaker, but rather naturally the best results are not to be obtained unless a well-proportioned balanced-armature unit is used.

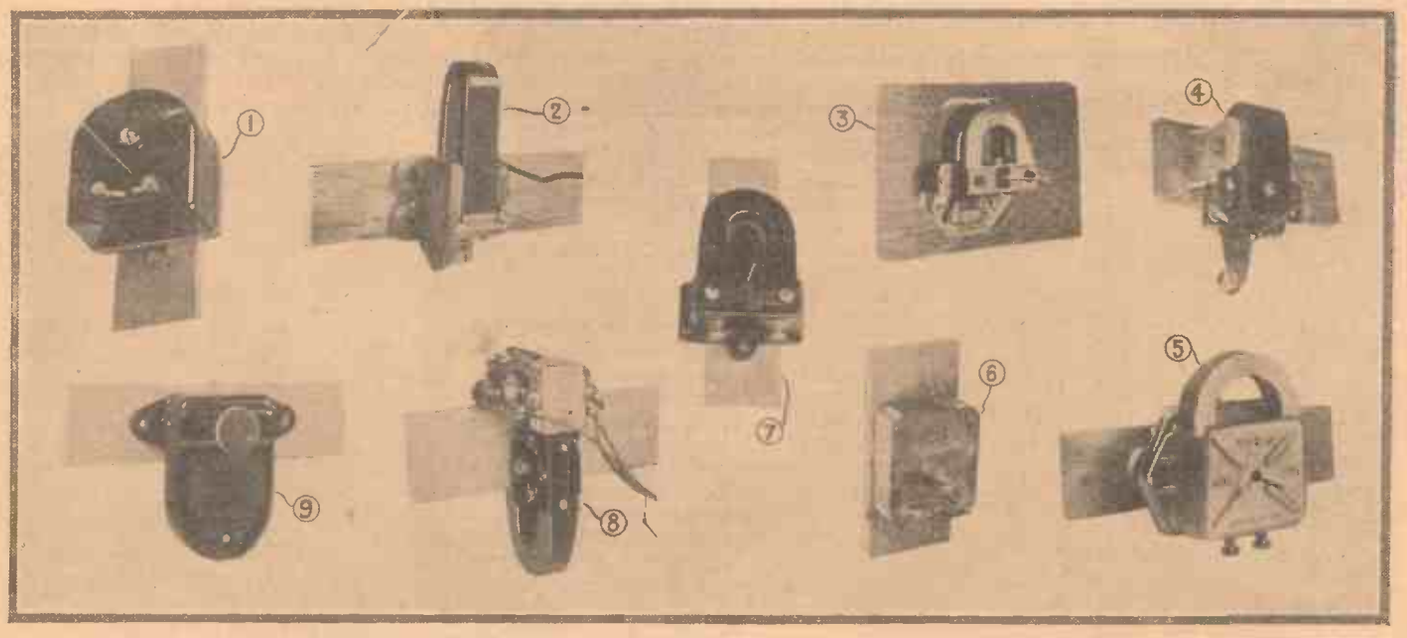
The unit is attached to a small strip of stout plywood, which can be screwed to the back of the tensioning frame.

It is rather important to make a good job of securing the unit driving rod to the cone washer in the diaphragm. The usual set screw provided should not be used for this purpose unless it is very stout. A safer plan is to use smaller nuts on the driving rod on each side of the cone washer.

That completes the construction of this new AMATEUR WIRELESS speaker. Now connect up the speaker unit leads and see what "moving-coil-speaker" results are obtained at the expense of so little time and trouble.

Above is a side view of the speaker, and on the right a working drawing, of which a full-size blueprint can be supplied, price 1/-





This picture shows the methods of fixing different units. The units shown are (1) Lissen, (2) Blue-Spot, (3) Tunewell, (4) Watmel, (5) Triotron, (6) Sheffield Magnet, (7) Ormond, (8) Hegra, (9) Brown

IS THERE AN IDEAL SET?

IT would be a difficult task to determine how many different types of receivers are in service.

Some sets, I know, are much like others, but the very fact that such small differences

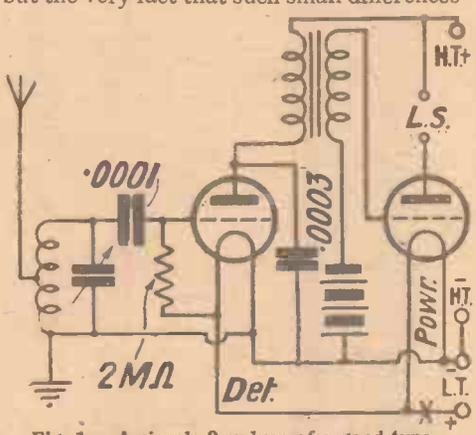


Fig. 1. A simple 2-valver of a good type

do exist proves the wide and critical tastes of numerous listeners.

Two sets may be identical, excepting that one is wired for a gramophone pick-up. One user plays his gramophone records electrically, whilst the other does not bother to do so. Numerous letters are received asking for slight modifications from existing published descriptions of sets. One would have thought that from all the sets described a reader would find one just meeting his needs.

But no, a set is chosen and a letter is sent asking whether this or that alteration is possible.

And so we wonder whether there is any set which, to special sections of readers, is an ideal one for their purposes. One section uses receivers with batteries; others are lucky enough to have mains units and use A.C. valves.

How many different three-valve sets there are! All provide approximately the same results, although, to be sure, one set is more selective than another. The volume from a third set may be greater than that from others, whilst a further set may excel in the quality of the reproduction obtained from it.

Yet another set might be very easy to tune, having single-knob tuning, as compared with a different type of set having numerous controls.

Then, again, we have those who consider a power-valve set to be right. Some have two high-frequency stages; others only a single H.F. stage and two low-frequency stages.

People often settle on the class of set desired on a cost basis, both the first cost and maintenance being considered. Those

At this time of the year when so many new sets are being made and purchased the question of whether any particular type is ideal is an important one. This article by W. James will be helpful in making a selection.

who have the best set regardless of this factor are the fortunate few. Others, on the other hand, may desire a certain standard of results. They want the local stations only, easy tuning, and good quality of reproduction. Two valves with plenty of high tension and a good reproducer bring them all they need. Having an outdoor aerial, much magnification is not needed.

Such a set is arranged as indicated in Fig. 1, the detector being of the so-called power type. With a low-impedance valve for detection, a good transformer, a large power valve, and ample high tension, this is a really good local-station set.

The set can be varied in several ways. One would be to feed the transformer through a resistance, as is often shown in these pages. A filter output circuit could be fitted, or a transformer. Some might even like to play gramophone records through a pick-up. I therefore show, in Fig. 2, a more complete two-valve set, having a jack for the gramophone pick-up and an output choke filter circuit, with the transformer resistance coupled.

With two valves quite enough magnification for playing records is available, except-

A LIST OF FULL-SIZE BLUEPRINTS OF "A.W." AND "W.M." SETS APPEARS ON PAGE 360

ing when the pick-up is very insensitive. With a powerful pick-up a volume control will be needed, and as this may be useful when receiving wireless, I have shown one connected to the set.

In the next class we have a large number of people and a variety of types of sets, all having three valves. First are those who, for some extraordinary reason, want two low-frequency-coupled valves and no high frequency. I say "extraordinary," because selectivity is a factor of importance these days, and the magnification obtained from one good low-frequency stage is usually adequate when selective tuning is not used. But still, there are those who obtain the results desired from a detector and two low-frequency set. If I had to make such a set, one stage would be resistance coupled and the second transformer coupled.

No doubt the most satisfactory arrangement having three valves, and the most popular one, too, has a stage of screen-grid high-frequency magnification, a detector, and a power valve. Such an arrangement can be made reasonably selective and powerful. The selectivity can be made such that it is possible to bring in the stations within range without much trouble. Therefore the next circuit, Fig. 3, is of a

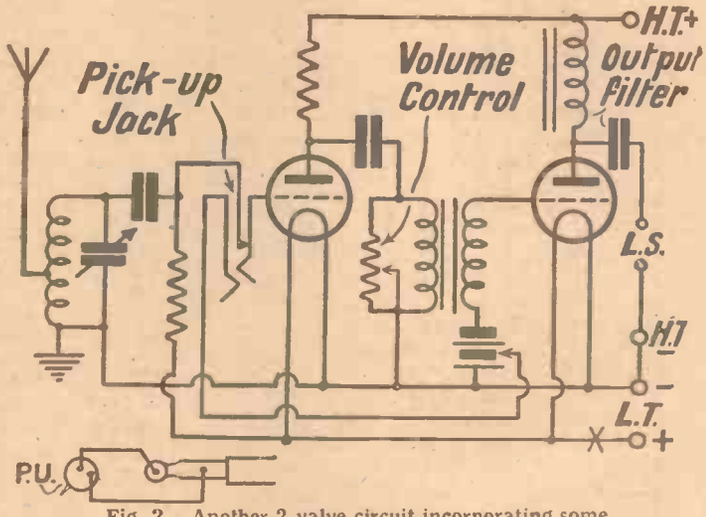


Fig. 2. Another 2-valve circuit incorporating some useful additions

three-valve set with a screen-grid stage

Now it is important to note that the results to be obtained from a set of this description depend largely upon the design With poor coils and a badly-arranged set

(*Continued at foot of next page*)

Some Notes on Present-day Short-wave Conditions

Around the Short-wave Dial

By M. BARNETT

THERE does not appear to be anything of much note happening on the short waves at present. Conditions remain very poor, with few bright spells. The writer's set was dismantled, unfortunately, or rather, it was in the throes of being re-modelled, at the time when the recent transatlantic flight was accomplished, so that it was not possible to listen to any relays from the other side of the Atlantic, although undoubtedly some of the short-wave stations, such as W2XAD or W2XAF, would be "on the job" at the time. It is at times such as this when short-wave receivers prove their worth because the owner has a fine opportunity of listening to items of world-wide interest as well as being first with the news.

Transatlantic Relays

It appears as though both the B.B.C. and the American broadcasting companies, such as the National and Columbia systems, are making more use of the facilities afforded by the transatlantic telephone for their re-broadcasting purposes than by making use of their own short-wave stations. Of course, the telephone system carries a twenty-four-hour service and is certainly more reliable than are the ordinary short-wave stations, and is not so subject to atmospherical interference. The recent talks relayed by the B.B.C. from America were carried out over this system. Certainly, great strides have been made in the relays since the first relay from the States was carried out.

Short-wave Mains Receivers

Recently I had occasion to recommend to a newcomer to the short waves a short-wave receiver which would be thoroughly up to date and which could be used off the A.C. mains. This friend had, for a long time, used a well-known commercial broadcast receiver which was all A.C. operated, and he was convinced that in his own particular case A.C. receivers were ideal for their general usefulness, and he was determined not to use batteries with his short-wave receiver if it was at all possible. At the same time he did not want to build the receiver himself and wished to buy a commercial outfit. Well, there may be some in existence, but the writer has yet to find an *English* all-A.C. screened-grid short-wave receiver, and in the end the result was that we had to make inquiries about an American model, which appeared to fill his requirements. British manufacturers have never appeared to be really keen about making short-wave receivers of the more elaborate type. An A.C. short-wave receiver can be successfully built as a commercial proposition as witness the very large range of models on the American market. Cannot our manufacturers do something?

DO YOU KNOW—

that Germany has no fewer than twenty-four stations working on wavelengths granted under the Prague Plan? Of course, some of these are common wavelengths. Cologne, Münster, and Aachen, for instance, all work on 227 metres.

that it is no good testing mains units with a low-resistance voltmeter, for you will get much lower readings than are actual? A meter having a value of about 1,000 ohms per volt is really advisable. Many good meters which work well with batteries give a false reading with mains units.

---

the selectivity may be poor and the range bad.

The tone quality obtained might also be unsatisfactory if poor parts are used and the set is forced. Always use the best possible parts, therefore. The diagram shows transformer-coupled stages. With good parts, selectivity and quality will be good. If the set is to be used chiefly for receiving the high-power stations, I would have a power detector and a low-frequency volume control, as indicated in Fig. 2. The set would, in fact, be the same as the two-valve set of Fig. 2, but having the screen-grid stage in front.

Common faults are poor quality and not enough selectivity for the range of the set. Some bad quality is caused by overloading. This, in turn, is usually the result of a desire for volume in excess of that which can usefully be obtained from the set.

With ample high tension, however, and the circuit properly adjusted, pretty good all-round results can be had. Some people would have a surprise if they applied 200 volts to a big power valve in the last stage, otherwise leaving the set as it was. The improved quality, greater volume, and more natural reproduction would surprise them. Too much stress cannot be laid upon the fact that ample anode circuit power is essential for good results. A fair set may sound very well when ample power is provided, but a good set will produce little better results than the worst when the anode circuit power supply is not sufficient.

Probably the most suitable set for present-day conditions is one having four valves and three tuned circuits. It is possible to have two screen-grid stages followed by the detector and power valves, or to employ an aerial circuit filter, a single screen-grid stage, a detector, and two low-frequency stages.

The magnification provided by the four valves is ample for those using a fair aerial and, as explained above, the quality will depend upon the particular parts used and the amount of the high-tension power.

I believe that four-valve sets will this season replace the three-valve types in popularity. The only difficulty is one of high tension. A dry battery will not last so long feeding four valves as three, and the largest sizes must be used. There is no difficulty when mains units are used, but with batteries one soon reaches the limit where the cost of maintenance is too high.

Single-knob tuning, provision for playing gramophone records, and other features are, to an extent, a matter of taste.

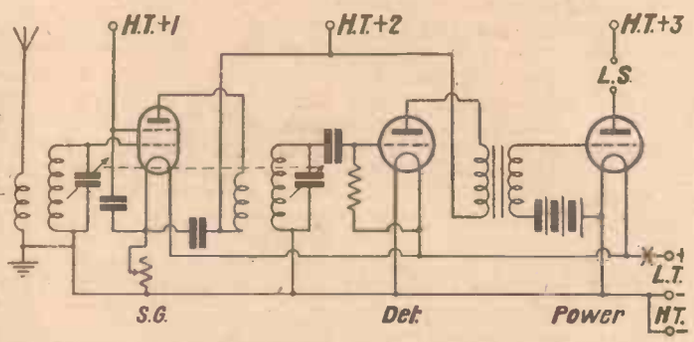
To be satisfactory, a single-tuning-control set must be made from good parts or the tuning will not hold good over the tuning range. Matched coils and condensers are, therefore, needed.

To handle a four-valve set after using a three is a pleasure. The factor of safety is so much greater, stations are received without forcing, and delicate controls are not needed to the same extent.

But for the finest results of all give me three screen-grid stages, a detector, and a power stage, with the right valves and 200 volts high tension. Most things can be received, the selectivity and power being adequate, while the quality to be obtained is good enough for the most critical listener.

"IS THERE AN IDEAL SET?"

(Continued from preceding page)



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Total £2-12-6

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GIVEN FREE with Complete Kit.—Ebonite Strip, 8 Belling-Lee Terminals, 1 Pair Grid-bias Clips, Panel Brackets, Plugs, Connecting Wire, Wiring Diagram.

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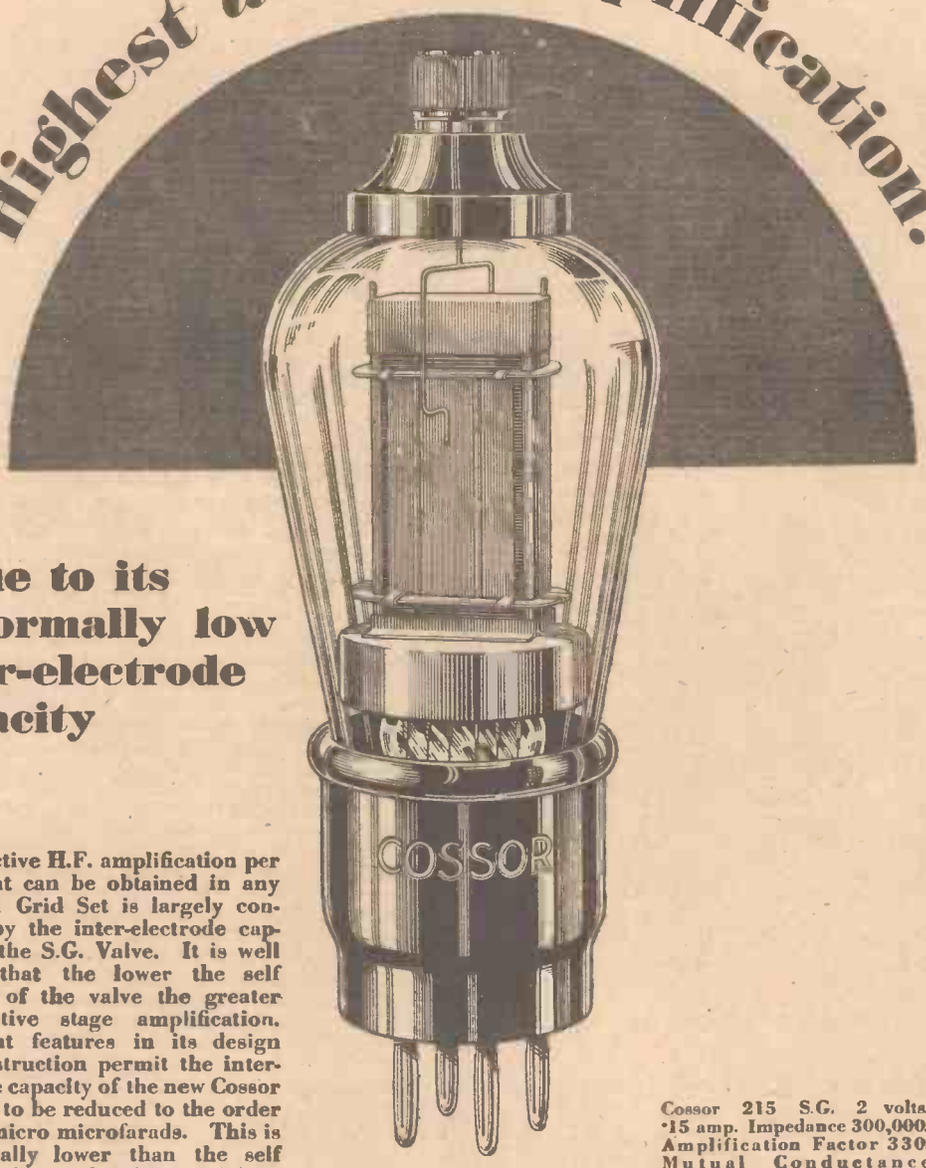

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5819 ♡

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

On Your Wavelength!

THEY WILL HAVE THEM

I WONDER what, if anything, the B.B.C. people think about the way in which purchasers of radio equipment insist that sets shall be capable of bringing in foreign stations? There is unquestionably much more long-distance listening done to-day than there ever was. I don't mean that people try habitually to receive Tokio on the loud-speaker with a two-valver or that any but the keenest of DX-ers are anxious to compile huge lists of stations heard. What I am driving at is that all the world and his wife want to be able to tune in some of the bigger foreign fellows from whom first-rate reception is possible if the gear is as it should be.

THE REASON

NOW, why? There can be only one answer to this question. The world and his wife would not think of ether trips abroad if they could find the entertainment that they want from the home stations. It has been drummed into them by the B.B.C. that foreign listening is a reprehensible practice (!), but still they insist on doing it. And the time when they particularly want foreigners is at the week-ends, when our home stations have so very little, as a rule, to offer in the way of entertainment. But it should be remembered that, once you contract the habit of going abroad, finding foreigners easy to receive, and what the Americans would call easy to listen to, you keep it up, listening less and less to the home productions. I am quite sure that the family set in my house, which is switched on and tuned in by all and sundry, spends far more hours during the year in reproducing Radio Paris, the two Dutch stations, Motala, Rome, Turin, Toulouse, Nürnberg, Bratislava, and Kattowice than it does in doing the same for "Raucous Reg," "Noisy Nat," 5XX, or 5GB.

STRAWS SHOW

I HAVE been particularly interested in this connection in watching the wireless progress of a pair of beginners who installed their first set some three weeks ago. They are musical people who revel in the "Proms.," but have no use at all for mediocre stuff. Don't think that they are high-brows: they aren't. They like good music, but they also like light, tuneful stuff well played and well broadcast. Mr. Beginner said to me the other day: "Our wireless set is a perfect godsend, and the great thing is that we can bring in the big foreign stations when tripe is being sent out by those at home. But," he went on, "I can't understand why our programmes should be so appalling at the week-end." He asked if I had used my set during the week-end September 6 and 7. I said that I had, and both of us proceeded to indulge in unprintable remarks.

TYPICAL

ON the Saturday afternoon we had each tried for the home programmes, and found both Regional and National transmitters sending out the same very ordinary "concert." We could, in fact, receive this same dreary programme on four different wavelengths—"Reg," "Nat," 5GB, and 5XX. "And Sunday," chimed in Mrs. Beginner, who had just come into the room, "Sunday really was the absolute limit!" And if you will just look at the programmes for Sunday, September 7, I think you will agree that it was. At 3 p.m. the National stations began their round of gaiety with one of the interminable church cantatas of Bach, of which most listeners must be heartily sick by this time. At 3.45 p.m. came the first service, a Boys' Brigade affair. At 4.30 p.m. we had the Gershom Parkington Quintet, which, like the organ, appears to be one of the B.B.C.'s main stand-bys. This was followed by a pianoforte recital; then came a Bible reading and a Wesleyan service, the "Week's Good Cause," the news, and at 9.5 p.m. a brass band concert. The total entertainment broadcast lasted two hours and fifty-five minutes for the whole day!

—AND THE ALTERNATIVE

THE Regional was equally hilarious. It did not awaken until 3.30 p.m., when it gave us an hour and a half of good military band music. There followed a theological discourse, a religious service, the "Good Cause," and news, as usual, and a not very bright concert. The total entertainment time once more was two hours and fifty-five minutes. A reverend friend remarked to me the other day: "Doesn't this idea of spending most of the weekend in pushing religious stuff out into the ether remind you rather of the Tibetian praying wheel?". In Tibet, you know, you write your prayers on a strip of paper which is glued round the circumference of the wheel. Either you spin the wheel or you arrange a little windmill to do it for you, but every revolution counts as one prayer.

HAVE YOU TRIED IT?

I HAVE come across many users of small sets, such as two-valvers, who complain that they just don't get enough amplification for proper loud-speaker volume and yet never seem to think of substituting a pentode for the triode that they have in the last holder. Actually, in nearly all two-valvers the substitution is so utterly simple that it is pretty well as easy as falling off the proverbial log. You simply remove the triode and place it on the mantelpiece. You then attach to the shank of the H.T. positive terminal a short piece of wire with a loop at its end. The next and final process is to insert the pentode into the vacant holder and to attach the loop in the aforesaid wire to the terminal on its cap. The average output valve of the small power type has an amplification factor of about six, and you get about ten times this from a pentode. Remember, though, that the pentode will not give its best results without an output transformer or filter circuit, unless your loud-speaker windings are of fairly high resistance.

WORTH THINKING ABOUT

ONE meets quite a lot of people who have but a single filament accumulator of fairly large capacity—enough probably to run the set for three or four weeks at a filling. It duly does its three or four weeks, as the case may be, and then the set goes out of action and, as soon as one of the family remembers to do so, the battery is taken to the charging station. On the average, the set is out of action for anything from three days to a week at a time. It is a far better thing, dear reader, to purchase not one enormous accumulator, but two of moderate capacity. You and I were always told in our childhood that work was good for us, though we found it hard to believe the statement. Work is certainly good for accumulators. You can keep them in tip-top condition if they are discharged and recharged at regular short intervals. The scheme is to have one accumulator in use and a second at the charging station. Then every week you change over.

PERIL BY LIGHTNING

DURING the last few weeks the London area has been favoured with several atmospheric manifestations on the grand scale. Talk of "Thunder on the left"! On one particular evening it came left, right, and centre, and very nearly scored a bullseye on the domestic roof. Personally I seldom feel fidgetty in a storm—as so many people do—about the outside aerial. After all, it is obvious that outside telephone lines offer a much more attractive target than a single garden wire. Yet one never hears of damage by lightning from this cause. Naturally, on the occasion in question my outside aerial was promptly switched over to earth; but, all the same, I couldn't help wondering what would happen if the old garden wire did happen to get it "in the neck."

A DIRECT HIT

A FEW days later my curiosity was satisfied, vicariously, by a Press account of a direct hit on an outside aerial belonging to a Doncaster listener. In this case the down lead was fitted parallel to one side of the house, being kept clear of the gutters and wall by a couple of iron brackets fitted with insulators. Curiously enough, the brackets seem to have caused most of the mischief. The insulator on one was smashed, so that the current ran straight through the bracket into the nearest bedroom, where it brought down a quantity of plaster. The insulator on the second bracket held good, but the lightning "side-flashed" it and tore some bricks out of the wall. The rest of the discharge followed the down lead and expended itself in bursting a condenser inside the set into a million fragments. No other damage was done to the set. All valves, transformers, etc., were quite unharmed,

On Your Wavelength! (continued)

except for being covered with a layer of "pitch," representing the remains of the unfortunate series condenser. Moral: Always earth your down lead when a thunderstorm is about!

CONTROLLING VELOCITY

ONE of the things which always puzzled me is the way in which the speed of electricity can apparently be controlled. Of course, I know that the normal velocity, either of electric waves or currents, is the same as that of light. But, all the same, it takes a much bigger fraction of a second for a signal to travel from this country to America over a submarine cable than it does for a wireless wave to cover the same distance through the ether. Then, again, one reads about waves which travel much faster than light under certain circumstances; for instance, when they pass through the Heaviside layer. Actually, I understand, it is chiefly a matter of capacity and inductance. Put quite simply, a capacitative path tends to accelerate a current, whilst inductance retards it.

"SHAPING" CIRCUITS

MUCH the same principle underlies the use of the so-called "shaping" circuits, which are coming more and more into favour for neutralising distortion in receiving sets. The circuit really consists of a "network" of capacity and inductance shunted across the output valve and designed to restore a correct musical volume, either by compensating for any loss in the higher frequencies, or by toning down the effect of undesirable resonance. Not even the best of sets is perfect, and it is the business of the "shaping circuit" to correct any residual distortion that cannot otherwise be attacked. I should say there is a big field for this new development, both for broadcast sets and in connection with electric gramophone amplifiers.

CURIOUS INTERFERENCE

I WONDER if you have ever experienced a curious form of interference which I have encountered recently. It does not seem to be due to any ordinary cause. It usually occurs when I am listening to a weak station or tuning my set, and it takes the form of a curious "wow" of rather rough musical character. It is for all the world like a spark station which has started to transmit and thought better of it. Two or three of these curious noises may follow one another, and perhaps no more will be heard. On other occasions, when I have just moved from a particular station to another one this interference seems to follow me up the tuning scale.

I had a shrewd suspicion about the cause, and my ideas were confirmed when I happened to be at Elstree the other day. The very same interference made its presence known while I was idly running over a hook-up which was on the bench there. I commented on the fact to Mr. Reyner, and he said: "Oh, that's only a wavemeter at work in the next lab." Sure enough, on walking over to the adjoining lab., I found someone operating a buzzer wavemeter, checking up the wavelength of the set on which he was working at the time.

WAVEMETER RADIATION

IF one holds a buzzer wavemeter relatively close to an aerial circuit and tunes it in, radiation will take place just in the same manner as it does if one oscillates. The amount of radiation is normally very feeble, but if the aerial circuit happens to be rather efficient or near the point of oscillation, which comes to much the same thing, quite an appreciable radiation can be set up, and any other receivers in the vicinity which happen to be tuned to the same frequency will pick up the distinctive note of a buzzer wavemeter. This interference can easily spread for a distance of a hundred yards. The fact that I observed the interference at home shows that there is obviously somebody in my vicinity who also possesses a buzzer wavemeter.

ATMOSPHERICS—A TIP

DURING this summer we have had a good lot of thunder and consequent atmospheric interference. This leads me to give readers, whether home-stationers or DX-ers, a tip which I have found most useful. Have an outdoor aerial, if you like, and use it when there is no atmospheric interference about. Put up also an indoor aerial and turn to this friend in need when the outdoor wire is bringing in too many crashes and bangs to make reception comfortable. But don't forget, though, that you must lower your outdoor aerial right down if you want to get the full benefit from the indoor. If the outdoor wire is left up aloft it will pick up impulses from atmospherics and the indoor aerial will receive them at second-hand. It is quite surprising what a difference the indoor aerial makes. On a recent evening, when friends complained that they could not listen to foreign stations in comfort, I was able to obtain excellent reception from Nürnburg, Turin, Toulouse, Hamburg, Katowice, and Rome. Unfortunately, one cannot say that the indoor aerial will work satisfactorily in each and every house. Sometimes it will allow fine strength to be obtained with only one high-frequency stage; sometimes, again, it proves inefficient, both the volume and number of stations received suffering badly when it is used. The only thing to do is to try whether your house suits it or not.

WORTH TRYING

TO see whether an indoor aerial will answer costs so little and takes up so small an amount of time that it is well worth trying out. The only ingredients required are four miniature insulators (costing about a penny apiece), four nails, some string, and enough No. 18 double-cotton-covered wire to go round three sides of a room. To follow the directions for putting it up, draw on any old piece of paper an oblong to represent the plan of the room, marking the corners A, B, C, D, the letters running clockwise. We will suppose that the set is to stand close to the corner marked A. Drive a nail into the wall A D (or the picture rail, if there is one) about 12 in. from corner A and another one 12 in. from corner D. Drive the other two nails into corner B and corner C. All the nails should be about a foot below the level of the ceiling. Pass the end of your reel of wire through the insulator near A, then take it successively through those near B and C. Anchor it to the insulator near D. Go back to A and pull the wire taut, which will cause the insulators to stand out from the walls. Allow a length sufficient to reach from the insulator at A to the aerial terminal of the set, cut off and make fast to this insulator. The job is now complete and the indoor aerial may be tried out. If your set is housed in a ground-floor room you may find it advantageous to erect the aerial in a first-floor room or in an attic, and to bring the lead-in through the floor and ceiling by means of a small ebonite tube.

THERMION.

Every Saturday night between midnight and 2 a.m. B.S.T., listeners may tune in transmissions by the new experimental transmitter at The Hague (Holland) on 299 metres. The call heard is "*Hier Idzerda Radio.*"

THE NATIONAL RADIO EXHIBITION

DAILY
11 a.m. to 10 p.m.
ADMISSION 1/6

COMPLETE GUIDE

FRIDAY, SEPT. 19 TO SATURDAY, SEPT. 27

The National Radio Exhibition at Olympia opens its doors to-morrow, Friday September 19. This is the ninth Radio Exhibition since the start of broadcasting, and it is the third under the auspices of the Radio Manufacturers' Association. New ideas in components, home-constructor kits and complete sets of special interest to every listener will be shown.

In the following pages we give a *Complete Guide to the Show*, and with the aid of the Floor Plans and this Full Review of the exhibits you should have no difficulty in making a stand-to-stand tour. A survey of outstanding exhibits, describing those of special novelty, will be given in the next issue of AMATEUR WIRELESS, the Second Special Show Issue.

STAND No. 1

This is the home of AMATEUR WIRELESS and the *Wireless Magazine*. A cordial invitation is extended to all readers to come and see for themselves the latest AMATEUR WIRELESS and *Wireless Magazine* receivers actually in the making—something to interest every set-builder. The current issues of both journals are on sale, together with a representative display of full-size blueprints. You can't miss our Stand—the first in the Exhibition.

STAND No. 1

Stand 2. Dunhams, Ltd., Bellerophon Works, New Wharf Road, N.1.

Portable sets, table model receivers and combined chargers and H.T. units for portables attract attention here. The Dunham range of receivers is very complete and comprises three-valvers fitted with a screen-grid stage and a pentode and four- and five-valve suitcase models. Of interest to users of home-constructed portable sets is the Dunham all-mains unit, which is fitted with a Westinghouse metal rectifier and provides H.T. and automatic grid bias.

A compact radio-gramophone—the Rolls

Stand 3. Trader Publishing Co., Ltd., St. Bride's House, Salisbury Square, E.C.4.

Stand 8. Wireless Retailers Association of Gt. Britain, 70 Finsbury Pavement, E.C.

VISIT THE "A.W." STAND FIRST

Stand 4. Iliffe & Sons, Ltd., Dorset House, Tudor Street, E.C.4.

Stand 5. Amalgamated Press, Ltd., The Fleetway House, Farringdon Street, E.C.4.

Stand 6. Odhams Press, Ltd., 93 Long Acre, W.C.2.

Stand 7. C. A. Vandervell & Co., Ltd., Acton, London, W.3.

A very wide range of C.A.V. batteries suitable for wireless purposes is now available and portable set users will doubtless pay great attention to the jelly-acid type of C.A.V. non-spillable accumulator. A new L.T. accumulator has been introduced which is provided with a self-contained metal carrier and there are now high-tension accumulators in three capacities. All-moulded high-tension batteries are now available in sixty-volt crates.

Stand 9. Turner & Co., 54 Station Road, New Southgate, N.11.

Coil troubles of all kinds can be solved by a visit to this stand, where will be found a complete range of coils to suit practically every receiver. The problem of selectivity has been dealt with in an extraordinarily satisfactory manner, and Tunewell's have coils which will improve the inherent selectivity of most circuits. Other Tunewell components include a useful all-purpose H.T. choke, two types of low-frequency transformer (a new Tunewell product) and the Tunewell speakers and a complete receiver, the Tunewell Super Three.

Stand 10. Ensign, Ltd., 88 High Holborn, W.C.1.

One of the range of McMichael table receivers

COMPLETE GUIDE TO SHOW PLAN AND EXHIBITORS

Stand 11. William Dibben & Sons, Ltd., Antelope Buildings, St. Mary's Road, Southampton.

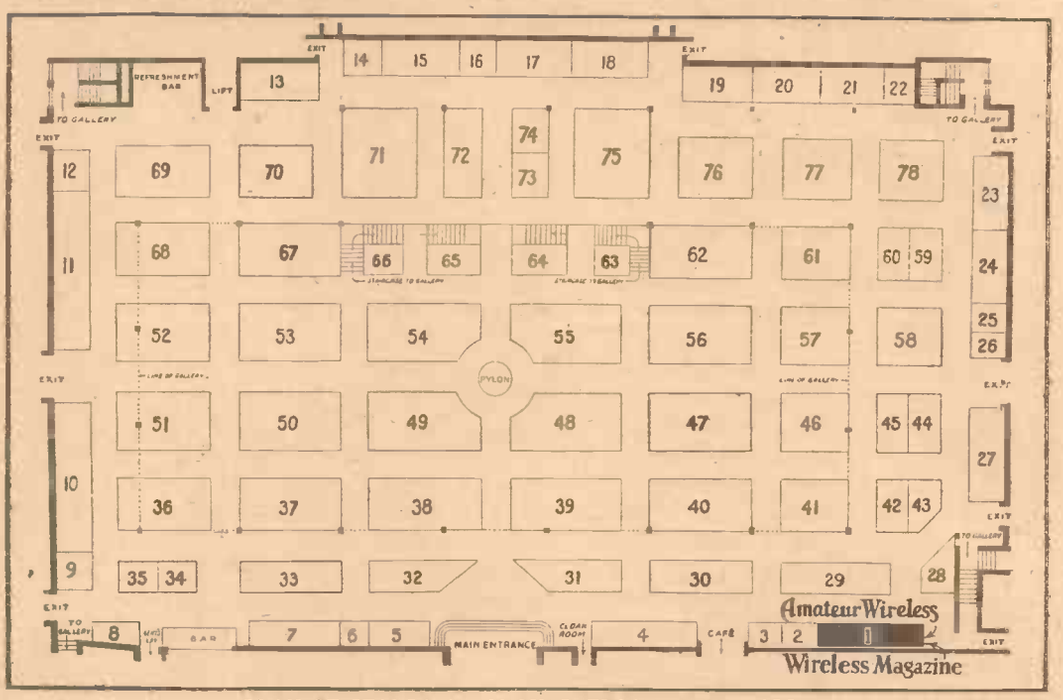
Monarch and Cromwell receivers feature on this stand and there are three types of chassis on view. The main type of set is a straight three-valver incorporating two transformer-coupled low-frequency stages. A novel tuning control with a drum dial is employed and provision is made for the addition of a gramophone pick-up when required. Numerous other small refinements will add to the improvement over the chassis of last year.

Stand 12. Watmel Wireless Co., Ltd., Imperial Works, High Street, Edgware.

Wavetraps, H.F. chokes, condensers, pick-up arms and dual-range tuners are to be found here. The new Watmel H.F. chokes DX2 and DX3 are becoming very popular, and many amateurs will make a call at this stand in order to make themselves further acquainted with the excellent characteristics of these excellent components.

Stand 13. Hobday Bros., Ltd., 21 Great Eastern Street, E.C.2.

Stand 14. Sel-Ezi Wireless Supply Co., Ltd., 6 Greek Street, W.1.



PLAN OF STANDS ON GROUND FLOOR, NEW HALL

Reference to this List and the Plans will enable you to locate any Exhibitor.

Name	Stand No.
Adey Radio, Ltd.	261
Amalgamated Press, Ltd.	5
Arding & Hobbs, Ltd.	262
Atalanta	232
Automatic Coil Winder and Elec. Equipment Co., Ltd.	107
Baird Television Co., Ltd.	216
Bakelite, Ltd.	255
Baker's Selhurst Radio	137
Beaver Electrical Supply Co.	206
Bel-Canto Radio, Ltd.	264
Belling & Lee, Ltd.	134
Benjamin Electric, Ltd.	115
Bernard Jones Publications, Ltd.	1
Birl, Sydney S., & Sons, Ltd.	73
Birkbys, Ltd.	245
British Ebonite Co., Ltd.	253
British General Manufacturing Co., Ltd.	59
British Radiophone, Ltd.	223
Brown Bros., Ltd.	17
Brown, Ltd., S. G.	78
BrownieWireless Co.of Great Britain, Ltd.	102
Bulgin & Co., A. F.	103
Bullphone, Ltd.	33
Burndept Wireless (1928), Ltd.	56
Burne-Jones & Co., Ltd.	121
Burton, C. F., & H.	44
British Blue Spot Co., Ltd.	217
Cadisch, R., & Sons	259
Carrington Manufacturing Co., Ltd.	140
Catesbys, Ltd.	260
Celestion, Ltd.	53
Chloride Electrical Storage Co., Ltd.	54
Clark & Moir, Ltd.	205
Classic Radio and Gramophone Co., Ltd.	113
Climax Radio Electric, Ltd.	27
Cole, E. K., Ltd.	48
Columbia Graphophone Co., Ltd.	71
Colvern, Ltd.	45
Cossor, A. C., Ltd.	52
Clarke, H., & Co. (Manchester), Ltd.	211
Concordia Electric Wire Co.	209
D.X. Coils, Ltd.	237
Danipad Rubber Co., Ltd.	208
Darwins, Ltd.	254
Dayzite, Ltd.	25
De la Rue & Co., Thos.	128
Dew, A. J., & Co.	15
Dibben, Wm., & Sons, Ltd.	11
Donotone (Regd.) Loud-speaker	139
Downing, John S., & Sons, Ltd.	210
Dubilier Condenser Co. (1925), Ltd.	50
Dulcetto-Polyphon, Ltd.	24
Dunhams, Ltd.	2
Dyson & Co. (Works), Ltd., J.	104
Eagle Engineering Co., Ltd.	43
Eastick, J. J., & Sons	236
East London Rubber Co.	20
Econasign Co., Ltd.	230
Edison Bell, Ltd.	29
Edison Swan Electric Co, Ltd.	67
Electrical and Radio Products, Ltd.	37
Ensign, Ltd.	10
Epoch Radio Manufacturing Co.	203
Ever Ready Co. (G.B.), Ltd.	49
Falk Stadelmann & Co., Ltd.	119
Ferranti, Ltd.	47
Flinders (Wholesale), Ltd.	22
Formo Co.	72
Fuller Accumulator Co. (1926), Ltd.	221, 265
Gamage, Ltd., A. W.	244
Gambrell Radio, Ltd.	106
Garnett Whiteley & Co., Ltd.	30
Garrard Engineering and Manufacturing Co.	256
General Electric Co., Ltd.	68
Graham Amplion, Ltd.	62
Graham-Farish, Ltd.	76, 108
Gripso Co., The	202
Grosvenor Electric Batteries, Ltd.	263
H.S.P. Wireless Co.	122
Halcyon Wireless Co., Ltd.	144
Hallie Bros. (Edmonton), Ltd.	141
Henderson Wireless and Electrical Service	231
Hobday Bros., Ltd.	13
Hunt, A. H., Ltd.	133
Hustler, Simpson & Webb	247
Hillman Bros.	18
Igranic Electric Co., Ltd.	240
Iliffe & Sons, Ltd.	4
Itonia Gramophones, Ltd.	21
Jackson Bros.	63
Jewel Pen Co., Ltd.	138
Johnson & Bolsom, Ltd.	142
Junit Manufacturing Co., Ltd.	65
Kalisky (Aldgate), Ltd., S.	23
Kolster-Brandes, Ltd.	55
L.E.S. Distributors, Ltd.	16
Lamplugh, S. A., Ltd.	124
Lectro-Linx, Ltd.	131
Lever (Trix), Ltd., E. J.	249
Lissen, Ltd.	40
Lithanode Co., Ltd.	135
Lock, W. & T., Ltd.	132
Loewe Radio Co., Ltd.	207
London Electric Wire Co. and Smiths, Ltd.	41
"Loud Speaker" Co., Ltd.	214
Mainten Manufacturing Co., Ltd.	219
M.P.A. Wireless (1930), Ltd.	213
M-L Magneto Syndicate, Ltd.	222
Mc. Michael, Ltd., L.	57
Manufacturers' Accessories Co. (1928), Ltd.	201
Marconiphone Co., Ltd.	38, 129
Matchless Radio Manufacturing Co.	246
Montague Radio Inventions and Development Co., Ltd.	143
Mullard Wireless Service Co., Ltd.	36
Murphy Radio, Ltd.	252
Mayfair Enterprises, Ltd.	212
National Accumulator Co., Ltd.	39
New London Electron Works, Ltd.	34
Odhams Press, Ltd. (Proprietors of the "Broadcaster"	6
Oldham & Son, Ltd.	64
Ormond Engineering Co., Ltd.	75
Osborn, Chas. A	258
Osram Valves (G. E. C.)	46
P. R. Products	224
Pandora, Ltd.	218
Paroussi, E.	227
Partridge & Mee, Ltd.	248
Partridge, Wilson & Co.	251
Perfectavox, Ltd.	241
Pertrix, Ltd.	243
Peto-Scott Co., Ltd.	110
Pioneer Manufacturing Co.	226
Pye Radio, Ltd.	31, 32
Quest Radio Manufacturing Co.	238
Radio Gramophone Development Co.	126
Radio Instruments, Ltd.	61
Radio for the Million (Mullard)	101
Radio Service (London), Ltd.	235
Radio Society of Great Britain	229
Redfern's Rubber Works, Ltd.	204
Red Star Radio, Ltd.	109
Rees Mace Manufacturing Co., Ltd.	117
Regent Radio Supply Co.	51
Ridged Cone Co., Ltd.	122
Rolls-Cayden Sales	237A
Rolls Radio, Ltd.	35
Selectors, Ltd.	114
Sovereign Products, Ltd.	136
Sel-Ezi Wireless Supply Co., Ltd.	14
Selfridge & Co., Ltd.	242
Sheffield Magnet Co.	125
Sherwood, A. M. E.	153
Siemens Bros. & Co., Ltd.	70
Six-Sixty Radio Co., Ltd.	58
Smurthwaite, F. W.	116
Standard Battery Co.	42
Stratton & Co., Ltd.	28
Sun Electrical Co., Ltd.	19
Swift Levick & Sons, Ltd.	129
Sylvex, Ltd.	127
"Tannoy" Products	111
Telegraph Condenser Co., Ltd.	145
Telsen Electric Co., Ltd.	69
Tonex Co.	233
Trader Publishing Co., Ltd.	3
Trelleborg Ebonite Works, Ltd.	228
Turner & Co.	9
Ultra Electric, Ltd.	77
Universal Gramophone and Radio Co., Ltd.	123
Umello, Ltd.	234
Vandervell & Co., Ltd., C. A.	7
Varley (Oliver Pell Control)	105
Voltron Electric, Ltd.	215
Watmel Wireless Co., Ltd.	12
Westinghouse Brake and Saxby Signal Co., Ltd.	239
Whiteley Boneham & Co., Ltd.	66
Whittingham Smith & Co.	74
Whiteley, Wm.	257
Wilkins & Wright, Ltd.	60
Wingrove & Rogers, Ltd.	118
Wireless Retailers Association of Great Britain	8
Wright & Weaire, Ltd.	250
Young Accumulator Co. (1929)	225
Zeitlin, V., & Sons, Ltd.	26

Stand 15. A. J. Dew & Co., 33-34 Rathbone Place, Oxford Street, W.1.

On this stand, which is for the convenience of wholesalers, will be found a display of components of all the leading makes.

Stand 16. L. E. S. Distributors, Ltd., 9 St. Martins Street, Leicester Square, W.C.2.

This is a wholesale concern, and on this stand will be shown a representative selection of complete receivers and components.

Stand 17. Brown Bros., Ltd., Gt. Eastern Street, E.C.

This stand is for the convenience of wholesalers.

Stand 18. Hillman Bros., 123 Albion Street, Leeds.

Wholesalers will be particularly interested in the display on this stand, for Hillman Bros. are the only northern wholesalers at the Exhibition. An interesting exhibit is a home-recording outfit for making gramophone records.

Stand 19. Sun Electrical Co., Ltd., 118 Charing Cross Road, W.C.

This concern acts as wholesale distributors, and here will be found an interesting range of sets and speakers.

Stand 20. East London Rubber Co., Gt. Eastern Street, E.C.2.

Stand 21. Itonia Gramophones, Ltd., 58 City Road, E.C.1.

Stand 22. Flinders (Wholesale), Ltd., East Stockwell Street, Colchester, Essex.

This stand, which is chiefly for the convenience of wholesalers, is a rendezvous for traders in the eastern counties.

Stand 23. Kalisky (Aldgate), Ltd., 75 Aldgate High Street, London, E.C.3.

Sopranist H.F. twin chokes, battery testers and hydrometers are shown on this stand together with the well-known Sopranist H.T. battery, a British product which is available in 60-volt, 100-volt and 120-volt types.

Stand 24. Dulcetto-Polyphon, Ltd., 2-3 Newman Street, Oxford Street, London, W.1.

This concern has for a long time played an important part in the manufacture of high quality electrically-reproducing gramophones, and in view of this, discriminating radio-gramophone enthusiasts will want to see the new Dulcetto Junior electric gramophone which sells at 75 guineas and which has a remarkably complete specification. A newcomer is the Dulcetto-moving-coil speaker, which is fitted in a handsome baffle cabinet.

Stand 25. Dayzite, Ltd., 17 Lisle Street, London, W C.2.

All the leading makes of kit sets and speakers will be found on this stand, which is of chief interest to wholesalers.

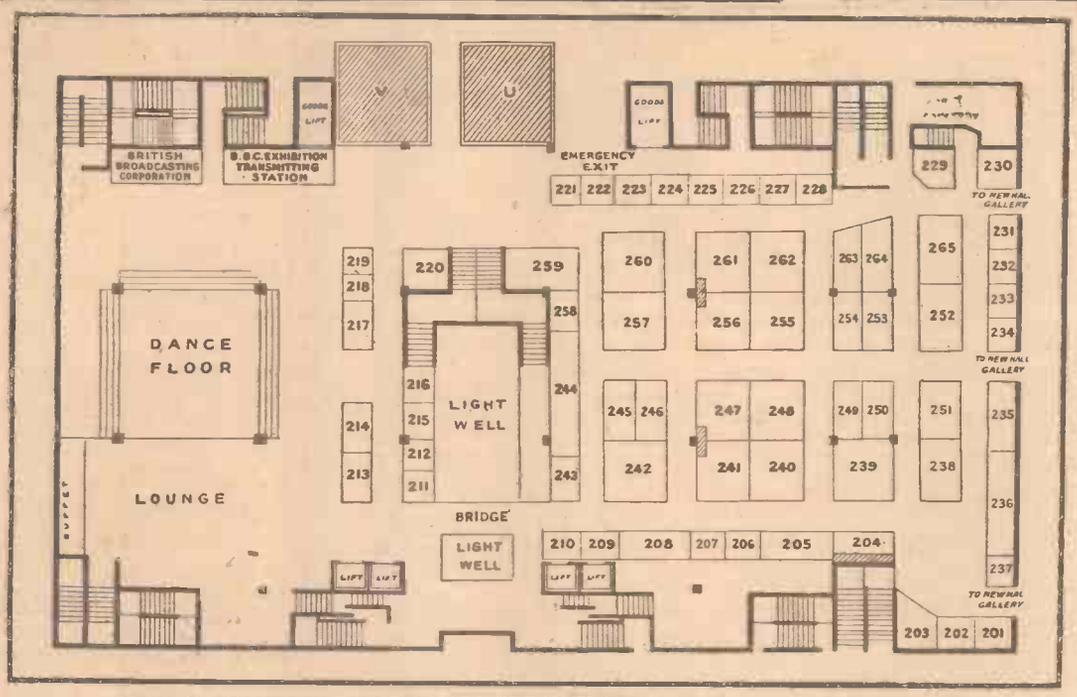
Stand 26. V. Zeitlin & Sons, Ltd., 54 Lambs Conduit Street, W.C.1.

A useful array of apparatus will be found on this stand, which is chiefly for the convenience of wholesale dealers.

Stand 27. Climax Radio Electric, Ltd., Haverstock Works, Parkhill Road, Hampstead, N.W.

Climax components have made so good a name for themselves that interest here centres not so much on these well-known parts as on interesting newcomers, the Climax All-Electric Two and the All-Electric Three complete receivers. Following the usual Climax policy of

COMPLETE GUIDE TO SHOW STAND Nos. 28–37



PLAN OF STANDS IN EMPIRE HALL (FIRST FLOOR). Demonstration Rooms shaded.

being well ahead with design, the familiar Climax mains units for H.T. have been considerably improved for the new season without addition to the price. Special precautions have been taken to prevent mains hum and motor-boating, and Climax can guarantee to mains drive any set with complete freedom from these troubles.

Stand 28. Stratton & Co., Ltd., Balmoral Works, Bromsgrove Street, Birmingham.

Short-wave enthusiasts should not miss this stand, where will be seen a new four-valve short-waver, the Eddystone. A four-valve short-wave constructor's kit is another new item, while the new Eddystone short-wave coils will interest set users who want to convert their own receivers to short-wave working.

Stand 29. Edison Bell, Ltd., Edison Bell Works, Glengall Road, S.E.15.

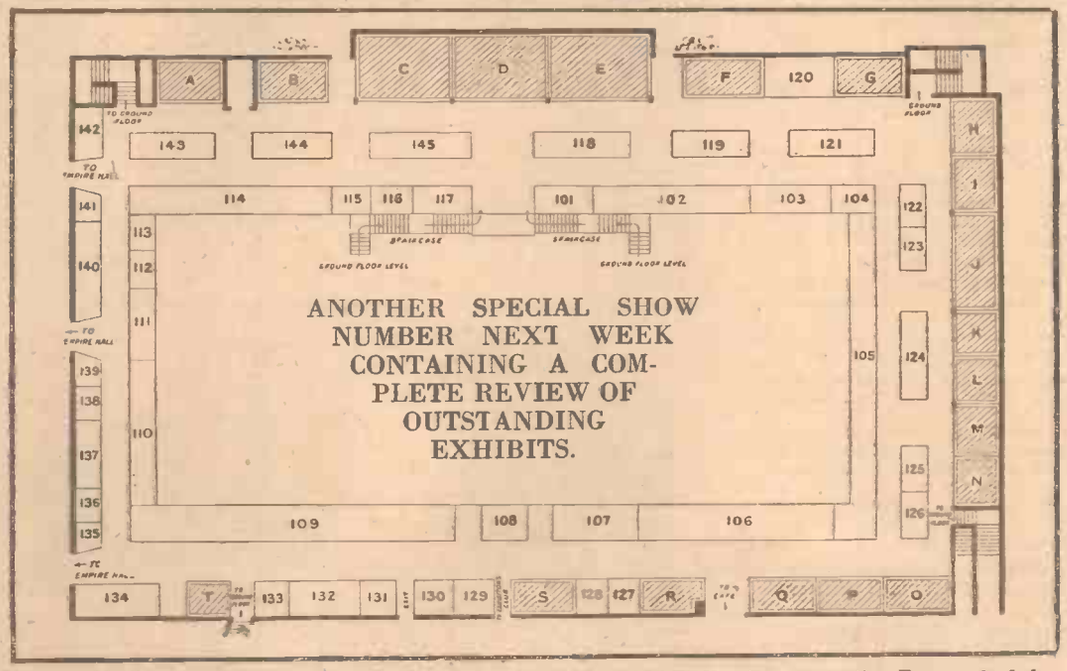
Apart from complete receivers and radio gramophones, amateurs who build their own sets will find here an interesting range of small parts, coils, transformers, switches, condensers and so on. There is now a wide range of Edison-Bell speakers from which to choose and those in search of modest-priced complete receivers should see the Maison Screen-grid Three, which is a modern type of transportable receiver.

Stand 30. Garnett Whiteley & Co., Ltd., Lotus Works, Mill Lane, Old Swan, Liverpool.

Amateurs are no doubt fully acquainted with the Lotus range of components, and visitors to this stand will find one or two new lines, one of them being a new type of drum dial for ganged condensers. Two new items also are a power rectifier unit and an all-mains unit for converting the well-known G.E.C. Music Magnet receiver to all-electric operation. The Lotus receivers on view include the popular three-valve transportable all-mains job, two types of three-valve all-electric set, and numerous battery-driven and console models.

Kolster-Brandes radio-gramophone

The Murphy trans-portable receiver



PLAN OF STANDS AND DEMONSTRATION ROOMS IN GALLERY. Demonstration Rooms shaded.

Stands 31 and 32. Pye Radio, Ltd., Paris House, Oxford Circus, W.1.

Pye's have introduced many new receivers and parts. The new Pye eliminators, which can be obtained on hire purchase terms form a section of the display on this stand, while the cabinet speakers, complete sets and components for the home constructor are also to be seen.

Stand 33. Bullphone, Ltd., 38 Holywell Lane, E.C.2.

The well-known Bullphone loud-speakers of all types are to be seen on this stand, including some interesting new models.

Stand 34. New London Electron Works, Ltd., East Ham, E.6.

Wire of all kinds is to be found here, not forgetting, of course, the famous Electron aerial wire which can be put to so many uses. The superial wire which can be obtained in lengths of either 50 or 100-ft. is also useful for aerial where high efficiency is desired. Set constructors should not miss Simple-Strip, which is a new idea for wiring up receivers without the use of solder.

Stand 35. Rolls Radio, Ltd., 138 St. John Street, Clerkenwell, E.C.1.

A four-valve portable set having two screen-grid stages, detector and pentode should not be missed. Other features of the exhibit include a table and a pedestal model of a high performance radio gramophone.

Stands 36 and 101. Mullard Wireless Service Co., Ltd., Mullard House, Charing Cross Road, W.C.2.

A demonstration is available in conjunction with this stand, where can be heard and tested the receivers and apparatus shown on the main stand. Apart from a comprehensive array of mains and battery valves there will be seen the Mullard pure music speakers, Permacore L.F. transformers and some new paper dielectric condensers, mica condensers, grid leaks and wire-wound resistances.

Stand 37, Aeonic Radio, Ltd., Aeonic Works, Horley, Surrey.

A complete range of Aeonic portable receivers is to be seen here. These include many novel features and merit detailed inspection.

COMPLETE GUIDE TO SHOW STAND Nos. 38—54

Stands 38 and 120. Marconiphone Co. Ltd., 210 Tottenham Court Road, W.1.

Here you will find many Marconiphone receivers including the popular model 39, a table model receiver which works from batteries or from mains, the model 55 five-valve portable, the long range receiver model 44, and the super performance set, model 56. Short-wave enthusiasts should see the Marconiphone three-valve short-wave receiver, and the Marconiphone speakers will interest all set-users.

Stand 39. National Accumulator Co., Ltd., 50 Grosvenor Gardens, London, S.W.1.

Stand 40. Lissen Ltd., Lissenium Works, Worple Road, Isleworth, Middlesex.

In the extensive range of Lissen components something is sure to be found of interest by every home builder of a set. On this stand will be found practically every product made by Lissen, including the standard model radio-gramophone, which incorporates receivers which can be operated from mains or batteries and from a frame or an outside aerial. A "baby" radio-gramophone which was not exhibited last year is now on view, and it should be noted that this employs a pentode valve in the last stage—a distinct sign of modern design. In addition to these are shown the new Lissen balanced-armature speaker units and new transportable set. Dry batteries and accumulators, of course, constitute a leading feature of the exhibit.

An electric turntable drive—the Garrard

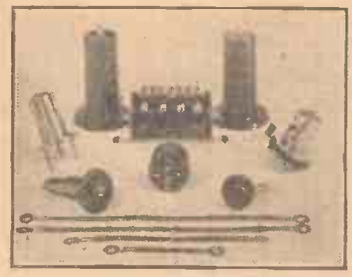
The Lissen variable condenser

Stand 41. London Electric Wire Co. & Smiths, Ltd., Church Road, Leyton, London, E.10.

Lewcos parts of all types are here on show, and apart from the wide range of coils which form the backbone of the Lewcos reputation, there are some newcomers in the way of new L.F. transformers, twin rejector wave traps, L.F. chokes, potentiometers, and so on. Lewcos coils are available for every circuit, and in view of the present need for selectivity, the little Lewcondenser is sure to attract attention.

Stand 42. Standard Battery Co., 184 Shaftesbury Avenue, London, W.C.

Wet high-tension batteries, complete receivers, speakers, pick-ups, and the well-known Wates test meter are to be found here. The test meter surely does not need introduction to readers, but many visitors to the stand will doubtless be surprised to learn of the number of uses to which this handy pocket meter can be put. The Standard Sac Leclanche wet H.T. battery is the solution of the H.T. problem for amateurs who have large sets and find that dry batteries are not economical and who cannot, owing to the difficulty of recharging, avail themselves of an H.T. accumulator.



Two groups showing some of the many useful Bulgin parts

Stand 43. Eagle Engineering Co., Ltd., Eagle Works, Warwick.

Set users should make a point of seeing the two-valve battery operated sets on the Chakophone stand. These sell at an extraordinary low price and table models are available which are very convenient in use and simple to control. Other famous Chakophone sets which are to be seen are the Warwick Portable Five, the "All-In" two- and three-valvers which operate on self-contained frame aerials and a new screen-grid four-valve suitcase type of set, which is listed at the extremely modest price of £17 17s. The new Chakophone Colassi speakers will also attract great attention.

Stand 44. C. F. & H. Burton, Progress Works, Bernard Street, Walsall, Staffs.

Stand 46. Osram Valves, General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2

Here will be found a complete range of Osram valves for every set. The range has been considerably extended during the past two years by the production of new and even more efficient mains-drive valves, and of the newer types of valve such as the pentode and screen-grid, with an even higher performance.

Stand 47. Ferranti, Ltd., Hollinwood, Lancs.

Apart from the extensive range of high-quality Ferranti parts which are too well known to need detailed description, the introduction of new Ferranti complete sets, many being driven from the mains, is a feature of importance. A new idea also is the Ferranti Magno-dynamic speaker, which is a permanent-magnet type of speaker, giving a performance at least as good as the mains-energised types.

Stand 48. E. K. Cole, Ltd., Ekco Works, London Road, Leigh-on-Sea.

Ekco eliminators are available to suit every receiver and some very convincing-looking new types are available which will make an instant appeal to amateurs who want to use mains power for working their receivers. Of particular interest are the Ekco eliminators for fitting in portable sets for indoor use.

STAND No. 1 IS "A.W." DON'T FORGET

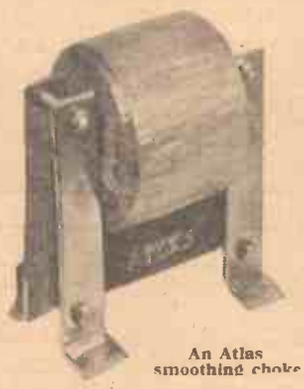
The well-known range of Burton components for home constructors is shown on this stand and there are several interesting new lines which should not be missed.

Stand 45. Colvern, Ltd., Mawneys Road, Romford, Essex.

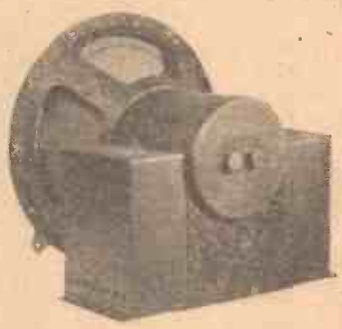
Among the many interesting components which will be found on the Colvern stand are some new coils and condensers. Condensers of all types are available, and here set builders will find many parts to suit their requirements.

Stand 49. Ever-Ready Co. (G.B.), Ltd., Hercules Place, Holloway, N.7.

Ever-Ready H.T., L.T. and G.B. batteries have earned a wonderful reputation for long life, and all battery users will be interested in the very complete display which is a feature of this stand. Of particular interest are the large-capacity H.T. batteries.



An Atlas smoothing choke



A moving-coil speaker by Bakers Selhurst Radio

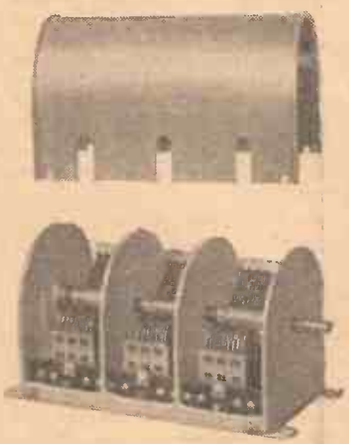
Stand 50. Dubilier Condenser Co. (1925), Ltd., Ducon Works, Victoria Road, N. Acton, W.3.

So successful have Dubilier Condensers proved that it is not intended to introduce any new type. Interest on the Dubilier stand will centre largely on the new All-Electric sets and radio-gramophones. Most of the receivers have provision for the use of a gramophone pick-up, so that they can give electric reproduction of records. The most popular complete receivers are the Dubilier two- and three- valvers, while the radio gramophones are obtainable with two, three and four valves.

Stand 51. Regent Radio Supply Co., 21 Bartlett's Buildings, London, E.C.4.

Apart from the very comprehensive range of mains eliminators available there will be seen here the new Regentone four-valve A.C. receiver which should do much to enhance the already high Regentone reputation. Eliminators are available to suit every set, and portable set users should make a point of seeing the popular models which are available for fitting in small suitcase and portable receivers to replace dry batteries.

Stand 52. A. C. Cossor, Ltd., Cossor House, Highbury Grove, N.5.



The new Polar "tub" condenser

On the Cossor stand are to be seen the new receivers for 1931 and a complete range of Cossor valves including all the new types introduced during the past season. Readers should make a point of visiting this stand, where they may learn much, in an interesting fashion, about valve technicalities and the method of choosing the right valve for any job.

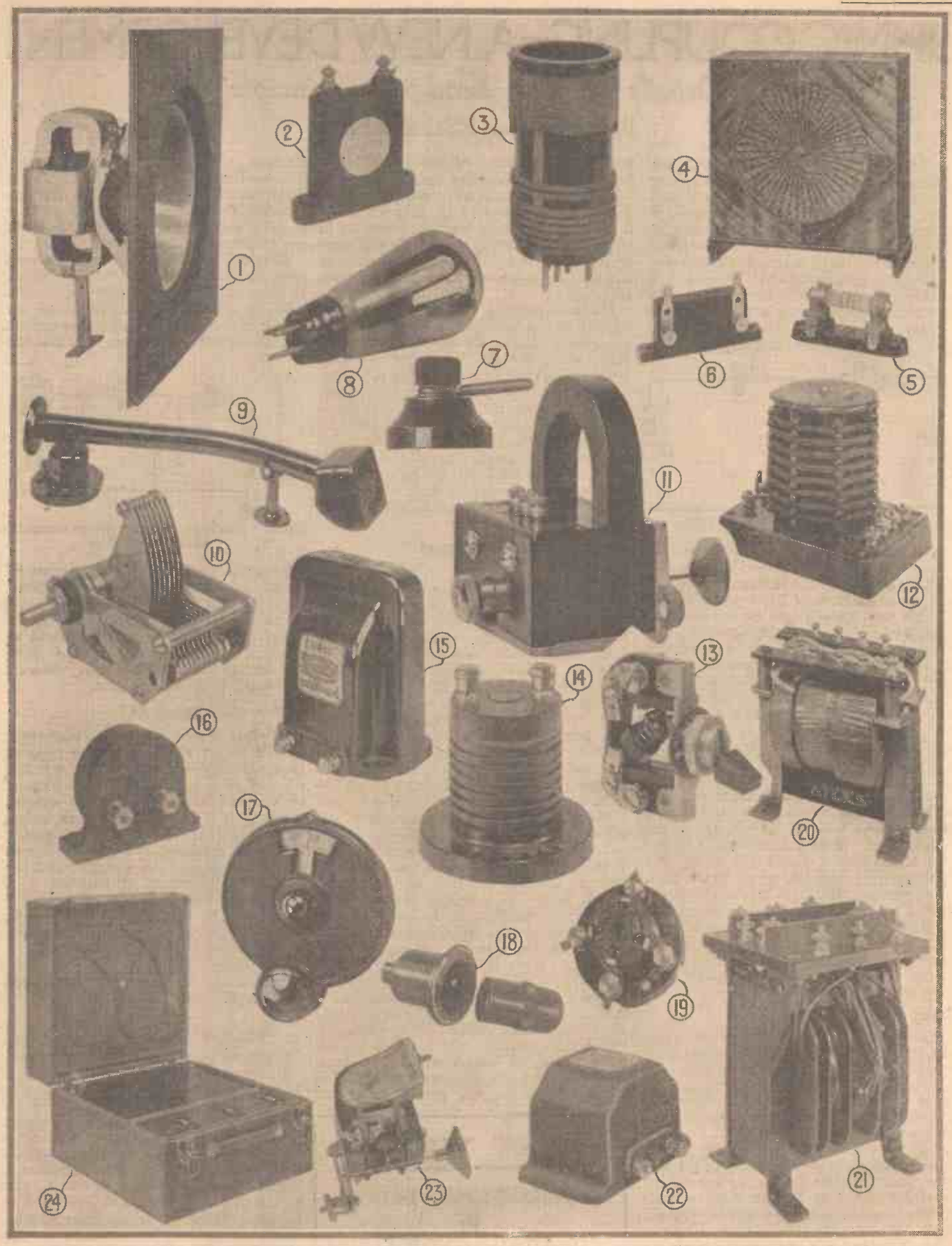
Stand 53. Celestion, Ltd., London Road, Kingston-on-Thames.

There is now a wide range of Celestion cabinet speakers, and so successful have these proved during the past year that no extensive change has been made. Gramophone enthusiasts should see the Celestion Woodruffe pick-up.

Stand 54. Chloride Electrical Storage Co., Ltd., 217-229 Shaftesbury Avenue, W.C.1.

Here are to be found a wide range of accumulators for every radio

COMPLETE SHOW GUIDE CONTINUED ON PAGE 325



SEEN AT THE SHOW: (1) W. and B. permanent-magnet speaker. (2) Lissen fixed condenser. (3) Formo dual-range coil. (4) Loewe cabinet-speaker. (5) Ediswan fixed resistance. (6) Edison-Bell fixed condenser. (7) Eelex Connector. (8) Details of Osram power valve. (9) Marconiphone pick-up. (10) Lotus variable condenser. (11) Amplion speaker unit. (12) Watmel dual-range coil. (13) Atlas quick-action switch. (14) Edison-Bell H.F. choke. (15) Lissen low-frequency transformer. (16) Telsen H.F. choke. (17) Igranic slow-motion dial (18) Bulgin mains plug and socket. (19) Telsen valve holder. (20) Atlas mains transformer. (21) Lotus power transformer. (22) Cossor low-frequency transformer. (23) Watmel speaker unit. (24) New Amplion portable set.

OHMIC COUPLING—A NEW DEVELOPMENT

Details of new band-pass principle

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

IN my article last week I pointed out that there were certain disadvantages arising from the use of the ordinary band-pass filter. In order to obtain a high degree of coupling so that a band-pass filter may be a practical proposition for a simple set, the ordinary methods of magnetic or capacity coupling are unsatisfactory. The peaks of the double hump become so far apart that the circuit tunes in a very unpleasant manner, particularly if any reaction is applied, while in addition the coupling does not

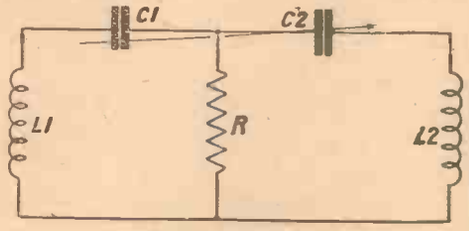


Fig. 1. Skeleton ohmic-coupled circuit

remain constant and the circuit is distinctly more lively at one end than at the other.

These difficulties can be overcome by use of a modified form of band-pass filter, in which a resistance is used for the coupling instead of an inductance or capacity. This circuit is shown in Fig. 1, from which it will be seen that the arrangement is one of very simple construction. The first circuit is composed of the inductance L1, the condenser C1, and the resistance R, the second circuit being L2, C2, and R. Thus the resistance R is common to both circuits.

If the aerial is coupled to the first circuit by some suitable means, and the first circuit is tuned to the incoming signal, currents will oscillate round the circuit and a small voltage will be set up across the resistance R. Since this resistance is also part of the second circuit, the energy will be transferred from this circuit to the next. No appreciable voltage will be set up in the second circuit, however, unless this is also tuned to the incoming signal, in which case a large voltage is produced across the inductance, which we can utilise to apply to our detector or H.F. valve as the case may be.

Stray Coupling

The value of this resistance is not large, and the extra loss can easily be made up by reaction. Indeed, various tests which we have taken in the course of the experiments show that the results obtained, viewed in strictly practical light, are superior to those obtained by ordinary methods.

The voltage developed across a resistance is independent of the frequency of the current, and therefore the energy transferred from one circuit to the next remains more or less constant over the whole wavelength scale. This is only strictly true as long as there is no coupling whatever between the circuits other than that existing through the resistance.

In practice a little stray coupling is likely to exist, and this will very quickly destroy the proper working of the circuit if it becomes of an excessive value. The ideal solution, of course, is to screen the circuits in a completely closed box. It is not necessary to go to these lengths, however, in order to obtain a very good approximation to the ideal, and in the practical form of circuit only a partial screening has been adopted.

Magnetic coupling between the two coils L1 and L2 has been avoided by the use of an astatic winding for one or both of the coils, while the stray-capacity coupling between the circuits is reduced to a negligible quantity by inserting a simple partition screen between the circuits. The exact manner in which this is carried out will be seen in next week's issue, where a two-valve receiver embodying this circuit is described. With these precautions, the only coupling between the circuits is that due to the presence of the resistance R, which is the condition we require.

An Important Advantage

Apart from this question of constancy, the ohmic-coupled arrangement has one important advantage. The strength of coupling between the two circuits can be increased to a greater extent than is possible with either magnetic or capacity coupling without producing any serious doubled-humped effect. Two tuning points are obtained if the resistance is made excessive, but with the values required in practice this effect is not evident. Yet the coupling can be increased to such an extent that the signal strength with the band-pass filter is the same as that with a single circuit, *using the same aerial coupling in each case*. This is not practicable with any other form of band-pass arrangement.

A still more useful feature of this system is that the coupling can be made variable without altering the tune of the circuit. Apart from the practical difficulties of varying the coupling in the magnetically- or capacity-coupled arrangement, any such method would disturb the tune of the system. With this new ohmic-coupled circuit it is only necessary to vary the value of the resistance R. If the resistance is made zero, there is no coupling at all (other than a very small amount of stray coupling which may possibly exist between the circuits unless we screen the circuits completely). As we increase the value of resistance the coupling gets stronger and stronger, and the signal strength can be increased audibly by varying this resistance. At the same time the resonance curve gets broader, so that the tuning is not so sharp, and it is very convenient to be able to vary one's selectivity in this manner.

Moreover, as the variation of the resistance does not affect the tune, it is possible to carry out these adjustments actually on a distant station. If, for example, one has a foreigner tuned-in, with a background of an interfering near-by station, the resistance

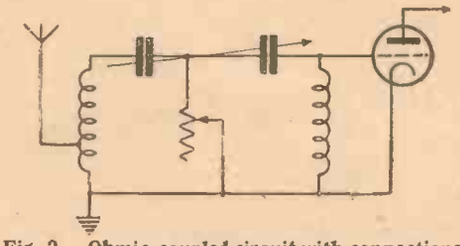


Fig. 2. Ohmic-coupled circuit with connections to aerial and valve

setting can be adjusted while the set is in operation until the best condition is obtained. As the resistance is reduced the selectivity increases progressively until the interfering station is finally reduced to a negligible strength, leaving the foreign station free and capable of being worked up to a really satisfactory signal.

A Practical Receiver

All that is required for the purpose is a simple 6-ohm rheostat of the type customarily employed to control the filament current of a valve. The high-frequency resistance of such a rheostat is somewhat more than 6 ohms, and ranges between 15 and 20 ohms in the maximum position. Generally speaking, one uses the rheostat about half-way round, which gives a high-frequency resistance of between 7 and 10 ohms. As we have seen, the extra loss introduced by this means has no adverse effect in practice, while the benefits derived from the system are truly remarkable.

The complete description of a receiver incorporating this principle will be given next week.

NEXT WEEK:

CONSTRUCTIONAL DETAILS OF A TWO-VALVE SET INCORPORATING OHMIC COUPLING

TELEVISION "STREAKS"

THE series of lines which appear to run across the surface of the received picture, in television, are caused by the shape of the holes used in the scanning disc. When circular holes are used the strongest ray of light naturally passes through the centre, the intensity falling-off considerably near the edges. The spacing of the bands seen on the picture then corresponds to the distance between the centre of one hole and the next. Square holes have been tried, but the modulation effect is too rapid and tends to increase the frequency band. A smoother result can be obtained by using diamond or lozenge-shaped apertures in the scanning disc. This greatly reduces "streakiness." M. L.

Advertising —the— Empire by Radio

By ALAN S. HUNTER

NOW that serious Empire broadcasting is within sight, following the Colonial Office conference, many suggestions are being offered regarding the financing of the service. It has been suggested that the Empire station, with its world-wide range of transmission, would be a fine medium through which Empire goods could be sold.

Before we can estimate the value of this idea, the work already done for Empire broadcasting ought to be clearly realised. At the moment, few people understand the preparations that have been going on.

With their experience of working the experimental short-wave transmitter at Chelmsford, the B.B.C. was able, in November, 1929, to draw up a scheme for Empire broadcasting, but as the source of financial support was by no means assured, the B.B.C was asked to submit a cheaper scheme.

This was accordingly prepared, so that in June, 1930, the Colonial Office received a letter containing suggestions that will, in all probability, form the basis of the new Empire service. In this later report we can trace the exact extent to which advertising support will be countenanced.

The B.B.C. is willing to include general British trade propaganda in the Empire transmissions, but it asks for a free hand in putting the idea into practice. The B.B.C., is not disposed to consider programmes sponsored by individual advertisers; in fact it becomes clear from the report that advertising interests are not to be called upon to support Empire broadcasting in any way.

The Cost

The cost of the service has been roughly estimated at £22,000 per year, on a five-year basis, the cost to be borne by the Colonial Office. The comparative cheapness of the scheme is due to great generosity on the part of the B.B.C. which is prepared to supply most of the programme material free of charge, subject to one or two entirely reasonable conditions.

Estimates show that the cost of the transmitting gear for Empire broadcasting involves a sum of £40,000. This sum would, with Government support, be borrowed so that the annual instalments, plus 6 per cent. interest, would be £9,500. The annual cost of maintenance is £7,000.

Apart from these engineering costs, programmes would require another £5,500 annually, in spite of the fact that the station would draw upon the B.B.C.'s national programme for sixty-five to seventy hours every week, free of charge.

It is proposed to broadcast Empire news bulletins at 12 noon, 6 p.m., and 12 midnight, thus fulfilling what is probably the greatest function of an Empire transmitter. Reuter's charges for this new service would be £2,000. Additional programme staff would cost another £2,000, contingent expenses £1,000, and broadcasts of special events £500.

A striking fact about the June, 1930, report compared with the November, 1929, report, is worth emphasising. In the early report the cost of programmes for the Empire station was worked out on a basis of £20 per hour and, assuming 1,700 hours' broadcasting per year, this meant a programme expense of £34,000. In the later report the costs of the station and the maintenance remain respectively at £40,000 and £7,000, *but the programme cost has been wiped out.* The original report contained this statement :

"As British home listeners cannot listen to the short-wave Empire stations, it does not appear that any part of the expense of the outgoing service can equitably be charged to them."

This view is probably shared by the bulk of B.B.C. licencees Many of them will undoubtably condemn the B.B.C. for changing their mind and giving away £34,000 of programme material. According to the proposals, the cost of the Empire service is now being shared by British listeners and the Colonial Office. The question naturally arises as to why the programmes could not be paid for by private enterprises anxious to find an Empire market for their goods.

The answer is fairly conclusive; the response in an advertising sense, in spite of the range of the proposed transmitters, would probably not justify the expense—at least not in the way American radio advertising justifies itself. Consider the reports from the various parts of the Empire concerned :

Canada : The novelty interest in relayed British broadcasting has waned. The interest that remains centres on news and events.

Empire's Needs

West Indies : Poor reception is experienced from this country and a demand has been expressed for news. High-quality musical programmes are wanted, but who would care to guarantee them on short waves?

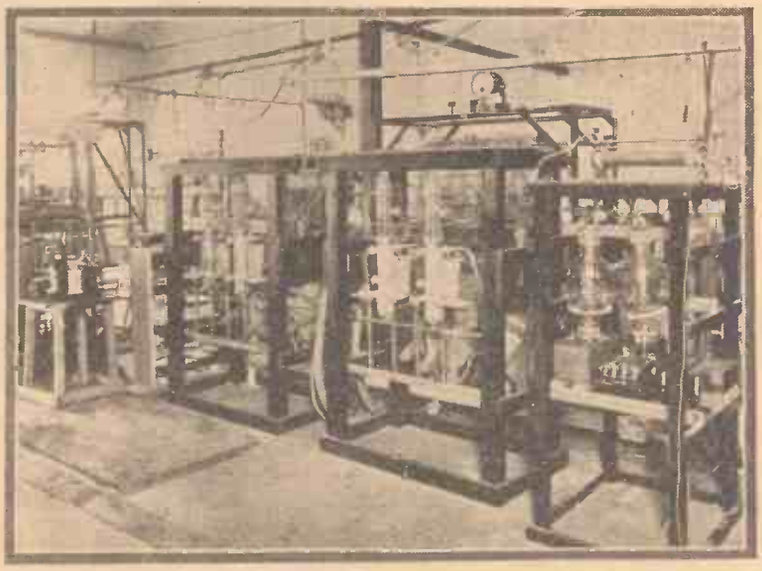
South Africa : Considerable listening goes on, with some desire for programme reception, but again the real interest is in news.

India : A fair amount of reception from 5SW goes on with a need for news and other special items.

Australia : A novelty interest only remains in connection with reception of Empire broadcasting, but there is a desire for relays of special events.

Remembering that some of these countries offer better facilities than others for re-broadcasting Empire transmissions, there still remains the fact that the chief demand of the Colonies and Dominions is for participation in the great ceremonies of the Empire, such as Armistice Day, and in outstanding sporting events, such as Derby Day.

Broadcasting these events is clearly the prerogative of the authorities concerned. Any interference by advertising interests would be unthinkable.



The transmitting gear of the Chelmsford short-wave station from which Empire experimental transmissions are being made

THE HOW AND WHY OF RADIO

I—WHY THE SET MUST BE TUNED

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

TUNING is one of the fundamentals of wireless. Without it, all the amplifiers in the world would be useless; and all the transmitting stations in the world would combine to produce an inconceivable chaos.

At all times of the day and night wireless waves are being created by broadcasting stations in different parts of the world. These waves permeate everything; for they are affecting an all-pervading medium—the ether.

The faintest signal from Australia or the strongest from Brookmans Park and the myriads of signals of intervening strength are reduced to the same dead level of inaudibility in this ether of space—unless we can tune them, when their relative strengths again assume importance.

Waves have been mentioned; how they come to be created is not relevant here; but they are created by every broadcasting station. And since the medium of propagation is common to all of them, they travel at the same speed—the inconceivable speed of 186,000 miles per second.

Wave Speed

The speed of the waves is constant and cannot be altered by man; but the frequency with which each wave is sent out can be controlled and *has* to be controlled, otherwise chaos would result.

Tuning is the process whereby the frequency of wireless waves is electrically varied, both at the transmission and at the receiving points. Clearly, if the transmitter determines on a certain frequency, one must arrange the receiver to respond to that frequency.

This frequency response is readily arranged by a tuning circuit such as the very simple example illustrated. It consists of a coil, having the property of inductance, and a condenser, having the property of capacity.

Tuning is a tremendous amplifying process; how true this is can be understood by appreciating the fact that the actual energy received in the aerial from a normal station would be of the order of millionths of a volt; tuning will amplify that infinitesimally small amount of energy up to as much as one or two volts—an amplification of a million—without valves or any other apparatus except tuning.

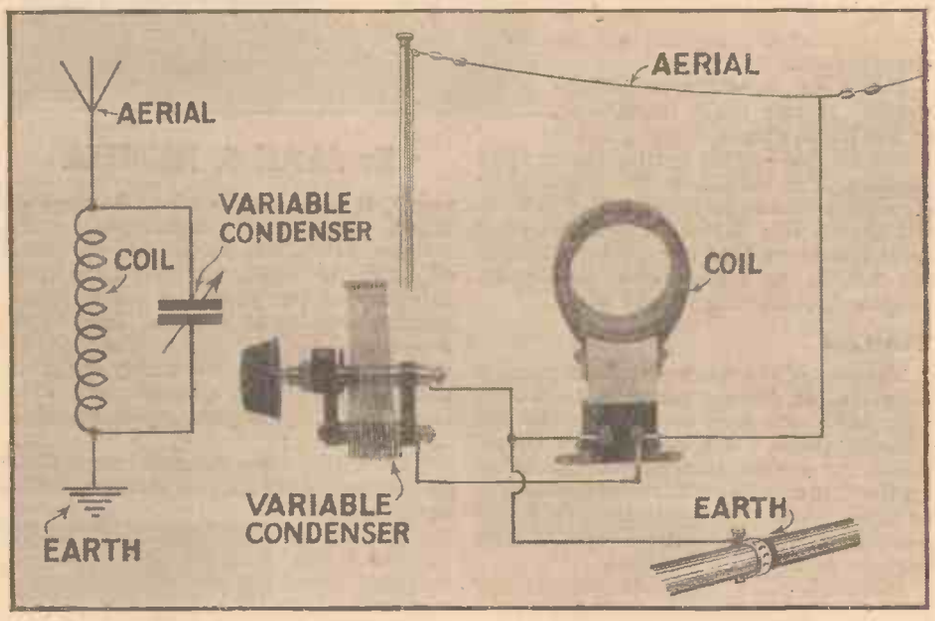
Tuning is electrical resonance, having a counterpart in many quite familiar everyday mechanical processes. Here are one or two examples of the phenomenon of resonance.

A piano struck on a certain note can cause a near-by vase to "ring," just because the note of the piano and the natural period of the vase are in tune. Everything has a natural period of vibration, even a large bridge; that is why soldiers marching over a bridge are made to break step, lest their united, persistent and uniform steps should happen to coincide with the natural beat of the bridge. If that happened tremendous forces would come into play; the amplifying effect of resonance could quite easily break down the bridge.

Resonance is a latent force, ready to be released when conditions are right. The force is great, but the agent releasing it may be quite puny. A small band of soldiers against a whole bridge seems an uneven match, but give those soldiers resonance and the bridge collapses.

So in the ether, a dead level of inaudibility remains until resonance or, as we can say, tuning, is brought into play. With tuning we can lift from this inaudible level a signal made strong enough by resonance to operate a wireless amplifier; and because the increase in the strength due to resonance is so considerable, we do not hear signals except those tuned.

We ought not to hear other signals and would not if our apparatus were perfect. But waves are now so close together that



The simplest possible aerial-tuning circuit in (left) diagram and (right) picture

when we lift one wave from the "sea" of the ether, we unavoidably drag up others—the waves of stations on each side of the required one.

Many other illustrations could be given; one more will help to complete the picture. A pendulum, consisting of a weight on the end of a freely-suspended string; tap the pendulum and it will swing away; when it returns it can be tapped again and be made to swing even further. Subsequently, the very gentlest tap, at the right moment, will keep the pendulum swinging, whereas a tap at the wrong moment, hard or gentle, will slow down the movement.

The same thing happens in a bath; one can create a miniature wave by sweeping the bath sponge through the water. If a further push is given behind the created wave it will probably become so big that the bath will overflow—yet the second push might be no more energetic than the first—but resonance would have been added.

In fact, unless the tuning apparatus is really good we get three or four waves in partial resonance; so we get a glimpse of the very real chaos that follows without selective tuning.

Selectivity is the measure of ability of a tuning circuit to respond to one wave and only one wave, to the exclusion of all others. Next week, among other matters, it will be shown why the simple circuit illustrated is seldom practicable to-day, although it was widely used two or three years ago.

NEXT WEEK, No. II—HOW TO TUNE THE SET

COMPLETE GUIDE TO SHOW STAND Nos. 55—71

(*Continued from page* 318).

purpose. This concern has had very many years experience in the manufacture of accumulators of all types for wireless work, and this stand is sure to attract attention from amateurs who are on the look out for accumulators which eminently fill their needs.

Stand 55. Kolster-Brandes, Ltd., Cray Works, Sidcup, Kent.

Kolster-Brandes now have an extraordinarily complete range of sets and gramophones. A two-valve all-electric receiver, a new dynamic speaker and a new type of wavetrap are lines which will attract particular interest, while the three- and four-valve receivers available have so embracive a range of utility that they are sure to find great popularity. The chief model of the range is a double-turntable radio gramophone, an ideal instrument for house party entertainment.

Stand 56. Burndept Wireless (1928), Ltd., Eastnor House, Blackheath, S.E.3.

On the stand are to be found receivers of practically every type made by this well-known firm. The range of Burndept speakers available is very comprehensive and moving-coil enthusiasts should make a point of seeing the latest Burndept job. Among portable sets the Burndept suitcase model is well known and merits detailed inspection.

Stand 57. L. McMichael, Ltd., Wexham Road, Slough, Bucks.

There are many portables and indoor sets in the McMichael range and a good idea of the number of sets in the whole range can be gathered on a visit to this stand. Of outstanding interest among portables is the McMichael Super Range Portable Four, and this will be seen together with many other models. Portable set users who are having trouble with selectivity should see the McMichael wave trap for portables.

Stand 58. Six-Sixty Radio Co., Ltd., 17-18 Rathbone Place, W.1.

On this stand will be found a wide range of Six-Sixty valves, which should be inspected by all set users. Some new types have just been introduced and the range is now particularly complete.

Stand 59. British General Mfg. Co., Ltd., Brockley Works, Brockley, S.E.4.

Here is to be seen a range of British General parts for set constructors.

Stand 60. Wilkins & Wright, Ltd., Utility Works, Holyhead Road, Birmingham.

The Utility range of components is well known and it is opportune to mention here only the interesting new lines which will be on show. These include the Mite Log Condenser and the Mite thumb-control condenser. New thumb-operated drum dials are now available, while a component of considerable interest is the new anti-capacity switch.

Stand 61. Radio Instruments Ltd., Purley Way, Croydon.

The comprehensive range of Radio Instruments components is such as to satisfy the need of the most discriminating set builders and on the R.I. stand are to be found in an excellent display a full range of R.I. parts for every purpose. The range has been considerably added to during the past season, and while it is impossible in the short space available here to precis the long list of all the parts available, it may be mentioned that transformers and power resistances for every purpose are to be had. A new R.I. transformer is the Hypermite, which has a nickel alloy core and which will improve the performance of practically any set. It is a companion to the well-known Hypermu which has made itself firm friends with many amateurs. Some interesting complete receivers are also to be seen here and these cover the whole range of set-users' requirements.

Stand 62. Graham-Amplion, Ltd., St. Andrew's Works, Slough, Bucks.

On this stand will be found an excellent range of Amplion speakers, including the new cabinet models which have been produced for the next season. Set users will be interested in the new Amplion receivers, many of which operate from the mains. Then there is the new Amplion portable which has created so much interest among users of this type of set.

A new line is the Junit eliminator which will be seen on this stand together with other members of the Junit range of components.

Stand 63. Jackson Bros., 72 St. Thomas' Street, London Bridge, S.E.1.

J.B. condensers are always well to the fore in design and for the new season some very efficient new models have been introduced which will prove of great service to the constructor. The frame construction of the popular Universal Log has been modified and similar slight alterations have been made in other members of the range to ensure the greatest efficiency.

Stand 64. Oldham & Son, Ltd., Denton, Manchester.

The "Lively O" range of accumulators made by Oldham & Son, Ltd., is well suited to the needs of listeners and the design of these cells is an entirely new idea in the production of slow discharge accumulators. Oldham batteries can be obtained in celluloid containers if desired and the series of unspillable accumulators should find great favour with portable set users. Sixteen different models are available so it should not be a difficult matter to find an accumulator in the Oldham range to suit your receiver.

Stand 65. Junit Mfg. Co., Ltd., 2 Ravenscourt Square, W.6.

No doubt interest here will centre on the new W. & B. cabinet loudspeakers which sell at low figures and are suitable for practically every receiver. Amateurs who wish to make up their own speakers will find much to interest them in the display of W. & B. four-pole balanced armature units and also in the new cone chassis and stands, available for fixing in cabinets. The Lodestone Moving-coil speaker designed by Mr. W. James and specified in the *Wireless Magazine* is also on show and this will appeal to the ever-increasing ranks of moving-coil enthusiasts. Smaller W. & B. parts, the well-known valve holders and A. C. valve sockets will appeal to set builders who appreciate good design with these smaller components.

Stand 66. Whiteley, Boneham & Co., Ltd., Nottingham Road, Mansfield, Notts.

Stand 67. Edison Swan Electric Co., Ltd., 1a Newman Street, W.1.

As is to be expected, Mazda valves form the outstanding exhibit here. Battery and mains types will be shown, including the new Mazda all-mains pentode and the new Mazda P220A. The new Ediswan receivers are shown, including the 1931 models of the Ediswan three-valve battery set, which achieved such success last season. Interest will focus on the Ediswan Power Pentode Three, a receiver which employs the new Mazda AC/Pen valve in the last stage. A speaker which on account of its novel construction and good reputation is bound to attract attention is the new permanent magnet R.K. speaker.

Stand 68. General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.

Some startling new features of design are embodied in the new Gecophone sets for the 1931 season, and all amateurs should make a point of seeing the new Osram Music Magnet Four, which, though designed on somewhat unconventional lines, is bound to prove a "winner." A range of interesting speakers is also on show.

Stand 69. Telsen Elec. Co., Ltd., Miller Street, Birmingham.

Here are to be seen the well-known Telsen Radiograd and Ace transformers. These have just been altered in appearance and new moulded cases are used.

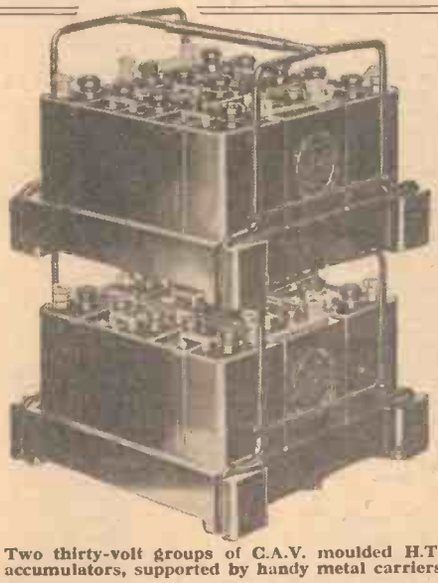
Stand 70. Siemens Bros. & Co., Ltd., Caxton House, Westminster, S.W.1.

This old-established firm of battery manufacturers is, naturally, displaying a wide range of dry-cells and batteries for every set purpose. The new Siemens "Full-O-Power" high-tension batteries have come into instant popularity, and these form one of the main features of the display.

Stand 71. Columbia Gramophone Co., Ltd., 92 Clerkenwell Road, E.C.1.

The new Columbia Radio gramophone is shown on this stand together with the well-tried receivers of last

A fine combined receiver and speaker, made by Varley



Two thirty-volt groups of C.A.V. moulded H.T. accumulators, supported by handy metal carriers

Jelly electrolyte is used in these new Exide non-spill accumulators, which are ideal for portable sets

First at the Exhibition—"A.W.'s" STAND No. 1

COMPLETE GUIDE TO SHOW STAND Nos. 72—113

year, the Columbia portable, and the radio table model. The Columbia moving-coil speaker is shown, together with a new cone speaker selling at £4 15s. 0d.

Stand 72. Formo Co., 23 Golden Square, Piccadilly Circus, London, W.1.

The components of the Formo Company are too well known to need extensive introduction, and it suffices to say that components to interest every amateur will be found on this stand. Handy gadgets such as the Formo illuminated drum dial, vernier control, midget and differential condenser and the well-known Formodensers will interest home constructors and those out to improve their receivers.

The Pigmy Four portable

A fine Lotus pedestal-model receiver

Stand 73. Sydney S. Bird & Sons, Ltd., Cyldon Works, Sarnesfield Road, Enfield Town, Middlesex.

There are some interesting new Cyldon condensers to be seen. Air-dielectric differential condensers are now available and Cyldon are showing for the first time a new type of short-wave condenser known as the Series Gap. Other new ideas are a slow-motion illuminated drum dial and a gang condenser built into a cast chassis.

Stand 74. Whittingham, Smith and Co., Portadyne Works, Chase Estate, Park Royal, London, N.W.

The chief exhibit here is the new edition of the Portadyne suitcase type receiver. This has four valves with one screen-grid stage and sells at 22 guineas complete.

Stand 75. Ormond Engineering Co. Ltd., Ormond House, Rosebery Avenue, E.C.2.

The Ormond slogan is "High in Quality, Low in Price," and this is fully borne out by the interesting display of components and complete sets to be found here. Ormonds have recently introduced some new lines but old favourites such as the Ormond Five, a cabinet model receiver, and the Attache Case Portable will find firm friends. Naturally, the very complete range of Ormond condensers forms one of the chief exhibits, and in conjunction with these the new vernier and drum dials will be of interest. Many amateurs are becoming enthusiasts for the Ormond dry H.T. batteries, and these too, will be found on this stand.

Stands 76 and 108. Graham Farish, Ltd., Masons Hill, Bromley, Kent.

There are some interesting new Graham Farish lines for the 1931 season. You should not overlook this opportunity of inspecting the Electroficient pick-up, the new Parvor Stamp fixed condensers, new L.F. transformers and an improved type of Microficient variable condenser.

Stand 77. Ultra Elec., Ltd., 661 Harrow Road, N.W.10.

Here are to be seen the well-known Ultra Air-chrome speakers which have so rapidly earned a good name for themselves and which can be used with every receiver. This type of speaker reproduces the low notes very well and does not cut off the higher tones to so great an extent as do some moving coils.

Stand 78. S. G. Brown, Ltd., Western Avenue, North Acton, London, W.3.

Interest on this stand undoubtedly centres on the latest Brown receivers, most of which are table models and can be obtained either assembled and tested or as kits of parts for the home constructor. Another feature is that most of these receivers can be operated from either A.C. or D.C. mains. The ever popular Brown speakers are exhibited in both the cabinet and horn types and an old friend is the Brown "Vee" unit cone and chassis.

Stand 102. Brownie Wireless, Nelson Street Works, Mornington Crescent, London, N.W.1.

The three chief receivers to be seen on the Brownie stand are the Dominion Console, the Dominion Three and the Brownie two-valver. The two-valver is sold at an extraordinarily low figure complete with valves, speaker and batteries. The newcomer is the Dominion Mainset Two, which at the low price of £12 15s. should make an instant appeal to all amateurs who are on the look-out for a receiver which operates direct from the mains.

Stand 103. A. F. Bulgin & Co., Ltd., 9-11 Cursitor Street, Chancery Lane, London, E.C.4.

Gadget lovers will find here a wealth of small parts which improve the appearance and performance of a set. Many new lines have been introduced, adding to the already comprehensive Bulgin range, and among these may be mentioned some new switches, mains plugs and sockets and numerous small parts which will interest radio-gramophone users.

"AMATEUR WIRELESS," FIRST IN RADIO —FIRST AT THE SHOW. STAND No. 1

Stand 104. Dyson & Co. (Works), Ltd., 5 Godwin Street, Bradford.

Godwinex eliminators for A.C. and D.C. form the chief exhibits here, and there is also a complete A.C. operated three-valver in which provision is made for the use of a gramophone pick-up. The H.T. and L.T. eliminators employ Westinghouse metal rectifiers, and all of them comply with the I.E.E. regulations.

Stand 105. Varley (Oliver Pell Control), 103 Kingsway, London, W.C.2.

This concern is doing excellent work in producing high quality components to suit every set purpose and in the wide range of parts of all kinds to be found on this stand, set constructors should have no difficulty in finding just the components they require for sets for the new season. Mains users should see the new range of power transformers, smoothing chokes, potentiometers, power resistances and so on, while other old friends such as the Nicore L.F. transformer will appeal to every user of a set. Volume controls, rheostats, potentiometers, anti-mobo units and new wire-wound resistances are all sure to attract attention, while the Varley range of receivers is most comprehensive.

Stand 106. Gambrell Radio Ltd., Buckingham House, Buckingham Street, W.C.

Gambrell Radio Ltd. are exhibiting a complete range of fine three- and four-valve receivers and a comprehensive radio gramophone, the Gambrell Radio Novogram, which operates either on A.C. or D.C. mains. A very handy instrument is the Gambrell wave-meter which operates on a novel principle and simplifies station searching. Gramo-radio users should see the Novotone.

Stand 107. Automatic Coil Winder and Elec. Equipment Co., Ltd., Winder House, Douglas Street, S.W.1.

Stand 109. Red Star Radio, Ltd., Aston Road, Birmingham.

On the Red Star Stand is to be found an extensive range of the new Red Star receivers.

Stand 110. Peto Scott Co., Ltd., 77 City Road, London, E.C.1.

This concern is exhibiting a full range of receivers of all the leading makes. Home constructors are catered for on a large scale by a comprehensive display of mains apparatus, kits of parts, and speakers, cabinets and batteries of all types.

Stand 111. Tannoy Products, 1-7 Dalton Street, W. Norwood, S.E.27.

Many new Tannoy mains units have been introduced during the past season and these will be seen on this stand. No valves are used in Tannoy eliminators, for Westinghouse metal rectifiers are used for L.T. work and Tannoy full-wave electrolytic rectifiers on the H.T. side.

Stand 112. Ridged Cone Co., York House, Southampton Row, W.C.

The R.C. indoor aerial forms one of the features of interest on this stand where also will be seen some new R.C. components, including a new type of microphone.

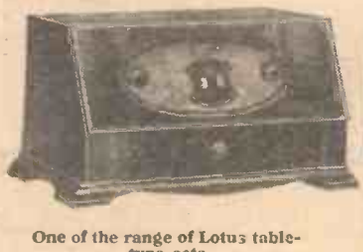
An Amplion five-valver, working from the mains

A popular low-frequency transformer, the Igranic

Stand 113. Classic Radio & Gramophone Co., Ltd, 25 Eccleston Street, S.W.1.

The Ariel Pigmy portable is a novel transportable receiver which has made a good name for itself on account of its high standard in quality and workmanship; its popular price, and its remarkable degree of selectivity—which nowadays is an essential in any satisfactory receiver. The Ariel portable is a five-valver in which it is claimed that the H.T. consumption has been reduced to a very low figure of 5 milliamps, thus lowering the cost of upkeep to a minimum. The set weighs only 22

COMPLETE SHOW GUIDE CONTINUED ON PAGE 329



One of the range of Lotus table-type sets

A typical high-tension battery

Pertrix

C.A.V

THE ORIGINAL Jelly Acid Non-Spillable Cell

The popularity of the C.A.V. Jelly Acid Battery is not explained by the mere fact that it contains jelly electrolyte—there are other jelly electrolyte batteries! There are three reasons why the C.A.V. is the most effective non-spillable yet produced.

THE JELLY ACID. Its composition is unknown outside our own laboratories. It maintains perfect contact with the whole of the plate surfaces, yet allows unrestricted gassing when on charge. It is chemically pure, and allows maximum conductivity.

THE CONTAINER. Of special construction, contains a baffle plate and moistening pad, which serves the triple purpose of arresting acid spray during charge, feeding the electrolyte with moisture to maintain an even consistency, and definitely confines the jelly to the plate chamber.

THE PLATES. These have been specially developed to give the utmost possible capacity when used with C.A.V. Jelly acid.

THE WHOLE. The C.A.V. is the lightest, cleanest, and most compact non-spillable on the market. By avoiding cumbersome acid traps, the greatest possible capacity for bulk is obtained.

Obtainable from our Depots and Battery Agents throughout the country and from all Radio Dealers.

TYPES and PRICES.

Type	Volts	Cap. at 20 hour rate	Weight Charged	Dimensions (in inches) L.	W.	H.	Price
2NS9	2	10	2 lbs	1 3/16	3 1/8	4 7/16	12/-
2NS13	2	15	2 3/4 lbs	2 1/2	3 1/8	4 7/16	14/6
2NS17	2	20	3 3/4 lbs	3 1/4	3 1/8	4 7/16	16/-
2NS21	2	25	4 1/2 lbs	3 1/16	3 1/8	4 7/16	18/-
2AN7	2	30	5 1/2 lbs	2 3/16	4 3/16	7	16/-

- AND BEST

May we send you copy of our latest Catalogue giving particulars of all types of C.A.V., H.T. and L.T Accumulators. Write to Dept. C.4

C.A.Vandervell & Co.s Ltd.s
ACTON, LONDON, W.3.

ALL POSITION
NON-SPILLABLE

STAND No. 7.
RADIO EXHIBITION
OLYMPIA, Sep. 19th - 27th.

Perfect for Portables

To Ensure Speedy Delivery, Mention "A.W." to Advertisers

The Greatest Achievements of a Great Firm

Brown
Grosvenor Moving Coil Receiver

Handsome walnut cabinet. Pitch control fitted. Price, fitted with 6 volt field coils and high resistance speech coil, £17. 17. 0. Fitted with permanent magnets and high resistance speech coil, £20. 0. 0. Energized direct from A.C. mains, complete with rectifier and high resistance speech coil . . . £21. 0. 0.

Brown
Screen Grid 4 Valve Portable Set

In handsome walnut cabinet. Ball-bearing turntable, special Brown Movement for Portable Sets, coils covering all wavelengths. Provision for connecting to additional speaker and pick-up. Complete with valves, batteries, unspillable accumulator . . . . . £19. 19. 0.

NEW Speakers — **Brown** — NEW Receivers

100% BRITISH THROUGHOUT

Brown
Austral Loud Speaker

Placed on market for first time after an overwhelming success in Australia. An unusually good loudspeaker for the price. Dimensions: 12½" high, 11½" wide, 4" deep. Supplied in oak only. Price . . . . £2. 10. 0.

WE ARE EXHIBITING AT

THE NATIONAL RADIO EXHIBITION OLYMPIA (NEW)
SEPT 19th—27th 1930

STAND 78

S. G. BROWN, LTD., Western Avenue, N. Acton, London, W.3.

Brown
Royal Loud Speaker

Cabinet designed to avoid box resonance common to a number of speakers. Gives remarkably clear reproduction. Fitted with the famous Brown "Vee" Movement and Duplex diaphragm. Price, mahogany only . £12. 10. 0.

♡ 5967

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

COMPLETE GUIDE TO SHOW STAND Nos. 114—134

(*Continued from page* 326)

lb. and so will appeal to set users who, not being motorists, have to consider lightness of weight.

Stand 114. Selectors Ltd., 206 Bedford Avenue, Trading Estate, Slough, Bucks.

Selectors Ltd. manufacture two battery-operated sets, two all-mains models, and one combined radio gramophone, while a new addition to the family is an attache receiver selling at a modest figure. In this newcomer the well-tried and proved Selector screen-grid circuit is employed, which is very simple to control and exceedingly efficient. The father of the family is the Selector-Vox, a radio gramophone working entirely from the mains and housed in a most attractive veneered walnut cabinet.

Stand 115. Benjamin Electric Ltd. Brantwood Works, Tariff Road, Tottenham, London, N.

The chief feature of this exhibit is a new rotary switch which should make a great appeal to home constructors on account of its efficiency and ease of fitting. Other Benjamin specialities are also on show.

Stand 116. F. W. Smurthwaite, 15a Onslow Gardens, Wallington, Surrey.

This concern is well known as actual manufacturers of speaker units. A number of separate units are shown here, together with some very attractive cabinet jobs.

Stand 117. Rees Mace Manufacturing Co., Ltd., 39a Welbeck Street, W.1.

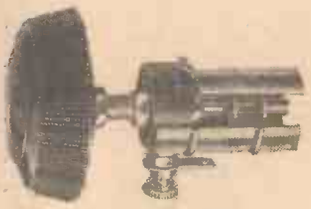
The Gnome portable set which has proved to be so successful during the past season has been carefully revised and improvements have been effected in the circuit and construction and design. The 1931 Gnome receiver is now a very high performance screen-grid four-valver housed in a hide suitcase.

Stand 118. Wingrove & Rogers, Ltd., 188 Strand, W.C.2.

Our old friend the Polar Bear has won a name for himself by reason of the excellence of the Polar Ideal range of condensers. These form the feature of major interest on the Polar stand, and every builder of a set or every user of a set who has reason to be dissatisfied with the existing condensers will find condenser problems solved by Polar. Other Polar parts include useful H.F. chokes, coil units and fixed potentiometers, while on this stand also will be found the D.P. Kathanode batteries for both H.T. and L.T. work.

Stand 119. Falk, Stadelmann & Co., Ltd., 83-93 Farringdon Road, E.C.1.

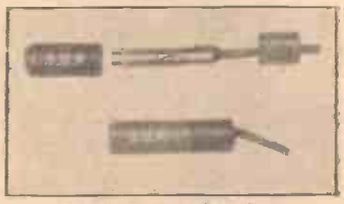
Radio apparatus to interest everybody is found on this stand, including the well-known Efescaphone complete set for battery or all-mains



A useful new Stratton component

The Hustler Double-Two receiver

A four-gang Colvern condenser



Handy Lectro-Linx plugs

operation, and also a new self-contained portable which incorporates a very efficient screen-grid circuit. Mains users should make a point of seeing the Efesca H.T. eliminators for A.C. and D.C.

Stand 121. Burne-Jones & Co., Ltd., 296 Borough High Street, S.E.1.

On this stand will be found an interesting range of components and complete receivers. Some newcomers in the way of smaller parts are ganging switches, wire-wound potentiometers, neutralising condensers, spaghetti wire-wound resistance and a new gramophone pick-up.

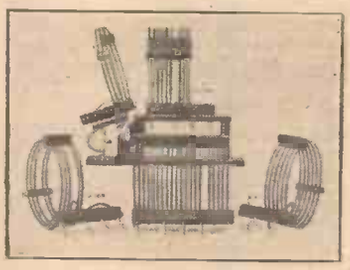
Stand 122. H. S P. Wireless Co., Langford Works, Weston-super-Mare.

This concern specialises in the manufacture of excellent portable sets, and a complete range of suitcase receivers and table models will be found here. The H.S.P. Supertwin two screen-grid portable receiver is the leader of the range, and it is interesting to note that this is fitted with a Celestion speaker and Hellesen H.T. batteries. In every set in the H.S.P. range a successful attempt has been made to cut down the H.T. consumption to the lowest limit and the average consumption is 9 milliamps.

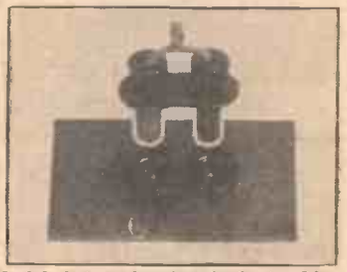
Stand 123. Universal Gramophone and Radio Co., Ltd., Ryland Road, Kentish Town, N.W.5.

Stand 124. S. A. Lamplugh, Ltd., King's Road, Tyseley, Birmingham.

The most interesting exhibit on the Lamplugh stand is the new inductor dynamic speaker which has recently been introduced and of which S. A. Lamplugh were the first licencees in this country. This new speaker is available in three models, one a chassis which costs £3 10s., a standard cabinet model at £5 10s., and a special *de luxe* cabinet model at £6 10s. Both of these cabinets can be supplied in oak or mahogany. This concern also makes most satisfactory mains- and battery-operated receivers. Mains users will be particularly interested in a new Lamplugh line, an all-mains A.C. power unit.



A set of Stratton short-wave coils



Useful plugs and sockets by Lectro-Linx

"A.W."—THE FIRST IN THE SHOW

Stand 125. Sheffield Magnet Co., 116, Broad Lane, Sheffield.

This concern has for a long time specialised in the construction of the component parts of speakers and speaker units, and here will be found interesting triple-diaphragm speakers, and new moving-coil and balanced-armature-type units, together with some handsome complete cabinet jobs.

Stand 126. Radio Gramophone Development Co., 72 Moor Street, Birmingham.

Stand 127. Syvex, Ltd., 144 Theobalds Road, W.C.1.

Stand 128. T. de la Rue & Co., 90 Shernhall Street, Walthamstow, E.17.

Stand 129. Swift Levick & Sons, Ltd., Clarence Steel Works, Sheffield.

This concern is exhibiting permanent magnets for speakers of all types. These are cast, bent or stamped in cobalt and tungsten steels.

Stand 130. A. M. E. Sherwood, 56 Hatton Garden, E.C.1.

Stand 131. Lectro-Linx, Ltd., 254 Vauxhall Bridge Road, London, S.W.1.

The name Clix has for a long time been synonymous with good connections, and there are now Clix plugs and sockets and similar connectors which should find extensive use. Among the new lines introduced are paralleling plugs and power sockets with safety bushes.

Stand 132. W. & T. Lock, Ltd., St. Peters Works, Bath.

Every set needs a cabinet and so every set user will be interested in the well-made jobs of W. & T. Lock. A complete range of Kabilok cabinets is on show including the familiar American pattern cabinets in panel sizes ranging from 12 ins. by 7 ins. up to 21 ins. by 7 ins. Among the many new designs and popular-priced cabinets on show will be radic gramophone cabinets and pedestal cabinets for sets and speakers combined. A feature of the new Lock speaker cabinet is the provision of a substantial baffle board.

Stand 133. A. H. Hunt, Ltd., H.A.H. Works, Tunstall Road, Croydon.

This stand is a comfortable meeting place for the many trade and wholesale friends of this old established concern.

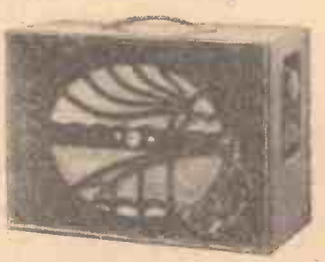
Stand 134. Belling & Lee, Ltd., Queensway Works, Ponders End, Middlesex.

Belling-Lee terminals, indicators, wander plugs and connectors of all kinds are shown on this stand, and set users who have any doubt as to

The Tannoy eliminator for portables

A well-known portable, the Columbia

The Cromwell moving-coil speaker



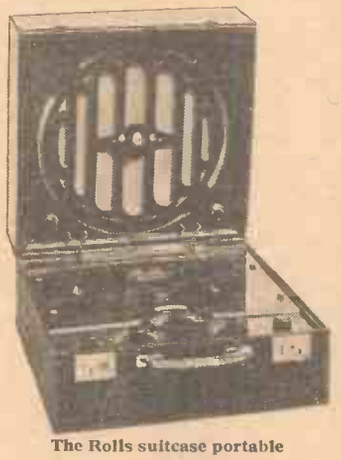
The H.S.P. five-valve portable

COMPLETE GUIDE TO SHOW STAND Nos. 135–212

the efficiency of their terminals and connectors should see how, by the fitting of Belling-Lee parts, such troubles may be avoided. A new idea is the set of Belling-Lee radio legs which make a pedestal model of any table-type receiver.

Stand 135. Lithanode Co., Ltd., 190 Queens Road, Battersea, S.W.

Battery users will find much to interest them here, and a prominent feature on the stand is a new non-spillable device which is fitted to most



The Rolls suitcase portable

of the popular Lithanode models. The great advantage is that it is now possible to raise the acid level in unspillable accumulators to as much as ¼ in. above the plates.

Stand 136, J. R. Wireless Co., 68 Rosebery Avenue, E.C.

Stand 137. Bakers Selhurst Radio, 89 Selhurst Road, London, S.E.25.

Moving-coil enthusiasts should see the new permanent-magnet type of moving-coil speaker, for this concern has over a long period specialised in permanent-magnet moving-coils. A model suitable for use with a pentode valve is available and one has a linen diaphragm. Standard types of moving-coil speaker are also to be seen.

Stand 138. Jewel Pen Co., Ltd., 21-22 Gt. Sutton Street, E.C.1.

Aerial lead-in tubes, permanent crystal detectors, coil holders, knobs and efficient panel-mounting switches are shown on this stand. The Jewel Pen Co. have an embracing range of small parts for the home constructor, and anyone who is contemplating building up a receiver should see this stand, for here it is likely that they will find some small part which will greatly facilitate construction.

Stand 139. Donotone (Regd.) Loud-speaker, 40 Furnival Street, E.C.4.

The Donotone loud-speaker operates on a novel principle and there are many types of speaker available to match up with the cabinet work of a receiver and the furnishing style of a room.

Stand 140. Carrington Mfg. Co., Ltd., 24 Hatton Garden, London, E.C.1.

During the past season many interesting new Camco models have been introduced and these are to be seen together with many old favourites. Gramo-radio users should make a point of seeing some of the new gramophone cabinets.

Stand 141. Harlie Bros. (Edmonton) Ltd., Balham Road, Lower Edmonton, N.9.

There are many interesting components for the radio-gramophone user on this stand, including the Harlie Volustat, electric gramophone motor and pick-up. The electric gramophone drive incorporates several novel features, and, if desired, the motor can be obtained as a complete unit with pick-up and automatic stop. Harlie Bros. are well-known manufacturers of moving-coil speakers. There are many types of speaker available for working off the L.T. accumulator or from the mains supply.

Stand 142. Johnson & Bolsom, Ltd., Carlisle Works, Carlisle Street, S.E.1. (Sole Concessionnaires; Harris Williams Manufacturers, Ltd., 5 New Zealand Avenue, Barbican, E.C.1.)

A novel set to be seen here is the Servis suitcase portable five, which is fitted with a Sixty-sixty speaker and a non-spill accumulator. The Servis five, which has an extraordinarily complete specification, sells at the low figure of £7 19s. 6d., while the Servis three-valver costs £5 12s. 6d.

Stand 143. Montague Radio Inventions and Development Co., Ltd., 117-119 Regent Street, W.1.

In the 1931 edition of the Beethoven Q.C.R. portable the Montague Quasi-constant reaction circuit is employed, which greatly simplifies tuning. Other sets on view are the Beethoven twin-screen-grid attache case portable, the Minor attache case portable and the Beethoven self-tuning portable.

Stand 144. Halcyon Wireless Co., Ltd., 27a Pembridge Villas, Notting Hill Gate, W.11.

Halcyon are marketing a number of transportable and portable sets and all-mains radio gramophones. One of the range which is bound to make a great appeal is the Halcyon super screen-grid four-valver, which is fitted with an Air-chrome speaker and Hellesen H.T. batteries. The Halcyon Grandola operates on the mains either on A.C. or D.C.

Stand 145. Telegraph Condenser Co., Ltd., Wales Farm Road, North Acton, W.3.

This stand is the "home" of fixed condensers and here are to be seen condensers of paper and mica dielectric, including the new high voltage mains condensers and non-inductive condensers for H.F. circuits. In addition, there are several new types of electrolytic condensers, which are available in working voltages of 12, 40 and 100.

Stand 201. Manufacturers Accessories Co. (1928), Ltd., 82 Gt. Eastern Street, E.C.

Stand 202. The Gripso Co., 32 Victoria Street, S.W.1.

The Gripso Co. have many novel terminals, switches, wander plugs, clips and similar small parts which will interest every user of a set. Three new indicating switches have been introduced which have a very clear on-off indication and which can carry a very heavy current.

Stand 203. Epoch Radio Manufacturing Co., 3 Farringdon Avenue, E.C.

This Company has specialised in the manufacture of moving-coil speakers and there is a wide range of these instruments on view. Separate units are available and there is also a great variety of moving-coil speakers in cabinets at prices from £5 19s. 6d. to £30. A novel idea is that most of these models are available in a variety of interchangeable diaphragms to match up with the tone output of a receiver, with or without output transformers.

Stand 204. Redferns Rubber Works, Ltd., Dawson Street, Hyde, Cheshire.

Knowing that it is important to work with the very best insulating materials, discriminating home constructors will find much to interest them at this stand. Ebonart panels in black and mahogany finishes, Bulwark panels and the well-known Redfern low-loss coil formers, choke formers and lead-in tubes are on show. There are many interesting uses to which moulded rubber can be put, and among these are the battery boxes, accumulator trays and loud-speaker mats, which can be seen here.

Stand 205. Clark & Moir, Ltd., 34 Marsh Street, Bristol.

Stand 206. Beaver Electrical Supply Co., 5 Great Chapel Street, Oxford Street, London, W.1.

The Corona five-valve portable set is to be seen here, together with a wide selection of Elite tuning coils and H.F. chokes. The H.F. chokes are obtainable in several types to suit various circuits.

Stand 207. Loewe Radio Co., Ltd., 4 Fountayne Road, Tottenham, N.15.

Speakers form part of the exhibit on this stand, and the two types

The new Polar disc-control for condensers

shown will include the four-pole speaker complete with a cabinet and a slightly smaller two-pole speaker also housed in a well-made mahogany finished cabinet. Two complete receivers are exhibited, together with the well-known Loewe Multiple valves and valve holders.

Stand 208. Danipad Rubber Co., Ltd., 5-7, Market Street, Finsbury, E.C.2.

Stand 209. Concordia Electric Wire Co., Ltd., 81 Milton Street, London, E.C.2.

Stand 210. John S. Downing & Sons, Ltd., Crown Works, Commercial Street, Birmingham.

Some very useful pedestal cabinets and cabinets for speakers and table-type receivers are exhibited by this concern. These cabinets are all made of well-seasoned timber and are thoroughly high-class jobs. Practically every make and design of receiver can be accommodated in one of these cabinets.

Stand 211. H. Clarke & Co. (Manchester), Ltd., Atlas Works, Eastnor Street, Old Trafford, Manchester.

Atlas eliminators for A.C. and D.C. working are to be seen here and a new easy payment system has been introduced whereby it is possible to obtain Atlas apparatus for a small initial payment and subsequent monthly instalments. There is a complete range of eliminators suitable for the current supply needs of practically every set. The new model A.C. 188 eliminator should be inspected.

This eliminator is a new Atlas product incorporating a trickle charger so that the accumulator in the set may be charged from the mains, and also having two voltage-variation controls. Those desirous of working their sets from the mains should make a point of seeing this new model.

Stand 212. Mayfair Enterprises, Ltd., 5, Cork Street, London, W.1.

THE EXHIBITION SET DESCRIBED IN THIS ISSUE IS ON VIEW ON OUR STAND No. 1

The Varley mains transformer—one of a large range

One of the range of Triotron valves

COMPLETE SHOW GUIDE CONTINUED ON PAGE 336

A Weekly Programme Criticism—By SYDNEY A. MOSELEY.

Without Fear or Favour

BREAKDOWNS

ARTISTES AND PUBLICITY

HOTEL ORCHESTRAS

OPERA TRANSMISSIONS

A "PROMS" SUCCESS

FILM CRITICISM

TWO points—brief, but important. Listening to a foreign station the other night, there was a sudden breakdown, and after a lengthy period came the explanation: "Sorry, there was a breakdown, but our line is now repaired." That sounded strange to my ears, and must have sounded strange to listeners generally who have had such a wonderful spell of uninterrupted transmissions from the B.B.C. Shall we put it down that Noel Ashbridge, now chief engineer of the B.B.C., is exceptionally lucky, or that technically there has been a good deal of improvement of late?

◆ ◆ ◆

One sees everywhere artistes on the variety stage billed in connection with the B.B.C. Artistes who broadcast are, I suppose, justified in referring to themselves as B.B.C. artistes, but what arrangement has Jack Payne with the B.B.C. to warrant such use of the B.B.C.'s name? It seems to me rather unfair to other artistes and once more raises the point of private enterprise against public ownership.

◆ ◆ ◆

Once upon a time it was one of my special pet pleasures over the wireless week-end to listen to the light orchestras relayed from big hotels, particularly the Carlton Hotel. These Saturday lunch-hour concerts were very popular. Now, for one of those mysterious reasons which the Wise Guys of Savoy Hill never divulge, the Carlton and other hotel bands have been replaced by a "Grand Orchestra"—whatever that may mean—from a "theatre" in Hammersmith. I used to live in Hammersmith, but I confess I do not know the theatre.

◆ ◆ ◆

If it is one of the new posh cinemas, then I can understand the very appropriate music which the "Grand Orchestra" dispenses to its own numerous clients; but why on earth music which is applicable to Hammersmith cinema fans should be dispensed to millions of listeners I do *not* understand. "A Hunt in the Black Forest" and other descriptive pieces so beloved on the seaside piers comes very strangely after the better sort of light music with which we were once regaled. Please understand I do not disparage this "Grand Orchestra" in its work of entertaining cinema audiences; but, since most of us like the best of anything that is procurable, I am sorry to miss the Carlton concerts—that's all.

◆ ◆ ◆

Elsie Cochran's voice is appealing, and I thoroughly enjoyed listening to her singing the other afternoon. Certainly the B.B.C. does not want for good vocalists.

◆ ◆ ◆

I am moving from the Essex coast to a part of London which is strange to me, and I am wondering whether my excellent foreign receptions will continue.

Making the most of the last few days in my old home, I got Rome again and heard a wonderful rendering of *Carmen*. Only the week previously I had seen this opera in Berlin and loved every note of it. The Rome transmission brought home to me the blessings of wireless once more. I do not agree that wireless is a bad second to the real thing. It is an excellent substitute.

◆ ◆ ◆

And in this connection, why can't we have more popular operas from the National programme? My only complaint with these foreign stations is that they keep one up too late, and I had to shut off the last act of *Carmen* in case the sound disturbed other people.

◆ ◆ ◆

Looking up an old programme, by the bye, I found that *La Traviata* was being given from the London station. Why not give it again?

◆ ◆ ◆

The programme the other day from the Midlands giving excerpts of no fewer than nine operas (with a tenor and contralto and with the Midland Wireless Augmented Orchestra) was a good idea; but still I say they ought to try the *whole* of one popular opera.

◆ ◆ ◆

Cyril Smith, the young and talented pianist, achieved a distinct success at his first Promenade Concert. He had a very good reception and quite a favourable Press. Since I had the satisfaction of engaging him some time ago as the television pianist, I was naturally pleased at his success, and congratulate him.

◆ ◆ ◆

I do not imagine that we have heard the last of the extraordinary muddle in handling the question of the B.B.C. film criticism. It is well-nigh inexplicable. If Mr. Whitley, the new chairman, really means to get down to business he should institute an inquiry into this matter at once. Many of the charges one hears in the club about alleged "Russian propaganda," of members of the B.B.C. being allowed to compete for this important post under pseudonyms, of feminine influence, may have little foundation in fact, but all call for strict investigation.

◆ ◆ ◆

From my own standpoint, I can state this definitely: Those who had the handling of this important matter certainly did not know what was wanted, and if other parts of the programme are chosen with such a complete lack of intelligence, then one can understand the growing dissatisfaction of many thousands of listeners all over the country.

◆ ◆ ◆

One of the finest singers I have heard recently is Arthur Fear, whose aria from *The Flying Dutchman* was rendered exquisitely. A voice of perfect range, a clear enunciation, 100 per cent. control of voice, and expression—what more can I say?

An Impression of Robert Loraine

The new 16-kw broadcasting transmitter which is now under construction at Wilno (Poland) will take over the wavelength now used by Cracow, namely 312.8m. (959 kc).

The "A.W." EXH

A PARTICULARLY SIMPLE AND EFFICIENT RECEIVE

NO matter what your present receiver may be, there are many good reasons why you should consider rebuilding it to the design of this new set!

CHEAP TO BUILD

Perhaps this seems a rather surprising statement, but there are good proofs. This set is a three-valver arranged on straightforward lines and at first acquaintance you may not see that it differs very much from your present receiver, particularly if this is one of the many other three-valvers which have sprung into popularity.

The plain fact is that here for the new 1931 season the "A.W." Technical Staff has produced something that really is different and which is an improvement upon the sets of last year, and of previous years.

Points of Design

Readers will be surprised to know of the difficulties that arise in the design of a new set.

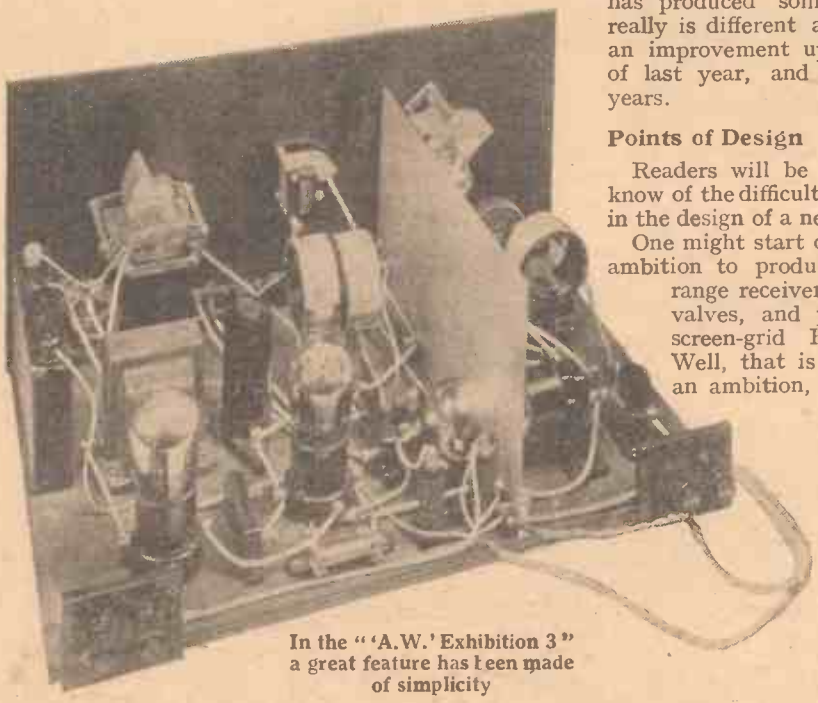
One might start out fired with ambition to produce a super-range receiver having five valves, and perhaps two screen-grid H.F. stages. Well, that is all right as an ambition, but it would raise a whole crowd of complaints from people who might be misled in building it up, and who would find that it is too big for their needs; and they would be unable to operate it.

Or you might go to the other extreme and say: "We will have simplicity above everything else. We will have a simple two-valver which everybody can build and tune. Of course, it will not have 'super' range but . . ." The obvious result would be that there would be a crowd of complaints from the other side of the crowd of radio listeners, the people who are "DX-ers" and who will not look at a set which does not bring in all the favourite standby foreign stations such as Rome, Milan, Turin, Toulouse, Cologne and so on. Of course, some two-valvers are very good—a fine new one will be described next week—but two-valvers have their limits as station-getters.

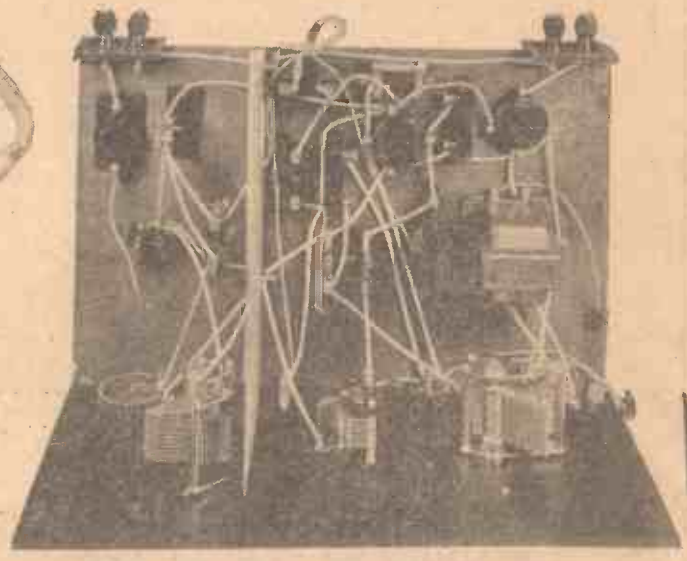
It is very difficult to steer a middle course and to bring out a set which is simple to tune and yet which "bags" foreigners, is cheap to construct yet is not skimped, and is as equally capable of receiving alternative B.B.C. programmes as it is of tripping nightly to the European capitals.

A three-valver *will* do this provided—and it is a very big "provided"—that it has the right design. Design is a little word with a big meaning, and meaning perhaps months of test trial and error behind it.

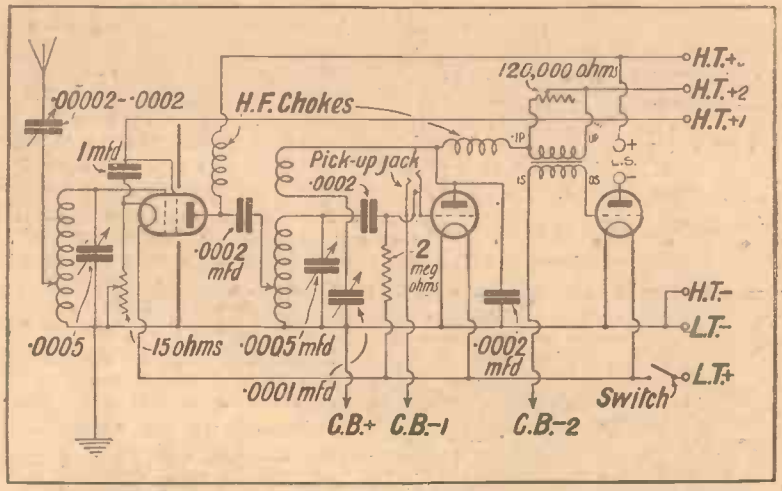
Maybe you have a three-valver at present, with which you are not over pleased. You are doubtful, perhaps, as to whether it is



In the "'A.W.' Exhibition 3" a great feature has been made of simplicity



Compare this plan view with the blueprint overleaf



In this circuit you can see the connections for the screen-grid valve, the leaky-grid detector and the transformer-coupled power valve. Note the way in which the gramo-radio jack is connected in the circuit. When the pick-up plug is inserted, the detector valve acts as the first low-frequency amplifier. The volume control connections can be seen, and it should be noted that this way of connecting a volume control does not introduce distortion

IBITION 3

R WITH SCREEN-GRID, DETECTOR AND L.F. STAGES

EASY TO WORK

We are not making an exaggerated claim when we say that you can build this set and have it working—and properly, too—in one evening, with only the usual set-construction tools.

Another detail contributing towards the simplicity is the fact that here plug-in coils are used. This may seem something of a heresy, for during the past two seasons the worth the trouble of rebuilding this to conform to our new specification.

Or perhaps you have a four-valver which is suffering from some inherent fault in design; you are dissatisfied with it and you are wondering whether it is not worth while doing away with one of the stages and concentrating everything on making the three valves as efficient as possible. Four-valvers are good, but a four-stager which is out of sorts is far worse and more tricky to handle than a three-valver in tip-top condition.

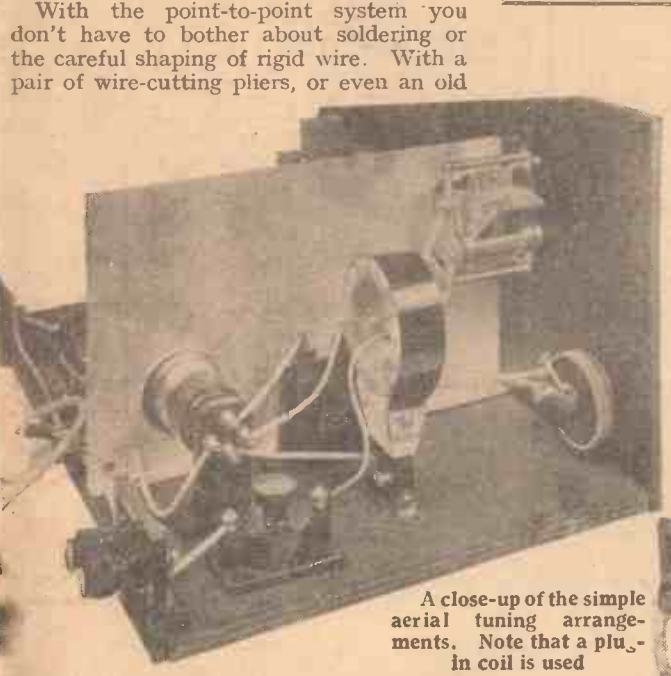
In introducing this new set we ask you to note that it is probably *the simplest three-valver that has ever been described in any journal.*

The reason for this is that the simplest system of wiring is used—that in which all the leads are held down by terminals, and no soldering is necessary. This is known as the point-to-point system, and, while it is not suitable for every receiver (some short-wavers, for instance), it is just the thing for an easy-to-build broadcast set.

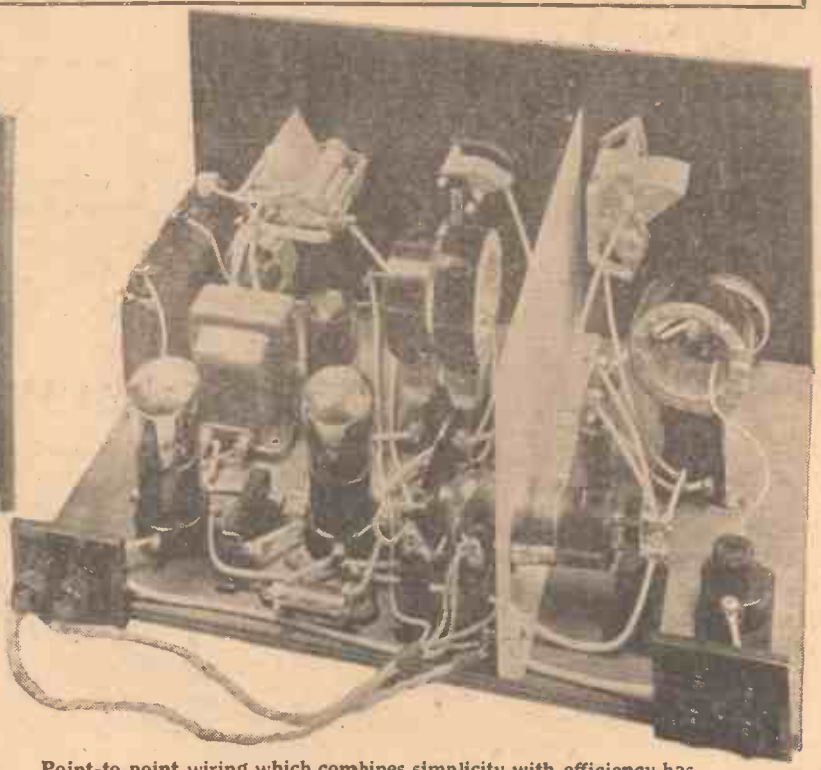
With the point-to-point system you don't have to bother about soldering or the careful shaping of rigid wire. With a pair of wire-cutting pliers, or even an old pair of scissors, you just cut the bare wire to the required lengths, slip it through pieces of insulated tubing, and clamp down the ends underneath terminals. What could be simpler?

COMPONENTS FOR THE "A.W." EXHIBITION 3"

Panel, 16 in. by 8 in. by ¼ in. (Becol, Lissen, Trolitax, Resiston).
15-ohm panel-mounting rheostat (Lissen, Igranic, Varley, Wearite, R.I.).
Pick-up Jack (Lotus, type No. 2, Igranic).
Plug (Lotus, Igranic).
120,000-ohm variable resistance (Regentone, Atlas, Lissen, R.I.).
Two .0005-mfd. variable condensers (J.B., Lissen, Dubilier, Lotus, Burton, Formo, Polar, Ready Radio).
.0001-mfd. reaction condenser (Bulgin, J. B., Lissen, Dubilier, Lotus, Telsen, Burton, Formo.)
On-off switch (Junit, Lotus, Bulgin, Trix, Lissen).
Single coil-holder (Lotus, Lissen).
Double coil-holder (Wearite).
Two valve holders (Burton, Lissen, Lotus, Telsen, Formo, Brownie, W.B., Junit).
Horizontal S.G. valve-holder (H. & B., Parex, Junit, W.B.).
High-frequency choke (Watmel D.X.3, Lissen, Varley, Telsen, Lewcos, Tunewell, Igranic, Bulgin, R.I., Ready Radio).
High-frequency choke (Lissen, Varley, Telsen, Lewcos, Tunewell, Igranic, Bulgin, R.I., Ready Radio).
Three .0002-mfd. fixed condensers (Lissen, T.C.C., Dubilier, Atlas New Type, Graham-Farish, Watmel).
2-megohm grid-leak (Lissen, Ediswan, Dubilier, Graham-Farish, Watmel).
Grid-leak holder (Lissen, Bulgin, Dubilier).
Low-frequency transformer 5-1 (Telsen, Radiogrand, Lissen, Ferranti, Igranic, Varley, R.I., Lewcos).
1-mfd. fixed condenser (Dubilier, Lissen, T.C.C., Hydra).
Two terminal blocks (Junit, Lissen).
Aluminium screen (Ready Radio, Wearite, H. and B., Parex).
Four terminals marked; L.S.—, L.S.+, A, E (Belling-Lee, type B, Clix, Eelex, Igranic).
Pre-set condenser, maximum capacity .0002 (Lewcos, Ormond, Lissen, Formo).
Two vernier dials (Igranic Major, Brownie, Formo).
Six wander plugs marked; H.T.—, H.T.+1, H.T.+2, H.T.+3, G.B.+1, G.B.—2 (Belling-Lee, Clix, Eelex, Igranic).
Two spade tags marked; L.T.+, L.T.— (Belling-Lee, Clix, Eelex, Igranic).
Four double tapped coils, 2-200's, 2-60's (Atlas, Tunewell, Lissen, Igranic, Lewcos).
Plug-in coils Nos. 60 and 100 (Atlas, Tunewell, Lissen, Igranic, Lewcos).
Length tinned copper wire for wiring (Lewcos).
Rubber covered flex (Lewcoflex).
Cabinet and baseboard (Clarion).
Panel Brackets (Ready Radio, Bulgin, Camco).
Grid-bias battery clip (Bulgin).
Lengths of Systoflex sleeving.

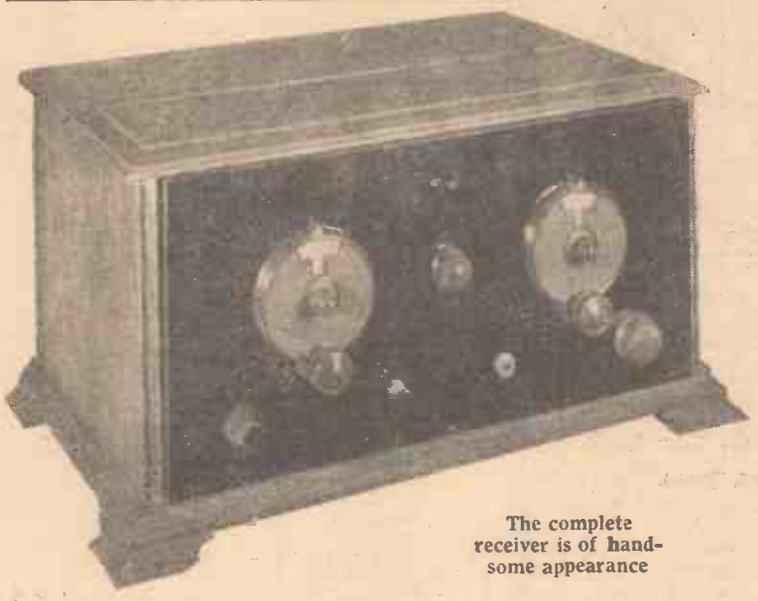


A close-up of the simple aerial tuning arrangements. Note that a plug-in coil is used



Point-to-point wiring which combines simplicity with efficiency has been employed

"THE 'A.W.' EXHIBITION 3" (*Continued from preceding page*)



The complete receiver is of handsome appearance

policy has been to advise those in trouble with the tuning of their sets to substitute dual-range coils in place of plug-in coils in moving holders.

Now why we are going back to plug-in coils is just that with new circuits plug-in coils are very convenient in use, and one does not use moving coil holders these days, for variable coupling is obtained by capacity: it was in the moving holders that most plug-in coil troubles originated. And plug-in coils are cheap.

The only "disadvantage," if such it can be called, of three separate plug-in coils, as are used in this set, is that these have to be changed to receive on the long waves. This is not so inconvenient as it may appear to be.

Coil Changing

The amount of dual-range listening is steadily decreasing. There are people in some part of the country who can receive nothing but 5XX; so their sets are permanently switched to the long waves. Also there are thousands—perhaps a million—who live in crowded areas and who can receive so many alternative programmes between 250 and 500 metres that they never bother to listen to 5XX or Radio Paris.

Plug-in coils therefore cater for the needs of those who do not necessarily want constantly to be changing from one waveband to another, but who want to explore to the full the advantages of each; and in any case it is only the matter of a minute to change all three coils if the other waveband is needed.

The Circuit

And now for a more critical examination of the set itself. It is, of course, a three-valver having a screen-grid high-frequency valve, a detector and a final low-frequency power valve. No "frills" are added to the circuit to make it more complicated without added efficiency.

The only two additions to the basic circuit are a pick-up jack and a volume control which really does control strength without introducing distortion at one or other of the ends of the volume control scale.

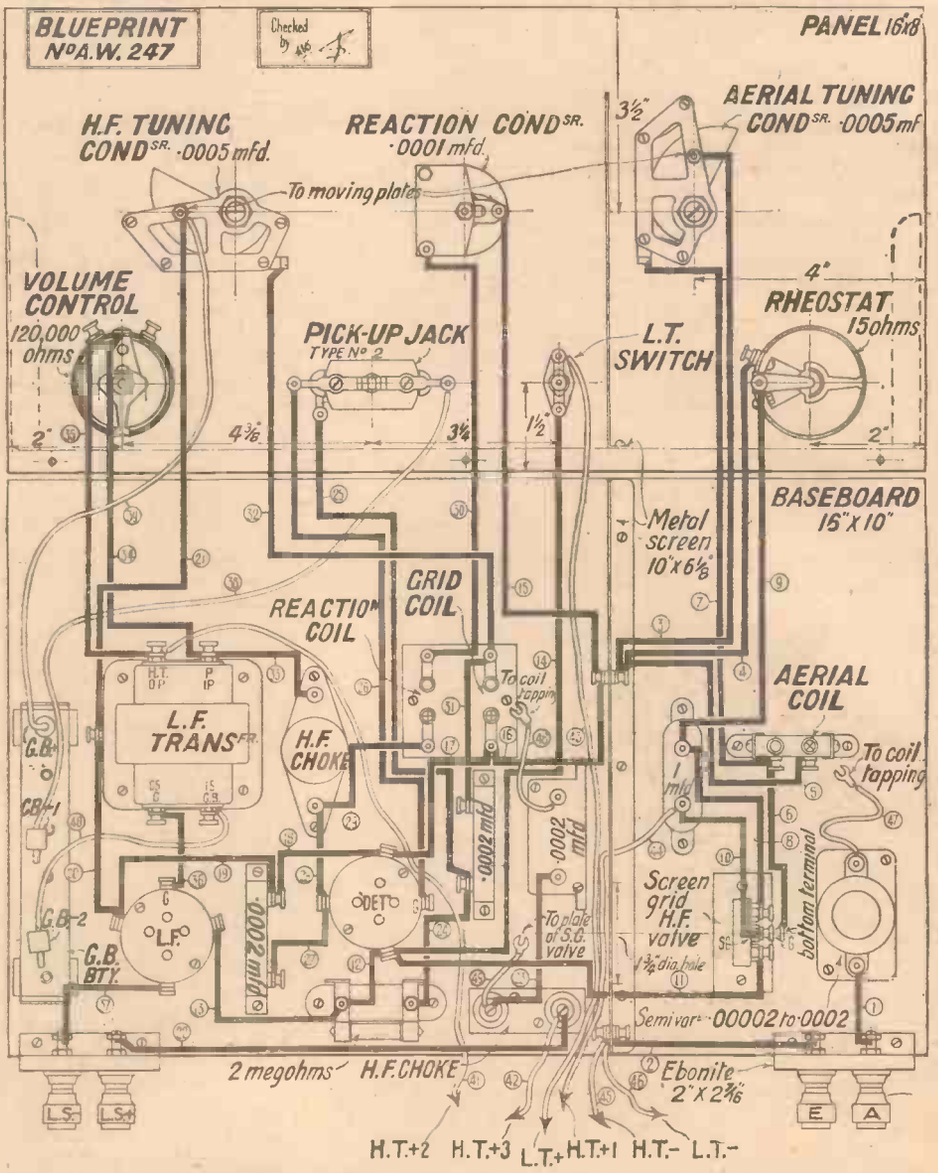
Those who are interested in the technical working can see for themselves how the circuit is arranged. Constructors will want to push on to a survey of the set itself, and on to the actual job of building.

Had the set been produced as a one-control job, which could have been done by ganging the aerial and high-frequency condensers, the complication of the circuit would have been increased; and the cost also, for good gang-condensers cannot be produced at cut prices. Also, sensibly-minded set users will not object to having a reasonable number of controls on the panel, for when there are few control knobs it may mean that the circuit cannot be properly controlled and in an endeavour to make the front of the panel appear "simple" the real job of handling the set may be made vastly more difficult.

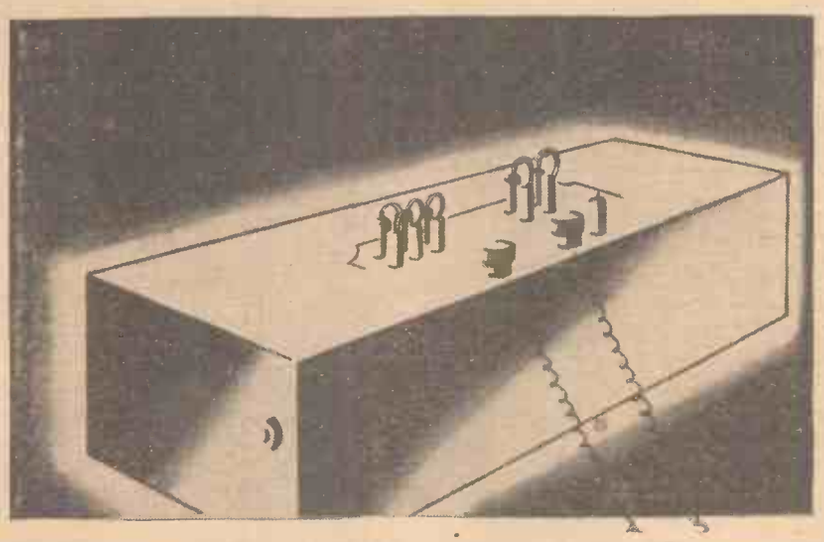
The Controls

On the panel there are the two tuning controls (the aerial and high-frequency condensers), the reaction condenser, the filament rheostat of the H.F. valve (which is a high-frequency volume control before the detector), the low-frequency volume control which acts after the detector, the filament on-off switch and the pick-up jack

(*Continued on page* 342)



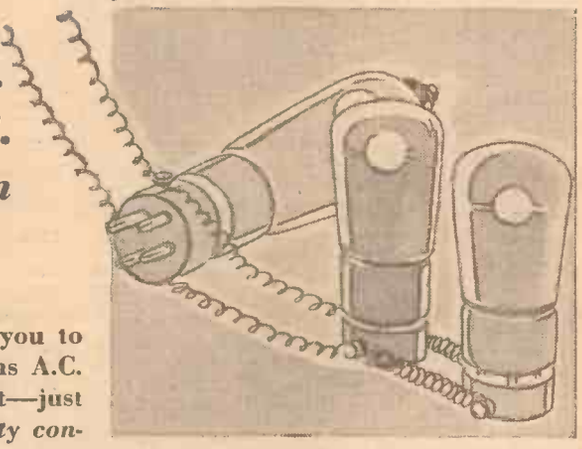
The layout and wiring diagram of the "Exhibition 3." A full-size blueprint is available, price 1/-



Make your Battery set All-Electric

The Six-Sixty A.C. mains conversion equipment is suitable for any Battery receiver

No internal wiring alterations. Specially selected Six-Sixty A.C. Valves and Six-Sixty 4/5 pin valve holder adaptor.



The new Six-Sixty A.C. mains equipment enables you to turn your present battery receiver into an all-mains A.C. operated set. No need to scrap a satisfactory set—just adapt it. *The dimensions of the complete Six-Sixty conversion equipment do not exceed those of the previous batteries,* while the unit is specially designed to co-operate with specially selected Six-Sixty A.C. valves. Nowhere else can you obtain this advantage—valves and mains-conversion unit built by the same manufacturer to suit each other and work together.

The Unit can be obtained correctly built for any A.C. house supply. It is fitted with L.T. terminals giving 4 volts and up to 5 amps. H.T. tappings of 60, 75, 100, 120, 150 and 200 volts and Grid Bias tapping of —1.5 to —20 volts are provided—any three H.T. or two G.B. values being available for use simultaneously. Automatic Grid Bias is provided—the most modern and expensive arrangement. A further advantage is that the H.T. leads from the set are not removed when once inserted.

Dimensions, 13" x 5½" x 4". Price complete, from £8 5s.
Mains Unit alone ... ... £6 6s.

Made by the makers of the famous Six-Sixty Valves.

Write for leaflet giving particulars of complete range, including new Six-Sixty Valves, Six-Sixty Cone Speaker Assembly and Cone Speaker Paper, Six-Sixty Turntable, Six-Sixty Valve and Set Tester, Six-Sixty Valve Adaptors, Six-Sixty Gramophone Pick-up Attachments, Six-Sixty Grid Leaks and Holders.

SAY

SIX-SIXTY

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

COMPLETE GUIDE TO SHOW STAND Nos. 213—232

(*Continued from page* 330)

Stand 213. M.P.A. Wireless (1930), Ltd., 62 Conduit Street, W.1.

M.P.A. receivers and cone speakers are to be seen on this stand.

Stand 214. Loud-Speaker Co., Ltd., Palmer Works, 2 Palmers Street, S.W.

A feature of note on this stand is the Enemains convertible five-valve mains portable set. This set can be adapted to work on practically any mains supply. A new A.C. three-valve mains portable will also be seen.

Stand 215. Voltron, Ltd., Queensway Works, Ponders End, Middlesex.

On this stand will be found a full range of the excellent Dynaplus parts for the home-constructor. A feature of particular note is the Dynaplus screen-grid three-valve kit of parts. This can easily be made up by any amateur with a slight acquaintance of simple set construction. A mains unit with a trickle-charger is also available.

(Left, and extreme right). Two well-known makes of screen-grid valve, the Osram and Cossor. (Centre). Three fine cabinet instruments. These are, from left to right, the Kolster-Brandes, Cromwell radio gramophone and the Camco Regent speaker cabinet.

Stand 216. Baird Television Co., Ltd., 133 Long Acre, W.C.2.

Stand 217. British Bluespot Co., Ltd., 204 Gt. Portland Street, W.1.

The British Bluespot Co., Ltd., is showing all the new complete Bluespot speakers and chassis units. As readers doubtless know, a new type of cabinet Bluespot has just been introduced selling at £2 10s. od., and this will be on view together with all the other new and old members of the Bluespot range.

Stand 218. Pandona, Ltd., 184 Aston Road, Birmingham.

A new type of Pandona portable receiver has been produced, and prospective portable set users should not miss this. In addition there is shown a super-five suitcase model and a new four-valver with a screen-grid circuit. Another successful Pandona line which is to be seen here is a five-valve radio gramophone at the extraordinary low figure of 32 guineas.

Stand 219. Mainten Mfg. Co., Ltd., 22 Grays Inn Road, W.C.1.

Mains eliminators and metal cabinets for receivers are to be found here.

Stands 221 and 265. Fuller Accumulator (1926), Ltd., Woodland Works, Chadwell Heath, Essex.

This concern specialises in many types of accumulators and H.T. batteries suitable for wireless work.

Stand 222. M.-L. Magneto Syndicate, Ltd., Victoria Works, Coventry.

Amateurs who have high tension problems which cannot be conveniently solved by the use of dry batteries or accumulators, should make a point of visiting this stand to examine at close quarters the ever popular anode converters which provide high tension from the L.T. accumulator.

Stand 223. British Radiophone Ltd., Aldwych House, Aldwych, London, W.C.2.

Portable set users will find much to interest them here for the National and Symphony Super five-valve portable are being exhibited. The National Portable quickly achieved an enviable reputation and the Symphony Super portable is a *de luxe* edition. These receivers, of course, incorporate their own speakers, but Radiophone cabinet speakers are also available and will interest all set users.

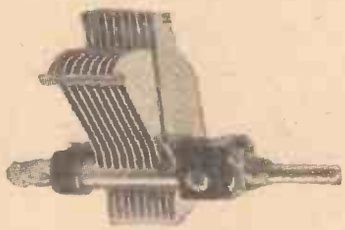
See the "Exhibition 3" on Stand No. 1

Stand 224. P.R. Products, P.R. House, Newgate Street, E.C.

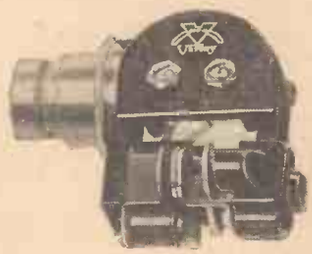
The whole range of P.R. valves of all types are to be seen on this stand, and there are now P.R. valves available for practically every type of receiver.

Stand 225. Young Accumulator Co., (1929), Burlington Works, Arterial Road, New Malden, Surrey.

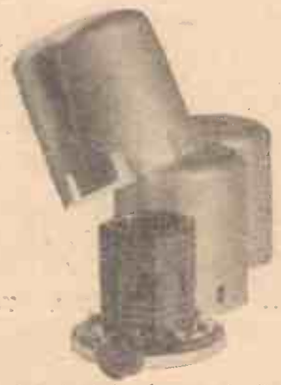
Here battery users will find a complete range of Young accumulators which are fitted with special separators and have a novel construction. Amateurs who use the mains for charging their batteries should make a point of seeing the Chromal electrolytic rectifier which again operates on a new principle. A good feature of the Chromal rectifier is that the liquid used is not corrosive, and may be spilled without fear of damage to carpets or clothing. The cost of operating such a rectifier is very low and full particulars can be obtained from the attendants on the stand.



A compact variable condenser, the Formo



The Varley pick-up



New ganged and screened coils of Colvern make

A new Camco speaker cabinet, the Triumph, with a metal front

Stand 226. Pioneer Mfg. Co., Cromwell House, Fulwood Place, W.C.

Apart from the well-known Pioneer switches a new line is the Pioneer midget condenser, which is a compression type suitable for series aerial work. If you are bothered with lack of selectivity you should see the Pioneer wavetrap.

Stand 227. E. Paroussi, 10 Featherstone Buildings, High Holborn, W.C.1.

Television enthusiasts should see the new scanning discs which can be used for making up home television receivers. Set builders will be interested to see the new Parex valve-holders, drum dials and wood-alum panels.

Stand 228. Trelleborgs, Ltd., Union Place, Wells Street, London, W.1.

This concern specialises in ebonite panels and in turned and machined parts for wireless purposes. Drum dial discs, insulators, coil formers and so on form part of this exhibit.

Stand 229. Radio Society of Gt. Britain, Ltd., 53 Victoria Street, S.W.

Stand 230. Econasign Co., Ltd., 137 Victoria Street, S.W.1.

Stand 231. Henderson Wireless & Electrical Service, 54 Queen's Road, Brighton.

Stand 232. Atalanta, 1-3, Brixton Road, S.W.9.

Handy tools for set constructors are exhibited here and particular interest

COMPLETE SHOW GUIDE CONTINUED ON PAGE 338

COMPLETE GUIDE TO SHOW STAND Nos. 233–244

(*Continued from page* 336)

centres on the Atalanta screw-driver, which greatly simplifies constructional work. The Atalanta chuck is a handy tool holder for small taps, reamers and broaches.

Stand 233. Tonex Co., Walker Street, Blackpool, Lancs.

Stand 234: Umello, Ltd., 12 Doughty Street, London, W.1.

Stand 235. Radio Service (London), Ltd., 105 Torriano Avenue, Camden Town, N.W.5.

Stand 236. J. J. Eastick & Sons, 118 Bunhill Row, E.C.1.

Terminals, wander plugs and connectors of every description will interest visitors to the Eelex stand. Every one who has a testing meter (which is a sine qua non nowadays) will want to have a pair of Eelex spring-loaded testing prods, which enable accurate connection to be made without the possibility of getting shocks from high-voltage wiring and components.

Stand 237, DX Coils, Ltd., 542 Kingsland Road, E.8.

On this stand set users will find a comprehensive array of coils suitable for many types of receiver. Some new coils have been introduced and the range of DX coils is now very embracive.

Stand 237a. Rolls-Caydon Sales, 77 Rochester Row, London, S.W.

Stand 238. Quest Radio Mfg. Co., 41, Newcomen Street, S.E.1.

Stand 239. Westinghouse Brake & Saxby Signal Co., Ltd., 82 York Road, King's Cross, N.

During the past radio seasons amateurs have learned to appreciate the value of good quality mains components, and the high reputation maintained by the metal rectifiers manufactured by this concern is indeed enviable. Rectifiers for every eliminator purpose can be obtained and amateurs who have any mains bothers whatsoever should make a point of calling at this stand.

FREE ADVICE AT STAND NO. 1

Stand 240. Igranic Electric Co., Ltd., 147, Queen Victoria Street, London, E.C.4.

On this stand will be found an excellent range of Igranic components and complete sets. In the components range there are some interesting new additions which will be of particular interest to home constructors, while in the Igranic series of receivers are to be found outfits suiting every listener and purse. As short-wave enthusiasts know, the Igranic Electric Co., Ltd., specialises in high quality components for wavelets receivers, and these, too, are exhibited.

Stand 241. Perfectavox, Ltd., Alexandra Works, High Street, Yeadon, nr. Leeds.

In addition to the existing range of Perfectavox receivers there is shown on this stand a new and cheaper model radio gramophone selling at 47 guineas. There are many points about this instrument which should appeal to radio gramophone enthusiasts, who should make a point of not missing this exhibit.

Stand 242. Selfridge & Co., Ltd., Oxford Street, W.1.

Here will be found an interesting assortment of sets made by various manufacturers, but the real purpose of the Selfridge stand is for the guidance of the public in purchasing radio apparatus, for the members of the Selfridge radio staff can give an impartial opinion on outfits available. "A.W." readers should avail themselves of this service.

Stand 243. Pertrix, Ltd., 233 Shaftesbury Avenue, London, W.C.

Pertrix dry batteries operate on a novel principle, differing largely from the ordinary sal-ammoniac action obtaining in other makes of batteries, and the high performance which results from this new design has quickly earned Pertrix a high reputation. This has been backed up by sound policy and there are now batteries to suit every amateur need. Pertrix also manufacture L.T. dry batteries and a useful range of accumulators.

Stand 244. A. W. Gamage, Ltd., Holborn, E.C.

Here will be found a wide range of complete receivers and components.

A Standard Radiogramplifier—a new radio-gramophone

This Lock cabinet will improve the appearance of practically any receiver

COMPLETE SHOW GUIDE CONTINUED ON PAGE 340

COMPLETE GUIDE TO SHOW STAND Nos. 245–264

(*Continued from page* 338)

Stand 245. Birkbys Ltd., Liversidge, Yorks.

This concern specialises in the production of Elo, a synthetic resin product which has many uses for mouldings in connection with formers.

Stand 246. Matchless Radio Mfg. Co., 105 Gt. Eastern St., E.C.

Stand 247. Hustler, Simpson and Webb, 55-57 Tanner Street, Bermondsey.

You should not miss on this stand the new Double-Two two-valver, described in last week's issue. This set has many novel features, and sells at an extraordinarily low figure.

Stand 248. Partridge & Mee, Ltd., 74 New Oxford Street, W.C.1.

On this stand will be found many components which will appeal to amateurs who build their own mains eliminators. Power chokes and transformers will be the feature of chief interest. A new Parmeko line is a high-grade L.F. transformer. Complete mains-driven amplifiers are on show here.

Stand 249. E. J. Lever (Trix) Ltd., 8-9 Clerkenwell Green, London, E.C.1.

The Trix Portable Five receiver is one of the chief features to be found on this stand. A novel point about this set is that it can be used in conjunction with an eliminator for indoor use and connection is made by a plug which automatically cuts out the H.T. battery inside the set. Other receivers and parts in the Trix range are also to be seen.

Stand 250. Wright & Weaire, Ltd., 740 High Road, Tottenham, N.17.

The Wearite range includes a number of mains components, power transformers, rheostats and many novel switches and coils, including the Binowave and Talisman. Wearite also have a comprehensive range of efficient high-frequency chokes, some of which have iron cores.

Stand 251. Partridge Wilson & Co., 217a Loughborough Road, Leicester.

Stand 252. Murphy Radio, Ltd., Broadwater Road, Welwyn Garden City, Herts.

The Murphy Portable is a newcomer in which every prospective portable user will find features of interest. The set on show is a four-valver weighing only 32 lb., having a single tuning control calibrated in wavelengths and taken an extraordinarily small amount of H.T. current—approximately 8 milliamps.

Stand 253. British Ebonite Co., Ltd., Nightingale Road, Hanwell, W.7.

New ideas for coil formers are to be found on this stand, and some new ribbed coil formers with small contacts have been introduced which will make a great appeal to amateurs who realise the importance of low-loss design in a coil.

Stand 254. Darwins, Ltd., Fitzwilliam Works, Sheffield.

Amongst the interesting apparatus to be seen on this stand are Cobalt steel permanent magnets suitable for moving-coil speakers, balanced armature and reed type speakers, etc.

Stand 255. Bakelite, Ltd., 68 Victoria Street, London, S.W.1.

This exhibit comprises a selection of components of many well-known manufacturers in which Bakelite materials have been used. Bakelite laminated sheet for panels is also exhibited.

A Baker's Selhurst Radio speaker

A handsome Varley table-model set

Stand 256. Garrard Engineering & Manufacturing Co., 17 Grafton Street, W.1.

A feature of interest to gramo-radio users which will be found here is the Garrard universal motor for turntable drive. This motor, which is a high-class job in every respect, operates from A.C. or D.C. at any normal voltage and is controlled by a master external resistance.

Stand 257. Wm. Whiteley, Queen's Road, W.2.

Stand 258. C.A.Osborn, Regent Works Arlington Street, New North Road, N.1.

Stand 259. R. Cadisch & Sons, 5/6 Red Lion Square, London, W.C.1.

Stand 260. Catesbys, Ltd., Tottenham Court Road, W.1.

Stand 261. Adey Radio, Ltd., 99 Mortimer Street, Regent Street, W.1.

Stand 262. Arding & Hobbs, Ltd., Clapham Junction, London, S.W.11.

Stand 263. Grosvenor Electric Batteries, Ltd., 2-3 White Street, Moorgate, London, E.C.2.

The Grosvenor high-tension battery is a newcomer which has sprung into instant popularity, and which fully justifies its title of the Grosvenor straight-line high test battery.

Stand 264. Bel Canto Radio, Ltd., Worple Way, The Vale, Acton, London, W.3.

The Standard Bel Canto speaker has a balanced armature movement requiring no adjustment and having entirely satisfactory response over the whole musical range.

"THE 'A.W.' EXHIBITION 3"

(*Continued from page* 334)

Out of the seven controls only two have to be operated in order to bring in the stations; the reaction control is not critical. As will be seen, the other controls are for adjusting the volume, for gramo-radio and so on. There is nothing difficult about that, is there?

Now we come to the constructional work. Readers who have previously made up AMATEUR WIRELESS sets will be able, with the aid of the photographs and the wiring plan given here, to get most of the constructional work done without difficulty. Amateurs who are making this set up as a first attempt at home construction should delay operations for a while until they can read the further constructional notes which will be given in the next issue and which, owing to the small space available in this, the first Special Show Number, it is not possible to give in full here.

In the meantime, you can go ahead with the purchase of the parts. In the accompanying panel you will see a full list of all the parts needed. It is the "A.W." policy to give alternatives wherever possible, so that constructors are not bound to purchase any one special part, and they may if they have a similar part on hand—and it is an equivalent of the part used in the original receiver—use it in the constructional work.

But please note that these alternatives are not chosen in a haphazard fashion; they represent a deal of care in the selection of other parts which really are the electrical equivalent of those used in the first design.

The first-mentioned parts in the list of components are those used in the set shown by the accompanying photographs; the others are the only alternatives which the "A.W." Technical Staff recommends.

You will see here a black and white wiring plan. This shows all the leads and is just the thing of which advantage should be taken by amateurs who cannot wire up from a circuit diagram and who want to have on the work table a plan showing the actual arrangement and connection of the leads.

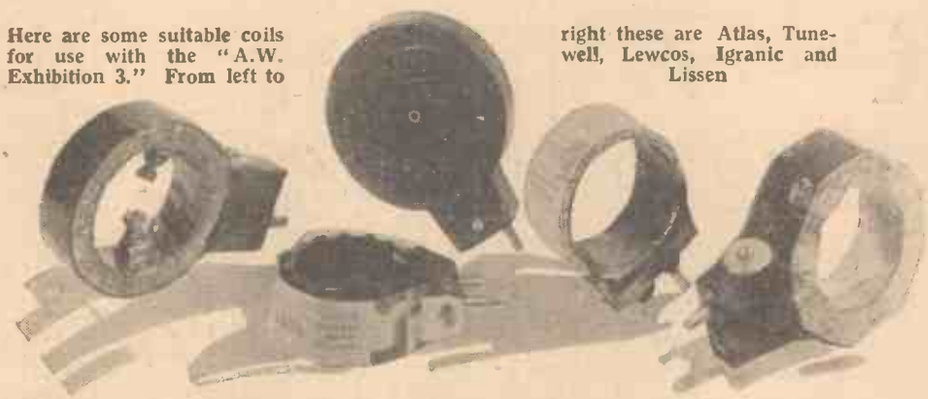
There are also constructors who like to work with a *full-size* diagram so that they can use this as a guide showing the exact positions of the components, and also as a drilling template for the panel.

For these readers we have prepared a full-size blueprint, and a copy of this can be obtained from the Blueprint Department, Amateur Wireless, 58-61 Fetter Lane, London, E.C.4. This is a proper blueprint and not merely a printed reproduction. It is just the thing which you will need if this is your first set.

The receiver is on show in the Radio Department windows of Selfridge & Co., of Oxford Street. This special display, by the courtesy of Messrs. Selfridge, will enable all London readers to see for themselves how simple is the layout wiring and general construction of this new AMATEUR WIRELESS winner.

Next week—make a note of the fact—hints on completing the construction will be given, together with full instructions for operating the set to the best advantage.

Here are some suitable coils for use with the "A.W. Exhibition 3." From left to right these are Atlas, Tunewell, Lewcos, Igranic and Lissen



IN MY WIRELESS DEN

WEEKLY TIPS—CONSTRUCTIONAL AND THEORETICAL

By W. JAMES.

Condenser Sizes

WHY are tuning condensers of .0005-microfarad capacity more widely used than other sizes? At one time .00035 microfarad was a popular size, but is now hardly used.

The chief reason, I think, is that the wavelength range is greater with the .0005, and this is particularly useful now that a fairly wide waveband must be covered.

We want to cover from 200 to 550 metres, and also from below 1,000 to nearly 2,000 metres. By carefully attending to the capacities of circuits, and using tuning condensers having low minimum values of capacity, a wide range may be covered with a .00035-microfarad condenser, but the range is greater when a .0005-microfarad condenser is used.

A smaller tuning coil may be used with a .0005-microfarad condenser, and stray capacities are then not quite so important. Given very good coils and separate tuning, I would prefer .00035-microfarad condensers, but for ordinary purposes the larger capacity is of more value.

Valves and "Strays"

In a circuit tuned by a multiple condenser, in which the capacity and inductances of the different circuits are nicely matched it is advisable not to overlook the fact that valves may have widely different capacities. Therefore you may expect the accuracy of tuning to be affected when a valve is changed for one of a different type or make.

The difference in the capacity of screen-grid valves of various makes is sufficient, according to my own tests, to make rebalancing necessary when changes are made.

It should not be overlooked that besides the grid-to-filament capacity, you have the anode-to-filament or earth capacity, with the result that relatively large differences are experienced.

Detector valves, too, of different types and makes do not have equal values of grid-filament capacity under working conditions. The practice of trying various valves in this stage without making an adjustment to the circuit is, therefore, likely to result in wrong conclusions being drawn, and it is advisable always to test the accuracy of tuning when any valves are changed.

Aerial Wires

Which is the best size of wire for an outdoor aerial? Some amateurs will tell you the popular seven strands of No. 22 having an enamel covering is the best; others prefer a single wire.

The truth is, I think, that the size of the wire is not important, provided it is not too thin. Tests made with various sizes of aerial wire show no measurable difference.

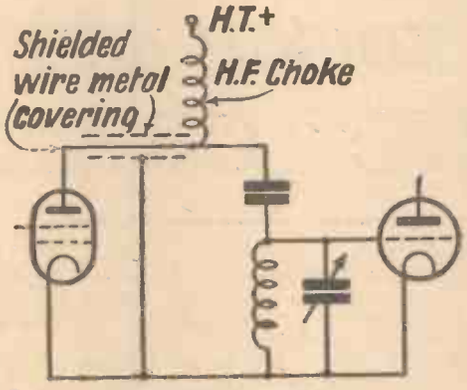
But what an effect different earths have. With a really good earth connection and a fair aerial the results may be two or three times better than when an indifferent earth is used with the same aerial.

I mention this because most of us look after the aerial and leave the earth to look after itself. This is wrong, and attention to the earth is well worth while.

S.G. Anode Connections

The practice of connecting a shielded wire between the anode of a screen-grid valve and the coil associated with it is not without danger, as the accompanying diagram will make clear.

We have the wire itself connected to the coil, and the metal covering, which is usually aluminium strip, taken to earth. As a



The accompanying paragraph raises an interesting point of "safety first"

consequence, the wire and the covering comprise a condenser connected across the tuned circuit.

If, therefore, the electrical properties of this condenser are poor, as well they might be, then the effectiveness of the tuned circuit will be reduced. There will be a loss in the condenser, and as it forms part of a tuned circuit, the relative loss will depend upon the actual losses of the tuned circuit itself.

IN OUR NEXT ISSUE

THE "ARROW TWO"

A critical survey of outstanding developments as revealed at the Show.

Some shielded wires that I have tested are perfectly satisfactory, but others are not. It is, therefore, as well to see that a good quality of shielded wire be used, in order to avoid both loss in signal strength and broadened tuning.

A Bad Habit

A pretty dangerous practice often indulged in is that of adjusting the grid bias whilst listening. This is known to lead to frequent replacements of dry batteries and power valves, for when too little bias is used the current is excessive.

The best plan is to commence with the value suggested by the makers. Then the value of the bias may be increased step by step until there is a falling away in the quality of the reproduction.

To use too little grid bias is wasteful. You may, when testing, not notice any difference in the quality when the bias is adjusted above and below a certain point. But it is quite possible that the current taken by the power valve is 50 per cent. greater when the bias is below the point as compared with when it is above it.

Always, therefore, use as much grid bias as possible. Never use the least amount, as the high-tension current consumption will be excessive.

Why Condensers are Sealed

Do you know why fixed condensers are always so well sealed? It is because the life of the condenser would be very short were moisture to get in the "works." Breakdown would soon occur, and the condenser be spoiled.

Spring-cleaning the Speaker

It pays to overhaul your speaker now and again. Dust may have collected in the movement and be restricting its motion, or a part may have worked a little loose.

Slight buzzes are often due to nothing more than dust. The magnets may have collected a few particles of metal or the cone driving rod may have loosened a little. Attention should, therefore, be given to these points. When the movement is covered, there is little chance of foreign matter collecting.

Some movements are not properly protected, however, and should be seen to now and again. A new cone will often result in vastly improved reproduction. The old one may be distorted or otherwise damaged. A new one will then be worth while. Look over fixing screws as well. Sometimes they work a little loose and allow a buzz to occur when certain notes are reproduced.

Where are the Alternatives?

SIR,—I was indeed pleased to read the various complaints anent the present-day programmes.

I have just been trying my set and what do I get? The same item 1,554 metres, 261.3 metres, 356.3 metres, and 479.2 metres. Where is the sense or reason of this? It is simply turning wireless into an automatic penny-in-the-slot musical box; and bad at that.

In the days when each station had its own individual programme, things were infinitely better. F. L. (St. Annes-on-Sea).

Tuning the "Talisman Two"

SIR,—I have made up the "Talisman Two" receiver and, although I get quite a number of stations from my set, the tuning is so critical that I sometimes find difficulty in tuning in a station which has previously been received. Is there no way of simplifying the tuning of this set?—H.J. (Hayes Common).

Your complaint is a reasonable one, coming, as it does, from one living outside the swamp area of the London stations. This receiver, when tested in our laboratories, needed something extra special in the way of a selectively tuned aerial tuning circuit to cut out the nearby powerful transmissions. To accomplish this, we incorporated an aerial pre-set condenser. The design of the Talisman coil itself makes possible a fairly selective aerial tuning circuit, but the added pre-set condenser makes tuning much more critical and selective. In your locality it would be an advantage to dispense altogether with the pre-set condenser, and we therefore suggest that you bridge its terminals with a length of copper wire. By doing so you will not only get simpler tuning, but much more volume from the distant stations.—ED.

Testing Eliminator Voltages

SIR,—I have been working my set for some time from a mains H.T. unit and, on the whole, have been very satisfied with the results. Recently, thinking I might be able to improve upon them, I purchased a voltmeter to enable me to adjust my eliminator voltages more accurately. It is in this respect that I have encountered trouble. The voltmeter shows a reading of only 20 volts when testing the detector valve, and only about 100 volts when testing the power valve.

The rated output voltages, according to the maker's specifications for the mains unit, are much higher than the voltmeter figures portend. In fact, the mains unit is one capable of giving up to 60 milliamperes at 180 volts. The receiver works quite well, yet the voltmeter readings indicate something radically wrong. Can you elucidate the mystery for me?—A.F. (Cheshire).

The secret of your trouble seems to rest with the voltmeter you are using. Unless your voltmeter has a very high resistance, you will get readings which are far less than the voltages actually obtaining under working conditions. The explanation is quite easy to understand. Assuming the valve under test to be a detector valve, it will demand from the mains unit a current of 1 or 2 milliamperes. If we now connect a low-resistance voltmeter, consuming something like 30 milliamperes, across the anode and filament legs of the valve, we throw a heavy strain on the supply terminals of the mains unit. The latter is designed to give a definite wattage output, and as the wattage or watt-power

(*Continued on page* 348)

figures represent the sum of the voltage of the unit multiplied by the current (in amperes) supplied from the output of the unit, it follows that any great increase in the current demanded from the output of the unit will result in a drop in the output voltage. If we use a high-resistance voltmeter, one consuming not more, and preferably much less, current than that consumed by the valve under test, we get practically no extra load on the eliminator, and therefore no voltage drop. A voltmeter having an internal resistance of about 1,000 ohms per volt should always be used for testing the output voltages from mains units.—ED.

L.T. from D.C. Mains

SIR, I have used for some year or more the H.T. and L.T supply unit which you published under the heading of "Juice from the Mains." This has given every satisfaction, but I should like, if possible, to do away with the accumulator in the L.T. supply circuit and get the L.T. direct from the mains. Is there a practical way of doing this?—F.W. (London).

Whilst it must be admitted that it is possible to obtain L.T. direct from D.C. mains, without the aid of a floating-charge accumulator, the necessary smoothing circuit required to replace the accumulator would entail so much experimenting and cost so much, we think the system, as far as an amateur is concerned, is not worth while. An L.T. smoothing choke would need to be fitted in the positive filament supply lead and the output terminals of the L.T. supply would need to be shunted with large capacity electrolytic condensers. A master control rheostat would also be needed in the positive supply lead.—ED.

"A.W." Solves your Wireless Problems

De-coupling H.F. Circuits

SIR,—I have built up a five-valve receiver, containing two screen-grid H.F. stages. This set is worked from a mains H.T. unit capable of delivering up to 80 milliamperes at 180 volts. The receiver works quite well on the medium waves, but as soon as I switch over to the long waves motor-boating starts. At first I attributed the cause to insufficient stopper circuits in the L.F. side of the set and attempted to overcome the trouble by including two stopper circuits, one in the plate circuit of the detector valve and another in the plate circuit of the first L.F. valve. Even this, however, did not stop the trouble. I am delighted with results on the medium waves, no sign of mains trouble, but am at a loss to account for the trouble on the long waves.

Your trouble is due to coupling between the H.F. and L.F. circuits, and we advise you to introduce de-coupling devices in the anode and screening grid circuits of each screen-grid stage. The stopper circuit resistances should have a value of 600 ohms and the by-pass condensers should have a capacity of .001 or .002 microfarads.—ED.

Motor-boating in L.F. Amplifier

SIR,—I have recently built a set specially for working a moving-coil speaker. The receiver is designed only to receive local and Daventry stations and incorporates a detector followed by R.C. and then push-pull L.F The receiver H.T. and the field current for the speaker are derived from the mains. I have incorporated the usual anti-mobo circuit in the H.T. supply to the detector valve, yet motor-boating is experienced. The valves are getting their quota of anode current, as greater values of voltage and current can be obtained. The eliminator is designed with anode feed resistances, not potential divider. Is there a way of avoiding the motor-boating please?

If you will fit another anti-mobo circuit in the H.T. supply to the first L.F. valve, you will avoid the trouble about which you complain. As this stopper circuit will be in series with the primary of the push-pull input transformer, the stopper resistance should have a value of 20,000 or 30,000 ohms. The by-pass condenser should be of the normal capacity—2 microfarads.—ED.

A list of Blueprints appears on page 360

When Asking Technical Queries

PLEASE write briefly

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

Queries cannot be answered personally or by telephone.

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"A.W." EXHIBITION 3

	£	s.	d.
1 Ebonite panel, 16 in. by 8 in.		6	0
1 Hand polished oak cabinet with 10 in. baseboard	1	5	0
1 Lissen 15-ohm rheostat		2	6
1 Lotus No. 2 jack		2	3
1 Lotus jack plug		2	0
1 Regentone 120,000-ohm resistance (variable)		9	6
2 Cyldon Juni Log .0005 variable condensers		17	6
2 Igranic Indigraph S.M. dials		12	0
1 Cyldon .0001 reaction condenser		5	0
1 ReadiRad on and off switch			10
2 ReadiRad single coil holders		1	8
1 Wearite double coil holder		1	9
2 W.B. valve holders		2	6
1 Parex S.G. valve holder		2	0
1 Watmel H.F. Choke, type D.X.3		6	0
1 ReadiRad H.F. Choke		4	6
3 Lissen .0002 fixed condensers		3	0
1 Lissen 2 megohm grid leak		1	0
1 Grid leak holder			6
1 Telsen Radiogrand L.F. Transformer		12	6
1 Dubilier 1 mfd. fixed condenser		2	6
2 Junit terminal mounts		1	4
1 ReadiRad aluminium screen, with hole for S.G. valve		2	0
4 Belling & Lee type "B" terminals		2	0
1 Lewcodensor .0002		2	6
6 Belling & Lee engraved wander plugs		1	6
2 Belling & Lee engraved spade terminals			9
2 Lewcos 200 X. coils		13	0
2 Lewcos 60 X. coils		9	6
1 Lewcos 40 C.T. coil		3	6
1 Lewcos 60 C.T. coil		3	6
1 Pair ReadiRad panel brackets			10
1 Bulgin G.B. clip			6
1 Set ReadiRad Jiffilinx		2	6
3 Valves as specified	1	19	0
Screws, flex, etc.		1	4
TOTAL (including valves and cabinet)	**£10**	**4**	**3**

ANY OF THE ABOVE COMPONENTS CAN BE SUPPLIED SEPARATELY, IF DESIRED

KIT A less valves and cabinet **£7 : 0 : 3**
or 12 equal monthly payments of 13/-

KIT B with valves less cabinet **£8 : 19 : 3**
or 12 equal monthly payments of 16/9

KIT C with valves and cabinet **£10 : 4 : 3**
or 12 equal monthly payments of 19/-

RECOMMENDED ACCESSORIES

	£	s.	d.
1 Amplion Cone Loud Speaker	1	19	6
1 Atlas H.T. Eliminator for A.C. Mains, A.C. 16	4	10	0
1 Atlas H.T. Eliminator for D.C. Mains, D.C. 16	3	15	0
1 Fuller H.T. Battery, 120 v.		15	10
1 L.T. Accumulator, 2 v. 30		11	0
1 Fuller 9 v. G.B. Battery		1	6

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SETS OF DISTINCTION

THE COLUMBIA MODEL 307

Full details of tests carried out with the new Columbia three-valve set, for A.C. and D.C. mains

The Columbia 3-valver for A.C. mains

WHEN I first heard the Columbia Graphophone Co. were producing a three-valve set for the mains, I must confess to wondering how they were going to live up to the Columbia five-valver. This firm has only been in radio for just over a year, yet we all accept Columbia as a household word. There is something to have to live up to a name, obviously. And Columbia *do* live up to their good name on Model 307, just tested.

I found this set rather similar in outward appearance to the five-valver tested some time ago. There is the same escutcheon plate at the front of the cabinet, carrying tuning dials and smaller subsidiary controls. There is the same robust look about the cabinet; the same easy access to valves and mains connections.

GOOD CONTROL PLANNING

In arranging the controls, the makers have shown their usual good sense. In the centre is the tuning system, consisting of two thumb-worked dials mounted side by side. The right-hand dial is calibrated in medium and long wavelengths; the divisions are made at every 25 metres on the medium band, from 225 metres to 554 metres; on the long waves the divisions are every 100 metres, from 1,000 metres to 1,900 metres.

The left-hand dial is uncalibrated, being associated with the aerial-tuning circuit. It is divided into easily-read degree divisions, from 0 to 100 degrees. In practice, one thumb works the two dials simultaneously. Logging is made easy by the provision of a pilot lamp above the dials, which are well illuminated.

To the left of the tuning controls I found the usual Columbia intensifier—a pre-detector control for volume. To the right is a reaction knob, almost inevitable in all three-valve sets, however good. There is a lever at the bottom, with three positions, for long waves, short waves, and gramophone pick-up.

The gramophone pick-up can be permanently connected to two terminals at the back and switched into circuit as required, so that the detector and pentode valves form a useful two-valve amplifier for gramophone-record reproduction.

Near the aerial and earth terminals is a knob controlling the selectivity of the set. I found this control very useful when getting rid of the two Brookmans Park stations, which were not unduly troublesome.

Another highly effective control fitted at the back of this set is a hum eliminator. Once adjusted to the centre position, this variable can be forgotten. I was able to cut out all trace of hum by carefully adjusting this little control, which is fitted close to the mains input transformer, at the back of the cabinet. Columbia never omit a control where they believe it will help to provide improved reception.

A.C. AND D.C. MAINS

Model 307, I should explain, is suitable for A.C. mains voltages between 100 and 125 volts and between 200 and 250 volts. Even this division of supply voltages is not sufficient in this country, so a tapped mains transformer with intermediate voltage points is employed. Naturally, one has to make sure the correct terminal is used. Model 307 is also available for D.C. wiring.

An important point to know is that Columbia Model 307 is designed to be used with the new Columbia loud-speakers. As a pentode valve is used in the power stage, any other loud-speaker must be chosen with care, otherwise the quality may suffer.

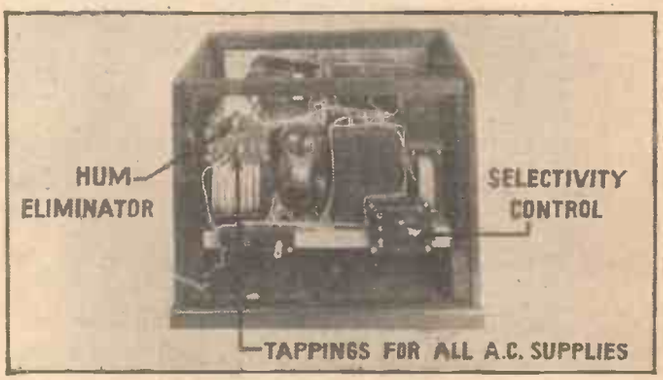
Now for actual results, obtained on my 70-ft. aerial in South-West London. With the intensifier control at its maximum and the reaction control at its minimum, I set the calibrated dial to the 350-metre mark, and immediately got the London Regional station at full blast. But it was received even more loudly when the left-hand dial was turned to 55 degrees, thus bringing into tune the aerial circuit. I could not help noting the excellent quality of the reproduction; it would certainly please most listeners.

EASY TUNING

Turning round both dials with the right-hand thumb until the 250-metre mark was reached, I found the National station at full strength, although a readjustment of the left-hand dial was necessary. So with foreign stations: they could be brought in by the simultaneous movement of the dials and increased in strength by readjusting the left-hand dial.

Volume is thoroughly controllable by the intensifier. There was no need to use the reaction control when receiving a large number of foreign stations, although the weak stations were greatly amplified by a gentle application of reaction.

The intensifier works on the last segment of its available rotation. All signals, including the strong locals, can be completely silenced by a half turn in an anti-clockwise direction.



Back view of the new Columbia set

So far as I could detect, there was no audible hum, even when reaction was brought close to the oscillation point. I was much impressed with the ability of the hum control to suppress the mains hum with such completeness.

From an evening's experience with the Columbia Model 307, I am inclined to think the medium waves are received equally as well as the long waves. Both wavebands were very lively. With my fairly short aerial there was no need to make much use of the selectivity control. On the long waves I had no difficulty in separating Radio Paris and Eiffel Tower from Daventry. Long-wave selectivity is, I judge, above the average in Columbia Model 307.

This set makes a very fine gramophone amplifier, as I proved by connecting up a B.T.H. pick-up to the gramophone terminals. The volume was overpowering, although there was no sign of distortion. I think the average user would need a volume control on the pick-up.

Set Tester.

SPARKS

Someone complains that his loud-speaker has a nasal tone, and asks how to eliminate it.

A conference should meet to discuss Nasal reductions.

There are 260,000 Czech listeners. We trust the authorities are keeping a Czech on their licences.

A correspondent asks whether he ought specially to insure his set against fire.

Not unless he has a real flair for wireless!

FOR RADIOGRAM OR PORTABLE, OR IN FACT, ANY RADIO SET.

Here is the new IGRANIC MIDGET TRANSFORMER which may be termed a

"Masterpiece in Miniature"

Although only 2⅜" x 1⅞" x 1¾" in size, no refinements—electrical or constructional—have been sacrificed in producing this transformer.

A patented bi-metal core embodying a new nickel alloy is used which does not permit other than a very small polarisation.

The MIDGET Transformer has a high primary inductance of over 60 henries. Slotted terminal nuts are provided, and all terminals clearly marked.

Price **10/6**

WEIGHS ONLY 7 OZS.!

Write for New Catalogue D148

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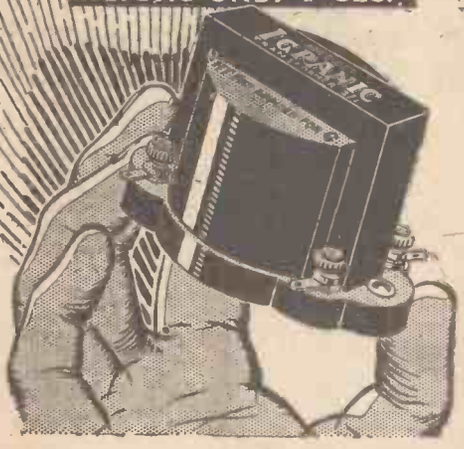


IGRANIC "MIDGET" TRANSFORMER

Inspect this "Masterpiece in Miniature" at our STAND No. 240, NEW EMPIRE HALL, OLYMPIA

When at the Exhibition Make a Point of Seeing

The new "Full o' Power" high-tension batteries shown by Siemens Bros. & Co., Ltd.

The complete range of components for the home-constructor, and also a selection of high-grade complete receivers, on the stand of Varley, Oliver Pell Control.

The new "Lively O" accumulators manufactured by Oldham & Son, Ltd., which are particularly convenient in use.

The service to set-buyers by assistants at the stand of Selfridge & Co., Ltd.

Pertrix H.T. batteries employing a novel principle and having an exceptionally long life.

A new range of mains components for set builders, shown by Partridge & Mee, Ltd.

The Pye Radio high-grade receivers which will appeal to those who do not wish to bother with home construction.

On the stand of Radio Instruments, Ltd., new components and high tested parts for every set builder.

Some interesting new condensers on the stand of Jackson Bros., and particularly several novel ideas in condenser control.

The Kolster-Brandes complete receivers and speakers.

A new idea—dynamic speakers, on the stand of S. A. Lamplugh, Ltd.

The wide range of parts for set builders manufactured by Lissen, Ltd.; and Lissen H.T. batteries, *of* course!

A wavetrap which can be used with portable sets, to prevent Brookmans Park interference, on the stand of L. McMichael, Ltd.

A novel means of getting H.T. from the L.T. battery, shown by M. L. Magneto Syndicate, Ltd.

Among the wide range of Mullard valves some new mains-driven jobs which will appeal to those who work their sets from the power supply.

In addition, the Mullard Pure Music speakers, Permacore L.F. transformers and the range of "Radio for the Million" receivers.

Novel cabinets for radio-gramophone users on the stand of the Carrington Manufacturing Co., Ltd.

Television scanning discs and neat-looking drum condenser dials shown by E. Paroussi.

Special coils enabling practically any receiver to work on the short waves, shown by Stratton and Co., Ltd.

Some old friends in the way of Celestion cabinet-type speakers.

Safety-contact switches for wave changing and many other purposes on the Pioneer stand.

A Rolls four-valve portable sold with an unconditional guarantee.

Permanent-magnet moving-coil speakers on the stand of Bakers Selhurst Radio.

Mains eliminators, employing an electrolytic rectifier, made by Tannoy Products.

The wide range of Ekco H.T. and L.T. eliminators and chargers.

A firm favourite—the Columbia table model receiver; also the new Columbia cone speaker.

Eliminators which can be used with portable sets, on the stand of Regent Radio Supplies.

The complete range of Cossor valves, and the new Cossor two-valve mains set.

Air-dielectric differential Cyldon condensers marketed by Sydney S. Bird & Sons, Ltd.

The Electroficient pick-up on the Graham-Farish stand, which will interest gramo-radio users.

A popular portable—the Marconi model 55 five-valver, together with the Marconiphone moving-coil and cone speakers.

Burndept's complete range of precision parts for the home constructor; and Burndept receivers, of course.

The Trix Portable Five, which can be adapted to take its H.T. from the mains.

BUILD THROUGHOUT WITH READI RAD COMPONENTS

Readi-Rad Components are remarkably low in price, but they are certainly not "cheap." They are high-grade components cleverly designed to do their work in the most efficient manner, but all the unnecessary and costly "frills" have been eliminated in order to save you money when set-building. The proof of their efficiency is to be found in the frequency with which they are specified in the Technical Press.

10d.

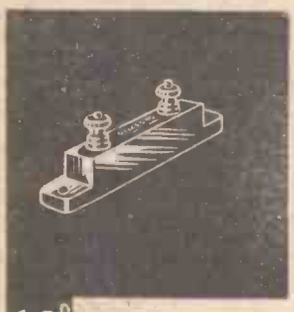
READI-RAD SWITCH

A Push-pull on and off switch of exceptionally "clean" design and robust construction. All metal parts heavily nickel plated and polished. Specially designed to maintain constant and noiseless contact and smooth, easy movement. One hole fixing. Fitted with attractive knob. Price 10d. each.

1/6

READI-RAD WAVECHANGE SWITCH

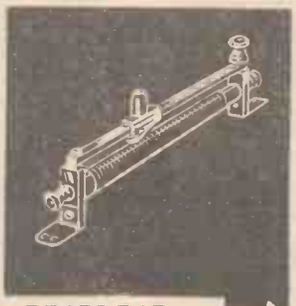
A 3-point push-pull switch, particularly suitable for use in dual range tuning circuits. Designed on low-loss principles giving certain contact, smooth action and reliable service. Heavily nickel-plated polished metal parts; attractive knob one hole fixing. Price 1/6.



10d.

READI-RAD FIXED CONDENSER

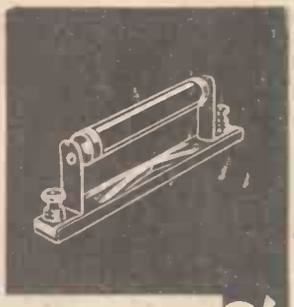
An entirely new and unique method of construction has made possible the production of this new range of fixed condensers at a remarkably low and economical price. A further attractive feature is the extremely small size which has been achieved without in any way affecting the very high efficiency of the condensers. Capacities .0001, .0002, .0003, .0005, .001, price 10d. each.



2/9

READI-RAD POTENTIO-METER
(Baseboard Type)

Very small and compact; easily fitted; easily connected; particularly smooth, accurate and noiseless adjustment; positive contact—these are the outstanding features of this baseboard-mounting Potentiometer. Accurately made, with nickel-plated metal parts. Resistance, 400 ohms. Price 2/9.



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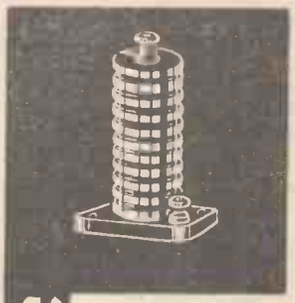
READI-RAD RESISTANCES
De-Coupling Type

A wire-wound Resistance, specially designed for use as a de-coupling resistance in order to prevent "motor-boating" in the method now recommended in most popular circuits. 600 ohms; complete with moulded bakelite base. Price 2/6.

Anode Feed Type

Supplied in two resistance values most suitable for use in the latest circuits of the Technical Press. 25,000 or 10,000 ohms. Complete with base. Price 2/6 each.



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READI-RAD "HILO" H.F. CHOKE

A real "de-luxe" H.F. Choke specified time after time by the most famous designers of the British Technical Press. Used by all discriminating constructors. High inductance; extremely low self-capacity. Efficient over tuning range of 10 to 2,000 metres. Solid ebonite hand-turned former, on bakelite base, designed to take up minimum baseboard space. Price 4/6.

2/6

READI-RAD 'BROOKMANS' CONDENSERS

This amazingly popular range of condensers now includes all capacities suitable for tuning and reaction. Heavy gauge brass vanes are of true logarithmic design with bakelite dielectric. Phosphor-bronze spring pig-tail provides thorough noiseless contact with moving vanes. One hole fixing. Particularly small dimensions and light weight. Complete with bakelite pointer-knob. Capacities .00075, .0005 and .0003, 3/6 each; .0001 mfd., 2/6.

2/-

READI-RAD STANDARD H.F. CHOKE

An entirely new H.F. Choke of novel design particularly recommended for all sets where small dimensions are an advantage and high efficiency essential. Windings are hermetically sealed in bakelite case. Easily mounted by a single screw to baseboard or panel. Terminals are particularly accessible. A masterpiece of efficiency at a startlingly low price, 2/-.

1/6

READI-RAD FUSE

An essential component in every receiver. Protects your valves from damage due to accidental wrong connections of battery leads. Rated to blow at 100 ma. Bakelite moulded base of particularly small dimensions and neat design. Easily fitted on baseboard with accessible terminals. Price, 1/6. Spare bulbs, 6d. each.

6/6

READI-RAD DUOGRAPH DIAL

A slow-motion dial of particularly handsome appearance. A special feature of outstanding advantage is the double ratio reduction gearing by which ratios of approximately 8 to 1 and 100 to 1 are provided by two knobs placed one behind the other. Easily fitted to standard ¼ in. spindles simply by tightening one screw. Price 6/6.

Ready Radio

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Telephone: Hop 5555 (Private Exchange) Telegrams: READIRAD, SEDIST.

READY RADIO (R.R., Ltd.), 159, BOROUGH HIGH ST., LONDON BRIDGE, S.E.1

RADIOGRAMS

ON June 1, 1930, Italy registered 137,160 licensed listeners, or an increase of 218 per cent over the number officially declared on January 1, 1929.

If atmospheric conditions permit, the B.B.C. will grant listeners an opportunity of hearing a running commentary on the races for the America's Cup between September 13 and 20. Mr. Samuel Wetheril associate editor of *Yachting*, will follow the competitors in a destroyer, and his accounts will be relayed to the mainland and re-broadcast in the National programme. On each weekday on which the racing takes place a broadcast will be carried out between 5 and 5.10 p.m. B.S.T. The first yacht to win four of the seven races gains the cup and so the final race may take place on any day after Tuesday, September 16. Although it is impossible to forecast the hour at which the race may finish, it is expected that the time will be about 9 p.m. B.S.T. The National programme may be suspended for a broadcast of Mr Wetheril's commentary on this exciting event.

On October 22, when the winter season of concerts opens at Queen's Hall, the full B.B.C. Orchestra of 114 players will make its first appearance before the public. Although Mr. Adrian Boult will wield the baton on the opening night, other conductors throughout the season will include Sir Henry Wood, Sir Landon Ronald, Albert Coates, Ernest Ansermet, Oskar Fried, and Hermann Scherchen. Amongst the soloists enjoying international repute will be found Backhaus, Cortot, Gieseking, Myra Hess, Lamond, Moiseiwitch, Solomon, Sammons, Casals, Suggia, Wanda Landowska, Arthur Catterall, Maria Olczewska, Stiles-Allen, Frank Titterton, and other well-known concert platform celebrities.

Red Tabs, a war play by an author who wishes to remain anonymous, will be presented in the National programme on October 2.

The famous Don Cossack Choir makes a welcome return to the microphone on October 12; the programme will be relayed to National transmitters from the Albert Hall.

Evelyne, a musical comedy adapted from the German by John Watt, and of which the plot is based on Phillips Oppenheim's stirring novel, "The Amazing Quest of Mr. Bliss," will be produced for the first time at the Savoy Hill studios during the coming autumn. The music is by Bruno Granichstaedten.

Peter Haddon and Rosie Moran, now appearing in the musical comedy, *Sons o' Guns*, will be heard for the first time in a Vaudeville hour on September 23. Their turn consists of an Anglo-American duologue, with music. The variety programme on that evening also includes Gillie Potter, Desiree Ellinger, Alfredo Rude, Elisabeth Pollock, and Mabel Marks.

Arrangements have been made to relay to the B.B.C. stations excerpts of operatic performances by the Covent Garden Opera Company during its autumn tour throughout the provinces. Scenes from Puccini's *La Boheme* and *Turandot* will be relayed from Glasgow to the London Regional transmitter on October 11 and 18.

Further editions of the *Ridegway Parade*, broadcast on September 10 and 13, will be heard by listeners on September 26 and 27, October 6, 8, 17, and 18.

(*Continued on page* 358)

TUNEWELL PRODUCTS

include :

Coils of all types, H.F. Chokes, L.F. Transformers, Bakelite Dielectric Type of Variable Condensers, Wave Traps, Speakers and Units, and complete Sets.

SUPER 3 VALVE SET. An ideal receiver for the man of moderate means, battery or mains operated, dual range. Gives perfect reception and tunes dozens of stations at full strength.

Only careful design and matching of all parts has enabled us to offer such a good all-round efficient set at such a moderate

PRICE - £3 . 19 . 6

Metal cabinet. Tunewell dual X Coil, Transformer, H.F. Choke, etc. Royalties extra.

SPEAKER UNITS 22/6 EACH

DUAL COILS

for straight and S.G. circuits from 7/9 each.

The new Dual X Coil specified for the 1930 Britain's Favourite 3 is tapped at 20% on both wave bands, has internal reaction and 3-point switch, panel mounting - - - Price 10/6

A similar coil tapped at 20% and 60% on both wave bands, as fitted to Tunewell Super 3 Valve Set above, 11/- each

SEND FOR LISTS

TUNEWELL SPEAKERS

Placed first in the recent "WIRELESS WORLD" tests for QUALITY OF REPRODUCTION.

SEPARATE COILS

from 3/11 each, 6-pin base fitting or Valve holder base type.

TRANSFOMERS

Popular (3-1)	-	Price 8/9
„ (5-1)	-	Price 8/9
Grand (3-1)	-	Price 12/6
„ (5-1)	-	Price 12/6

CONDENSERS

.0005, .0003 and .00015 - 3/11 each

CUT-OUTS

for clearing high wave and separating low wave - 10/6 each

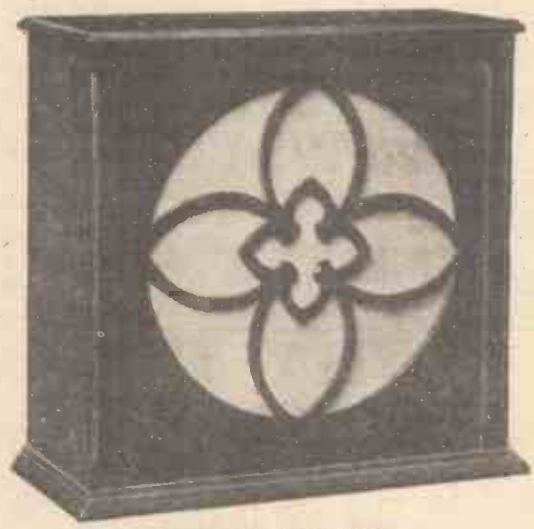
TWO-PIN COILS

Plain, Centre-tapped and X type.
BRITAIN'S FAVOURITE
Prices from 1/6

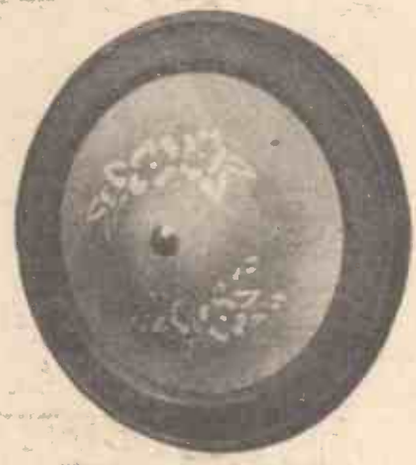
H.F. CHOKES—97% efficient. Price 6/6

CONCAVE PLAQUE STAND TYPE.
Oak, Mahogany or Walnut.
14-inch Cone - £2 . 2 . 0
(19 inches overall)
12-Inch ditto £1 . 17 . 6

STAND No. 9
NATIONAL RADIO EXHIBITION, OLYMPIA



CABINET SPEAKER.
Oak, Mahogany or Walnut.
Size: 16 × 16 × 7
Price £3 . 3 . 0



POPULAR PLAQUE TYPE.
Price complete, 28/6
Best 14-inch cone. Neat and efficient.

TURNER & CO., 54 Station Road, New Southgate, N.11

To Ensure Speedy Delivery, Mention "A.W." to Advertisers

MORE RADIOGRAMS

(*Continued from page* 356)

On September 22 (National) and on September 25 (Regional) *R.U.R.* (Rossum's Universal Robots), by Karel Kapek, is to be revived, by request. The cast will include Robert Loraine.

As in previous years, Lady Tree has undertaken to compere and present a special League of Mercy programme; it will be broadcast nationally on October 14.

Arrangements have now been completed by the E.I.A.R. for the nightly exchange of programmes between Milan, Turin, and Genoa. Apart from local transmissions, the interval signal adopted is that of Turin—the song of the nightingale and the call: *Eh-yah, Radio Milano Torino, Genova.*

A monopoly for twenty-five years has been granted by the Grand Duchy of Luxembourg for a broadcasting service in that little state. According to local reports, it is not thought that the previously used transmitter will be taken over, but it is rumoured that a high-power station is to be erected at some short distance from the capital. Possibly, as such work might entail a delay of from one year to eighteen months, authority may be obtained to work Radio Luxemburg provisionally during that period.

The new 15-kilowatt P.T.T. station erected at Strasbourg-Brumath will be officially inaugurated on October 3 next.

Radio Touraine, a private broadcasting station in the neighbourhood of Tours (France), will shortly start daily transmissions on 210 and 40 metres.

More than 280,000 persons pay an average of one shilling and tenpence a month to receive wireless programmes in Budapest.

Approximately 69 per cent. of radio sets in the United States are sold on the instal-ment credit plan according to a recent survey of the Department of Commerce.

Radio Vitus (Paris) has decided to erect a 15-kilowatt transmitter at Romainville, in the immediate neighbourhood of the French capital. It is stated that this station will work in close co-operation with a well-known sound film studio.

Stuttgart (Germany), Toulouse PTT (France), and Barcelona (EAJ 1, Spain) will exchange wireless programmes at regular intervals from October 15 onwards.

The latest news with regard to the Scot-tish Regional B.B.C. station is that the present scheme for erecting the transmitter at Falkirk may have to be abandoned. It is stated that trouble has arisen from the nature of the subsoil at the selected site. This has proved, on investigation, to be of a mixed nature, which would prove unsuit-able to the foundations. Further tests are being made, but it is probable that if the soil is still found to be unsatisfactory a search will have to be resumed for a site.

A list of "A.W." and "W.M." Blueprints appears on page 360

Among the most successful of the B.B.C.'s feature programmes in Scotland have been those reproducing as faithfully as possible the atmosphere of the impromptu concerts through which the folk-lore and music of the Highlands are preserved. The B.B.C., accordingly, is encouraging such programmes, and Aberdeen is following Edinburgh's lead in the matter. The farthest north station has already broad-cast some good "ceilidhs,' and is now entering new ground by attempting a representation of a typical evening at one of the tiny "shielings" on the hills, where the Highland girls live when herding cattle and sheep on the summer pastures.

Three illegal wireless stations, one at Halluin, another at Metz, and the third in Paris have been discovered by the French police. All three stations were working on short waves transmitting messages to America which should have been sent through the services operated by the Ministry of Posts and Telegraphs.

A fresh European record was registered on August 7 last, when fifty-one broad-casting stations relayed a performance given at the Salzburg (Austria) Music Festival.

See the BURTON EMPIRE TWO

—a revelation in radio value

THE EMPIRE TWO BATTERY MODEL **57/6** Valves Extra

A compact little receiver of very attractive appearance, designed to give good reception of local station programmes. Tuning is effected by a drum drive condenser, combined with a volume control. Two push-pull switches provide for changing wave range, and for switching on and off. Contained in Moulded Bakelite Cabinet.

£8.12.6 Valves Extra

SCREEN GRID BATTERY RECEIVER

A highly selective 3 valve receiver incorporating a screen grid high frequency stage and a detector transformer coupled to a power output valve. Adequate volume is obtained without the use of a pentode. Tuning is effected by a single drum dial driving a pair of ganged condensers. A small auxiliary condenser is provided to give fine tuning. Wave range switching is effected by a single switch, which also serves to switch the set on and off. Reaction is by a differential condenser system which gives very smooth control, and entire freedom from troublesome hand capacity effects.

Among the latest additions to the famous BURTON range of radio receiving sets and component parts which will be exhibited at Olympia for the first time, is the BURTON EMPIRE TWO, Battery Model, the BURTON EMPIRE THREE SCREEN GRID, Battery Model, and the BURTON ALL-MAINS TWO and THREE Valve Models. . . . Considered in conjunction with the high-grade BURTON standard of material, workmanship and finish, and the unrivalled results obtained from radio products of our manufacture, these new models represent the most remarkable value ever offered. If you are at the Radio Exhibition don't fail to call at the BURTON stand and see them for yourself, or write NOW for latest illustrated catalogue.

World famous Burton Components

SINGLE CONDENSER

Complete with fast and slow motion drum control. **12/6** each

Ditto with plain drum control. **10/6** each

THE BURTON AUDIO TRANSFORMER

A neat and compact instrument of the highest efficiency, being carefully wound to give correct ratios. Enclosed in neat moulded case.

TYPE B/3, ratio 3-1 : **10/6** each
TYPE B/5, ratio 5-1 : **10/6** each

FULL-SIZE BLUEPRINTS

When ordering, please send Postal Order, NOT STAMPS

CRYSTAL SETS (6d. each)

B.B.C. Brookman's Park Set AW206
Regional Crystal Set WM176

ONE-VALVE SETS (1s. each)

B.B.C. Official One AW208
Hartley Single-valver WM198

TWO-VALVE SETS (1s. each)

Talisman Two (D, Trans) AW194
Wavelets Two (D, Trans) AW229
No-battery A.C. Mains Two (D, Trans) .. AW230
No-battery Gramo-radio 2 (D, Trans) .. AW238
1930 Talisman 2 (D, Trans) AW239
Easy Tune Short-wave 2 (D, Trans) AW242
Searcher Two (D, Trans) AW245
Brookman's Two (D, Trans) WM168
New Crusader (D, Trans) WM182
Radio-Record Two (SG, D) WM187
Gleaner Two (D, Trans) WM201
Music Monitor (D, Trans) WM208

THREE-VALVE SETS (1s. each)

All-wave High-mag. Three (D, 2 Trans) AW199
Knife-edge Three (D, RC, Trans) AW201
Talisman Two-three (D, RC, Trans) AW203A
Wide World Short-wave Three (HF, D, Trans) AW207
Everybody's Three (SG, D, Trans) AW209
1930 Ether Searcher (SG, D, Trans) AW211
New All-Britain Three (HF, D, Trans) .. AW214
Best-by-Ballot Three (SG, D, Trans) Price 4d. free with copy of "A.W." AW217
Brookman's By-pass Three (D, 2 Trans) .. AW220
Everybody's All-electric Three (SG, D, Trans) —A.C. AW221
1930 Clarion Three (SG, D, Trans) AW223
Beginner's Regional Three (D, 2LF) AW232
Britain's Favourite Three 1930 (D, 2 Trans) .. AW243
Car Three (D. R.C. Trans) AW244
Standard Coil Three (HF, D, Trans) WM117
Brookman's Three (SG, D, Trans) WM161
Community Three (D, RC, Trans) WM164
Brookman's Push-Pull Three (SG, D, Trans) 1/6 WM170
All-nations Three (D, 2 Trans) WM178
Inceptordyne (SG, D, Pentode) WM179
Brookman's A.C. Three (SG, D, Trans) 1/6 .. WM184
Music Marshal (D, 2 Trans) WM190
Gramo-Radio D.C. Three (SG D Trans) .. WM196
Concert Three (D, 2 Trans) WM199
New Lodestone Three (HF, D, Trans) WM205
De-Luxe Three (D, RC, Trans) WM209

FOUR-VALVE SETS (1s. 6d. each)

Clarion All-electric Three (SG, D, Trans—A.C. Rectifier) AW200

(Continued on page 362)

BROADCAST TELEPHONY

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

Metres	Kilocycles	Station and Call Sign	Power (Kw.)
GREAT BRITAIN			
25.53	11,751	Chelmsford (5SW)	15.0
*200	1,500	Leeds	0.16
*242	1,238	Belfast	1.2
*261	1,148	London Nat.	65.0
*288.5	1,040	Newcastle	1.2
288.5	1,040	Swansea	0.16
288.5	1,040	Stoke-on-Trent	0.16
288.5	1,040	Sheffield	0.16
288.5	1,040	Plymouth	0.16
288.5	1,040	Liverpool	0.16
288.5	1,040	Hull	0.16
288.5	1,040	Edinburgh	0.4
288.5	1,040	Dundee	0.16
288.5	1,040	Bournemouth	1.2
288.5	1,040	Bradford	0.16
*301	995	Aberdeen	1.2
*309.9	968	Cardiff	1.2
*356	842	London Reg.	45.0
*376.4	797	Manchester	1.2
*398.9	752	Glasgow	1.2
*479	626	Midland Reg.	38.0
1,554	193	Daventry (Nat.)	35.0
AUSTRIA			
*246	1,220	Linz	0.6
*283	1,058	Innsbruck	0.6
*352	851	Graz	9.5
*453	666	Klagenfurt	0.6
*517	578.5	Vienna	20.0
BELGIUM			
206	1,460	Antwerp	0.4
212	1,415	Binche	0.2
216	1,391	Chatelineau	0.25
216	1,391	Brussels (Conference)	0.25
243	1,235	Courtrai	0.1
244.7	1,226	Ghent	0.25
245.7	1,229	Schaerbeek	0.5
338.2	887	Forest	3.0
*500	590	Brussels (No. 1)	1.2
CZECHO-SLOVAKIA			
*263	1,139	Moravska-Ostrava	11.0
*279	1,076	Bratislava	14.0
293	1,022	Kosice	2.5
*342	878	Brunn (Brno)	3.0
*487	617	Prague (Praha)	5.5
DENMARK			
*281	1,067	Copenhagen	1.0
1,153	260	Kalundborg	10 0
ESTONIA			
401	748	Reval (Tallinn)	0.7
FINLAND			
*221	1,355	Helsinki	15.0
291	1,031	Viborg	15.0
*1,796	167	Lahti	54.0
FRANCE			
210	1,430	Radio Touraine	0.5
222	1,351	Fécamp	0.7
235.1	1,275	Nimes	1.0
240.4	1,248	Béziers	0.3
249.5	1,202	Juan-les-Pins	0.5
255	1,175	Toulouse (PTT)	1.0
265	1,130	Lille (PTT)	1.0
*272	1,103	Rennes (PTT)	1.2
286	1,049	Montpellier	1.2
*287.2	1,044.6	Radio Lyons	0.5
294.5	1,018.5	Limoges (PTT)	0.5
304	988	Bordeaux (PTT)	1.0
308.9	971	(Vitus) Paris	1.0
316	950	Marseilles (PTT)	1.5
328.2	914	Grenoble (PTT)	1.2
329	911.8	Poste Parisien	1.2
345.2	869	Strasbourg (testing shortly)	15.0
370.4	810	Radio LL (Paris)	0.5
385	779	Radio Toulouse	8.0
447	671	Paris (PTT)	1.0
466	644	Lyons (PTT)	2 3
1,446	207	Eiffel Tower	15.0
*1,725	174	Radio Paris	17.0
GERMANY			
31.38	9,560	Zeesen	15.0
*218	1,373	Flensburg	0.6
*227	1,319	Cologne	1.7
*227	1,319	Münster	0.6
*227	1,319	Aachen	0.31
232.2	1,292	Kiel	0.3
*239	1,256	Nürnberg	2.3
246	1,220	Cassel	0.3
*253	1,184	Leipzig	2.3
*259	1,157	Gleiwitz	5.6
*270	1,112	Kaiserslautern	0.25
*276	1,085	Königsberg	1.7
*283	1,058	Magdeburg	0.6
*283	1,058	Berlin (E)	0.6
*283	1,058	Stettin	0.6
*316	950	Bremen	0.3
*319	941	Dresden	0.3
*325	923	Breslau	1.7
*360	833	Stuttgart	1.7
*372	806	Hamburg	1.7
*390	770	Frankfurt	1.7
*418	716	Berlin	1.7
*453	662	Danzig	0.25
*473	635	Langenberg	17.0
*533	563	Munich	1.7
560	536	Augsburg	0.3
*566	529	Hanover	0.35
576.1	520.7	Freiburg	0.3
*1,635	183.5	Zeesen	35.0
1,635	183.5	Norddeich	10.0
HOLLAND			
31.28	9,599	Eindhoven (PCJ)	30.0
*299	1,004	Huizen (between 11.40 a.m. and 5.40 p.m. B.S.T.)	8.5
*1,071	280	Huizen	6.5
*1,071	280	Scheveningen-Haven	5.0
*1,875	160	Hilversum	8.5
HUNGARY			
210	1,430	Budapest (Csepel)	1.0
550	545	Budapest	23.0
ICELAND			
*1,200	250	Reykjavik (shortly testing)	16.0
IRISH FREE STATE			
*224.4	1,337	Cork (1FS)	1.5
*413	725	Dublin (2RN)	1.5
ITALY			
25.4 and 80		Rome (3RO)	9.0
247.7	1,211	Trieste (testing)	2.0

(Continued on page 362)

"FULL-SIZE BLUEPRINTS"

(*Continued from page 360*)

Music-Lover's Gramo-radio (SG, D, RC, Trans)—1s. 6d. AW202A
Music-Lover's Gramo-radio (Loud-speaker) 1s. AW202B
Horizon Four (SG, D, 2 Trans) AW237
1930 Monodial (2SG, D, Trans) WM158
Electric Four (All A.C.—SG, D, RC, Trans) .. WM162
Brookman's Four (2SG, D, Trans) WM174
Transportable Four (SG, D, 2 RC) WM180
Super Q (SG, D, 2 Trans) WM189
Lodestone Four (HF, D, RC, Trans) WM193
Searcher's Four (SG, D, RC, Trans) WM194
Invitation Four (SG, D, RC, Trans) WM200

FIVE-VALVE SETS (1s. 6d. each)

James Quality Five (2SG, D, RC, Trans) .. AW227
All-wave Lodestone Five (HF, D, RC, Push-pull) WM146
1930 Five (2HF, D, RC, Trans) WM171
Dual-screen Five (2SG, D, RC, Trans) .. WM185
Radio-Record Five (SG, D, Trans-parallel) .. WM188
Overseas Five (3SG, D, Trans) WM191

AMPLIFIERS (1s. each)

"A.W." Gramophone Amplifier AW205
Brookman's Separator (HF Unit) AW212
Two-valve Amplifier AW216
"Mag" Gramo Unit AW224
Radio-Record Amplifier (DC Mains) WM183
Selecto Amplifier (HF, Unit) WM210

MISCELLANEOUS (1s. each)

Short-wave Adaptor (1 v.) AW183
Simplest H.T. Unit AW197
By-pass Unit (Wavetrap) with copy "A.W."—4d. AW218
"Twin" Brookman's By-pass (6d.) AW222
"A.W." Paper Loud-speaker AW231
James H. T. and L.T. Charging Unit AW232
Simplest H.T. Eliminator for D.C. Mains .. AW234
Simplest H.T. Eliminator for A.C. Mains .. AW236
Choke-Output Unit AW240
Simple Tester Unit (6d.) AW246
A.C. Mains Amplifier WM149
H.T. Unit for A.C. Mains WM159
"W.M." Linen-diaphragm WM172
Brookman's "Wipe-outs" WM186
Short-wave adaptor for Overseas Five WM192
Staminator Unit for A.C. Mains WM202
Universal Push-pull Amplifier WM204
Outspan Short-wave Adaptor WM207

PORTABLE SETS

Music Leader (SG, D, RC, Trans) with copy "A.W." .. .. AW203 -/4
Sunshine Three (SG.HF.SG.D, Trans) AW235 1/-
Continental Portable (SG, D, Trans) .. AW241 1/-
Pedlar Portable Two (D, Trans) .. WM195 1/-
Pedlar Portable Three (D, 2 Trans) .. WM197 1/-
James Portable SG3 (SG, D, Trans) .. WM203 1/-
Foursome Portable (SG, D, 2 Trans) .. WM206 1/-

Copies of the "Wireless Magazine" and of "Amateur Wireless" containing descriptions of any of these sets can be obtained at 1s. 3d. and 4d. respectively, post free. Index letters "A.W." refer to "Amateur Wireless" sets and "W.M." to "Wireless Magazine."

AMATEUR WIRELESS 58-61 FETTER LANE, LONDON, E.C.4.

"BROADCAST TELEPHONY" (*Continued from page 360*)

Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)
291	1,030	Turin (Torino)	8.5
332	905	Naples (Napoli)	1.7
379.5	790	Genoa (Genova)	1.5
*441	680	Rome (Roma)	75.0
453	662	Bolzano (IBZ)	0.2
*501	599	Milan (Milano)	8.5
LATVIA			
*525	572	Riga	12.0
LITHUANIA			
*1,935	155	Kaunas	7.0
NORTH AFRICA			
363.4	825	Algiers (PTT)	16.0
416	721	Radio Maroc (Rabat)	10.0
1,350	222.2	Tunis Kasbah	0.6
NORWAY			
364	824	Bergen	1.0
369	813	Fredriksstad	0.7
453	662	Nidaros	1.2
455	659.3	Porsgrund	1.5
*493	608	Oslo	0.5
POLAND			
214.2	1,400	Warsaw (2)	1.9
234	1,283	Lodz	2.2
*313	959	Cracow	1.5
*335	896	Poznan	1.9
381	788	Lvov	2.2
385	779	Wilno	0.5
*408	734	Katowice	16.0
1,411	212.5	Warsaw	14.0

Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)
PORTUGAL			
240	1,247	Oporto	0.25
320	937.6	Lisbon (CTIAA)	0.25
ROMANIA			
*394	761	Bucharest	16.0
RUSSIA			
720	416.6	Moscow (PTT)	20.0
800	375	Kiev	20.0
824	364	Sverdlovsk	25.0
1,000	300	Leningrad	20.0
1,060	283	Tiflis	10.0
1,103	272	Moscow Popoff	40.0
1,200	250	Kharkov	23.0
*1,304	230	Moscow-Stchelkovo (C.C.S.P.)	100.0
1,380	217.5	Bakou	10.0
1,481	202.5	Moscow	20.0
SPAIN			
251	1,193	Barcelona (EAJ15)	0.5
266.7	1,125	Barcelona (EAJ13)	10.0
*349	860	Barcelona (EAJ1)	8.0
368	815	Seville (EAJ5)	1.5
407	737	Madrid (España)	1.0
424	707	Madrid (EAJ7)	2.0
460	652	San Sebastian (EAJ8)	0.5

Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)
SWEDEN			
135	2,222	Motala	30.0
230.3	1,303	Malmo	0.6
*257	1,166	Hörby	15.0
299.6	1,001	Falun	0.65
*322	932	Göteborg	15.0
*435.4	689	Stockholm	75.0
*542	554	Sundsvall	1.5
*770	389	Ostersund	0.75
1,223.5	244	Boden	0.75
*1,348	222.5	Motala	40.0
SWITZERLAND			
318.8	943	Basle	0.65
*403	743	Berne	1.1
*459	653	Zurich	0.75
680	442	Lausanne	0.6
760	395	Geneva	0.25
1,010	297	Basle	0.25
TURKEY			
*1,200	250	Istanbul	5.0
1,961	153	Ankara	7.0
YUGOSLAVIA			
306.5	978.7	Zagreb (Agram)	0.7
432.3	694	Belgrade	3.0
574.7	522	Ljubljana	2.8

All wavelengths marked with an asterisk have been allotted according to the *Plan de Prague*.

For a talk from Glasgow on "The Descent and Migration of Clothes," the B.B.C. had to explain by way of introduction, that the subject was not that popular practice of handing down clothes from elder brothers to their juniors, or of the future of the garments when they were taken away by the ol' clo' man! The talk was quite a serious one, tracing the evolution of clothes from 500 B.C.

In tests conducted at Schenectady by engineers of the General Electric Company, the spoken words of a member of the company's staff were transmitted through an elaborate system around the world in an eighth of a second. The voice came back as an echo, the speaker hearing each syllable an eighth of a second later.

JUNIT

MAINS UNIT

SERVANT OF THE SET

STAND 65 OLYMPIA SEPT. 19-27

MASTER OF THE MAINS

Here are particulars of the new Junit Mains Unit.
The units which will satisfy every critic. Perfectly silent in operation.
Constructed of the finest components and material.
Each unit is constructed for use on Mains ranging from 200v.-240v.

UNIT TYPE 150/4 A.C.
Giving 150 volts at 25 milliamperes load, and incorporating 4-volt centre-tapped winding for supplying filament current for indirectly heated valves. Size 9in. x 5in. x 3½in.
Tappings: One variable 0-150
One fixed 150
One fixed S.G.
Price £5 : 0 : 0

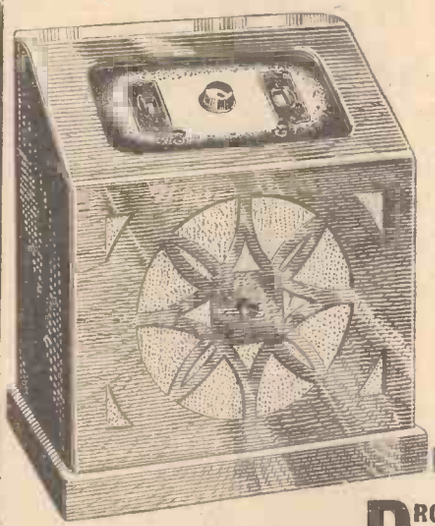
UNIT TYPE 120.
Giving 120 volts at 20 milliamperes load. Size 9in. x 5in. x 3½in.
Tappings: One variable 0-120
One fixed 120
One fixed S.G.
Price £4 : 7 : 6

UNIT TYPE 120/T.C.
Giving 120 volts output at 20 milliamperes load, and also containing trickle charger for 2-, 4- or 6-volt accumulators. Size 9 in. x 5 in. x 3¼ in.
Tappings: One variable 0-120
One fixed 120
One fixed S.G.
Price £5 : 17 : 6

Ask your dealer for full particulars.

Advertisement of the Junit Manufacturing Co., Ltd., 2, Ravenscourt Square, London, W.6. (M.C.111)

Britain's FIRST Successful Screened Valve Kit-Set



"Tour Europe from your Armchair"

PROOF? Here it is. Read what *Amateur Wireless* says

"An indoor aerial .... This set brought in Midland Regional at fine strength."

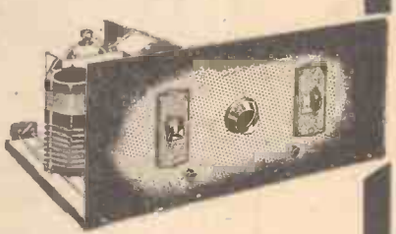
"London Regional is not an easy station to get rid of, but ..... I lost it completely in less than 5 degrees. I could hardly find the National at first; so there was obviously no difficulty in cutting out that station."

"The Voltron people are quite justified in their slogan, for as darkness came on I was able to listen to such familiar European stations as Toulouse, Rome, and Vienna at full loud-speaker strength."

Illustrated above is the new Dynaplus cabinet showing the set fitted in position. The cabinet is, in a beautiful walnut finish, fitted with the latest Voltron Cone Loud-speaker and provides ample room at the back for batteries or eliminator.

CABINET FITTED COMPLETE WITH CONE LOUD-SPEAKER **50/-**

DYNAPLUS
SCREENED
3
Complete Kit of Parts
£3 : 12 : 9



VOLTRON
years ahead in design
COMPONENTS

You can get full particulars of Voltron products from Voltron Authorised Agents throughout the British Isles. In case of difficulty, write to us for the free blueprint and name of our nearest Agent.

VOLTRON ELECTRIC, LTD., QUEENSWAY, PONDERS END, MIDX.

Let "A.W." Solve Your Problems

Postcard Radio Literature

Cheap H.T.

UNDER the interesting title "Everlasting H.T. for £1 Down," Pye Radio Ltd., in a recently produced folder, show how their H.T. eliminators and L.T. charger can be obtained on convenient hire-purchase terms. **48**

A Good Portable

The Columbia portable was reviewed recently by "Set Tester," and the nice things he had to say about it have endeared me to this set. Columbia's also have a new table model receiver which works from the mains, and I think potential set buyers will be missing a good opportunity if they do not get the little booklet describing these sets. **49**

R.I. Listed

I have on hand the latest R.I. catalogue of components, which is far too comprehensive to review in detail, but which I can thoroughly recommend to every constructor and set user. Very full details are given of many of the components and, in the case of transformers, in particular, helpful curves and circuits are published. **50**

The Dynamics

Have you yet come across the N. & K. dynamic speaker, marketed in this country by Broderson's? This new speaker action is well worth investigating, and it is fully described in a folder available. **51**

Home-made Eliminators

Why not make up your own eliminator? It is quite easy with the new Stall kits of parts sold by the Triotron valve people, and literature is to be had describing these. **52**

Varley for 1931

The number of Varley parts is legion, and rather than attempt to detail them here, I advise you to get the new Varley catalogue for 1931. This gives most complete details. **53**

GET THESE CATALOGUES *FREE*

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

H2!

Beating Nature—!

on her own ground!

The nose of a bloodhound, the ears of a deer, the whiskers of a cat—fascinating instances of the acute degree to which nature has carried sensitivity in many of her amazing creations. Yet the scientists of the Marconi Valve Factory have devised an appliance which for sensitivity beats any of these. This marvellous achievement is incorporated in the new Marconi Valve H.2, the introduction of which marks **an entirely new era in the "detector" field of radio science.**

The Marconi H.2 is a new high magnification valve with a mutual conductance of 1.0 ma/volt—the highest yet attained in this class—particularly suitable for detection in portable receivers. The amplification factor of 35, and impedance of only 35,000 Ohms, are obtained by special constructional methods which at the same time give exceptional freedom from microphonic feed-back. Marconi H.2 should be fitted as "detector" in portables—or, indeed, in any set where maximum sensitivity is essential. It will give greater range, fuller tone and perfect stability. It will bring in new stations with amazing consistency and improved reproduction.

Marconi H.2, the new **EFFICIENCY** detector, with the highest conductance, costs only 8/6. **It is ALL BRITISH!**

MARCONI

H.2.

8/6

REDUCED PRICES NOW IN OPERATION

Remember! Marconi Valves are used by the B.B.C., Imperial Airways, Croydon Control Tower, Metropolitan Police, Trinity House Beacon Stations and Lightships, Empire Wireless Communications, Large Passenger Liners, etc.—need more be said?

SAFETY FOR SIXPENCE

SUPPOSE you "blew" your Screen-grid Valve to-night . . . Sixpence would have saved it. The Belling-Lee S.G. Anode Connector is entirely insulated. Even if it touches exposed metal parts at earth potential your valves are safe and your H.T. supply too.

Just push it over the Screen-grid Anode Terminal in place of the usual nut. Then forget it. Strong spring grip—compact—side entry for flex—a special loading device grips the braid as well as the wire.

S.G. Anode Connector 6d. each

For Screen Grid or Pentode.

Patent

TWO NEW COMPONENTS

The new Terminal Mount, Price 8d. The new "Wanderfuse," Price 1/6. Spare fuses (150 m/a), 9d. each.

Belling-Lee Terminals: Type "B," 6d. Type "M," 4½d. Type "R," 3d. Wander Plug, 3d. Safety Plug and Socket, 9d. Twin Plug and Socket, 1/6. Indicating Spade Terminal, 4½d. Battery Cords, 9 way, 5/9. *(Also made in 5, 6, 7, 8 and 10 way.*

STAND No. 134 National Radio Exhibition, Olympia

BELLING-LEE
FOR EVERY RADIO CONNECTION

Advt. of Belling & Lee, Ltd., Queensway Wks., Ponders End, Mdx.

LET "AMATEUR WIRELESS" SOLVE YOUR PROBLEMS

AT THE QUEEN'S HALL

THE miscellaneous concert on Tuesday, September 9, was a great occasion. There was a work by Marcel Dupre for organ and orchestra, the composer playing the solo part not a concerto, but a symphony. Dupre seems one of the few pioneers of modern music in whom one can imagine real genius; but this may be a mistaken impression. He has a wonderful technique, however; he is able to mould modern musical form with extraordinary ability. So many composers of the present day are still at the experimental stage.

The programme was well chosen. There was a Gluck overture, a new violoncello concerto by Honegger, and a Handel organ concerto (when Marcel Dupré had played the organ for the second time the applause amounted to an ovation), and Schubert's "Unfinished Symphony." Hearing this work after two modern works revealed some of its amazing depths. There is nothing else anything like it. It is spontaneous in the mature mind of this composer, and a link between the pagan and the spiritual in music. L. R. J.

TUNGSRAM VALVES

It should be noted that an incorrect address was given in the Tungsram advertisement on page 253 of No. 431. The correct address is 72, Oxford Street, W.1.

The new Scottish B.B.C. headquarters in Edinburgh, situated in what was formerly the Queen's Hall, are a great advance in every respect on the premises formerly occupied at Blythwood Square, Glasgow. One of the main features is No. 1 studio, which has been constructed out of the old Queen's Hall itself. It is the largest broadcasting studio in Great Britain, and the stage has been extended so that it can accommodate a fairly large orchestra. On three sides are commodious galleries from which invited audiences will, on occasion, be able to see and hear the performance. There are facilities for the operation of spot-lights. The walls of No. 2 studio will be undraped, but will be lined with textile material, and decorated in simple pastel shades.

NEXT WEEK:
THE "ARROW TWO"

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

EASY TERMS

We specialise in the supply of all good quality Radio Sets and Components on easy terms. We will give you efficient and prompt service. A few examples below :—

McMICHAEL MAINS THREE.—The outstanding all-mains set of the season. Remarkable performance both as regards sensitivity and quality of reproduction. A receiver we can thoroughly recommend.
Cash Price £21
or 22/- with order and 11 monthly payments of 38/-

ECKO ALL-MAINS 2-VALVE SET.—A reliable Regional Receiver for A.C. or D.C. mains.
Cash Price, £14/10/-
or 18/6 with order and 11 monthly payments of 26/-

LISSEN 2-VALVE SET.—Battery Model, including valves.
Cash Price, £3/10/-
or 5/6 with order and 11 monthly payments of 6/6

NEW OSRAM MUSIC MAGNET 4 KIT.—A first-class long-distance Receiver, incorporating 2 H.F. stages, single-dial tuning.
Cash Price, £11/15/-
or 16/- with order and 11 monthly payments of 21/-

NEW ORGOLA 1931 4-VALVE KIT.—A high-grade complete kit of parts, including cabinet and valves.
Cash Price, £13/12/6
or 16/6 with order and 11 monthly payments of 24/6

NEW COSSOR EMPIRE 3 KIT.—A considerable advance on last season's 3-valve Kit and at a lower price.
Cash Price, £6/17/6
or 10/- with order and 11 monthly payments of 12/6

N.K. FARRAND INDUCTOR LOUD-SPEAKER UNIT.—Quality of reproduction almost equal to a moving-coil speaker.
Cash Price, £3/10/-
or 5/6 with order and 11 monthly payments of 6/6

MARCONI PICK-UP.—The best and most sensitive Pick-up available at the present time.
Cash Price, £3/3/-
or 4/- with order and 11 monthly payments of 6/-

12 EXIDE W.H. UNITS (120 volts, 5,000 M/a).
Cash Price, £4/2/6
or 5/6 with order and 11 monthly payments of 7/-
Higher voltages if desired.

NEW BLUE SPOT 66R UNIT.—The finest balanced-armature movement on the market. Complete with large Cone and Chassis.
Cash Price, £2/10/-
or 5/- with order and 10 monthly payments of 5/-

All makes of Eliminators, Loud Speakers (including Moving Coil), Meters, Batteries, etc., supplied on similar terms. Kindly let us have your inquiries and a quotation will be sent by return.

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THE STANDARD PLUG-IN COIL

Sold everywhere from **1/-**

DX COILS Ltd, London, E.8

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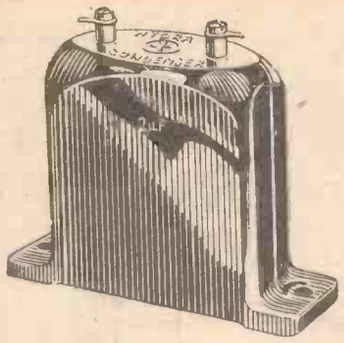
You will get the best and cheapest selection of Microphones for all purposes at 218 Upper Thames Street, E.C. Electradix Mikes are used everywhere. Broadcast Mikes, £12, £6 and £2, for public address. Announcers' Hand or Stand Mikes, 15/-. Wrist Speech Microphones, 10/6. Solo Hand Mikes 107B in brass case, 3/6. Microphone Units for making multiple mikes, 4/6. Skinderviken Buttons, 3/6. W.E. Service Speech Buttons, 10d. Booklet "Wonders of the Microphone," 6d. Add postage on above.

New September Sale List just issued. Free for stamped addressed envelope.

Microphone Specialists,

ELECTRADIX RADIOS,
218 Upper Thames Street, E.C.4



A condenser cannot live to fail twice! A Hydra cannot fail to live throughout the lifetime of your set—and longer! Hydra condensers never fail—they do not leave our factory until we are satisfied of that!

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LOUIS HOLZMAN Ltd.

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Lyons "B.A.T." 750 watt Q.M.B. Switches are designed and manufactured to give efficiency. Use them confidently in High-frequency circuits, also H.T. and L.T. Battery Eliminators, Trickle Chargers, Gramophone Motor Switches, Moving-coil Loud-speaker Field Switches, Starting small Electric Motors, etc. *Illustration shows:*

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No. 728 with Soldering Tags	2/-	each
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PATENTS.—Trade Marks, Advice Handbook free.—B. T. King, Regd. Patent Agent, 146a Queen Victoria Street, London.

DECORATE YOUR LOUD-SPEAKER YOURSELF. Transfers giving painted effects on Fabric, Wood, Metal, etc. Sample and catalogue 1/-. A.W., Axon Ltd., Jersey, England.

COMPLETE KITS.—All Circuits. C.O.D. or Terms:—R.I.B., 33 Maroon Street, London, E.1.

ENGINEERS—IMPORTANT NOTICE.—Results now to hand show that 93 per cent. of our candidates pass their Exams. at the first attempt, a remarkable record unapproached by any other organisation and showing why we alone guarantee "No Pass—no Fee." If 93 out of every 100 ordinary men can succeed, why should you remain in the ranks? Now is the time to "get busy" and investigate. Our handbook, "Engineering Opportunities," explains the most simple and successful home-study methods of passing B.Sc., A.M.I.Mech.E., A.M.I.C.E., A.M.I.E.E., A.M.I.A.E., G.P.O., C. & G., Matric., etc., Exams. This book outlines courses in all branches of Civil, Mech., Elec., Motor, and Wireless Engineering, shows the unique advantages of our Appointments Dept., and includes a brilliant foreword by Prof. A. M. Low, in which he shows clearly the chances you are missing. Send for Free Handbook Now (state branch, post, or exam.).—British Institute of Engineering Technology, 109 Shakespeare House, 29-31 Oxford Street, London.

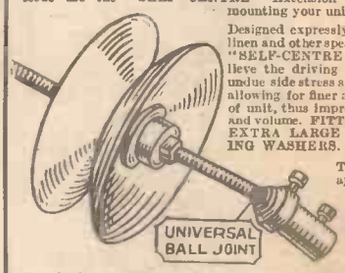
WE WILL ACCEPT YOUR SURPLUS APPARATUS (making you a high allowance) in part payment for any new apparatus; your enquiry will be dealt with promptly.—Bostock & Stonnill, 1, Westbourne Terrace, S.E.23.

WIRELESS AND GRAMOPHONE CABINETS. Ready for assembling or assembled. Write for lists. D. Mendip Industries, Winscombe.

BANKRUPT BARGAINS.—List free. **KITS:** Straight 2—Cabinet, panel, .0005, .0003 variables, Faradex transformer, six-pin coil, base, S.M. dial, choke, .0003, .0001 fixed, leak, V.H. switch, wire, etc., complete, 24/-, carriage 2/-. STRAIGHT 3, cabinet, panel 14 by 7 in., two .0005 variables, S.M. dials, dual coil, .0003, .0001 fixed, V.H., Faradex transformers, choke, G.L., wire, strip, etc., complete, 35/-, carriage 3/-. **MAINS SETS:** A.C. only, complete valves. Highest class manufacture in oak cabinet illuminated dial, 180-2,000 metres, Philips valves. Prices: two-valve, £6 10s.; three-valve, £9, or with 4-pole speaker incorporated, 25/- extra; four-valve S.G., £13. Carriage 5/-. **COMPONENTS:** Faradex transformers, 3/3; Bullphone dual coils, 8/6; H.F. chokes, 1/6; set 4 S.W. coils, 5/-; .0005 S.L.F., 2/6; Polar .0003, 2/9; ditto .0001, 2/-; 1-mfd., 1/8; 2-mfd., 2/-; 18 by 7 in. panels, 3/-; 12 by 8 in., 2/6; Puratone valves, 4/6; power, 6/6; S.G., 10/-. Five-valve portables, £5 15s. I guarantee to supply any part or kit cheaper. No rubbish.—Butlin, 143b Preston Road, Brighton.

FOR THE NEW "A.W." LINEN DIAPHRAGM LOUD-SPEAKER

When constructing the new Linen Speaker described in this issue use the "SELF-CENTRE" Extension Rod when mounting your unit.



Designed expressly for use in linen and other speakers. The "SELF-CENTRE" will relieve the driving rod of all undue side stress and chatter, allowing for finer adjustment of unit, thus improving tone and volume. FITTED WITH EXTRA LARGE REVERSING WASHERS.

Tested and approved by "Amateur Wireless." Price, as illustrated 1/6, post free 1/8.

To obtain the finest results with this speaker use our specially prepared linen dressed with GOLDEN TAUTENING DOPE. This dope, prepared as the result of considerable research, is NON-INFLAMMABLE and WATERPROOF.

C.O.D. Terms available. Trade inquiries invited.

The special qualities of this dressing will yield to a full and rich response to all sound frequencies. Golden Tautening Dope WILL NOT DETERIORATE WITH AGE. THE LINEN MAINTAINING FULL TAUTNESS. Price 1/- per 8-oz. tin, post 1/3. Linen: 6/- per sq. yd. Any length cut.

WEEDON & CO., 80 LONSDALE AVENUE, LONDON, E.6

High-Grade SET & SPEAKER CABINET
Constructed of finely figured Oak on carved ball and claw legs, hand french polished.

The Acme of Craftsmanship £8.8.0, carriage paid.
Radio-Gramophone Cabinet £10.0.0, carriage paid.
Models from £2.2.0 to £20. Thirty-page illustrated catalogue, post free.
GILBERT, Cabinet Maker, *Established* 1866. **SWINDON**

EVERY WIRELESS USER SHOULD GET THIS CATALOGUE

WHETHER you are buying a new set this year, or adapting your present set, or if you are needing components to construct your own receiver you should not fail to get the Lotus Catalogue. In this attractive little booklet are described all the new Lotus models, a wide range of Electric and Battery Sets to suit every taste and purse. The catalogue also gives particulars of the Lotus Components, famous amongst constructors for accuracy, finish and workmanship.

One minute spent filling in the coupon below will assure you of perfect wireless reproduction for the season.

★

The Lotus Stand at Olympia is No. 30

To Garnett, Whiteley & Co., Ltd.,
Lotus Works, Mill Lane, Liverpool.

Please send me free of cost the new Lotus Catalogue.

Name .....

Address .....

A.W./X .....

LOTUS
SETS & COMPONENTS

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

Printed in England. Published by Bernard Jones Publications, Ltd., 58/61 Fetter Lane, London, E.C.4
Sole Agents for South Africa: CENTRAL NEWS AGENCY, LIMITED. Sole Agents for Australasia: GORDON & GOTCH, LIMITED. Saturday, September 20, 1930.

Amateur Wireless
September 27, 1930

SECOND BIG SHOW NUMBER

HOW TO TUNE : THE PROPER WAY TO USE A SPEAKER

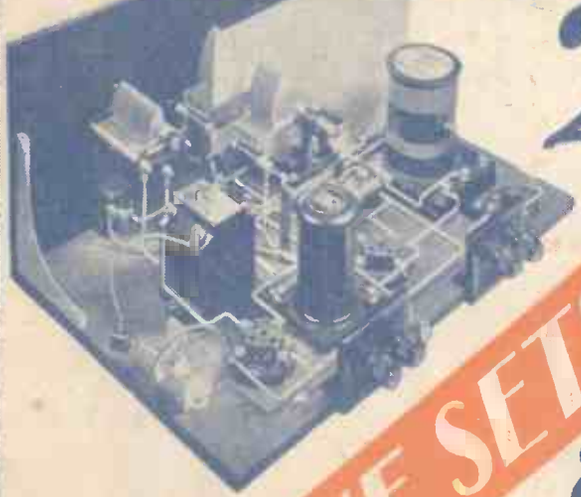
Amateur Wireless

and Radiovision

72 PAGES 3d.

Vol. XVII. No. 433 Saturday, September 27, 1930

The ARROW 2



TWO FINE SETS IN THIS ISSUE

& "A.W." EXHIBITION 3

Registered at the G.P.O. as a Newspaper

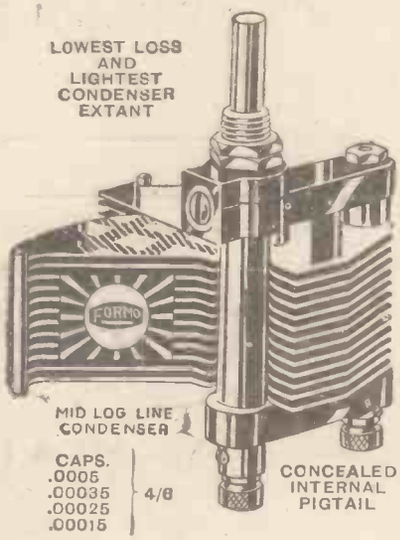
NOTHING CAN TOUCH US FOR QUALITY, RANGE OR PRICE

CAP .0005

3 GANG 45/- 4 GANG 55/-

A TRULY WONDERFUL GANG CONDENSER FINE CRAFTSMANSHIP AND PERFECT BALANCE

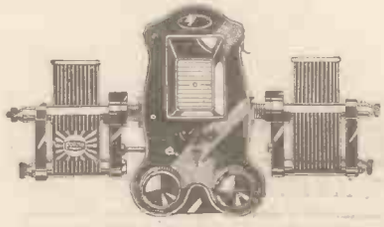
LOWEST LOSS AND LIGHTEST CONDENSER EXTANT



MID LOG LINE CONDENSER

CAPS.	
.0005	4/6
.00035	
.00025	
.00015	

CONCEALED INTERNAL PIGTAIL



ILLUMINATED DRUM DIAL : 8/6
WITH TRIMMER BALANCING CONTROL
WITH TWIN GANG CONDENSER - 17/6
WITH SINGLE CONDENSER 13/-

CAPS. MFD.	Price
2	3/-
1	2/2
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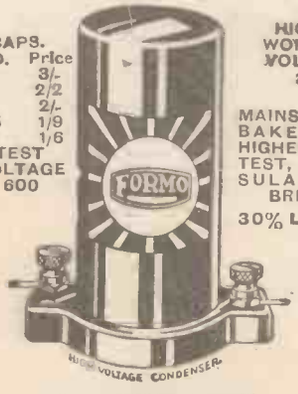

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MAINS CONDENSERS BAKELITE CASE, HIGHER VOLTAGE TEST, HIGHER INSULATION, NO BREAKDOWNS

30% LOWER PRICES

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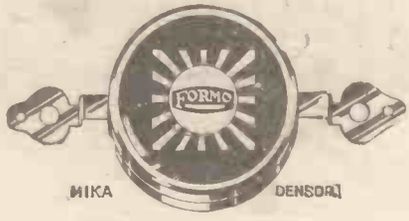

.0001	6d.	.0005	7d.
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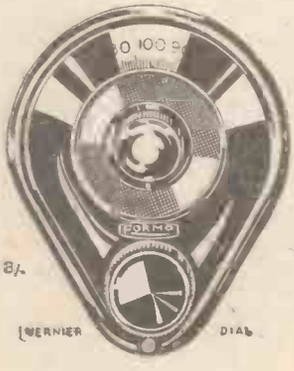
1,000 VOLT TEST

MOULDED IN THE FINEST BAKELITE ONLY BEST MICA EMPLOYED AND THOUGH SO INEXPENSIVE, ARE WITHOUT QUEST ON THE FINEST LITTLE MIDGETS MADE

EASY READING SILKY ACTION



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A GREAT LITTLE COMPRESSION TYPE VARIABLE CONDENSER

CAPS.	PRICE
F.0001 J.0003 G.001 H.002	1/6 2/3

PERFECT ACTION NO CRACKLE

CAP .00015 3/9

EIGHT OF OUR 35 LINES

BRITISH LEADERSHIP

SUPPLIERS TO THE LEADING SET MAKERS OF THE COUNTRY

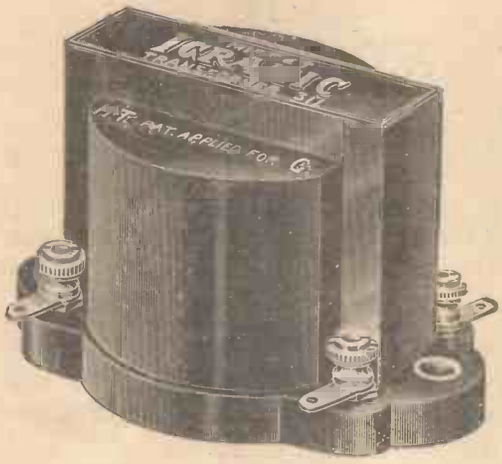
CATALOGUE FREE. GERRARD 1863.
GOLDEN SQ. PICCADILLY CIRCUS, LONDON.

STAND NO. 72 AT OLYMPIA

C.H.S.

Multum in Parvo!

NOW SOMETHING *REALLY* NEW IN TRANSFORMERS



IGRANIC MIDGET 10/6

The trend of modern receiver designs calls for smaller components without sacrifice of efficiency. The new Igranic MIDGET L.F. Transformer is a masterpiece in miniature. No refinements—electrical or constructional—have been sacrificed for size.

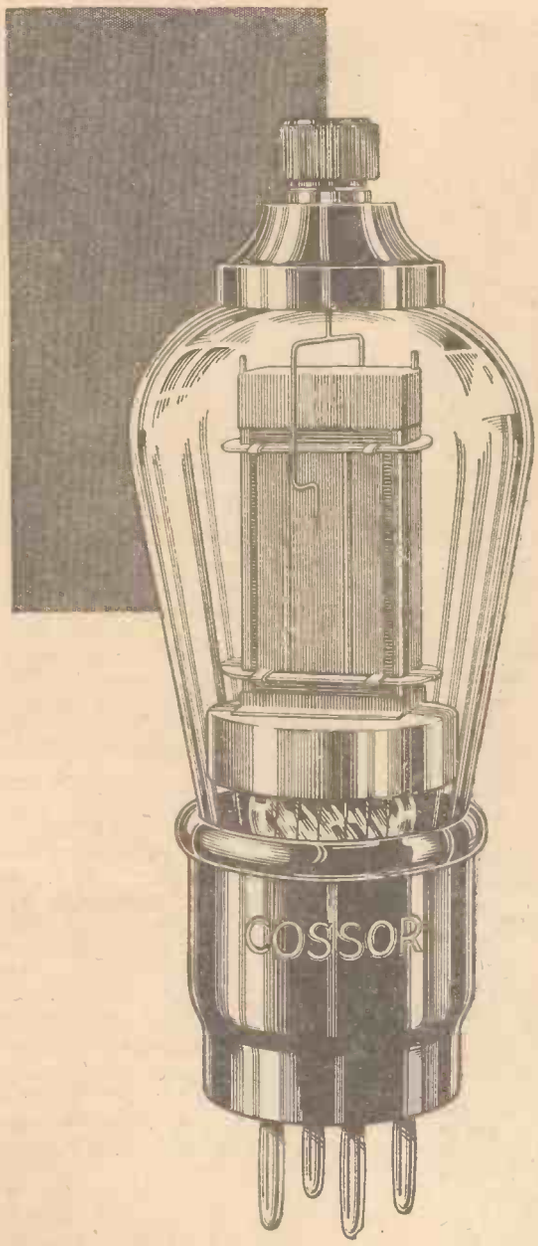
Study its star points. Remember that its efficient performance has been proved by many exhaustive laboratory and practical tests. It is the Transformer you have been waiting for

THE STAR POINTS

1. Size $2\frac{7}{8}$" x $1\frac{7}{8}$" x $1\frac{3}{4}$". Weight $6\frac{1}{2}$ oz.
2. Patented bi-metal core of new nickel alloy, which permits overload without ill effect.
3. Primary inductance of over 60 henries.
4. Case of polished Bakelite. Ample material surrounds fixing holes. All terminals clearly marked.

147 Queen Victoria St
IGRANIC ELECTRIC Co. Ltd.
LONDON

Inspect this "Masterpiece in Miniature" at
STAND No. 240, New Empire Hall, Olympia
Write for New Catalogue No. D149



Highest *effective* amplification

The effective amplification available with any Screened Grid Valve is largely controlled by its inter-electrode capacity. The lower this self-capacity the greater the effective amplification available. In the new Cossor 215 S.G. residual capacity has been reduced to the low order of ·001 micro-microfarads. This is lower than any other Screened Grid Valve on the market. Due to this—and also to the absence of grid current—the new Cossor 215 S.G. permits a degree of effective amplification which, a year ago, would have been considered utterly impossible. Illustrated folder giving full technical details sent free on request.

Cossor 215 S.G. 2 volts, ·15 amp. Impedance 300,000. Amplification Factor 330. Mutual Conductance 1·1 m.a/v. Normal working Anode Volts 120. Positive Voltage on Screen 60-80. Price **20/-**

THE NEW COSSOR 215 S.G.

HIGHEST *ACTUAL* AMPLIFICATION

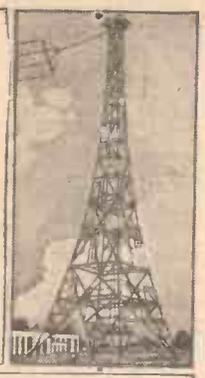
A. C. Cossor, Ltd., Highbury Grove, London, N.5.

♡ 5992

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

No. 433. Vol. XVII. SEPTEMBER 27, 1930

Amateur Wireless and Radiovision



EDITOR: BERNARD E. JONES.
TECHNICAL EDITOR: J. H. REYNER, B.Sc., A.M.I.E.E.
THE LEADING RADIO WEEKLY FOR THE CONSTRUCTOR, LISTENER & EXPERIMENTER.
RESEARCH CONSULTANT: W. JAMES.
ASSISTANT EDITOR: H. CORBISHLEY.

NEWS · & · GOSSIP · OF THE · WEEK

STILL ON!

DON'T forget that the Show closes on Saturday, September 27. If you haven't already been, try to squeeze in an hour or so at the first opportunity. Make your first visit Stand Number One—and see the new "A.W." and "W.M." receivers.

BLAITHWAITE!

A READER living near Slaithwaite is alarmed at the controversy over the pronunciation of the name. He sends in his complaint in rhyme.

"There was a young fellow of Slaithwaite (*'Slowitt'*),
Who looking much worried said 'Blaithwaite,'
My wireless set
Won't Manchester get,
So I think in the dust-bin I'll thraithwaite.'"

What do *you* think about it?

SURPRISING LICENCE FIGURES

ALTHOUGH we all know the total of B.B.C. licences has now exceeded the three-million mark, very little has been said of the rate of increase; it is rather surprising. Latest figures show that the present rate of increase is higher now than it has been for years. Additions to the present total are being made at the rate of one thousand a day. As the B.B.C. reckons five listeners to every licence holder, its audience is increasing at the enormous rate of five thousand a day!

NOT YET SATISFIED

"THIS does not mean that we are satisfied with the licence figures," a B.B.C. official stated. "Any talk of saturation point is premature until every home in the country has a wireless set—and, of course, a wireless licence." It is interesting to speculate on the reasons for this big licence increase. Perhaps the high-power stations being erected under the Regional scheme are partly responsible. But we imagine that there are other reasons, such as the increase in high-power stations abroad and in the lower cost of wireless apparatus.

WAS IT A LEG-PULL?

DID you notice in a "Diversions" that item which was introduced as a matter of "extreme scientific interest"? In all seriousness Gardiff said that they were about to broadcast the sound of an earthworm calling its mate! It sounded suspiciously like the notes of a saxophone meandering up and down the scale. Bearing in mind the preceding and following items on this programme it would be interesting to know what was behind this earthworm broadcast, and if it *was* a leg pull, well . . . !

NEXT WEEK:—

ANOTHER BUMPER NUMBER!

The first and second Special Show Numbers of AMATEUR WIRELESS have beaten all records. Next week there will be another bumper number. Special articles include:

"Thermion" looks Back at the Show.

More About the "Arrow Two."

A Novel Speaker Idea.

USUAL PRICE, 3d. *MAKE SURE OF YOUR COPY.*

REAL PURITY

MR. WHITAKER-WILSON, the well-known musician who reviews the gramophone records in the *Wireless Magazine*, has joined the ranks of real musical men who now believe that true tone is to be had on the wireless. The other day he was listening to reproduction in the "A.W." Laboratory, without knowing the programme. A solo violinist was heard, and Mr. Whitaker-Wilson started. "Why," he said, "that's Isolde Menges. I know her tone and I know her playing!" She was playing an unaccompanied Bach sonata, and so there was a good opportunity to hear the solo instrument.

ON THE MAINS

ON referring to the programmes he found he was right. The set was an "A.W." one, the "No-Battery Gramoradio Two," and that is an answer to heretics who still adhere to the idea that distortion and mains interfering must be noticed in an all-electric set. Many gramophones would not make true tone so obvious.

A 50-kw. RADIO PARIS?

WE learn that in the near future it is probable that Radio Paris, the well-known French long-wave broadcasting station, will increase its power to 50 kw. Already this station is a serious rival to Daventry; with increased power it may conceivably swamp Daventry, so far as southern listeners are concerned.

THE HOME OF "THE SHOW"

A new view of the New Hall at Olympia, with the futuristic Empire Hall in the background. The Radio Exhibition is larger than ever this year and occupies three floors

NEWS · & · GOSSIP · OF THE · WEEK —*Continued*

CHAOS ON SUNDAY

WE can imagine what might happen on a Sunday evening; our Daventry would be ambling through its religious duties when dance music from Radio Paris, sponsored by a British firm anxious to advertise its wares, would burst through, completely submerging our 25-kw. Daventry. Not a pleasant prospect—even to those who want brighter Sunday programmes!

WHY R.M.A. PAYS B.B.C.

A RECENT protest against the financial arrangements between the Radio Manufacturers' Association and the B.B.C. in connection with their stand at Olympia deserves some comment. There is really nothing unfair in the B.B.C. being paid by the R.M.A. The B.B.C. has taken on the responsibility, at the request of the R.M.A., for the whole of the loud-speaking equipment of the various stands. It would obviously be unfair to expect listeners, through the B.B.C., to pay for this service to manufacturers exhibiting at Olympia.

TELEVISION

THE announcement in the newspapers that Television, Ltd., with which company is associated the Baird system of television, is to be voluntarily wound-up may easily be misinterpreted. Readers will remember that Television, Ltd., was formed in June, 1925, as a small private company to develop Baird's television inventions, and in due course it sold most of its rights to a new public company, Baird Television Development Co., Ltd., and later the remainder of its rights to a second public company, Baird International Television, Ltd. Recently these two public companies have amalgamated into one under the title of Baird Television, Ltd., the private company (Television, Ltd.) continuing in existence merely as a holder of shares in the one public company. We are now informed that, there being no longer any need for its continued existence as a separate entity, it is being voluntarily wound-up. The public company, Baird Television, Ltd., is not in any way affected.

A lively "snap" of the Ridgeway Parade, which broadcast last Saturday. These costumes are worn before the microphone to create the right "atmosphere"

The B.B.C.'s Chairman, the Hon. J. H. Whitley, with Mrs. Whitley. He is shortly leaving for India on Indian Labour Commission affairs

EMPIRE STILL WAITING

"THERE is no hitch in negotiations between the Colonial Office and the B.B.C.," said an official at Savoy Hill with reference to a question regarding the progress of the Empire broadcasting scheme. But, so far, no signal to go ahead has been given. Meanwhile, listeners all over the Empire are anxiously waiting to see whether the Colonial Office, acting upon the recommendations of the recent Colonial Conference, can persuade the Treasury to advance the ready money required to put the B.B.C.'s Empire broadcasting proposals into effect.

WHY QUANTOCK HILLS?

SOME surprise has been expressed by Welsh listeners that the proposed West of England station should be situated outside Cardiff. The Quantock Hill site, where B.B.C. engineers are now carrying out tests, is certainly a fair way from Cardiff. But that is one of the chief requirements of a regional centre; its powerful transmitters must be located some distance away from the centre of the proposed service area, otherwise selectivity troubles would be very difficult to overcome. It is for this reason that the proposed Falkirk site for the Scottish Regional station is some twenty-five miles from Edinburgh and Glasgow.

B.B.C. SYMPHONY CONCERTS

THREE world-famous artistes will face the microphone for the first time when they appear at the B.B.C. Symphony Concerts during the coming season. They are Alfred Cortot, the famous pianist; Adolf Busch, the brilliant violinist; and Pablo Casals, one of the world's greatest 'cellists. The series of concerts includes many other artistes of international reputation, and the soloist at the first concert will be Guilhermina Suggia. The latest additions to the list of artistes are Elisabeth Schumann, well known to Covent Garden audiences, and Fritz Wolff.

NEW STUDIOS

GREAT attention is being paid by the B.B.C. to the decoration of the new studios at the Edinburgh station. A layer of felt, 1 in. thick, is being covered with fabrics which give the appearance of a rich wall-paper. For the large studio a deep golden wool fabric has been selected, while the second studio, which is about twice the size of a large drawing-room, will be decorated with a damask of green and silver. The third studio, a small room to be used for talks, will have modern hand-woven tapestry.

The "A.W." EXHIBITION 3

BUILDING AND OPERATING THE THREE-VALVE RECEIVER DESCRIBED IN LAST WEEK'S ISSUE

HERE is our response to the call for a really simple set.

At Olympia this year you will find many complicated sets and radio-gramophones, and yet when it comes down to actual facts you will find that this complicatedness is often more assumed than real.

It is of no use having a complicated receiver if it does not do any more than would a simpler set, and in this AMATEUR WIRELESS receiver for the Exhibition the Technical Staff has endeavoured to produce a simple set having only three valves which really will give good results and, at the same time, will have something of the refinement possessed by expensive radio-gramophones.

Volume Control

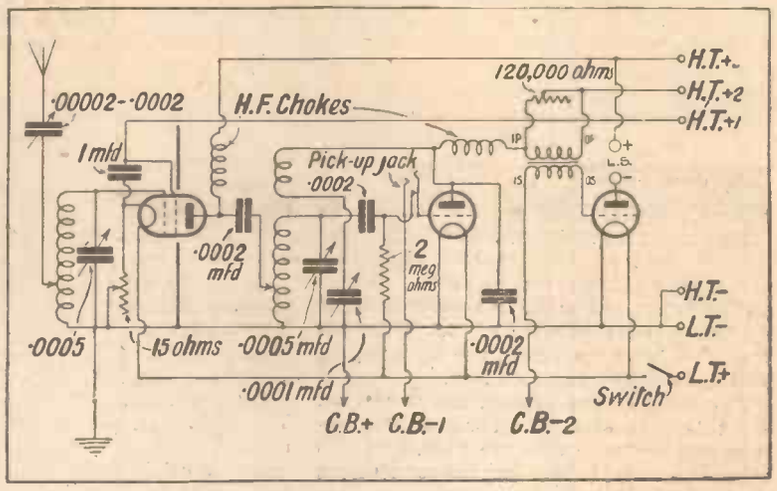
For instance, in this set you can use a gramophone pick-up and so get electric reproduction of records; and you can control volume with a handy knob on the panel just the same way and just as efficiently as you can with a very costly gramo-radio outfit.

Last week preliminary details were given of this set, and if you intend building it or modifying your present receiver to this design, then you should get last week's issue and make sure of the preliminary details. Here we give particulars of the constructional work.

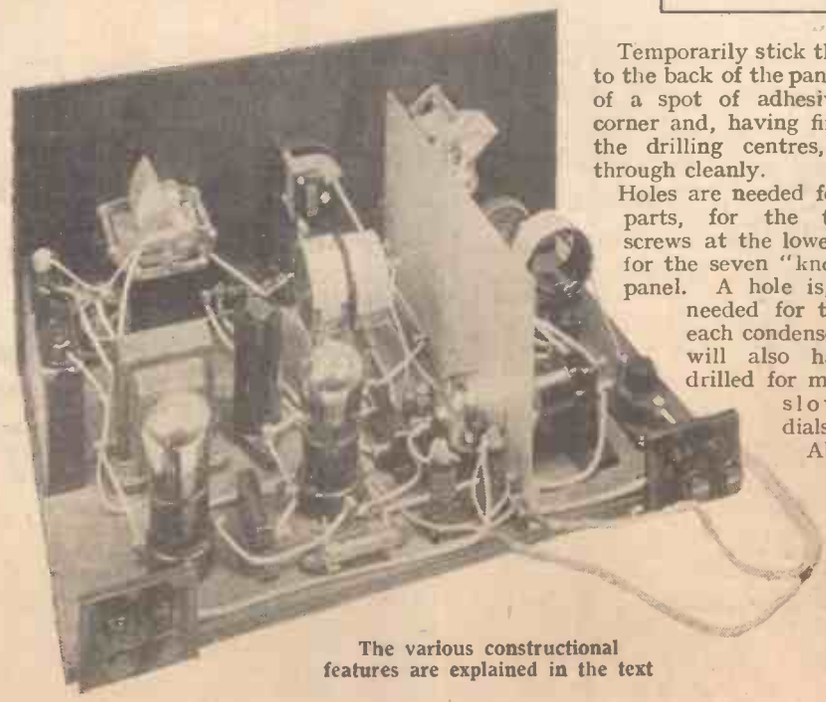
To assist constructors a full-size blueprint has been prepared and is available, price 1s., from the Blueprint Department, AMATEUR WIRELESS, 58-61 Fetter Lane, London, E.C.4. This, with the photographs shown last week, will enable constructors to get most of the work done without difficulty. Any points that call for special notice are mentioned in the following notes.

In panel on the next page will be seen a list of parts that are needed. As was explained last week, it is our policy to give alternatives to the original parts specified wherever possible, so that if you have a similar part on hand it can be used in the constructional work. But please do not deviate from the parts specified or from alternatives.

Many radio dealers will be prepared to drill the panel for you, provided you purchase from them the complete set of parts needed. In any case the job of drilling the panel is quite simple when you have the full-size blueprint.



The circuit of the "Exhibition 3." The actual wiring diagram was given last week



The various constructional features are explained in the text

Temporarily stick the blueprint to the back of the panel by means of a spot of adhesive at each corner and, having first punched the drilling centres, drill them through cleanly.

Holes are needed for the panel parts, for the three wood screws at the lower edge, and for the seven "knobs" on the panel. A hole is, of course, needed for the shaft of each condenser and holes will also have to be drilled for mounting the slow-motion dials.

All the other panel parts, the reaction condenser, filament rheostat, volume control, low-tension switch, and gramo-radio jack are all of the one-hole fixing variety. It is advisable not to mount any of the parts until the panel is fixed at right angles to the baseboard by means of the panel brackets and wood screws.

The layout of this set is on generous lines, so that you can safely mount all the parts on the panel and screw on the parts to the baseboard before any of the wiring is started. The two terminal strips can be cut from small pieces of ebonite, or they can be purchased complete if desired.

You should make sure that you get the spacing of all the parts on the baseboard quite correct, and the easiest way to do this is to place the blueprint on the board and punch through the screw holes. Then it is only a matter of five minutes or so to get all the parts properly secured in their places.

Make sure that you get the valve holders the right way round, for the orderliness and the wiring depend upon having the grid and anode terminals in the right positions. The L.F. transformer should be mounted with the terminals G and G.B. facing towards the rear of the baseboard.

The screen is best purchased ready cut and drilled, and it is simple to attach to the baseboard by three wood screws. Two terminals on the screen are used for making negative and earthing connections, and the use of the screen in this way as part of a common circuit greatly simplifies the wiring.

Wiring

If you prefer square wiring, then you can use rigid insulated wiring, such as Glazite, but in the original set we made a point of having everything as simple as possible, and the simple point-to-point wiring scheme was adopted.

With this you use bare wire, cut it to the length required for each connection, and slip it through pieces of Systoflex tubing. This material can be obtained from any

(*Continued at foot of next page*)

For the Newcomer to Wireless: ABOUT VALVES

EVERY manufacturer seems to make a variety of valves for two, four and six volts; I wonder if you would explain the reason for this.

Until only a few years ago there was but one type of valve available. This was called the general-purpose valve and as its name shows it had to do duty for every part of the set.

Well, why shouldn't we use the same kind of valve throughout?

For very much the same reason that we don't go fishing in dancing pumps, or have hobnails in our bedroom slippers! You will remember that we saw that the wireless set could be divided into three parts.

You mean high-frequency amplifiers, the detector and the note magnifiers?

Exactly. Now as we have seen each part of the set has a particular purpose to perform. The high-frequency circuits deal with tiny impulses, the detector has to convert high-frequencies into low, whilst the low-frequency circuits deal with quite big impulses and supply the output from the set to the loud-speaker.

Yes, I follow that.

If then we want to get real efficiency from the wireless set it pays to use in its different parts valves designed for these special purposes.

I see on looking through this catalogue that you can divide valves—leaving out screen-grids and so on—into three classes, which correspond with what you have just said. What are the main features of each?

In a high-frequency valve we want as much magnification as we can reasonably obtain, and quite a big figure is possible for valves that have to deal with small impulses. The detector is a different problem altogether, though many high-frequency valves work very well indeed in this position. Nowadays we have special detector valves which allow just that last ounce of efficiency to be obtained. I won't bore you with the technical details, but a special detector valve means greater sensitiveness, bigger signal strength and usually smoother reaction control.

What about the low-frequency valve?

Here a very big magnification is not possible in the valve itself because this cannot be combined with the ability to handle large impulses without distortion. Those which reach the output valve may be very big indeed and here we require what is known as power valve or super-power valve. The names are rather misleading, for they do not give bigger magnification than other valves. Actually, in fact, they give less, but they can handle big impulses without being overloaded. If you were to put a general-purpose valve into the last holder of a big set it could not deal properly with the impulses that reach it. It would be overloaded and the results from the loud-speaker would be horrible.

"THE 'A.W.' EXHIBITION 3"

(*Continued from preceding page*)

radio dealer, and although it is not the tidiest method of wiring, it is certainly the simplest and most direct and, of course, there is no need for soldering. This undoubtedly will make the point-to-point system popular with many set constructors who, however simple the soldering is, still fight shy of using an iron.

For some of the connections in the set short lengths of rubber-covered flex terminating in spade tags are used, and this wire is also used for making the connections to the batteries.

As the blueprint and photographs show, the battery leads are grouped in two sections, the two low-tension wires being plaited together and the four high-tension wires being similarly grouped.

One of these wires is the H.T. negative lead, and the other tappings are for the screen-grid and anode circuits. The grid-bias battery is, of course, held in its own clips on the baseboard.

The wiring of the gramo-radio jack is quite simple. The single leaf connection is taken to a wander plug, which goes in the 1½- or 3-volt tapping of the grid-bias battery. The top leaf is connected to the grid of the detector valve and the lower leaf is taken to the grid condenser.

When all the wiring is complete, it is really a very wise plan to make a careful check, for this prevents the possibility of short circuits, run-down batteries, and burnt-out valves.

Valves must be chosen carefully. Suitable valves to use in the screen-grid high-frequency stage are the Cossor 215SG, Marconi S215, Osram S215, Six-Sixty 220SG, Mullard PM12, Mazda 215SG, Lissen SG215, Dario SG, and Fotos C150.

The detector valve can be chosen from the following: Cossor 210HF, Dario Univ., Marconi HL210, Osram HL210, Six-Sixty 210HF, Mullard PM1HF, Mazda HL210, Lissen HL210, Fotos BA9, P.R. PR3LF, Triotron HD2.

The following 2-volt power valves can be used: Cossor P2, Dario SP, Marconi P2, Osram P2, Six-Sixty 220P, Mullard PM252, Mazda P220, Lissen P220, Fotos BD9, Tungsram P215, P.R. PR120.

All the foregoing valves are 2-volters. The equivalent 4- or 6-volt valves may be used.

In the original set Atlas coils have been used, four double-tapped coils (two 200's and two 60's), and two plain coils (Nos. 60 and 100) being used to cover the necessary wavelength ranges.

The double-tapped coils are used in the H.F. (single socket) and detector (socket nearest screen) positions, the plain 60 and 100 coils being used in the reaction socket for medium- and long-wave reaction respectively.

The two tuning condensers move very nearly in step, except at the extreme ends of the scales. Don't overlook the aerial pre-set condenser.

Let us know of the results you get. The Technical Staff is very proud of its latest "baby."

COMPONENTS FOR THE "'A.W.' EXHIBITION 3"

Panel, 16 in. by 8 in. by ¼ in. (Becol, Lissen, Trolitax, Resiston).
15-ohm panel-mounting rheostat (Lissen, Igranic, Varley, Wearite, R.I.).
Pick-up Jack (Lotus, type No. 2, Igranic).
Plug (Lotus, Igranic).
120,000-ohm variable resistance (Regentone, Atlas, Lissen, R.I.).
Two .0005-mfd. variable condensers (J.B., Lissen, Dubilier, Lotus, Burton, Formo, Polar, Ready Radio).
.0001-mfd. reaction condenser (Bulgin, J. B., Lissen, Dubilier, Lotus, Telsen, Burton, Formo.)
On-off switch (Junit, Lotus, Bulgin, Trix, Lissen).
Single coil-holder (Lotus, Lissen).
Double coil-holder (Wearite).
Two valve holders (Burton, Lissen, Lotus, Telsen, Formo, Brownie, W.B., Junit).
Horizontal S.G. valve-holder (H. & B., Parex, Junit, W.B.).
High-frequency choke (Watmel D.X.3, Lissen, Varley, Telsen, Lewcos, Sovereign, Tunewell, Igranic, Bulgin, R.I., Ready Radio).
High-frequency choke (Lissen, Varley, Telsen, Lewcos, Sovereign, Tunewell, Igranic, Bulgin, R.I., Ready Radio).
Three .0002-mfd. fixed condensers (Lissen, T.C.C., Dubilier, Atlas New Type, Graham-Farish, Watmel).
2-megohm grid leak (Lissen, Ediswan, Dubilier, Graham-Farish, Watmel).
Grid-leak holder (Lissen, Bulgin, Dubilier).
Low-frequency transformer 5-1 (Telsen Radiogrand, Lissen, Ferranti, Igranic, Varley, R.I., Lewcos).
1-mfd. fixed condenser (Dubilier, Lissen, T.C.C., Hydra).
Two terminal blocks (Junit, Lissen).
Aluminium screen (Ready Radio, Wearite, H. and B., Parex).
Four terminals marked: L.S.—, L.S.+, A, E (Belling-Lee type B, Clix, Eelex, Igranic).
Pre-set condenser, maximum capacity .0002 (Lewcos, Ormond, Lissen, Formo, Sovereign).
Two vernier dials (Igranic Major, Brownie, Formo).
Seven wander plugs marked: H.T.—, H.T.+1, H.T.+2, H.T.+3, G.B.+, G.B.—1, G.B.—2 (Belling-Lee, Clix, Eelex, Igranic).
Two spade tags marked: L.T.+, L.T.— (Belling-Lee, Clix, Eelex, Igranic).
Four double tapped coils, 2-200's, 2-60's (Atlas, Tunewell, Lissen, Igranic, Lewcos).
Plug-in coils Nos. 60 and 100 (Atlas, Tunewell, Lissen, Igranic, Lewcos).
Length tinned copper wire for wiring (Lewcos).
Rubber covered flex (Lewcoflex).
Cabinet and baseboard (Clarion).
Panel Brackets (Ready Radio, Bulgin, Cameo).
Grid-bias battery clip (Bulgin).
Lengths of Systoflex sleeving.

ANNOUNCERS TELL THEIR STORIES

DR. ERNST OF THE WESTDEUTSCHER RUNDFUNK ON—

THOSE FOOTBALL BROADCASTS

Busy work at the goal! While the game is going on, announcers give a running commentary through the portable microphone

I HAVE always been interested in finding out, in connection with broadcasts outside the studio, not only what effect the actual appearance of a hitherto anonymous announcer had upon listeners, but also what manner of man the imagination of the public had built round an impersonal voice. I have found that voice alone is no reliable guide at all to the personality of its speaker.

A strange microphone visit, when a broadcast was given from the depths of a coal-mine

It is desirable that every studio should employ a number of announcers, if only because the diversity of the programmes calls for an equal diversity of suitable voices. Would it not be queer if the voice which broadcasts the news in dry, authoritative phrases were heard again during the course of the dance music programme? Or, again, how would it strike you if the voice which had learnedly discussed Beethoven with you were the same which reads out the Stock Exchange reports?

Every announcer should, to some extent, be protean, but he should certainly not be used as a kind of Jack-of-all-trades. The case is somewhat analogous to that of the stage, where we certainly do not wish the serious and dignified classical singer to reappear later in the evening as an exponent of syncopation. Such an artiste would lose all touch with his audience.

This question of "touch" is the very essence of the announcer's job. There are some men who, in spite of all their culture and goodwill, act as a cold douche upon their hearers whenever they speak. Others are the darlings of the public for the sake of some indefinable gift which brings their personality vividly home to the public.

There are others, again, who cultivate the "beautiful voice" so sedulously and fall such complete victims to their own charm, that in the end they are worshipped by the flappers—if by no one else.

There is one somewhat sobering fact which an announcer should never forget: he is, to some extent, a necessary evil! There are many announcers who find it difficult to say "good night" to their hearers once only or without exaggerated unction. On the other hand, there are some so poor in vocabulary, that they repeat themselves like gramophone records. The happy medium is by no means easy to strike, and it is true to say that a good announcer is born, and cannot be trained.

The five and a half years during which I have been connected with the Westdeutscher Rundfunk have been full of interest, and have not lacked situations, especially in commenting upon events outside the studio. One peculiar fact is that, in spite of all experience, a moment of acute stage fright still precedes the switching in of the "mike." As soon as a couple of words have been spoken, when one has, so to speak, got into "second gear," all signs of nervousness disappear. In effect it feels like the frantic mental search for the opening sentence to a newspaper "leader."

Lights Out!

What would *you* do, for instance, if the lights went out suddenly in the middle of the Stock Exchange report? On one occasion I managed fairly well for four minutes with a box of matches! The activities of the Stock Exchange for that day came to an end with the last match!

Two broadcasts of sports' events remain particularly vivid to me. The first was the maiden European football broadcast from Münster, in 1925, and the second a similar event from Aix-la-Chapelle in 1929.

I naturally felt somewhat nervous on the former occasion, as it was given to me to be the first to comment on a "footer" match by radio and I had to "create" the part. Of course, everything went wrong, as is nearly always the case when very special

(*Continued at foot of next page*)

Here is the portable microphone used in outside broadcasts—in this instance at the start of a balloon race

NEW RECORDS FOR THE RADIO-GRAMOPHONE

THE standard of recording of the best of modern records is so high that it is difficult to visualise any further great advances unless a new material for the discs is doveloped. This, possibly, would enable a truer bass tone to be recorded without excessive wear taking place. On tones, purely and simply, modern recording is absolutely efficient. In the recording of transients and other complex sounds improvement is still possible.

The cheaper priced records are steadily progressing towards an excellent standard. Two of the best of recent issues that have come to my notice are "Wotan's Farewell," *The Valkyrie* (Wagner), sung by Horace Stevens (Decca K527-8), and Saint-Saëns' Concerto in G Minor, played by Reginald Paul and Metropolitan Symphony Orchestra (Broadcast Twelve 5173-5). The first-named records give a real Wagnerian impression as an orchestra of about seventy-eight, including four double-basses, three trombones, tuba, and full percussion was used for the recording. The reproduction of this bass and Horace Stevens's clear and understandable singing label this record as absolutely first-class.

A Good Piano Record

The Saint-Saëns' Concerto is a further example of the Vocalion Co.'s excellent recording of the piano. Their earlier success with a Tchaikovsky concerto, played by Maurice Cole, will be remembered. The full beauty of the Saint-Saëns' work is heard in the second movement on record No. 5174. In this the piano has some delightful passages alternating with orchestral interpolations of truly dynamic intensity. The recording throughout is admirable.

Tosti's "Good-bye," sung daintily by Betsy de la Porte (Broadcast 5177), is rather refreshing since the song is now not quite so hackneyed as it was. The "turn" of the final "Good-bye" of the chorus is delightfully phrased. An earlier ballad record which should not be missed is Landon Ronald's "O Lovely Night," sung as a duet by the same singer with Guy Marshall (Broadcast 5150). Other popular records in the Broadcast list are "Cheery Song Memories" (584); "The Post Horn Galop" (590), by the Life Guards Band; and "Sans Facon March" (591), an accordion solo by Emile Charlier. The post-horn solos on 590 came out with startling clarity on my loud-speaker, as they seem to stand out well.

Reproduction of Dancing Sounds

Miscellaneous recorded noises are always interesting. Perhaps in no other way do various equipments show up their individual peculiarities as in the manner in which the extremes of the frequency range are dealt with. On "You know what I'll do," played by Spike Hughes and his Three Blind Mice (Decca F1856), the sounds of the dancing of Philip Buchel have been recorded. The patter of shoes on a dance floor must be low in frequency, and, considering the necessary limitations of modern recording, the sound reproduces surprisingly well. Messrs. Decca state that the sound is genuine dancing and that no faking was done.—A. C. McDONALD.

"ANNOUNCERS TELL THEIR STORIES"

(*Continued from preceding page*)

precautions are taken against a breakdown. The whole of the previous week we had selected and tested the best phone lines to the ground but, just before the match, the microphone went *phut* and refused to be

On some occasions the ordinary studio microphone is taken out, in its insulated supporting ring, for sports broadcasts

coaxed into working by the assembled perspiring experts.

In the end I had to use an ordinary telephone set, and my style was badly cramped by the fact that I had to talk almost in a whisper, for fear of "blasting" the phone. But, somehow, it worked.

Four years after, at Aix-la-Chapelle, it did not work. I spoke to the enthusiastic football fans of Germany for twenty-two minutes, but when I got home I was mortified to learn that not a word had come through. Our two telephone lines had been broken long before the start of the match by the pressure of the crowd.

My "pilgrimages" with the microphone to the hives of industry in Rhineland and Westphalia revive memories. I shall long remember the broadcast from the depths of a coal mine, where, sitting between the seams, on the coal heaps, we placed our "mike" close to the winding engine amidst a crowd of coal-begrimed hewers. Then, again, we once placed a microphone at the glowing mouth of the Bessemer steel furnace.

On two occasions we broadcast impressions of the rejoicings of thousands of people when the bells of Treves and of Aix-la-Chapelle proclaimed the end of the long period of Allied occupation. I seem still to hear the mighty paeon of 50,000 voices raised in "Our Lord, be praised."

One of my most peculiar experiences was, after five and a half years of work as an announcer, to hear my own voice! This happened in connection with the Davis Cup in London, when a part of my comments was recorded by a gramophone concern. I must say that I was surprised and a bit disappointed.

I am not sure that I could stand hearing my own voice in this way every day!

Germany is keen on "industrial" broadcasts. Here a microphone tour of a cotton mill is being made

On Your Wavelength!

A WONDERFUL SHOW

EVERY year that I visit the Exhibition—and I usually turn up early on the first day and go on doing so until they push me out on the final night—I find it more and more entrancing. My only regret when I enter, whilst I am engaged in looking round, and when I leave is that I am not a millionaire. One of the most encouraging things about wireless is that every exhibition we have had has been the best show yet. The wireless trade is nothing if not progressive, and each year it makes for distinct steps in a forward direction. This year there is nothing startling. I mean, we haven't got a valve with seventeen grids or a loud-speaker which translates Czecho-Slovakian into English, or anything of that kind. But you cannot visit a stand without being struck by the wonderful progress that has been and is still being made in the design and manufacture of components. The stuff they are turning out now is *good*.

A GOOD THING

I SHALL be dealing at length in the next issue with my impressions of the Exhibition, but I would like just to mention one or two things that have struck me during its opening days. I am particularly impressed by the attention that makers have given to the design of output transformers and to output filter circuits. In the past one has too often seen a thoroughly good set and a thoroughly good loud-speaker given no fair chance of showing what they could do, simply because one was yoked straight to the other without any proper output device. Output transformers and filter circuits of good design make it possible for the good set and the good loud-speaker to give the listener their very best.

OTHER POINTS

AND there is a component in which I take a particular interest because I myself suggested it (though it was then turned down in no uncertain manner) two or three years ago. This is an L.F. auto-transformer with a high step-up ratio intended specially for use in resistance-feed circuits. There is, I believe, a very big future for components of this kind, for they can be made much more cheaply than transformers with separate windings and you can obtain a very high overall inductance, since all available space can be devoted to the one winding. I am glad to see, too, the really sound variable condenser with slow-motion arrangements incorporated, the whole being produced at extraordinarily low prices. Many of the new loud-speakers impress me very much, and there is no question that we have now definitely arrived at the era of quality. The public knows that every sound in the broadcasting studio is being sent out into the ether, and it now demands receiving apparatus that will reproduce these sounds in a living-room.

LOOK OUT FOR HIM

THERE is a newcomer on the long waves just now who is well worth the attention of listeners. Perhaps, though, I should not call him a newcomer, for actually the station has been receivable in some kind of way for a long while past. The transmission in question is Warsaw, who works on a wavelength of 1,411 metres and is to be found at condenser settings rather above midway between those required for Motala and the Eiffel Tower. On recent evenings Warsaw has been coming in with astonishing strength and beautiful quality. If you haven't heard him before, I strongly recommend you to go for him now. The long waves are nearly always worth while, for at any time of the day or night and at any time of the year you can be certain of picking up a good many stations. Kalundborg is, I suppose, one of the best and most reliable transmissions that we have from the Continent, and on the same band there are the two Dutch stations Hilversum and Huizen, Motala, the Eiffel Tower, Zeesen, and Radio Paris. Except when atmospherics are bad, the long waves are a happy hunting-ground for the man who wants genuine alternatives for his local station.

UP AND UP

THE latest Continental stations lists showing output ratings make very interesting reading, though probably few people had realised how many giants there are nowadays. Starting at the top of the list, we have the Finnish station at Lahti with 54 kilowatts. This station is fairly well heard in the north, though, curiously enough, he is seldom very well received in the south of England. Radio-Paris is now up to 17 kilowatts, whilst Königswusterhausen boasts 35 kilowatts—the same power as 5XX. Other long-wave stations of the super-power type are Moscow Old Komintern, 30 kilowatts; the Eiffel Tower, 15 kilowatts; Warsaw, 14 kilowatts; Motala, 40 kilowatts; Kalundborg, 10 kilowatts; and Moscow Popoff, 40 kilowatts.

THE MEDIUM BAND

ON the medium waves, Budapest now has an output rating of 23 kilowatts; Langenberg, 17 kilowatts; Rome, 75 kilowatts; Stockholm, 75 kilowatts; Kattowitz, 16 kilowatts; Bucharest, 16 kilowatts; Gothenburg, 15 kilowatts; Vibourge, 15 kilowatts; Moravaka-Ostrava, 11 kilowatts; Hörby, 15 kilowatts; and Helsingfors, 15 kilowatts. With these figures in view, one can safely prophesy a wonderful autumn and winter ahead. As a matter of fact, conditions are already extraordinarily good for the time of year, and I have a friend (*not* a howler) who has already logged nearly thirty stations with nothing more ambitious than a detector valve followed by a triode note-magnifier. All these were received on the loud-speaker—they had to be, because he hasn't any telephones.

A SHORT-WAVE BIG 'UN

SHORT-WAVE work has been rather under a cloud (or should we say under a sunspot?) for some little time now, but there are indications that an improvement all round is setting in. I am very glad to hear that WLW, one of America's 50-kilowatt giants, is applying for an increase in the output power of its short-wave "pup." WLW is relayed regularly by W8XAL, which until recently has been working with quite modest power. Nevertheless, I have frequently heard this station, and heard it quite well. Now I hear, direct from WLW, that application has been made for permission to increase the rating of W8XAL to 10,000 watts, and they have every hope that this will be granted. If they do so the station should be heard very well indeed in this country. It is not, perhaps, generally known that W2XAF and W2XAD have for some time past been using their full power only on special occasions. Whenever they do use 10 kilowatts or so, which is their maximum, there are crops of reports from all over the country from listeners who have had excellent reception.

WHERE DID THAT ONE COME FROM?

THERE was a very interesting discussion during the recent meeting of the British Association at Bristol on the subject of atmospherics. After a paper by Mr. R. Watson Watt, various investigators put forward their views regarding the origin of atmospherics. Mr. Watson Watt and the majority of British radio men think that all of them can be put down to electrical disturbances in our own atmosphere. It was shown some time ago that the number of atmospherics recorded in twenty-four hours corresponds very nearly with the estimated number of lightning flashes in that period for the whole world. Foreign scientists, though, don't all hold the same views. One of them gave emphatic expression to the opinion that the great majority of atmospherics originate far outside our atmosphere and that their cause is solar rather than terrestrial. Meantime, what we most greatly need is some means of eliminating those beastly tearing and crashing sounds from our loud-speakers, and if any scientist will help us in this way he will earn the thanks of millions the world over.

A GLORIOUS FREAK

ONE does every now and then strike freak valves which differ in their characteristics very considerably from those published by their makers. And sometimes such valves are nothing short of remarkable. Some time ago I came across a medium-impedance valve which, owing probably to the presence of some kink or other in its curve, turned out to be the very best detector that I have ever yet come across. Unfortunately, it didn't last very long—the kink must have straightened out

On Your Wavelength! (continued)

or something of that kind! Recently another wonderful freak has come my way. This is a valve of the low-impedance super-power type which one would normally expect to pass a current of about 15 milliamperes with 150 volts on the plate and some 25 volts negative grid bias. Wanting rather powerful reproduction of a "Prom." the other night, I pulled out one of these valves from a batch and fitted it into the last holder. This particular valve had not previously been used. The milliammeter that I always keep wired in my common negative high-tension lead instantly flew into activity, its needle hitting the end stop with a bump. The H.T. and G.B. were as they should be, so I stuck in a milliammeter with a larger maximum reading.

LIKE THE REAL THING

TO my surprise, I found that the valve was passing more than double its normal current. Quickly I made a rough characteristic by taking readings with various G.B. voltages. It was a far, far finer thing than the published curves; the sort of characteristic, in fact, that one would expect to find for a valve with an anode current of 33 milliamps and 200 volts on the plate. The reproduction of the "Prom." was something to be remembered. Strangely enough, this miracle of efficiency happened on a night when I had asked some musical friends in to hear just what the wireless set could do. I was able to make my negative grid bias on the last valve something formidable and to reproduce a piano concerto at something like Queen's Hall strength without a sign of overloading. My friends went away marvelling and saying that they had no idea that any wireless set could be like that.

THE OTHER SIDE OF THE MEDAL

USUALLY, of course, it is just the other way round. You ask in somebody who is particularly interested in a topical talk and when you switch on your set speech, which has previously been crystal clear, is found to be as "woomfy" and as "boomy" as you can imagine. The set overloads, if you allow enough volume to come through to fill an ordinary room, and the accumulator runs out about ten minutes after you have switched on. If musical friends turn up, the loud-speaker insists on "zizzing" whenever one particular note occurs. Then the bass, of which you have previously been so proud, is conspicuous by its absence and when the violin man starts stunting on the E string nothing but a series of toneless squeaks is to be heard. You explain that the set has never done this kind of thing before and you catch them smiling at one another as much as to say: "That's what every wireless man tells us." Wireless is full of these little trials; but there are compensations.

THE QUEEREST CASE EVER

QUITE the most astonishing case of a breakdown in a wireless set has come my way during the past week. The set belongs to a beginner friend of mine who knows very little about electricity or wireless, but has, nevertheless, gumption enough not to do silly things. He 'phoned me the other day to ask if I would care to have a look at a rather strange mix-up. On going to the house, I found a small two-valve set of a perfectly straightforward kind installed on a low table under a window-sill. The aerial and earth leads come to a large double-pole change-over switch just inside the window, and from this wires about a foot long lead to the aerial and earth terminals. These wires were of heavy flex of first-rate quality, with an inner covering of cotton, a sheath of thick rubber (which was in excellent condition), and an outer covering of braided silk. A couple of days before he had moved the loud-speaker from its usual position, placing it temporarily at the other end of the set. Placed so, its leads lay upon the short aerial and earth wires from the switch. The loud-speaker leads—it was made up from a well-known unit—were of tinsel with three layers of cotton insulation. The high-tension battery was a 100-volt standard-capacity and the positive wander-plug was actually in the 90-volt socket.

STRANGER AND STRANGER

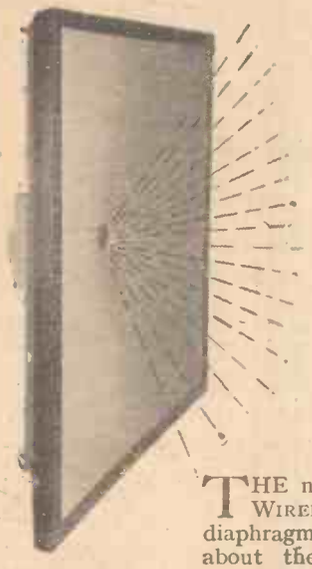
WHEN I saw the set its leads—or, rather, two of them—were in an almost incredible condition. The aerial wire had clearly been pretty nearly white hot, for all three layers of insulation had disappeared and the tinning had gone from the flex within. The bare portion was about 4 in long And now comes a very curious point. Between it and the spade tag attached to the aerial terminal was an inch of wire whose insulation was in perfect condition; yet the galalith (I think that is what it is) insulating sleeve of the spade tag attached to the aerial terminal was thoroughly charred and the metal of the spade itself was blackened. The loud-speaker leads—both of them—had all three layers of insulation burnt clean off for a length of about 18 in. The account of what had happened was this. My friend was awakened in the early morning by the housemaid, who urged him to come at once, as the wireless set was smoking and giving out sparks He flew to the scene, and had the sense to pull out the H.T. wander-plugs and disconnect the L.T. battery. The earthing switch was in the "safety" position.

HOW COULD IT HAPPEN?

IF you draw out the circuit of a straightforward two-valve set with aperiodic aerial coupling, and no output transformer or filter circuit, you will see that one of the loud-speaker leads is 90 volts positive to the aerial lead-in, which is connected to earth and L.T. negative *via* the aerial coil. So far, so good; but you are not going to tell me that any standard-capacity battery is capable of supplying the current necessary to bring big lengths of wire to white heat or that 90 volts is sufficient to pierce four layers of cotton insulation, one of rubber and one of braided silk. Subsequent tests show that the flex in question can easily carry 10 amperes of current without overheating. The particular low-resistance battery—the average of a dozen brand new ones of the standard-capacity size—shows that the maximum current on short-circuit is a little over 6 amperes, and this could, of course, be delivered only for a few moments. A super-capacity battery may produce as much as 15 amperes on short-circuit, but there is no standard-capacity battery in existence that will show more than 6 or 7, and the majority of makes "flash" a good deal less than this.

TESTING OUT

I HAD with me a set of instruments, and the first thing I did was to test out the condition of the battery. It had been in use for just over a week before the accident occurred, with an average of four hours a day. These batteries show a very high E.M.F. per cell when new, and the reading between the positive socket and the negative socket was still 90 volts. Clearly, therefore, it had not been under a load of several amperes for long. This surmise was proved to the hilt when I flashed the battery with an ammeter. It still showed nearly 2 amperes. Obviously, the current producing the smoke and the sparks discovered by the maid was supplied by the H.T. battery, but it is equally clear that that which burnt the leads so badly could not possibly have been. What was it? I will defer giving my explanation until next week, in the meantime readers might like to puzzle the problem out. THERMION.



THE PROPER WAY TO USE A SPEAKER

Some Useful Hints—with Special Reference to the New "A.W." Linen-diaphragm Speaker

THE new AMATEUR WIRELESS linen-diaphragm speaker is about the simplest thing that you could possibly make up in order to get good results. AMATEUR WIRELESS has been experimenting with linen-diaphragm speakers for about the past two years and, owing to the excellent designs which have been published, speakers of this type have become almost a standard of excellence in speaker reproduction and the term "linen-diaphragm" has become almost a household word.

Excellent Quality

A pleasant surprise is in store for those who have not yet tried out a linen speaker. The amount of bass that you can get from one of these, provided your set is tolerably efficient, is very remarkable, and compares with a moving coil. There is not that same tendency to woolliness, however, which some moving-coil speakers exhibit, particularly on speech; and, while linen speakers have plenty of bass, they are, at the same time, not deficient in the "highs."

The great advantage of a linen speaker is that it can be used with practically any type of unit; but, naturally, you must not expect to get good results unless a good unit is employed.

Many units—in fact, practically every unit on the market—has been tried by the AMATEUR WIRELESS Technical Staff, and it is rather distressing to see how a linen-diaphragm shows up the defects of a poor unit.

Another thing is that most people nowadays appear to want more volume than they previously needed, and modern sets can supply this. It is difficult to overload a linen speaker if a well-made unit is fitted, but with a poor unit it has no greater "factor of safety" than an ordinary cheap speaker of any type.

Different Units

In the course of tests with this new single diaphragm linen speaker, nine well-known units have been tried, these being Lissen, Blue Spot, Tunewell, Watmel, Triotron, Sheffield Magnet (Skylark), Ormond, and Brown "V." These have all been found to give good results.

Most of these units are very adaptable in fixing, although the actual fitting positions are not all the same and it is in the matter of fixing the unit to the diaphragm that so many people go wrong and, therefore, fail to get good linen-speaker results.

First, it is inadvisable to mount the unit or work the speaker until the diaphragm is quite tight. When the unit is mounted, it should be rigidly attached to the batten secured to the sub-frame of the speaker, and the driving rod should be exactly centralised with the cone washer in the diaphragm. The photograph of these nine units, given last week, shows how each is mounted to the batten.

It is essential that the driving rod should be exactly central with the cone washer, for if there is any side-strain on the rod the working of the unit may be upset and, in addition the diaphragm cannot vibrate freely. If the speaker tends to buzz when it is working, it is a likely sign that the unit is not properly mounted.

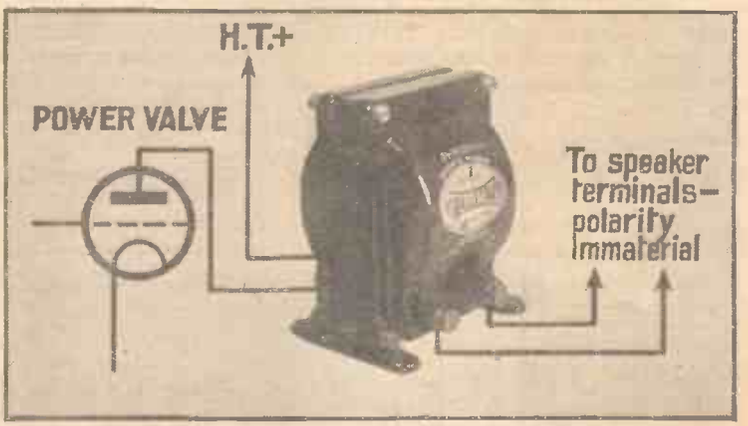
Of equal importance is the attachment of the driving rod to the cone washer, for if there is any looseness here an annoying rattle will be set up. Some cone washers have a very small and frail set-screw, which is hardly sufficient for the job—at least when it is used in conjunction with speakers so efficient as the new single-diaphragm linen jobs.

Most unit driving rods are threaded, and it is a good plan to secure the rod to the washer by means of small nuts, one on each side. As a further prevention of rattle, the centre of the washer may be plugged with Chatterton's compound when the rod has been pushed through, and when this dries it will make a firm joint.

Matched Output

The best results are hardly to be expected unless the unit matches up with the output stage, and a very good idea to overcome any troubles that may arise in this respect is to use a tapped output transformer.

The accompanying pictorial diagram here shows how easy it is to fit an output transformer to a set. An output choke filter circuit can be used instead if desired, but this is not so simple, because it means the employment of a choke and a coupling condenser, whereas an output transformer is complete in itself.



This picture shows how to connect an output transformer to the set to improve the performance of the speaker

DO YOU KNOW—

that if your present alternating-current eliminator—perhaps of the portable type—is not capable of providing sufficient high-tension to work the set, then another eliminator, or even a dry high-tension battery may be used? Do not connect the two in series, but connect negative to negative.

that one studio in the new Broadcasting House in Portland Place, London, is finished in the rough? The building looks like being complete by the end of 1931.

that the quickest way to upset the working of a compression-type variable resistance is to turn the knob firmly to the full-in position? Even the best resistances of this type are liable to be upset if the resistance unit inside is compressed too tightly.

PREVENTING FADING

ONE of the most effective remedies for fading is to use a carrier wave having a varying plane of polarisation. In one such system two horizontal short-wave aerials are arranged at right angles to each other, and are energised alternately, i.e., in rhythm with the low-frequency modulation. The modulating current is applied to two oscillator valves, arranged in push-pull, so that one aerial is excited during positive half-cycles, and the other during negative half-cycles. Using this method of transmission it is found that the strength of the received signals never drops below one-third the maximum. B. A. R.

Station WLW, Cincinnati, has asked the Federal Radio Commission for permission to build a new 10,000-watt auxiliary short-wave station, which it proposes to engage in international rebroadcasting, picking up programmes transmitted from foreign countries and rebroadcasting them.

THE BROWN REGIONAL TWO

SETS OF DISTINCTION

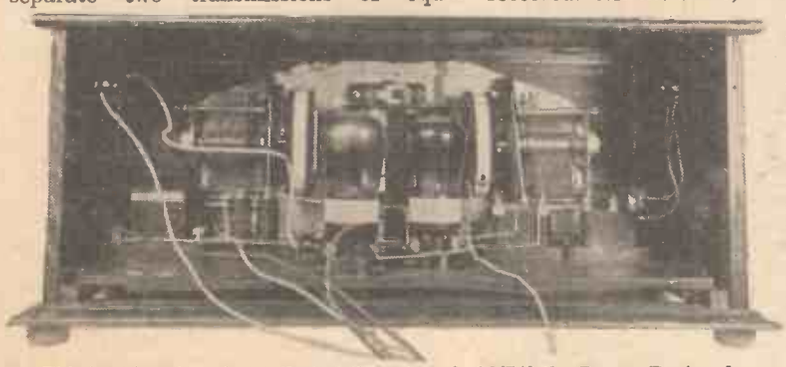
Specially designed for listeners living in regional areas, such as Brookmans Park and Daventry, this new two-valve Brown set provides the necessary selectivity without loss of volume

ALTHOUGH I frequently preach the gospel of bigger and better sets, I fully appreciate that we must have small sets also. For listeners of limited means, and for listeners wanting only local reception, a two-valve set, such as the new Brown model recently tested, admirably fills the bill.

With so many simple sets, owing to the limitation of the single-tuning circuit employed, selectivity is poor. No one can say that of the new Brown set, which is one of the most selective little sets I have ever tested.

A Regional Set

Its designation as a regional set is fully justified. In a regional set, some measure of selectivity is implied, since its job is to separate two transmissions of equal strength. In this sense a regional set is more [illegible] than what we used to call a local set, which had no need to be selective.



This interior view shows that at the price of £6/5/0 the Brown Regional Two represents excellent value

The Brown two-valver is for battery operation and thus appeals to that considerable proportion of listeners having no electric-light supply. In common with most two-valvers, the Brown set does not cost much to run. I found that, using the two Mullard valves specified, the total anode-current consumption was 8 milliamperes at 120 volts.

Naturally enough, the first valve is the detector and the second the power output, transformer-coupled to the detector. The power valve is a Mullard PM2, capable of giving good quality if the loud-speaker is effective.

That reminds me; the Brown Duckling loud-speaker, which usually costs £1 15s., can be purchased complete with the set for £7 10s., which means a saving of 10s. The Duckling is a good junior cone-type of loud-speaker, well suited to work with the Brown set.

A distinctive oval-shaped control panel created a favourable impression when I examined the cabinet, which is a compact oak one of dignified looks. On the panel are fitted the tuning and reaction dials, on-off switch, wave-range switch and volume control. For a two-valver, the Brown set has more controls than usual. The wave-range switch is not included in the battery switching, as is so often done these days.

We do not often see a volume control on a two-valver; most sets of this type rely on reaction to modify the strength of signals received. All the same, I think the Brown designers are to be thanked for their thoughtfulness. Even on a two-valve set, the local station is sometimes so strong that the volume needs reducing. This can be done much more satisfactorily by means of a volume control than by de-tuning.

Thumb-operated discs are employed, for [illegible] on the left and reaction on the right. They are clearly marked, as indeed are all the controls on the Brown set.

A Practical Test

On my test aerial, I had not the slightest trouble in bringing in the National 261-metre transmission, quite clear of the 356-metre Regional. The National station was strong at 25 degrees, as was the Regional station at 44 degrees. Quality in the reproduction of both these stations was pleasing, surprisingly so in view of the cheapness of the whole outfit.

Having fulfilled its function—to bring in the regional transmissions at good strength and free from mutual interference, the Brown set was not allowed to rest on its laurels. I made it bring in the Midland regional transmission, which it very creditably reproduced at good loud-speaker strength, the reading on the tuning dial being 70 degrees.

Two aerial terminals are fitted to the Brown set; one is for use where a longish aerial has been erected and the other for a short aerial. My aerial is about 70 ft. long and I do not think a shorter one would be advisable with this set, because the tuning coil has exceptionally selective properties. Besides, a very short aerial with a small set is never advisable. One throws away much energy that cannot be made up on the set owing to its comparatively limited amplification.

Simple Control

It does not take long to know the controls of the Brown set. The tuning is very easy; the slow-motion part of the dial works with useful precision. On the reaction control also the slow-motion effect was appreciated.

For Midland regional reception I had to use some reaction, but for the London Regional station no reaction was required. A few degrees of reaction helped to bring up the strength of the National to full volume.

The volume control was found necessary when receiving the London Regional. Although this control is, in fact, a filament rheostat in the detector circuit, I could detect no loss of quality when the volume was reduced.

Where the strength is not enough, owing to poor aerial conditions, or to the great distance of the nearest transmitter, I can endorse the maker's suggestion that a pentode valve be used in place of the power valve normally specified.

SET TESTER

Broadcasting station WOR, at Kearny, N.J., has a novel way of cleaning its transmitting aerial insulators. The engineers have evolved the idea of using a hydrogen balloon with brushes of long and flexible bristles fastened to top, bottom, and sides. By allowing the balloon to rise against the insulators and then moving it about, it was found possible to give them an adequate cleaning.

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A Weekly Programme Criticism—By SYDNEY A. MOSELEY.

Without Fear or Favour

"DIVERSIONS"

"PLUGGING"

THE NEW FILM CRITIC

A ONE-SIDED AFFAIR

"BEACHCOMBER"

JULIAN ROSE

SEVERAL readers of this page have taken advantage of the offer I made and have asked for auditions so that they might broadcast in the television programmes.

I am glad to say that all have been given a trial and a few given engagements.

◆ ◆ ◆

There is a feeling that the new series of "Diversions" has not come up to scratch. No need to particularise. Nevertheless, one must remember that in order to appreciate efforts of this sort you must give your imagination full spur. A diversion, for instance, in which you are taken into the bowels of the earth will sound unutterably tame unless you transport yourself in spirit to the coal mine. No use waiting for the mine to come to you; *you* must go to the coal mine in imagination.

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Regarding the matter of dance music, I should like to ask this question: Is the B.B.C. satisfied that the "plugging" scandal is at an end?

I am assured from a good source that it isn't; in fact, it is worse than ever. During the last few weeks I have been listening to more dance-music broadcasts by the many bands, and I could not help being struck by the fact that certain tunes—which shall be nameless so far as I am concerned—were repeated *ad nauseam*.

◆ ◆ ◆

Now, I will admit this. Many of these plugged songs and dances are good. They are catchy and even clever. But the point is *that a good many songs and dances of equal merit are frozen out* because certain bands will not play them unless they are paid—well, "bribed" is the real word.

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How can Mr. Roger Eckersley, who is responsible for the entertainment side of the programmes, checkmate these disgraceful methods? Admittedly it is difficult. But I will help him and the B.B.C. by this suggestion:

Let those publishers who really think that certain good numbers are being squeezed out submit them to Savoy Hill, where an impartial committee will decide on their merits. Broadcast bands would then *have* to play them by order of the B.B.C.

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The present system is as illogical as would be the case if the bands of actors themselves decided on what plays to produce. It is Mr. Gielgud and his confrères who decide what the players shall perform.

◆ ◆ ◆

I wish the new film critic, Mr. Birrell, every success in his new job. I haven't yet had the opportunity of listening to him, but will do so at the earliest moment.

The official attitude definitely challenges the film industry, which appears to have taken the appointment badly. While I applaud the stand taken by the B.B.C. on the grounds that this appointment was a matter of its own concern, I certainly think it a decided mistake to emphasise Mr. Birrell's parentage.

◆ ◆ ◆

Has he been appointed because his father happens to be a man of renown?

There is already far too much of this "son of his father" business at Savoy Hill. The fact that Jack Spratt is the son or nephew of Lord Spratt doesn't cut much ice with the post-war world in general; but it seems to make a lot of difference at Savoy Hill.

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Fleet Street had an attack of this form of snobbery for a while, and you saw the most appalling nonsense in some of the papers which catered for the Lower Ten by providing tripe by the Upper Ten. But that is all over now. May I hope that Savoy Hill—particularly during the regime of a Labour Government—will look to brains, and not blue blood?

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Here is an observation by a correspondent who signs himself "Radiofan":

"The type of turn which Rupert Harvey puts over is, I think, rather unfair to listeners. The fact that he uses diagrams means that (1) in order to appreciate his turn you must buy the official programme and (2) you must have it handy. When I listened to this turn I happened to possess the current programme and was able to follow the stunt; but friends who rely on the newspapers for their radio information tell me that they were greatly incensed at being, so to speak, left in the dark."

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I wonder how many people were really amused at "Beachcomber's" skit of a news bulletin? On reading this bulletin in a B.B.C. publication I thought it was very funny; but, to my mind, such humour as "Beachcomber's" has to be seen in black and white to be appreciated. When he read it out in his rather unattractive voice, the funny points slipped past and scarcely gave one a chance to appreciate their subtleties.

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Several correspondents have been complaining to me about our old friend Julian Rose. One suggests that he would be well advised "to give all his old gags a holiday and think out some new patter. Even when he strikes a new subject a lot of his well-worn stuff works its way in."

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The revival of *Ingredient X* was a welcome one. In my opinion, this is a play which ranks with the best broadcast efforts to date. It is a tribute to the study of broadcasting methods which L. du Garde Peach has undoubtedly made, and to the producing ability of Peter Creswell.

An impression of Standli, Edgar and Douglas

BROADCAST ARTISTES IN PICTURE

OLIVIA BURLEIGH.—This charming young actress singer, now in Philip Ridgeway's revues, is also well known on the operatic stage, especially to "Old Vic" audiences.

SAMUEL KUTCHER.—A distinguished violinist, Mr. Kutcher formed his own quartet and has given many recitals.

DOROTHY SILK.—Heard again recently in a promenade concert from Queen's Hall, Miss Silk has sung at most of the famous choral festivals throughout the country. She has made a cult of Bach's music and has "discovered" many unfamiliar arias.

BURTON HARPER.—A well-known provincial baritone, he has broadcast on many occasions. He has a wide range of tone and repertoire suitable for most programmes. He appeared in the Midland Regional programme of September 21.

FREDERICK THURSTON.—One of the best-known soloists of the clarinet, Mr. Thurston is attached to the B.B.C. Symphony Orchestra and special quartets for chamber music.

FREDERICK LAKE.—One of the early stars in broadcast programmes, this fine singer has figured prominently at Albert Hall and Queen's Hall concerts. In many of his recitals he has joined forces with Miss Constance Wentworth.

CORA ASTLE.—This clever young pianist was heard in a programme on September 17. A brilliant technique and excellent choice of work make her a favourite artiste.

BEN WILLIAMS.—Mr. Williams is a noted actor as well as singer, being a member of the Carl Rosa Opera Company. He was heard in the title role of "Faust" when this company first broadcast last year.

CONSTANCE WENTWORTH.—A well-known singer and actress, Miss Wentworth has often collaborated with Mr. Frederick Lake in duologues.

German Radio Compared With Ours

Noel Ashbridge, Chief Engineer of the B.B.C., gives some side-lights on—

In an exclusive interview with the "Amateur Wireless" Special Commissioner

AT Muhlacker, not far from Stuttgart, the German broadcasting authorities are erecting a new high-power station which will have a power of over sixty kilowatts. My first question to Mr. Ashbridge was whether he thought there was any chance of us being left behind in the race for power now going on among European broadcasters.

"Our British stations have been designed to work between 30 and 50 kilowatts. That power is, we consider, the most economical for the wavelengths used."

Asked to explain the meaning of economical power, Mr. Ashbridge said: "I mean it is no good pumping out power if it is not going to increase the non-fading service area. Fading of a station largely depends on its wavelength; that is why there is such a tremendous demand for long-wave stations, which provide a very great non-fading area of reception."

To recognise the truth of the Chief Engineer's statement one has only to remember how, outside the recognised service area of the National 261-metre transmitter, fading is quite pronounced, whereas the Daventry long-wave transmission on 1,554 metres is heard many hundreds of miles away without fading.

Power and Range

I inferred from Mr. Ashbridge's remarks that increasing the power above 50 kilowatts does not materially extend the non-fading range of a medium-wave station. We should all bear this fact in mind before hoping too much in the way of good reception from proposed high-power European stations.

"The Germans are going in for high-power stations situated outside the towns," went on the Chief Engineer.

"But you must always remember that they have only one station at each transmitting locality, whereas we are legislating for two."

How the German listeners get an alternative programme was then made clear.

"German sets are, on the whole, designed for a longer range than ours, so other stations can be heard. But they are very cheap and most of them are for A.C.-mains operation."

German Tendency

"From your visit to the German Radio Exhibition," I asked, "what would you say was the outstanding tendency?"

"Undoubtedly, the extraordinary preponderance of mains-operated sets. More sets of the long-distance type are shown, although there still appears to be quite a good market for local-station sets.

"The German Exhibition has a general presentation not unlike our own, but there is a bigger scope there for gramophone and television exhibits. One manufacturer surprised me by sticking to a set with neutralised high-frequency stages.

Mr. Noel Ashbridge, Chief Engineer of the B.B.C.

"I saw a considerable number of components designed to prevent reception being marred by domestic appliances working from the electric light. In this connection there seems to be a good deal of reception trouble from local electrically worked appliances. Chokes, condensers and filters of various kinds were very prominently displayed in a special section of the exhibition."

Portables in Germany

I wanted to know whether the English fad for portable sets had caught on in Germany. "So far as one could see at the German Exhibition, portables do not seem to be nearly so popular," said Mr. Ashbridge.

I suggested that this was probably due to the preponderance of mains-operated sets.

"Agreed; but so far as the general design of other sets is concerned, I think you can take it that the broad divisions are the same. There are, for example, radio gramophones and sets with enclosed loudspeakers and, of course, ordinary table sets."

Overlooking the grounds of the German Radio Exhibition is the nearly completed headquarters of the Berlin Reichs Rundfunk Geschellshaft. I naturally inquired as to how this new building compares with the B.B.C.'s Broadcasting House now being erected at Portland Place.

"One might say that the design of the new German broadcasting headquarters has been affected by the fact that the site is some distance from the centre of Berlin. For this reason there is more space available. But I noticed certain points of similarity. The main studios have been built in the 'core' of the building and the offices form a ring round them.

"There are not so many studios in the German headquarters as there will be at Broadcasting House, when it is completed in about a year's time. The outstanding difference between the German and British

(*Continued on page 412*)

THE HOW AND WHY OF RADIO

II—HOW TO TUNE THE SET

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

BECAUSE it was in the nature of an introduction, I was not able, in last week's article, to get down to the practical side of tuning. As I explained, tuning is the first idea to grasp in the "how and why" of radio.

There are always two ingredients in a tuning circuit. One is inductance and the other is capacity. Inductance is the property of a coil and capacity is the property of a condenser. A tuning circuit always employs a coil and a condenser.

From this week's illustration, the general form of a condenser can be seen. This component is designed so that one set of vanes interleaves the other set by a varying amount. The more the vanes overlap the greater is the capacity of the condenser; the less they overlap, the smaller the capacity. When we speak of a .0005-microfarad condenser, we mean one that has a *maximum* capacity of .0005 microfarad.

Tuning can be varied by altering the inductance of the coil or the capacity of the condenser. In practice, we usually alter the capacity and keep the inductance fixed, not because this procedure is the most efficient, but because it is mechanically the most simple.

When a transmitting station is allocated a certain wavelength, its tuning circuit must be adjusted to that wavelength by means of a coil and a condenser. The London Regional station, for example, has in its tuning circuit a certain value of capacity and inductance, which together produce the wavelength of 356 metres.

There is an important point to note here: the London Regional station's wavelength can be arrived at by dozens of different combinations of inductance and capacity. A small amount of inductance and a large amount of capacity can produce the same wavelength as a large amount of inductance and a small amount of capacity.

So in the receiving circuit there is no need to have exactly the same proportion of inductance and capacity in order to tune to the London Regional station. All that matters is that the coil and condenser shall together produce the same wavelength constant as is produced by the Regional's tuning circuit.

It will have been noted how one set is adjusted to, say, 40 degrees on the tuning dial to bring in the Regional station, whereas another set brings in this station at, say, 30 degrees. In the first set more condenser capacity has been used than in the second, but the wavelength of both sets will have been adjusted to the same value.

It is the chief job of a tuning circuit to respond to one signal to the exclusion of all others. Unless two stations happen to be tuned to the same wavelength, which should not happen under present-day arrangements, their signals can be separately tuned by a receiver.

Interferences

If these two signals have wavelengths fairly close together, tuning one may unavoidably tune the other. At the present time there are so many stations wanting to transmit that their wavelengths are sometimes unavoidably very near to one another. A modern tuning circuit must, therefore, be designed so that when responding to one station it does not respond to other stations on nearby wavelengths.

The circuit A is not selective; even if the condenser were adjusted to the correct setting for the Regional station, it is probable that another station would be heard also. The circuit B is much more selective and, in a simple set, would provide good separation between two such stations as the London Regional and National, which have a wide wavelength difference.

The circuit C is the same as B, except that it covers two distinct wavelength ranges. Instead of a simple plug-in coil, as at A and B, the arrangement at C includes a dual-range coil.

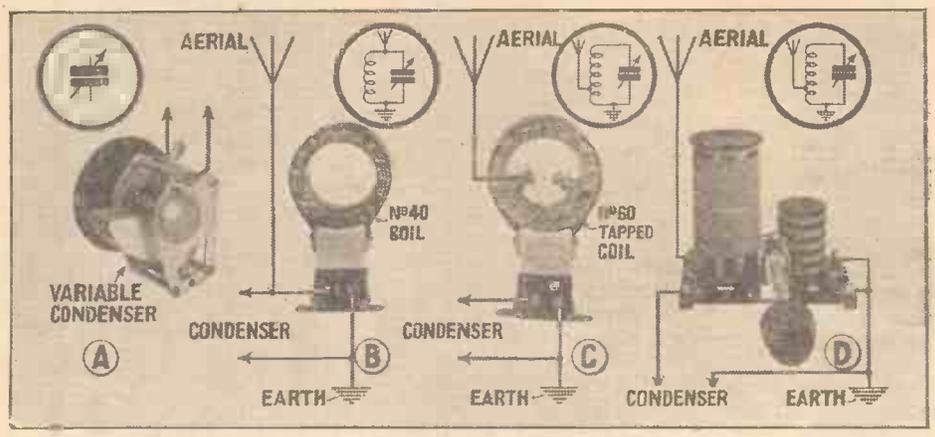
Wavelength Ranges

Stations transmit within one of two distinctly separate wavelength ranges. We speak of a medium-wave station when its wavelength is between the limits of 250 and 550 metres; and of a long-wave station when its wavelength is between the limits of 1,000 and 2,000 metres.

One coil cannot cover both wavelength ranges in conjunction with the normal variation of condenser capacity. We can design a coil that, with a .0005-microfarad condenser, will tune from 250 to 550 metres; or a coil for 1,000 to 2,000 metres; but not one that will tune from 250 to 2,000 metres.

Because of this, tuning coils have to be made interchangeable, or two coils have to be mounted between a switch. Plug-in coils provide for interchangeability and dual-range coils provide for convenient switching from one wavelength range to another.

HOTSPOT.



A.—·0005 mfd. condenser. B.—Simple tuning circuit. C.—Tapped aerial tuning circuit. C.—Dual-range aerial tuning circuit

RADIO MEDICINE

IT is believed that the germs of certain diseases can be killed by a high body temperature. In other words what we call a fever is not so much a mere symptom of disease, as an instinctive reaction or defence against the invader. Radio-frequency oscillations have recently been successfully applied to heat deep-seated organs and other internal parts of the body, in order to induce an artificial fever and so attack the germ *in situ*. It is found that a 30-metre wave produces the greatest heating effect. This method is a development of the well-known diathermy treatment, where currents of a much lower frequency are employed for curative purposes.

M.B.

Centres from which wireless programmes may be redistributed by private persons are gradually increasing. It appears to be within the power of the local council or corporation to give the necessary permission.

NEXT WEEK: III—HOW WIRELESS WAVES ARE DETECTED

Around the Show

SOME SPECIAL POINTS OF INTEREST

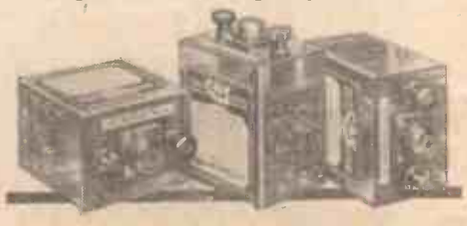
By "A. NODE BEND"

YOU know, although every year I enjoy the Radio Show more and more, I really do believe that, as each year it gets bigger, there is an increasing difficulty in seeing everything that you want to. Of course, it is a fine idea to have a part of the new building, now that that is open, and I do think that the addition of this section,

The new Regentone four-valve receiver, which works from the mains

for this year's Show, makes things much more enjoyable.

What I mean is that with such a large number of firms exhibiting at this Show and with such a wide range of component parts and complete sets on view it is very difficult for the average man, who can perhaps pay only one visit and that at the crowded time of the evening, to get a concise idea of what developments have taken place during the past year.



The G.A.V. non-spill accumulator in three positions. This accumulator is ideal for portable sets

There are dozens of different ways of seeing the Show. I used to go, having first selected a dozen or so firms whose stands I wanted to see, and I tried to see them; the time afterwards, if any, was left for the rest of the Show. But as the years go on—this is the ninth Radio Show, by the way—it is increasingly difficult to do this because of the huge crowds.

Once upon a time I was content to follow the crowd and see the stands as I passed; but that means that for a proper review of Olympia you must spend several evenings there; which is not a thing most people can do.

Anyway, this year I have endeavoured to make a fairly critical stand-to-stand review and for the benefit of those who have only a brief time to spare at Olympia, and for those who are not able to go at all, I think the following notes may be of use.

A surprising thing is that the first impression one gets at Olympia this year is that the halls are full of complete sets—portables and radio-gramophones chiefly.

One or two people at Olympia seemed to think that this foreshadowed the death of home construction and the coming of the days when cheaper complete sets and kits of parts would for ever obviate the need for home assembly according to published designs. My opinion is that the present popularity of rather complicated manufacturers' receivers and radio gramophones will lead to a new phase of home construction. Undoubtedly there is a demand for these expensive radio gramophones and for four and five-valve receivers, but not everybody can afford to buy them and as the need for them increases so will there grow up a new opportunity for home constructors.

Certainly there are some very new ideas at Olympia this year in complete sets. Once upon a time I suppose we should have called the present cabinet designs "American"; they are in some cases futuristic.

NEXT WEEK:

"Thermion" Looks Back at the Show

Some cabinets are of wood but there are also some clever imitations in bakelite of expensive woods. Metal cabinets and fabric-covered cabinets are also to be seen on some stands. I made a note of some of the most striking designs.

Ferranti, Ltd., have brought out a number of new sets, some of which are in plain fabric-covered boxes and others are housed in veneer walnut pedestal cabinets. Most of these are mains driven and some of the cabinet models incorporate the new Ferranti speaker. Two new two-valvers are included in the Ferranti range and a novel feature about one of these sets is

A new R.I. component—a very efficient low-frequency choke

that it is permanently pre-set to two Regional stations.

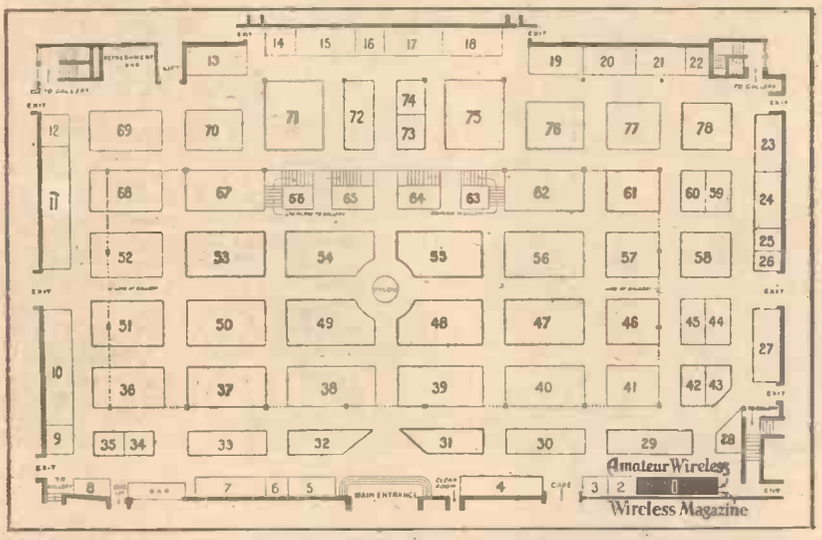
On the Climax stand, 27, I saw a very attractive three-valver in a rather extraordinary cabinet. I learn that Climax have incorporated some of their novel and useful ideas in this set. The controls appear to be very conveniently arranged.

Philips have a new all-electric two-valver and this is housed in the same type of cabinet which we have learnt to associate with Philips during the past season. This firm also has two new pedestal models and several new speakers. The cabinets of all these are typically Continental.

Kolster-Brandes are bringing out set after set in the worthy endeavour to suit

AROUND THE SHOW—Some Special Points of Interest *(Continued)*

every need. I was particularly interested in the new five-valve A.C. mains set which can be adjusted to work on 100-120 and 200-250 mains.



PLAN OF STANDS ON GROUND FLOOR (NEW HALL)

two-valver and one a three-valver for mains operation. A good point is that a model is available for 25-cycle mains and mains of this periodicity are still used in many parts of the country.

A new idea is the Regentone four-valve, which works from A.C. mains and incorporates two screen-grid stages. I should like to compliment the designer on the way he has overcome many difficulties which I know crop up when an attempt is made to work more than one screen-grid stage from the mains.

Varley, Ltd., entered last year very successfully into the set market. They have a very nice little two-valve A.C. model which sells at fifteen guineas, and a three-valve direct current mains model at £16. The Varley all-electric radio-gramophones have been redesigned and there is obviously a deal of thought put into the new outfit.

Gambrell are also specialising in high grade radio gramophones and the Gambrell Novogram is well worth seeing.

Gramo-Radio Receivers

The interesting point about the new R.I., A.C. portable three-valver is that now the A.C. pentode is used in the last stage. The new Madrigal four-valver, the latest R.I. idea, has two screen-grid valves and

A Complete List with Stand Numbers of every Exhibitor at the Show

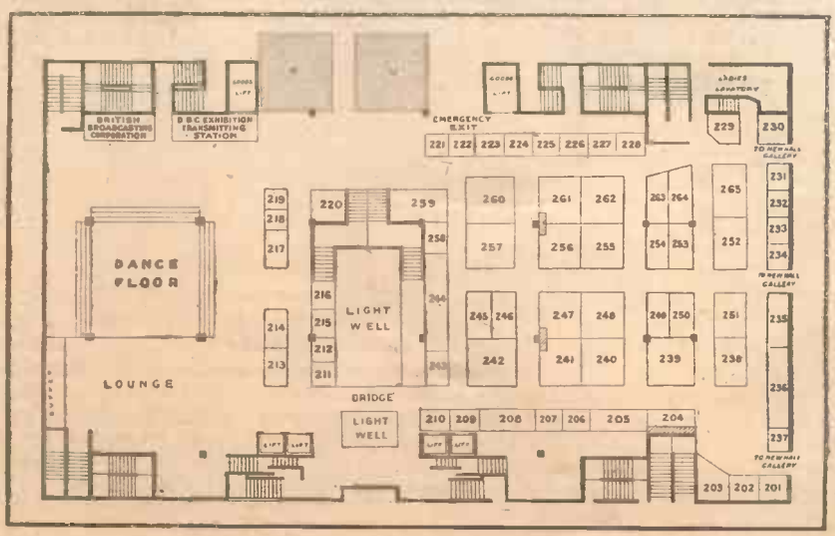
Name	Stand No.
Adey Radio, Ltd.	261
Amalgamated Press, Ltd.	5
Arding & Hobbs, Ltd.	262
Atalanta	232
Automatic Coil Winder and Elec. Equipment Co., Ltd.	107
Baird Television Co., Ltd.	216
Bakelite, Ltd.	255
Baker's Selhurst Radio	127
Beaver Electrical Supply Co.	206
Bel-Canto Radio, Ltd.	264
Belling & Lee, Ltd.	134
Benjamin Electric, Ltd.	115
Bernard Jones Publications, Ltd.	1
Bird, Sydney S., & Sons, Ltd.	73
Birkbys, Ltd.	245
British Ebonite Co., Ltd.	253
British General Manufacturing Co., Ltd.	59
British Radiophone, Ltd.	223
Brown Bros., Ltd.	17
Brown, Ltd., S. G.	78
Brownie Wireless Co., of Great Britain Ltd.	102
Bulgin & Co, A. F.	103
Bullphone, Ltd.	33
Burndept Wireless (1928), Ltd.	56
Burne-Jones & Co., Ltd.	121
Burton, C. F. & H.	44
British Blue Spot Co., Ltd.	217
Cadisch, R., & Sons	258
Carrington Manufacturing Co., Ltd.	140
Catesbys, Ltd.	260
Celestion, Ltd.	53
Chloride Electrical Storage Co., Ltd.	54
Clark & Moir, Ltd.	205
Classic Radio and Gramophone Co., Ltd.	113
Climax Radio Electric, Ltd.	27
Cole, E. K., Ltd.	48
Columbia Graphophone Co., Ltd.	71
Colvern, Ltd.	45
Cossor, A. C., Ltd.	52
Clarke, H., & Co. (Manchester), Ltd.	211
Concordia Electric Wire Co.	209
D.X. Coils, Ltd.	237
Danipad Rubber Co., Ltd.	208
Darwins, Ltd.	254
Dayzite, Ltd.	25
De la Rue & Co., Thos.	128
Dew, A. J., & Co.	15
Dibben, Wm., & Sons, Ltd.	11
Donotone (Regd.) Loud-speaker	139
Downing, John S., & Sons, Ltd.	210
Dubilier Condenser Co. (1925), Ltd.	50
Dulcetto-Polyphon, Ltd.	24
Dunhams, Ltd.	2
Dyson & Co. (Works), Ltd., J.	104
Eagle Engineering Co., Ltd.	43
Eastick, J. J., & Sons	236
East London Rubber Co.	29
Econasign Co., Ltd.	230
Edison Bell, Ltd.	29
Edison Swan Electric Co., Ltd.	67
Electrical and Radio Products, Ltd.	37
Ensign, Ltd.	10
Epoch Radio Manufacturing Co.	203
Ever Ready Co. (G.B.), Ltd.	49
Falk Stadelmann & Co., Ltd.	119
Ferranti, Ltd.	47
Flinders (Wholesale), Ltd.	22
Formo Co.	72
Fuller Accumulator Co. (1926), Ltd.	221, 265
Gamage, Ltd., A. W.	244
Gambrell Radio, Ltd.	106
Garnett Whiteley & Co., Ltd.	30
Garrard Engineering and Manufacturing Co.	258
General Electric Co., Ltd.	68
Graham Amplion, Ltd.	62
Graham-Farish, Ltd.	76, 108
Gripso Co., The	202
Grosvenor Electric Batteries, Ltd.	263
H.S.P. Wireless Co.	122
Halcyon Wireless Co., Ltd.	144
Harlie Bros. (Edmonton), Ltd.	141
Henderson Wireless and Electrical Service	231
Hobday Bros., Ltd.	13
Hunt, A. H., Ltd.	133
Hustler, Simpson & Webb	247
Hillman Bros.	18
Igranic Electric Co., Ltd.	249
Iliffe & Sons, Ltd.	4
Itonia Gramophones, Ltd.	21
Jackson Bros.	63
Jewel Pen Co., Ltd.	138
Johnson & Bolsom, Ltd.	142
Junit Manufacturing Co., Ltd.	65
Kalisky (Aldgate), Ltd., S.	23
Kolster-Brandes, Ltd.	55
L.E.S. Distributors, Ltd.	16
Lamplugh, S. A., Ltd.	132
Lectro-Linx, Ltd.	131
Lever (Trix), Ltd., E. J.	249
Lissen, Ltd.	41
Lithanode Co., Ltd.	135
Lock, W. & T., Ltd.	207
Loewe Radio Co., Ltd.	214
London Electric Wire Co. and Smiths, Ltd.	41
"Loud Speaker" Co., Ltd.	219
Mainten Manufacturing Co., Ltd.	213
M.P.A. Wireless (1930), Ltd.	222
M-L Magneto Syndicate, Ltd.	57
McMichael, Ltd., L.	201
Manufacturers' Accessories Co. (1928), Ltd.	38, 120
Marconiphone Co., Ltd.	248
Matchless Radio Manufacturing Co.	143
Montague Radio Inventions and Development Co., Ltd.	38
Mullard Wireless Service Co., Ltd.	232
Murphy Radio, Ltd.	212
Mayfair Enterprises, Ltd.	33
National Accumulator Co., Ltd.	34
New London Electron Works, Ltd.	19
Odhams Press, Ltd. (Proprietors of the "Broadcaster")	6
Oldham & Son, Ltd.	64
Ormond Engineering Co., Ltd.	75
Osborn, Chas. A.	253
Osram Valves (G. E. C.)	43
P. R. Products	224
Pandona, Ltd.	218
Paroussi, E.	227
Partridge & Mee, Ltd.	243
Partridge, Wilson & Co.	251
Perfectavox, Ltd.	241
Pertrix, Ltd.	243
Peto-Scott Co., Ltd.	110
Pioneer Manufacturing Co.	223
Pye Radio, Ltd.	31, 32
Quest Radio Manufacturing Co.	238
Radio Gramophone Development Co.	126
Radio Instruments, Ltd.	61
Radio for the Million (Mullard)	101
Radio Service (London), Ltd.	235
Radio Society of Great Britain	229
Redfern's Rubber Works, Ltd.	234
Red Star Radio, Ltd.	109
Rees Mace Manufacturing Co., Ltd.	117
Regent Radio Supply Co.	51
Ridged Cone Co., Ltd.	112
Rolls-Caydon Sales	237A
Rolls Radio, Ltd.	35
Selectors, Ltd.	114
Sovereign Products, Ltd.	138
Sel-Ezi Wireless Supply Co., Ltd.	14
Selfridge & Co., Ltd.	242
Sheffield Magnet Co.	125
Sherwood, A. M. E.	130
Siemens Bros. & Co., Ltd.	70
Six-Sixty Radio Co., Ltd.	58
Smurthwaite, F. W.	116
Standard Battery Co.	42
Stratton & Co., Ltd.	28
Sun Electrical Co., Ltd.	19
Swift Lewick & Sons, Ltd.	129
Sylvex, Ltd.	127
"Tannoy" Products	111
Telegraph Condenser Co., Ltd.	145
Telsen Electric Co., Ltd.	69
Tonex Co.	233
Trader Publishing Co., Ltd.	3
Trelleborg Ebonite Works, Ltd.	229
Turner & Co.	9
Ultra Electric, Ltd.	77
Universal Gramophone and Radio Co., Ltd.	123
Umello, Ltd.	234
Vandervell & Co., Ltd., C. A.	7
Varley (Oliver Pell Control)	105
Voltron Electric, Ltd.	215
Watmel Wireless Co., Ltd.	12
Westinghouse Brake and Saxby Signal Co., Ltd.	239
Whiteley Boneham & Co., Ltd.	66
Whittingham Smith & Co.	74
Whiteley, Wm.	257
Wilkins & Wright, Ltd.	60
Wingrove & Rogers, Ltd.	118
Wireless Retailers Association of Great Britain	8
Wright & Weaire, Ltd.	250
Young Accumulator Co. (1929)	225
Zeitlin, V., & Sons, Ltd.	26

The new model Columbia screen-grid three (the type 307 set) is well worth seeing. I believe "Set Tester" reviewed this particular receiver in last week's issue of "A.W."

On the stand of Pye Radio I was interested in an all-electric version of the Pye twin-triple portable set.

On the Marconiphone stand you are generally sure to find something new and of outstanding interest. The Marconiphone Co. has certainly made wonderful progress during the past year with its receivers. I have always been very fond of the model 55 portable which I see they are selling like hot cakes ready for the new season. A new set which will undoubtedly be popular is the Marconiphone model 39. It works from the mains and sells at only £21.

The Ekco eliminator people, E. K. Cole, Ltd., have two very fine receivers, one a



PLAN OF STANDS IN EMPIRE HALL (FIRST FLOOR). Demonstration Rooms shaded

AROUND THE SHOW—Some Special Points of Interest *(Continued*

should have ample range. A very high-performance set is the Burndept Universal Screen Grid Five. This has quite a moderate high-tension consumption and is available as a battery model for those who have no mains. It is listed at thirty guineas while for mains operation the price is thirty-nine guineas. I think you will agree that for a high-performance five-valver these prices are very low.

An entirely new McMichael set is the Mains Three which sells at £20. The appearance of this set is rather unusual and to my mind very pleasing.

But let us get away from complete sets and see how the trend of design is likely to be followed by the home constructor. Because of the striking new cabinets used in complete sets manufacturers of cabinets for the home constructor have been led to bring out some very novel new designs.

I like the new Camco Waverley radio-gramophone cabinet. I should like to know how they managed to produce this at the very low figure of £5 10s.; the quality is excellent.

Speakers are better than ever this year—that is if one is to judge by appearances and by the splendid technical details available. It is not easy at this show to get a good idea of reproduction. There are plenty of dynamic speakers at Olympia this year and this new principle marks a milestone in speaker progress.

Some moving-coil speaker manufacturers have brought out new permanent-magnet moving coils. This idea was started many years ago, when moving-coil speakers first came out, but up to the present the difficulty has been to find a suitable metal for the permanent magnets. New steels are now available which, it is claimed, do not show any depreciation in magnetism over a period of many years.

STAND No. 1 is "A.W."

I made some notes about speakers I saw on various stands although I cannot claim to have seen them all. A newcomer was the Blue Spot Model 41 K—a handy general-purpose speaker for use with the average type of set and which I think is good value for fifty shillings. It is housed in an attractive veneer-walnut cabinet.

Bakers Selhurst Radio have a large range of moving-coil speakers and at least one permanent magnet model.

I spent a deal of time examining the new moving-coils on the Epoch stand.

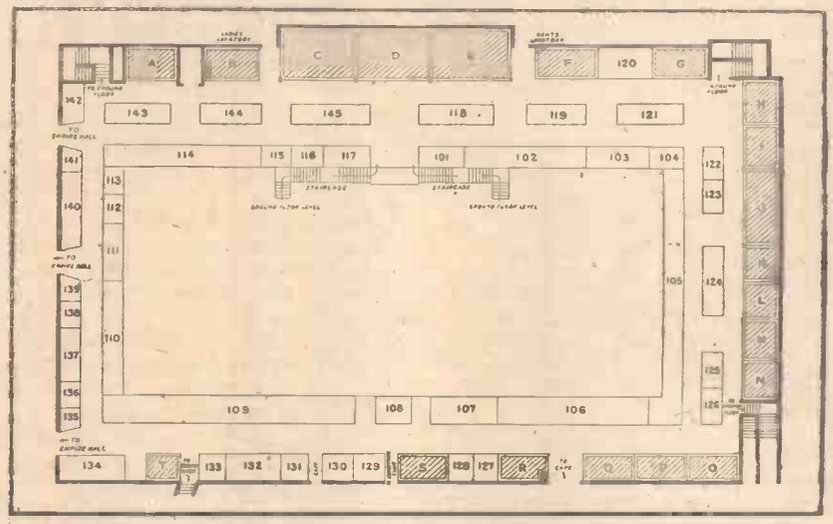
Kolster-Brandes have produced a moving-coil speaker with a permanent magnet fitted and this is contained in a rather unusual style of cabinet.

S. A. Lamplugh, Ltd., are selling the chassis of an inductor dynamic speaker at the very modest price of £3 10s., while a special cabinet model is available at £6 10s.

The General Electric Co., Ltd., also have an inductor type speaker, which is quite a new idea so far as the G.E.C. is concerned.

I notice that Celestion have introduced some new models, the D 10 and D 12, priced respectively at £3 and £5. For those who favour ordinary four-pole units there are many available, such as the

(Continued on page 410)



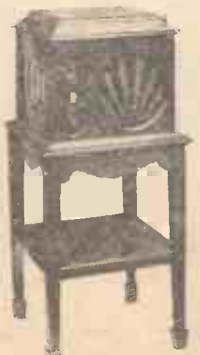
PLAN OF STANDS AND DEMONSTRATION ROOMS IN GALLERY.

Demonstration Rooms shaded

The Dubilier radio-gramophone, incorporating the Dubilier A.C.3 set

The Ferranti console-type set

The Marconiphone 506 mains set and moving-coil speaker



A Chakophone radio-gramophone for battery or mains working

A portable with a screen-grid stage, the H.S.P.

An Osram Music Magnet in a Lock cabinet

The ARR

THE FIRST SET USING THE NEW

By J. H. REYNER

The "Arrow Two" is particularly selective and will provide ample volume

WHEN the preliminary experiments on the ohmic-coupled circuit were completed, the question arose as to the type of set through which this idea should be introduced to readers. Some difficulty was experienced because the principle is so widely applicable. I felt, however, that there must be numbers of readers who are content with relatively simple sets. They live somewhere near a local station, and though they listen principally to this station, there are times when they like to obtain other reception.

Readers living close to the Regional programme will, of course, have difficulty in cutting out one programme and obtaining the other. Even if they have arranged by the addition of wavetraps or similar devices to obtain satisfactory reception, any receiver so constructed possesses limitations and is rather clumsy.

The present receiver has been tested on a full outdoor aerial at Elstree, which is five miles from the Brookmans Park aerials. It was possible not only to separate the two Brookmans Park transmissions, but also to tune in the Midland Regional programme and one or two foreigners as well without any appreciable interference. This may not sound very extraordinary, but our experience shows that no single circuit will do this, and even some circuits having a stage of H.F. amplification are not so selective.

The receiver, therefore, is a simple one, containing a detector circuit followed by one L.F. stage and is capable of giving good loud-speaker results on a number of programmes. It combines the most desirable feature of high selectivity with adequate signal strength. It is, I should imagine, a useful receiver for north of England readers when their regional station opens.

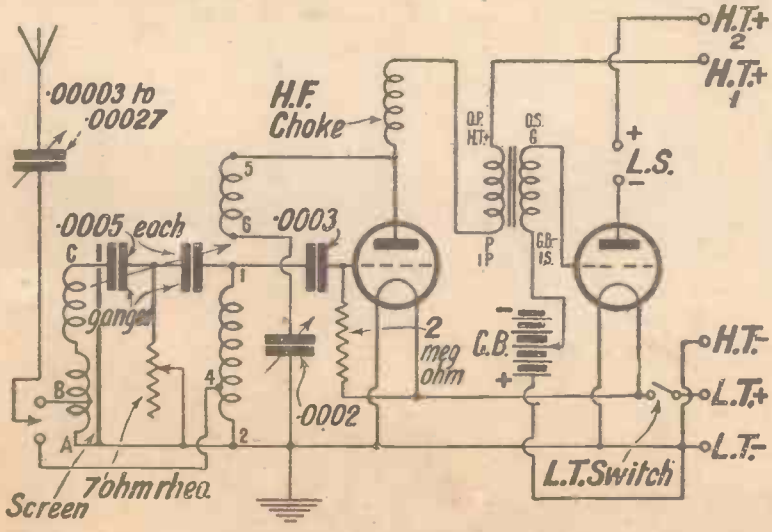


Fig. 1. The circuit of the "Arrow Two." A list of the components required appears on page 408

The circuit of the arrangement is shown in Fig. 1. It will be seen that I have incorporated a switch in the aerial circuit, whereby the aerial may be changed over either to a single coil or to the band-pass arrangement. This is very useful in that it enables direct comparison to be made if one is interested and proves the value of the additional circuit.

The ideal receiver, of course, would be one in which this new circuit was incorporated on both wavebands. It is necessary, however, to match the coils somewhat carefully, and I felt that it would be desirable, at any rate at first, to limit the application of the principle to short waveband only, where the problem of selectivity is more acute. Therefore, the receiver was built up from the following point of view.

Dual Range

There is a dual-range coil feeding a detector valve, followed by a transformer-coupled low-frequency stage. This is a simple two-valve arrangement, and there is nothing special about the circuit. This arrangement, indeed, is used on the long waves, the aerial being connected direct to the No. 4 terminal on the coil.

For short-wave reception the coil switch is changed over, and this converts it to a simple two-valve set operating on the broadcast band. When one requires more selectivity, however, the aerial switch (in the centre of the panel) is thrown over to the other position connecting the aerial to the band-pass circuit. A slight alteration of tune will now be necessary, but the station will be found in approximately the same position as before.

Both the circuits are tuned with a dual condenser, the two circuits must, therefore, be matched as regards inductance and stray capacity. The number of turns on the band-pass coil have been chosen to match fairly accurately the short-wave winding of the dual-range coil employed, and for this reason no other make

Compare this plan view with

OW 2

V OHMIC-COUPLING PRINCIPLE

, B.Sc., A.M.I.E.E.

of dual-range coil is practicable in this set. If the reader likes to match the coils for himself, of course, any good dual-range coil may be employed, but the details given with this article only apply to the Lewcos D.W.A. coil.

The Band-pass Coil

The aerial is connected to the band-pass coil through a pre-set condenser on to a tapping point as illustrated in Fig. 2. This tapping, again, is so chosen that with the normal aerial it is possible to adjust the effective aerial capacity to match the band-pass circuit with the secondary circuit, and for all normal purposes this will be found to be sufficient. The pre-set condenser in the aerial circuit is adjusted on a suitable distant station, and thereafter requires no alteration.

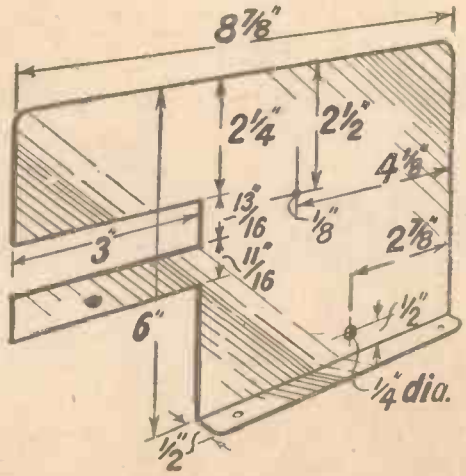
Energy is transferred from the first circuit to the second circuit by means of the voltage drop across a resistance, and this resistance has been made variable in the present instance in order that varying degrees of selectivity may be obtained. The whole arrangement is thus one of extreme flexibility, for one can make the tuning exceptionally sharp (at some expense of signal strength), while if one only requires average selectivity the maximum coupling can be used, and the signal strength is accordingly increased. Towards the maximum position, as I pointed out in the previous article, it is possible to change over the switch of the band-pass arrangement to the single circuit arrangement with very little difference in signal strength, but with a marked difference in the selectivity. In order to a-

the wiring diagram overleaf

Construction is quite simple and few components are required

void any other coupling, a capacity shield is placed between the dual-range coil and the band-pass coil, and this screen is extended to some extent between the two halves of the dual condenser. In addition, the band-pass coil is wound astatically and is placed symmetrically with regard to the dual-range coil, as illustrated, so that there shall be no magnetic coupling between the circuits. It is important to arrange the coils carefully, as shown in the photographs, although a small deviation will not give rise to any serious untoward effects.

Having discussed the general principles



of the set, we may turn to the construction, although this will present little difficulty. It is desirable to obtain a full-size blueprint of the set (price 1s., post free), as this makes everything to do with the construction quite clear, and shows the positions of the components exactly. First of all drill the panel to take the various components. In the top left-hand corner is the rheostat controlling the ohmic coupling, while in the corresponding right-hand corner is the .0002 reaction condenser. At the bottom of the panel, in the centre and on the right-hand side, are the aerial switch and the on-off switch respectively, while at the left-hand side a hole must be drilled for the operating rod of the dual-range coil switch. It only remains now to drill a hole in the centre of the panel for the spindle of the dual condenser, and this must be drilled accurately to the dimensions given, as this condenser does not fix on to the panel, but is attached to the baseboard, the spindle projecting through the hole on the panel.

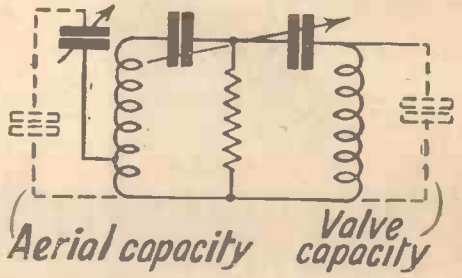


Fig. 2 (above). Showing pre-set condenser in aerial circuit

Fig. 3 (left). Details of screen

Having drilled the panel in this manner, it may be screwed to the baseboard and the dual condenser may be fitted into position. This is supported on the baseboard, as just pointed out, by two feet at the back, and when it is mounted up against the panel, with the spindle projecting through the hole therein, it is quite rigid. Various other components on the panel may now be mounted, followed by the several baseboard components in their respective positions.

The next operation is the winding of the band-pass coil. This is wound on a 1½-in. Paxolin former (Fig. 4), and consists of 100 turns of 28 d.s.c. wire. This wire is wound on in two sections of 50 turns, separated by

THE "ARROW TWO" *(Continued from preceding page)*

½ in. Drill a hole at the end of the former in order to anchor the wire, then wind on 50 turns of wire. This wire should then be threaded through another hole or connected to some form of anchorage in order to hold

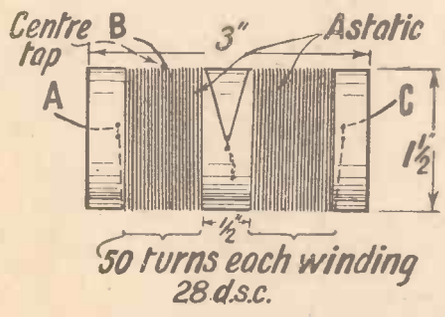


Fig. 4—Winding details of band-pass coil

the winding tight. A further 50 turns are now wound on *in the opposite direction* and the first turn of this second 50 is spaced ½ in. from the first 50.

When 25 turns of this second 50 have been wound on, a tapping is taken for the aerial connection, and this may be done in various ways according to the readers' facilities and patience. The remaining 25 turns are then wound on, and the wire once more anchored at the end.

Two small ebonite feet must now be constructed for fixing the coil, since it must be clear of the baseboard in order to allow the operating rod of the dual-range coil to pass underneath it. The construction will be clear from the diagrams and photographs, but if any reader is in doubt he can purchase the coil ready made.

Having mounted this coil in position on the baseboard, the screen should be cut and placed in between the coil and the dual-range coil, being interleaved between the two halves of the dual condenser, as already mentioned. Further than this no difficulty should be experienced in the construction, which is of a straightforward and relatively simple character. It may be found to be desirable, when first wiring up, to remove the screen, in order to obtain access to certain components such as the aerial switch immediately under the dual condenser, but this is the only point in which any trouble may be experienced.

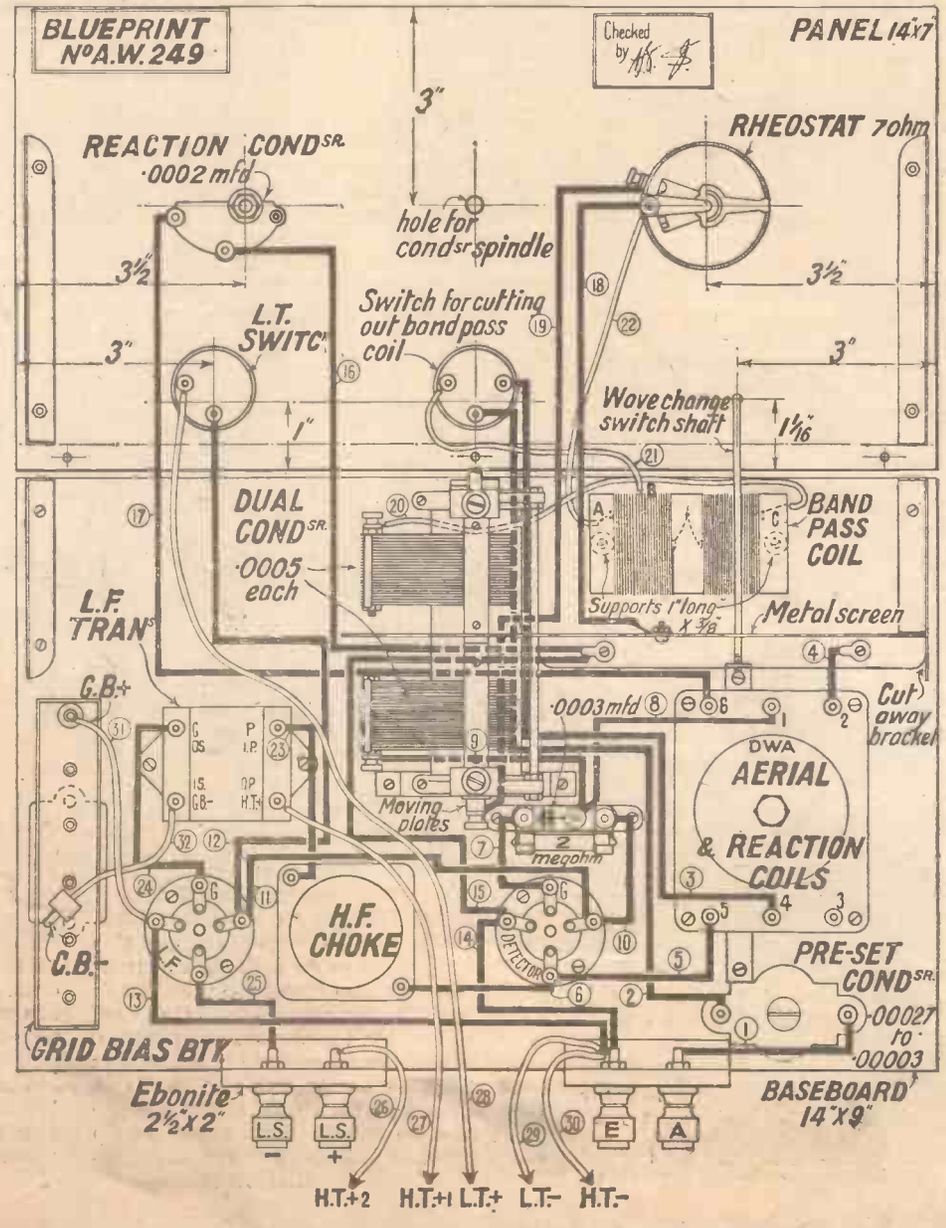
Operating details of this receiver will be given next week. For those who wish to try this receiver out it is only necessary to say that the valves should be detector and power valve, the H.T. voltages 60 and 100 respectively, and the L.T. and grid-bias to suit the valves in use.

A credit of 24,000,000 escudos (about £230,000) has been granted for extending and remodelling urban and inter-urban telegraph and telephone lines and the installation of radio stations in Portugal.

The Czechoslovakia Ministry of Posts and Telegraphs is erecting in Prague a building which will be the headquarters of broadcasting in Czechoslovakia. The new national broadcasting station, which is under construction near Cesky Brod, east of Prague, will be of 60/120 kilowatts.

LIST OF COMPONENTS REQUIRED

Panel, 14 in. by 7 in. by ¼ in. (Becol, Lissen Trolitax, Resiston).
Dual condenser .0005 mfd., with brass support (Formo, Ormond, J.B.).
7-ohm rheostat (Lissen, Igranic, Varley, Wearite, R.I.).
On-off switch (Bulgin, Junit, Lotus, Lissen, Benjamin, Claude Lyons).
Change-over switch (Bulgin, Lotus).
.0002-mfd. reaction condenser (Burton, Bulgin, Lotus, J.B., Lissen, Dubilier, Formo, Polar).
Dual-range aerial coil (Lewcos type D.W.A.).
Two anti-microphonic valve-holders (Telsen, Lotus, Benjamin, Formo, Wearite, Burton, Brownie, W. & B., Junit).
Low-frequency transformer (Varley Ni-core 11, Telsen, Ferranti, Lotus, R.I., Burton, Lissen, Igranic).
High-frequency choke (R.I., Lewcos, Lissen, Tunewell, Sovereign, Watmel, Igranic, Dubilier, Bulgin, Varley, Ready Radio).
.0003-mfd. fixed condenser with grid-leak clip T.C.C., Dubilier, Graham-Farish, Lissen, Ediswan, Watmel, Atlas).
2-megohm grid leak (Ready Radio, Watmel, Lissen, Ediswan, Graham-Farish).
Pre-set condenser .00027 max. (Igranic, Formo, Lissen, Lewcos, Ormond, Sovereign).
Vernier dial (Igranic "Minor," Brownie, Formo).
Coil former 3 in. by 1½ in. diameter (Atlas, Wearite).
Two terminal blocks (Junit, Lissen).
Four terminals marked L.S.—, L.S.+, A. E. (Belling-Lee type B, Clix, Eelex).
Five wander plugs marked H.T.—, H.T.+1, H.T.+2, G.B.+, G.B.— (Belling-Lee, Clix, Eelex, Igranic).
Two spade tags marked L.T.+, L.T.— (Belling-Lee, Clix, Eelex).
Two ounces 28 D.S.C. Wire (Lewcos).
Glazite for wiring.
Pair panel brackets (Lissen).
Grid-bias battery clip (Bulgin).
Special screen (Ready Radio, Wearite, Parex, H. & B.).



The wiring diagram and layout. We can supply a full-size blueprint of this, price 1/-

C.P.C.

"Current per Cell"—that is the modern test of the H.T. battery for radio. Because with modern valves the drain upon your H.T. battery is very heavy and every cell to-day must do its share.

The cells of the Lissen Battery are large in size. Each cell is a deep reservoir of energy. Each cell is master of its work—ready to pour out its energy unstintingly—for month after month it will do that for you.

If you want most "Current per Cell" get a Lissen Battery. 10,000 radio dealers have it. But ask firmly for it by name.

on "current per cell" Lissen scores every time!

PRICES	
60 volt (reads 66)	7/11
100 volt (reads 108)	12/11
120 volt	15/10
36 volt	4/6
60 volt (For Portable Receivers)	7/11
99 volt (For Portable Receivers)	12/6
60 volt (Super Power)	13/6
100 volt " "	22/-
4½ volt Grid Bias	10d.
9 volt	1/6
16 volt	2/9

4½ volt Pocket Battery, 5d. each (4/6 doz.)
Single Cell Torch Battery, 4½d.

LISSEN LIMITED Worple Road, Isleworth, Middlesex

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

AROUND THE SHOW—Some Special Points of Interest (*Continued from page* 405)

Ormond. Incidentally this unit can be obtained with a large cone chassis and housed in an attractive corner cabinet at 79s. 6d.

The Lodestone moving-coil speaker designed by Mr. W. James is always to be obtained and I see that Whiteley Boneham

A fine new Varley receiver. The speaker is housed below the set

and Co., Ltd., have a model available for a six-volt accumulator at four guineas and a D.C. mains model at £4 14s.

S. G. Brown, Ltd., are prominent again this year with some very modest-priced cone speakers and a new Brown moving-coil chassis is available.

Of course, the craze nowadays is all for working from the mains. In fact, sometimes I think we have too much of a good thing and overlook the obvious fact that not everybody has the mains nor can afford mains operation. There are plenty of H.T. batteries and H.T. accumulators at Olympia this year and, of course, L.T. accumulators are never likely to die entirely for it is not a cheap matter to get low tension direct from the mains.

Among the dry H.T. batteries I noticed the new Siemens Full O' Power battery—100 volts for 13s.—and also the Pertrix range. Pertrix batteries, of course, do not work on the ordinary Leclanché cell principle. Another dry H.T. battery is the Fuller Sparta, which is part of the standard equipment of the new Hustler "Double Two" set, with which receiver most readers are no doubt acquainted.

Oldham & Sons, Ltd., have brought out a new series of low-tension accumulators called the Lively-O. These have just the commonsense features which we associate with the name of Oldham. They are particularly robust, have integral carrier handles, large vent caps and so on.

A new Exide jelly-electrolyte accumulator, known as the Gel-Sel is available and should appeal particularly to portable set users.

H.T. accumulators are shown by many

First at the Exhibition
"A.W.'s" STAND No. 1

firms including, of course, C. A. Vandervell and Co., Ltd., who have a very robust-looking all-moulded accumulator H.T. battery. Ten-volt accumulator blocks are made by the Fuller Accumulator Co. (1926) Ltd., and on stands 26 and 221 are to be found a wide range of these.

Rather naturally, in view of the great popularity of mains working, there are many firms showing units of all kinds for A.C. and D.C. Many firms are specialising in mains units for portables. These, of course, take the place of the H.T. battery when the set is being used indoors, and many of these units have a trickle charger so that the set's accumulator can be kept up to tiptop condition. Both Ekco and Regentone are well-known manufacturers of units of this type.

The Pandona Portable Five receiver

A useful point about the new R.I. all-insulated H.T. unit is that it is designed to be entirely safe and to eliminate all possibility of shocks. An A.C. model is available at £4 15s. and a D.C. model at £2 12s. 6d.

One of the useful range of Varley parts—a dual-range low-frequency choke

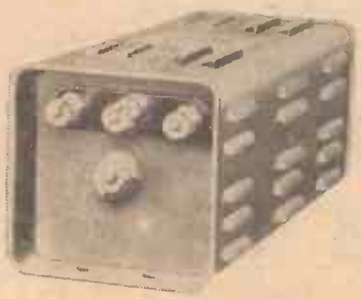
I notice that many new Regentone models have a switching arrangement whereby a constant voltage output can be maintained on widely differing loads. Tannoy low-tension units utilise the Tannoy electrolytic rectifiers—a job which has many advantages.

A portable mains unit made by E. K. Cole, Ltd., is listed at £4 12s. 6d., and throughout the range of Ekco mains units high performance at low cost is evident. H.T. units for a discharge of 60-milliamperes are put on.

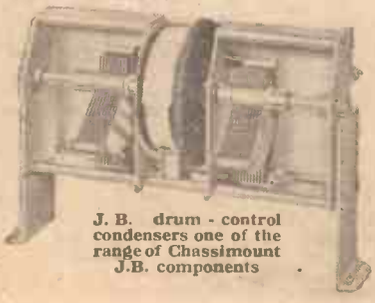
A newcomer is the Clarke's Atlas type A.C. 188 which incorporates a trickle charger and has two voltage variation controls.

There is probably nothing radically new in valves this year, although the A.C. pentode should be regarded, I suppose, as a newcomer. Many manufacturers are trying to lower the inter-electrode capacity of screen-grid valves and it is probable that by next year some very low valve self-

(*Continued on page* 412)



A new Westinghouse metal rectifier, the H.T.7



J. B. drum-control condensers one of the range of Chassimount J.B. components

The Exide type WH10 glass-cell H.T. unit

This Columbia portable gramophone, in a stout carrying case, is useful for outdoor work

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EXHIBITION 3

	£	s.	d.
1 Ebonite panel, 16 in. by 8 in.		6	0
1 Hand-polished oak cabinet, with 10-in. baseboard	1	5	0
1 Lissen 15-ohm rheostat		2	6
1 Lotus No. 2 jack		2	3
1 Lotus jack plug		2	0
1 Regentone 120,000-ohm resistance (variable)		9	6
2 Cyldon Juni Log .0005 variable condensers		17	6
2 Igranic Indigraph S.M. dials		12	0
1 Cyldon .0001 reaction condenser		5	0
1 ReadiRad on-and-off switch			10
2 ReadiRad single coil holders		1	8
1 Wearite double coil holder		1	9
2 W.B. valve holders		2	6
1 Parex S.G. valve holder		2	0
1 Watmel H.F. Choke, type D.X.3		6	0
1 ReadiRad H.F. choke		4	6
3 Lissen .0002 fixed condensers		3	0
1 Lissen 2-megohm grid leak		1	0
1 Grid leak holder			6
1 Telsen Radiogrand L.F. transformer		12	6
1 Dubilier 1-microfarad fixed condenser		2	6
2 Junit terminal mounts		1	4
1 ReadiRad aluminium screen, with hole for S.G. valve		2	0
4 Belling & Lee type "B" terminals		2	0
1 Lewcodensor .0002		2	6
6 Belling & Lee engraved wander plugs		1	6
2 Belling & Lee engraved spade terminals			9
2 Lewcos 200 X coils		13	0
2 Lewcos 60 X. coils		9	6
1 Lewcos 40 C.T. coil		3	6
1 Lewcos 60 C.T. coil		3	6
1 Pair ReadiRad panel brackets			10
1 Bulgin G.B. clip			6
1 Set ReadiRad Jiffilinx		2	6
3 Valves as specified	1	19	0
Screws, flex, etc.		1	4
TOTAL (including valves and cabinet)	£10	4	3

KIT A less valves and cabinet **£7 : 0 : 3**
or 12 equal monthly payments of **13/-**

KIT B with valves less cabinet **£8 : 19 : 3**
or 12 equal monthly payments of **16/9**

KIT C with valves and cabinet **£10 : 4 : 3**
or 12 equal monthly payments of **19/-**

ARROW TWO

	£	s.	d.
1 Drilled ebonite panel, 14 in. by 7 in.		4	6
1 Formo dual condenser, .0005, with brass supports		16	3
1 ReadiRad 35-ohm rheostat		2	0
1 ReadiRad on-off switch			10
1 Bulgin change-over switch, No. 533		2	3
1 Cyldon reaction condenser, .0002		6	0
1 Lewcos dual-range coil, type D.W.A.		15	0
2 W.B. anti-microphonic valve holders		2	6
1 Varley L.F. transformer, Nicore II		15	0
1 ReadiRad "Hilo" H.F. choke		4	6
1 ReadiRad .0003 fixed condenser, with grid-leak clip			10
1 ReadiRad 2-megohm grid leak			10
1 Igranic pre-set condenser, .00027 max		2	6
1 Igranic "Minor" S.M. dial		3	0
1 Paxolin coil former, 3 in. by 1½ in.			9
2 Junit terminal mounts		1	4
4 Belling Lee, type "B," engraved terminals		2	0
5 Belling Lee engraved wander plugs		1	3
2 Belling Lee engraved spade terminals			9
2 oz. No. 26 d.s.c. wire		2	0
1 Pair ReadiRad panel brackets			10
1 Grid-bias battery clip			6
1 Special screen ReadiRad		2	6
1 Set ReadiRad jiffilinx for wiring up		2	6
2 Valves as specified		19	0
1 Hand-polished oak cabinet, with 9-in. baseboard	1	2	6
Screws, flex, etc.		1	1
TOTAL (including valves and cabinet)	£6	13	0

KIT A less valves and cabinet **£4 : 11 : 6**
or 12 equal monthly payments of **8/6**

KIT B with valves less cabinet **£5 : 10 : 6**
or 12 equal monthly payments of **10/6**

KIT C with valves and cabinet **£6 : 13 : 0**
or 12 equal monthly payments of **12/3**

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AROUND THE SHOW—Some Special Points of Interest (*Continued*)

capacities will be in order. Already Cossors have produced two new screen-grid valves in which the inter-electrode capacity is claimed to be .001 micromicro-farads.

There are so many new small components that it is impossible to detail them here. My advice to all home constructors with regard to getting full details of all the new parts is to read carefully the stand-to-stand reviews of the Exhibition given in last week's issue of "A.W." and also to follow "Observer" in "Postcard Radio Literature" week by week, for this contributor picks on all the new parts and through the "Postcard Radio Literature" free service you can have full details sent to you.

A striking new Ferranti receiver. This is mains-operated

One of the new Telsen components, on H.F. choke

A very worthy attempt to lower the price of small parts has been made by many firms and quality has not been allowed to suffer. Take Telsen, for instance; this concern has introduced worthy successors to the Telsen Radio-Grand and Ace transformers in the shape of an H.F. choke, valve holder and small variable condenser. These are sold at astoundingly low prices.

Lissen, Ltd., have an all-embracing range of components for set constructors (in addition to other Lissen products such as H.T. batteries, speakers, complete sets and radio gramophones), and firms such as A. F. Bulgin & Co. have many parts which will not only assist constructors of new sets, but which will also prove of use to those who want to make their receivers more up to date or more convenient in use.

The Regentone W2A eliminator

The Clarke's Atlas AC 188 unit

A handy mains component, the Atlas Rheograd

One of the new J.B. Chassimount ganged condensers fitted with the J.B. vernier drum drive

The Lectro-Linx valve holder

One of the Radio Instrument's new cabinet receivers

"GERMAN RADIO COMPARED WITH OURS"

(*Continued from page* 401)

broadcasting headquarters is that we had to arrange our studios to permit sometimes three productions to be broadcast at the same time. There is not this complication in Germany."

Zeesen, which lies some 30 kilometres from Berlin, is the Daventry of Germany and in many ways is not unlike it. The Chief Engineer said:

"Although Zeesen is something like Daventry, it is quite unlike the new regional station at Brookman's Park. All the components of the Zeesen transmitter are mounted separately and not screened in units, as is done at Brookman's Park."

I reminded Mr. Ashbridge that English listeners have a lot of trouble in separating Zeesen from Daventry on the one side and Radio Paris on the other. Was this due to some weakness in the station, or to its unfortunate wavelength allocation?

"Zeesen provides a very good service in Germany. But you have raised an interesting point. Do you know, German listeners have just the same trouble in getting Daventry clear of their own station. The Brookman's Park stations are heard in Germany much better than Daventry 5XX after nightfall, just as we hear the medium-wave Germans better than we hear Zeesen."

I told Mr. Ashbridge how well I had heard our National 261-metre transmitter when at Juan Les Pins recently. He said that in Lausanne he had heard the National transmitter much more strongly than the 356-metre Regional, although, as in my experience, fading was noted.

Returning to the new Muhlacker station the Chief Engineer remarked: "One point of interest in the new high-power German station is the use of wooden masts. They are 300 to 400 ft. high and are made of wood to avoid mast screening effects."

I reminded him that the masts of B.B.C. stations are of steel lattice-work construction. Did we get screening troubles?

"We do not, because we insulate our masts at the base and take special precautions to prevent 'shadow' effects."

Asked about studio technique in Germany, the Chief Engineer said they were now taking a lot of interest in modulation control, in an effort to improve reception by the avoidance of "blasting."

"Studios are similar in dimensions to ours, but they certainly contain a higher degree of reverberation. The Germans do not seem to favour synthetic echo."

The recent success of the Salzburg relay prompted me to ask whether the Germans were ahead of us in land-line technique. The Chief Engineer was non-committal, but he said, in concluding our interview:

"Lightly-loaded cables with a high cut-off are the best for good broadcasting quality. Underground circuits will gradually be introduced into the B.B.C. system, thus providing land-line quality at least as good as on the Continent."

A man who, according to evidence, collected nineteen batteries from various clients and vanished, duly appeared in Court. An "accumulator" charged!

A newspaper article refers to "the amateur wireless builder surrounded with screws, etc."

Make your Battery Set all-electric

The Six-Sixty A.C. all-mains conversion equipment is suitable for practically any battery operated receiver.

No internal wiring alterations. Equipment includes specially selected Six-Sixty A.C. valves—and Six-Sixty 4/5 pin valve holder adaptors.

Yes, we know how you feel about it—this question of scrapping a perfectly satisfactory battery set in order to change to all-mains—so we have produced the Six-Sixty all-mains conversion equipment. To start with, you need to alter nothing of the construction of your set—the special Six-Sixty valve-holder adaptors make your present valve-holders fit the 5-pin valves supplied. Then you are buying a unit, in the fullest sense, an eliminator and a set of specially selected A.C. valves, built by *one* manufacturer to co-operate and work perfectly together.

The Six-Sixty Unit can be supplied to operate from any A.C. house mains. H.T. tappings of 50, 75, 100, 120, 150 and 200 volts are provided and G.B. tappings of 1.5, 3, 4.5, 8, 15 and 20 volts, any three H.T. or two G.B. values being available simultaneously. Grid Bias is on the ultra modern automatic principle—all risk of overloading eliminated. The dimensions (13 x 5½ x 4) of the complete equipment are not larger than your present batteries—an important point—and the H.T. leads need never be removed from the set when once inserted. Isn't that what you've been waiting for? Of course it is—but why wait any longer?

Price: A.C. Mains Conversion Equipment complete from £8 : 5 : 0
Mains Unit (H.T., L.T. and G.B.) only ... ... £6 : 6 : 0

Write for leaflet giving particulars of complete range, including new Six-Sixty Valves, Six-Sixty Cone Speaker Assembly and Cone Speaker Paper, Six-Sixty Turntable, Six-Sixty Valve and Set Tester, Six-Sixty Valve Adaptors, Six-Sixty Gramophone Pick-up Attachments, Six-Sixty Grid Leaks and Holders.

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IN MY WIRELESS DEN

WEEKLY TIPS—
CONSTRUCTIONAL AND THEORETICAL

By W. JAMES.

The Voltage of a Pick-up

HOW many volts are generated by a pick-up? Sometimes two or three; but, as a rule, a volt is good average.

The magnitude of the output from a pick-up may surprise readers. It used to be thought that a fraction of a volt was all that could be expected. But this is not true. Some notes, particularly low ones, create relatively large voltages.

A pick-up that I use, with a 3-1 transformer, gives me as much as 9 volts across the secondary on occasions. This illustrates the necessity for adequately biasing the grid of the valve to which the pick-up or transformer is connected.

A further point is that if the output from the transformer is applied direct to the grid of a two-valve power amplifier loud signals will be obtained. Probably a volume control will be needed; but this will, of course, depend upon the size of the output stage and the amount of the magnification.

Greedy Screen-grids

The current passed by some screen-grid valves is pretty heavy—five or six milliamperes. The question, therefore, arises as to how this may be reduced when the full magnification is not needed.

Two methods occur to me. One is to apply grid bias, say, negative 1.5 volts. This amount of bias will reduce the anode current considerably.

The second method is to reduce the value of the screen voltage. This will lower the anode current and at the same time will increase the impedance of the valve. There are times when it is not desirable to reduce the voltage of the screen owing to the other effects produced, and this also applies to the grid bias suggested.

When a valve is passing too much current, however, the grid bias must be increased or the screen-grid voltage be reduced. Changes in the voltage of the anode do not produce much effect.

For Frame-aerial Users

A point worth noting in connection with frame aerials is that the inductance of the aerial depends upon not only the number of turns, but the spacing.

You may wind on fifteen turns and find the wavelength range too low. This can be altered by pressing the turns closer together. Sometimes a spacing of one-quarter inch is recommended, and this may be satisfactory. But the inductance of the frame will be greater when the turns are placed side by side.

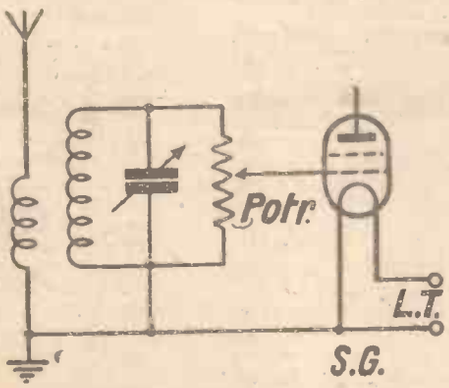
I have just heard of a case where the wavelength range was too low, the turns being right in number. The trouble was due to the spacing being excessive, and when the turns were put closer together the wavelength range increased.

A Handy Volume Control

A form of volume control that appears to have advantages is shown in the circuit given herewith, and comprises a high-resistance potentiometer connected across the tuned circuit.

Unfortunately, however, the method is not so successful in practice. The potentiometer does not behave entirely as such. In other words, when the contact arm is set half-way, much less than half the voltage across the tuned circuit is applied to the grid.

This is because the top half of the resistance is in series with the grid and



A handy form of volume control. The connections are explained in the accompanying paragraph.

lowers the voltage. If a fairly low resistance is used for the purpose of avoiding this effect, the grid circuit is affected. Its selectivity is reduced and the signal strength is lowered.

Thus it seems that this form of control, which at first glance looks so nice, is actually one having snags. The method is therefore not widely used. Those who would like to try should use a non-inductive potentiometer having a resistance of, say, from 200,000 to 500,000 ohms.

Are Mains Sets Economical?

What is the amount of power taken by a typical mains set having three or four valves? Thirty or forty watts seems a reasonable amount; that is, about the amount taken by a small electric lamp. The cost of running is, therefore, quite small, being a penny or so a week.

Permanent-magnet Moving-coils

Moving-coil speakers are likely to increase in popularity now that permanent-magnet types of reasonable price are available. True, some people say they do not care for moving-coil reproduction. But that is probably because they have heard only a poor example.

A good moving coil with a good set provides fine results. There are other good speakers, but I am fond of my moving-coil, and have lately changed over to a permanent-magnet type, which is satisfactory.

Alternating-current Valves

Valves of the A.C. type have to be supplied with current for the heaters at 4 volts. Higher and lower voltages are not satisfactory, and for this reason it is advisable to be sure that the valves have exactly 4 volts under working conditions.

A transformer whose voltage does not vary too much with the load should be used, but the no-load voltage ought not to be accepted as the actual voltage.

Transformer Facts

It is, I suppose, generally realised that the inductance of a transformer falls off as the current through the primary increases. Thus we find that the inductance of a transformer when connected to a valve of medium impedance is, say, 50 henries and only 30 henries when a valve of the low-impedance class is used.

The difference in the inductive values is due to the greater current passed by the lower impedance valve, and an obvious result is that the low-note magnification is proportionately reduced.

At the same time, there are other effects. The high-note reproduction may be increased or decreased. Certain it is that the higher notes are affected, besides which the quality may be impaired by the production of harmonics through the transformer.

New Fixed Condensers

I have lately seen some pretty little fixed condensers; quite cheap they will be, too, when issued.

The time has definitely arrived, I think, when we shall be able to buy fixed condensers of good quality at quite low prices. Some of the condensers issued are, as I have said before, unnecessarily elaborate.

The main thing about a condenser is, of course, the condenser element, and provided this is fitted with a neat and serviceable case, then the component is satisfactory. A few new ideas are badly needed by some of the component people.

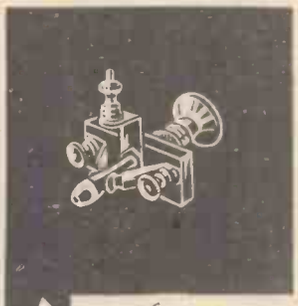
BUILD THROUGHOUT WITH READI RAD COMPONENTS

Readi-Rad Components are remarkably low in price, but they are certainly not "cheap." They are high-grade components cleverly designed to do their work in the most efficient manner, but all the unnecessary and costly "frills" have been eliminated in order to save you money when set-building. The proof of their efficiency is to be found in the frequency with which they are specified in the Technical Press.

OLYMPIA—STAND 238

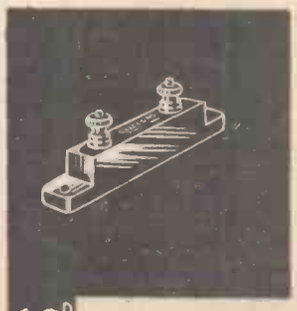
10d. **READI-RAD SWITCH**

A Push-pull on and off switch of exceptionally "clean" design and robust construction. All metal parts heavily nickel plated and polished. Specially designed to maintain constant and noiseless contact and smooth, easy movement. One hole fixing. Fitted with attractive knob. Price 10d. each.



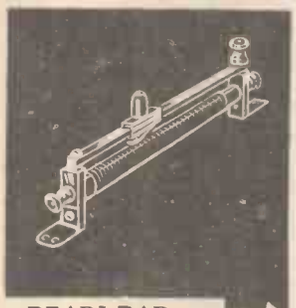
1/6 **READI-RAD WAVECHANGE SWITCH**

A 3-point push-pull switch, particularly suitable for use in dual-range tuning circuits. Designed on low-loss principles giving certain contact, smooth action and reliable service. Heavily nickel-plated polished metal parts; attractive knob; one hole fixing. Price 1/6.



10d. **READI-RAD FIXED CONDENSER**

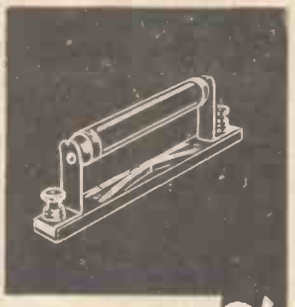
An entirely new and unique method of construction has made possible the production of this new range of fixed condensers at a remarkably low and economical price. A further attractive feature is the extremely small size which has been achieved without in any way affecting the very high efficiency of the condensers. Capacities .0001, .0002, .0003, .0005, .001, price 10d. each.



2/9 **READI-RAD POTENTIO-METER**
(Baseboard Type)

Very small and compact; easily fitted; easily connected; particularly smooth, accurate and noiseless adjustment; positive contact—these are the outstanding features of this baseboard-mounting Potentiometer. Accurately made, with nickel-plated metal parts. Resistance, 400 ohms. Price 2/9.

200 ohms, 2/9; 400 ohms, 2/9; 300 ohms, 3/-; 1,000 ohms, 3/6.



2/6 **READI-RAD RESISTANCES**
De-Coupling Type

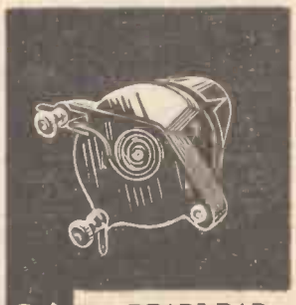
A wire-wound Resistance, specially designed for use as a de-coupling resistance in order to prevent "motor-boating" in the method now recommended in most popular circuits. 600 ohms; complete with moulded bakelite base. Price 2/6.

Anode Feed Type

Supplied in two resistance values most suitable for use in the latest circuits of the Technical Press. 25,000 or 10,000 ohms. Complete with base. Price 2/6 each.

4/6 **READI-RAD "HILO" H.F. CHOKE**

A real "de-luxe" H.F. Choke specified time after time by the most famous designers of the British Technical Press. Used by all discriminating constructors. High inductance; extremely low self-capacity. Efficient over tuning range of 10 to 2,000 metres. Solid ebonite hand-turned former, on bakelite base, designed to take up minimum baseboard space. Price 4/6.



2/6 **READI-RAD 'BROOKMANS' CONDENSERS**

This amazingly popular range of condensers now includes all capacities suitable for tuning and reaction. Heavy gauge brass vanes are of true logarithmic design with bakelite dielectric. Phosphor-bronze spring pig-tail provides thorough noiseless contact with moving vanes. One hole fixing. Particularly small dimensions and light weight. Complete with bakelite pointer-knob. Capacities .00075, .0005 and .0003, 3/6 each; .0001 mfd., 2/6.

2/- **READI-RAD STANDARD H.F. CHOKE**

An entirely new H.F. Choke of novel design particularly recommended for all sets where small dimensions are an advantage and high efficiency essential. Windings are hermetically sealed in bakelite case. Easily mounted by a single screw to baseboard or panel. Terminals are particularly accessible. A masterpiece of efficiency at a startlingly low price, 2/-.

1/3 **READI-RAD FUSE**

An essential component in every receiver. Protects your valves from damage due to accidental wrong connections of battery leads. Rated to blow at 100 m/a. Bakelite moulded base of particularly small dimensions and neat design. Easily fitted on baseboard with accessible terminals. Price, Holder, 9d., Bulbs, 6d. Spare bulbs, 6d. each.

6/6 **READI-RAD DUOGRAPH DIAL**

A slow-motion dial of particularly handsome appearance. A special feature of outstanding advantage is the double ratio reduction gearing by which ratios of approximately 8 to 1 and 100 to 1 are provided by two knobs placed one behind the other. Easily fitted to standard ¼ in. spindles simply by tightening one screw. Price 6/6.

Ready Radio

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Telephone: Hop 5555 (Private Exchange) Telegrams: READIRAD, SEDIST.

READY RADIO (R.R., Ltd.), 159 BOROUGH HIGH ST., LONDON, S.E.1

IN SEARCH OF TRUE PURITY

KENNETH ULLYETT gives some good advice which will interest you if you are dissatisfied with results and want to improve your reception for the new season

This is a plan view of a simple push-pull stage, and in the right-hand photograph—

—the simple layout of the two valves and input and output transformers can be seen

A MISTAKE that many people make is in believing that true purity in reproduction can be obtained without some attempt to reproduce true volume.

I do not mean that it is necessary to have a set blaring at its maximum to get lively reproduction, but even with the best of sets there is something very unreal about the reproduction when the volume knob is turned to its minimum position.

Personally, I always think that very soft—although, no doubt, very good—reproduction is something like looking at a distant scene through the wrong end of a pair of binoculars.

The true purity is there, but the "naturalness" is not.

The reason with the binoculars is obvious, but it is not quite so obvious in the case of sound, for it is not easy to see why a weak sound, if undistorted, should not be as acceptable to the ear as a loud and still undistorted sound.

The real reason is a little involved. While a set may have what technicians term a "straight-line characteristic" (that is, while it can reproduce all frequencies, from the higher to the lowest, with the same degree of perfection), and while the speaker may reproduce just as satisfactorily, the final link, the human ear, does not hear things as it should.

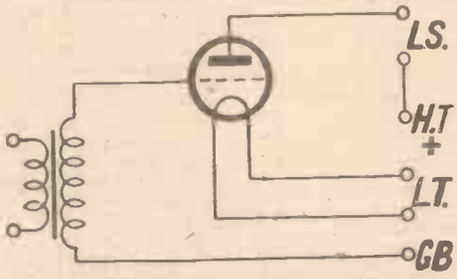
Getting Naturalness

The average human being hears higher tones better than lower tones, and subconsciously places more importance on them. For example, many telephone conversations appear perfectly "natural," although any telephone engineer will tell you that there is a huge degree of low-note cut-off on the 'phone, and that there is practically no bass at all.

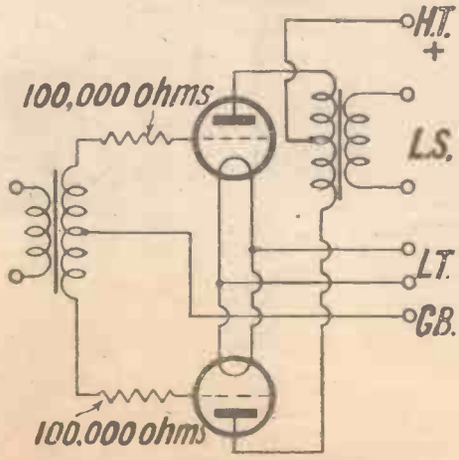
With some modern super-performance radio-gramophones, the reproduction is as good as anyone could wish for and the bass notes really appear to be there—although whether that is so or whether it is merely a harmonic bass is a matter of comparative unimportance.

Now, this reproduction may seem very well to a listener standing at a reasonable distance from the instrument. When the volume is turned down the reproduction appears to get shrill.

This is not the fault of the volume control, but is simply a proof of a physical fact that when the volume is decreased, the decreasing, so far as the human ear is concerned, starts with the low notes, and the bass drops off first. The corrollary of this is that in order to have the bass properly heard, the volume must be sufficient.



Compare this circuit of a plain low-frequency stage with—



—this circuit of a very simple push-pull stage

There are many sets which should give better reproduction if the volume were increased, which can be so by putting up the high-tension voltage and, perhaps, fitting a larger power valve to cope with the increased output.

For example, take the standard amplifier used in the AMATEUR WIRELESS laboratory (it was described recently on page 236 of AMATEUR WIRELESS No. 430). Many speakers give very fine reproduction on this amplifier with an input power of about 5 watts, although they may show all manner of faults on a less powerful amplifier.

There is no doubt at all that the real way to get true purity is to have sufficient H.T. and a power valve capable of standing up to the job. It is not the cheapest way, but the additional expense is not so great as many people suppose.

With the new reductions in valve prices the initial cost of a large power valve, or even a couple of small power valves for a push-pull arrangement, is not so out of proportion as it was with the cost of the other valves in the receiver.

Advantages of Push-pull

There is no need to have a very large and expensive eliminator for providing the H.T. If a smaller eliminator is already being used, then a push-pull circuit can be used for the final stage of your set and you will get the same results as are to be had from a large power valve, without increasing the H.T. voltage up to the 300 mark.

I have a small push-pull stage which works quite well on 150 volts with two of the new P2 power valves, and these are not at all expensive valves to buy.

Alternatively, if one has an eliminator which gives a high enough voltage, but which has not a current output for a power valve of the "super" class, then a cheap way out of the difficulty is to use the eliminator only for the power valve and to use an ordinary medium-capacity dry battery for the other valves in the set, which is a job in which it will give good service, for the current demand is low.

The Question of Cost

Of course, if one is working entirely from dry batteries, then the cost of increasing the H.T. supply, both in current and voltage, to deal with a large power valve, is certainly higher, but with some of the new valves a high-tension voltage of 150 is sufficient. Some of these valves take slightly more low-tension current, perhaps .2 or even .25 ampere, instead of .1 or .15 ampere, but that does not matter very much.

I have just been trying out one or two well-known makes of balanced-armature units on the AMATEUR WIRELESS amplifier from which one can get a maximum of 10 watts output if necessary, and it is rather surprising what a huge volume some of them will stand without rattling.

NEW LIGHT ON THE SELECTIVITY PROBLEM

Here Mr. W. James gives some useful advice to readers who are having trouble in getting selectivity consistent with good volume.

THE tendency nowadays is to use a single low-frequency stage. There are, to be sure, instances of two stages being used with good results. Then we have other sets with a stage of push-pull amplification, some having an amplifier between the output stage and the detector, and others being coupled directly with the detector.

The amount of the volume needed is a factor here, as quite enough output can be obtained from a "power" detector to load a power stage of sufficient size for a normal volume of reproduction. Power output is, as a matter of fact, easily obtained. The difficulty is always to obtain the station desired, and that only, with adequate volume.

My point is, of course, that unless a set be sufficiently selective, more than one station may be heard together. A *balanced* set is, therefore, needed for the proper reception of the broadcast.

From this it naturally follows that selectivity must be dependent upon the power or magnification of the set.

Local-station Sets

With a set of low magnification, for example, such as you might call a local-station set, the selectivity need be only just enough to separate the local stations. With greater selectivity, nothing would be gained. The set would not be able to bring in other stations, owing to its lack of magnification.

A local-station set, then, needs just enough selectivity to separate the local stations, and sufficient magnification to enable them to be heard at the desired strength.

Now let us suppose a further stage of low-frequency is added. What is the result?

First, that the total magnification is greater and louder signals may be obtained, depending upon the size of the first valve.

Secondly, that the two local stations probably now interfere. They will not if a volume control is fitted and is so adjusted that the amplification is just what it was before. But interference will probably be experienced if the extra amplification is used.

Now, why is this?

It is because we have raised the amplification above the point allowed when arranging the tuned circuit which controls what passes to the detector.

A Comparison

And here we have a valuable clue as to what happens. In the two sets exactly the same signals reach the detector. There might be, for example, a signal having the strength of 50 units from the station to which the set is fully tuned and also a signal of, say, 1 unit from an interfering station. With a magnification of 50 times we have strengths of 2,500 and 50 units applied to the power valve, this being for the 2-valve set.

The interfering signal is not heard, its strength being only 50 units. But now, when the 3-valve set is working, with its magnification of, say, 1,000 times, the interfering station produces a strength of 1,000 units.

This is just a little less than half of the full strength obtained from the 2-valve set, and will obviously be heard. The figures are given merely to illustrate my point, namely, that the addition of a stage of low-frequency magnification, while increasing the total amplification and, perhaps, the power output, very often does allow interference to be heard.

With an increase in the magnification should also be arranged better selectivity. With this the set becomes something more than a local station receiver, for the increased magnification means that distant stations will be brought up to good strength and the improved selectivity, that some, at least, will be received clearly.

In an ideal set the selectivity and magnification would be so balanced that any station within range will be heard without interference.

Comparatively few sets are so nicely arranged. The truth is that it is so easy to increase magnification; much more difficult to better the tuning without adding to the number of controls. When we add a high-frequency stage, we usually increase the magnification and improve the tuning as well. Generally, we do not improve the tuning enough; relatively, that is.

With quite a broad-tuning circuit and a screen-grid valve, the magnification can be increased fifty times. But the contribution made by the tuned circuit to the overall selectivity is relatively too little. The result is that you notice how the sensitivity of the set has increased, but that it tunes broadly. With a sharply-tuned circuit attached to the screen-grid valve, it is possible that the selectivity will be too great for the amplification.

When tuning a set having this fault you will notice gaps on the tuning dials between the points where stations come in. This is clearly as big a defect as not enough selectivity, when there are no clear sections between the tuning points of the chief stations.

Modern Conditions

For modern conditions it is desirable to have four valves, with three good tuned circuits. With more valves and further circuits better results will, of course, be obtained.

The four-valve arrangement will, however, provide good results, acceptable to many amateurs. Foreign stations will be receivable with regularity. There will be a margin of safety with some of the more powerful stations and better quality than is usual will be obtained, because the set will not have to be forced as many three-valve receivers are.

We can arrange four valves very easily in two ways. First, we can have one screen-grid stage, a detector, and two low-frequency magnifiers, and, secondly, two high-frequency stages, using screen-grid valves, a detector and one low-frequency stage. The better scheme of the two depends upon circumstances, and actually the final result is about equal with both.

The two arrangements will be as illustrated in Figs. 1 and 2. In Fig. 1 is an

(*Continued on page 420*)

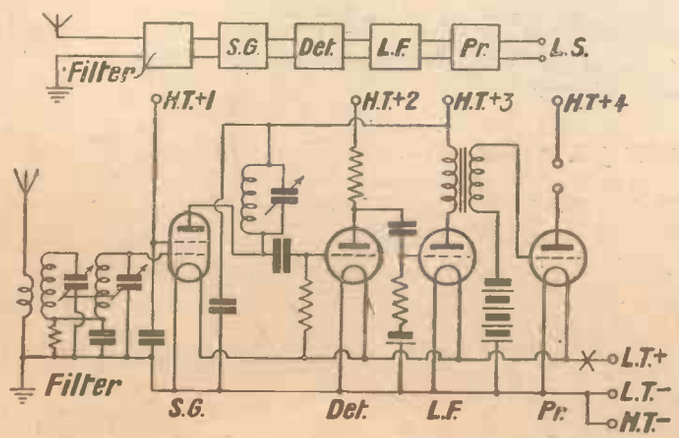


Fig. 1. A circuit in which an aerial-circuit filter is employed

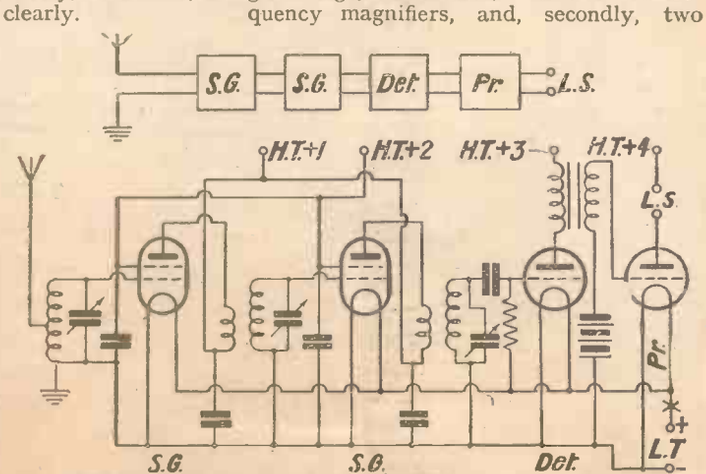


Fig. 2. A two-screen-grid arrangement in which there are three tuned circuits

A SELF-WINDING GRAMOPHONE MOTOR

AS gramophone users may know, clockwork and electric gramophone motors may have disadvantages when a pick-up is used in place of an acoustic soundbox.

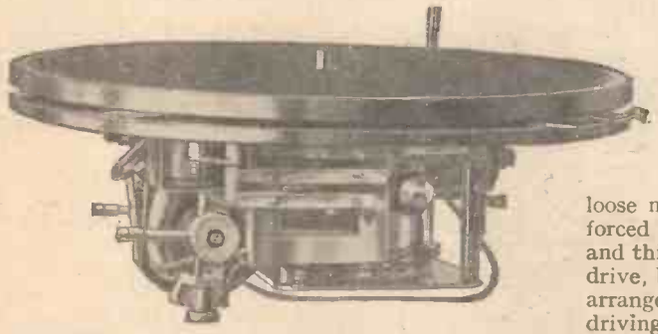
The convenience of electric reproduction is such that the inconvenience of winding up a clockwork motor is all the more obvious, and with some electric motors it is difficult to prevent a slight induction effect between the motor windings and the pick-up.

Both these possible disadvantages are overcome in the new A.E.D. self-winding gramophone motor, which is a high-class clockwork motor automatically wound by an electric motor. This, obviously, overcomes the need for tedious winding, and at the same time there is no possibility of electrical interference, for the motor winds only when the clockwork motor is not working.

The motor is supported on a unit plate with an automatic stop. The electric drive is connected to the clockwork mechanism through the intermediary of a reduction gear, and the arrangement which prevents the electric motor overwinding the spring is very simple.

The coupling consists of one member fixed to the winding shaft and one sliding member held in engagement by a coil spring, the tension of which can be adjusted.

When the gramophone motor spring is wound up to such a point that its tension exceeds that of the small coil spring holding the coupling members in engagement, the loose member of the coupling is forced back out of engagement and this not only disconnects the drive, but by means of a contact arrangement, switches off the driving motor.



The new A.E.D. self-winding gramophone motor which though spring driven is electrically wound

The electric winding motor is of the universal type and can be used on alternating and direct current supplies of all the usual voltages. The current consumption is, of course, very low, for the motor is only in use intermittently for about 30 seconds at intervals of 3½ minutes.

The makers of this interesting gramophone motor are Auto Electric Devices, Ltd., Diamond Works, Brighton, Sussex.

"NEW LIGHT ON THE SELECTIVITY PROBLEM"

(*Continued from page* 418)

aerial circuit filter or loosely-coupled circuit, followed by the screen-grid stage. Fig. 2 shows the two screen-grid arrangement, there being the three tuned circuits.

These two circuits may be so arranged that they are well balanced in their amplifying and selecting powers, so that with an outdoor aerial in a place not too close to a broadcast station a fair number of stations can be brought in at good strength without trouble.

Unfortunately reception conditions vary so from place to place. Aerials differ, too, with the result that a set which appears to be quite selective enough in one place may seem not too good in another. The general principle remains, however, that the two chief factors go hand in hand, an excess of one of them being without value.

Our chief trouble is always with the local station. Such a strong signal is usually received, that the station is heard over a fair tuning range. This trouble is removed, however, by providing good tuning and a useful volume control. If the tuning curve of the set is one showing reception of a narrow band of frequencies only, then the local station is of no more trouble to cut out than is a distant one.

More than three tuned circuits are necessary for this degree of tuning, however, and the set becomes expensive. No doubt in due course more valves will be used in popular sets and more power also. Then better all-round results will be obtained with regularity.

RADIOGRAMS

ON September 30 the Prime Minister, Mr. Ramsay MacDonald, will broadcast in the National programme a talk on "The Imperial Conference."

Cavallerie Cockneyana is the title of a musical burlesque forming part of the vaudeville programme down for transmission on September 30 (National) and on October 4 (Regional). It will include Mario de Pietro, Yvette Darnac, Edith Gunthorpe, Winnie Melville, Derek Oldham, and Cecil Baumer. Harry Hemsley, with his child impersonations, is also in the same "bill."

A Wisp of Lace, a play dealing with highwaymen and brocaded petticoats, is to be broadcast to Midland Regional listeners from the Birmingham studio on October 3. The action takes place on the famous Bath road and at Bath, in the Pump Room of that fashionable resort during a ball. Both book and music are by Vivien Lambelet, the daughter of the well-known composer.

By request, Hermann Kester's monologue, *Nurse Henriette*, will be revived in the National programme on October 24.

Mr. George Lockhart, one of the leading figures in circus life, has arranged for the microphone a special entertainment entitled, *On Both Sides of the Ring*. It will be broadcast in the North Regional programme on October 3. Doodles, the popular clown, provides the humour.

What a Nerve, a farcical sketch with an unexpected climax, with interpretation by Vera Ashe and Sydney Evans, is down for transmission through Midland Regional on October 4.

The National vaudeville programme on October 2 will present to listeners "turns" by Dorothy McBlain, Nancy Logan, Mabel Constanduros, Michael Hogan, Stainless Stephen, and Leslie Weston.

A private broadcasting station at Oporto (Portugal), styling itself Radio Porto, transmits a wireless programme on Mondays, Wednesdays, and Fridays, from 1.15 to 3 p.m. and from 11 p.m. to 1.30 a.m. B.S.T. On other days broacasts are made from 8.30 to 10.30 p.m. B.S.T. The station does not work on Sundays. Its wavelength is 240 metres.

In the last five years the number of listening licences registered in the Leningrad (Russia) area has increased 320 times. In 1925 there were 500 receivers; to-day over 160,000 are in daily use.

A new short-wave transmitter situated in the neighbourhood of Belgrade (Yugoslavia) broadcasts wireless entertainments every Monday evening, between 9 and 10 p.m. B.S.T., on 30 metres. The interval signal adopted is that of a metronome (fifty beats per minute).

Some mystery surrounds a small broadcasting station of apparently Portuguese origin. Although the call *Radio Sonora* is put out at regular intervals daily between 1 and 3 p.m. and from 11 p.m. to 1.30 a.m. B.S.T., no information is given regarding the site of the transmitter. The wavelength is given as 207 metres, and the signals are regularly heard in the northern districts of France.

The sum of about £20,000 has been allocated for the working expenses for the Indian Broadcasting Company for the year April 1 to March 31, 1931. At the moment there are fewer than 10,000 licence holders.

According to official information, the new PTT Strasbourg station will carry out tests during September and the official inauguration of the transmitter has been fixed for October 3.

The German State Broadcasting Company has just lost a case in which it claimed copyright, for its news services on the ground that "part" of the news had already appeared in the Press.

Olympia!

LOOK FOR STAND No. 69

Here you will see the latest Telsen Successes—Components which have been the talk of the Show. Every Telsen Component has been designed to give maximum efficiency, whether used individually, or collectively; they have a most striking appearance, each model being made in beautiful Genuine Bakelite of exquisitely grained walnut.

To realize the beauty of music—clear speech—without background or distortion of any kind, it is essential to include in your set components which give perfect synchronisation with each other—and no finer components could be incorporated for this purpose in any set than the Telsen range—they are the last word in radio design—technically and externally.

Replace your old parts with "Telsen scientifically designed Components"—"Radio's Choice" for "Better Radio Reception."

Telsen "Radiogrand" Transformer specially selected for the "A.W." Exhibition 3" set described in this issue.

TELSEN

TRANSFORMERS

Advt. of TELSEN ELECTRIC CO., LTD., BIRMINGHAM.

WE TEST FOR YOU

A weekly review of new components and tests of apparatus.

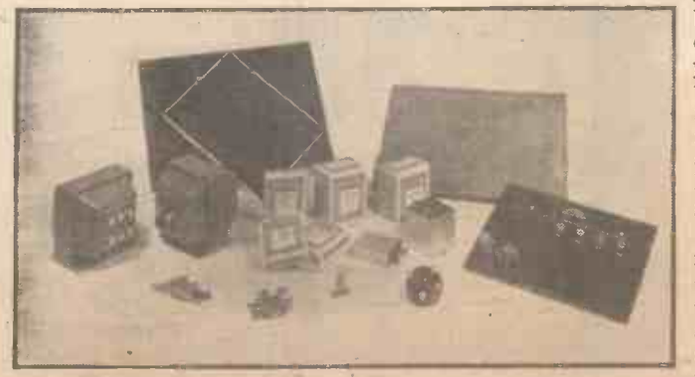
Conducted by our Technical Editor, J. H. REYNER, B.Sc., A.M.I.E.E.

Stal Eliminator Kit

THE saving in cost by making a set from parts is a fact of which most readers are fully aware.

A new idea is the home-building of eliminators. We have built up and tested a Stal eliminator from the parts supplied by the makers. It comprises a mains transformer for use with a Triotron valve, a double-wound choke of ample dimensions, two 4-microfarad condensers, and three 1-microfarad condensers. These are all mounted according to diagram on a wooden baseboard, and finally enclosed in a protective metal case. A fuse is supplied to prevent damage in the event of a short circuit. The primary of the mains transformer we tested was wound for 220 and 250 volts, but other voltages can be obtained.

It took approximately one hour to mount the components and to wire them up roughly, after which the eliminator worked without any trouble. By means of a potentiometer linked across the extreme positive and negative terminals, four different H.T. potentials are available. The values of both current and voltage output given by the makers were found to be substantially correct: 40 milliamps was provided at 175 volts, using the full tapping. On the second tapping 17 milliamps was provided at 140 volts, and on the third, 7.5 milliamps at 120 volts. The fourth tapping gave 2 milliamps at 90 volts. The output is, therefore, sufficient to operate quite powerful sets and would give reasonable volume from a moving-coil speaker. The smoothing was good, only a slight hum being noticeable when not receiving music or speech. The eliminator should give good results under normal conditions, and may be recommended to readers.



Here are some of the parts included in the Stal home-built eliminator kit

New Blue Spot Speaker

THE Blue Spot speaker unit is well known to readers. Right from the beginning, this unit has been a success, and the various improved models which have made their appearance from time to time have added to the laurels gained by the original.

Readers will be interested, therefore, to learn that a new model complete Blue Spot speaker is now made. This consists of a Standard Blue Spot unit attached to a cone some 10 inches in diameter.

In an attractive veneer-walnut cabinet, the new Blue Spot speaker

This cone is supported at the periphery by felt, and is arranged to be virtually free-edged. The material of the cone itself is "dead," this being recognised nowadays as the correct procedure, since anything of a stiff nature is liable to break up into marked subsidiary resonances in the higher frequencies and give a screechy tone.

The cone is reinforced near the apex in order to give rigidity, and the result, judged from an aural test was very successful. The tone is pleasing, and the sensitivity good.

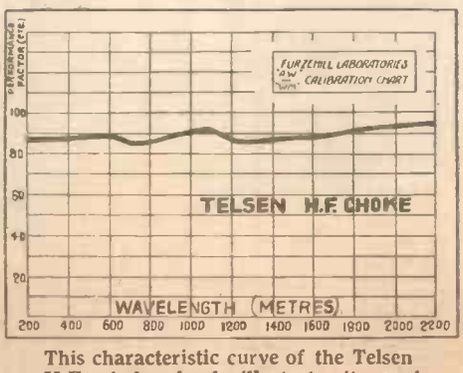
The whole apparatus is housed in a cabinet measuring 12½ in. by 12½ in. by 6 in. from back to front. As can be seen from the photograph the cabinet is quite plain with rounded edges, and is of distinctive appearance.

There is an adjustment at the back whereby the correct position of the balanced armature unit can be found. The finish is actually a walnut veneer, and at a price of 50s. retail this speaker should prove an attractive proposition.

Telsen H.F. Choke

ONE of the new lines introduced by Telsen this season, is an H.F. choke which sells at the very low price of 2s. 6d. An H.F. choke is to some extent like an intervalve transformer. There is a limit to the reduction in price owing to the fact that one must obtain a fairly high inductance, which means wire, and wire costs money. It is possible to sell an H.F. choke at a price less than 2s. 6d. by making the inductance about 10,000 microhenries only, but such components are a sheer waste of money.

In view of the low price, therefore, this Telsen H.F. choke has quite a creditable performance. It has an inductance of 143,000 microhenries, and a D.C. resistance of 370 ohms. It consists of a small former, on which the winding is placed. This former in turn is fitted into a bakelite mould, which carries the terminals and a base portion fitted with holes for screwing down to a baseboard. The whole component is a little over 1½ in. wide, 1 in. deep, and 1¼ in. high, so that it is quite neat and compact, while in addition it is finished off in the new Telsen mottled brown moulding so that it looks quite attractive.



This characteristic curve of the Telsen H.F. choke clearly illustrates its good performance

We put our standard choke test on this component, to find the proportion of current which would flow through a .0001 by-pass condenser. The more current by-passed, the more efficient the choke. The performance factor of the choke is shown in the curve accompanying this report, and it will be seen to be uniform at or around a value of 85%.

Mains Units with Valves

SIR,—For the past two years I have used a James Touchstone Four receiver and this has given great satisfaction. The set is worked from an A.C. mains H.T. unit and operates a moving-coil speaker. Quite recently I noticed a falling off in the quality of reproduction and decided that the valves in the set had become worn out. These valves were replaced, as also were the various resistances, grid leaks and grid bias battery Reproduction is still muffled and indistinct and I am at a loss to account for the failing. My mains unit is one made by a reputable firm and has never required attention since it was first installed. Can you help me to get the clear cut reproduction which I originally obtained from my receiver?—H. W. (Dulwich).

If you are using one of the older type A.C. mains H.T. units, it probably has a valve rectifier incorporated in it. This rectifying valve, after two years' service, has no doubt finished its useful term of life. To prove whether the valve in your rectifier is faulty or not, you are advised to test the actual current consumption for each valve in your set. If the valves do not appear to be getting their rated amount of anode current, you may be sure the rectifying valve requires replacing. Should you decide to test the output voltages from your eliminator unit, use a voltmeter having a resistance of at least 1,000 ohms per volt.—ED.

Free Bias for A.C. Valves

SIR,—I have seen quite a number of circuits lately in which free grid bias is obtained for A.C. mains valves by the simple expedient of introducing a resistance between the grid-return circuit and the cathode circuit of the valve being biased. Is there a simple method of determining what value of resistance should be used to give a particular bias to the valve?—G. S. (Woolwich).

A study of the characteristic curve of the valve to be biased is necessary before it is possible to determine the value of a suitable biasing resistance. Ohm's Law may then be applied and the result is the resistance in ohms required. To give a definite example, examine the curve of the Marconi or Osram ML4 mains valve. At 150 anode volts and with 16 volts negative grid bias, an anode current of 14 milliamperes will flow. The formula for Ohm's Law is: Resistance equals voltage divided by the current in amperes. The biasing resistance required is equal to the biasing voltage divided by the anode current in amperes. To convert milliamperes to amperes, put the figure 1,000 above the milliampere figures. Reverting to our example, 16 volts × 1,000

$$\frac{}{14}$$

gives us the resistance required; in this case, 1,143 ohms approximately. If the figures do not work out to suitable round number figures for which resistances are readily obtainable, the anode voltage can be increased or decreased to facilitate obtaining a value of bias which will result in a satisfactory resistance value.—ED.

Fitting a Gramophone Pick-up

SIR,—It is my intention to use a gramophone pick-up in conjunction with my receiver. It is a straightforward detector and two L.F. receiver, having grid leak rectification. I already have a volume control fitted to the first stage of L.F. coupling and have been told that with this arrangement the adaptation for gramophone amplifying will be quite a simple matter. Can you advise me of what alteration to the wiring is necessary to enable me to achieve my object?—W. S. (Surbiton).

(*Continued on page* 428)

You should disconnect the wire between the grid leak and condenser and the grid of the detector valve. Connect the grid of the valve to the arm terminal of a single pole change-over switch, and wire up the grid condenser and grid leak to one switch-contact terminal. Connect the other switch-contact terminal to one terminal of the pick-up and take a flexible lead from the other terminal of the pick-up to a black wander plug. This plug should be inserted in the grid bias battery (at present in use with the receiver) at about one and a half volts negative. A volume control variable resistance should be connected across the pick-up terminals.—ED.

Adding Output Filter Circuit

SIR,—Hearing a conversation among fellow-passengers in a train concerning the advantages of using a choke-filter output circuit with a loud-speaker, I am writing to ask if you can give me some hints on the components and wiring required for such an arrangement. I have no interest in radio other than that of good reproduction from the British stations which I receive on my set. Possibly you have published details in past issues of your journal and can advise me in this respect?—B. R. (Ilford).

Choke filter output systems are incorporated in the design of most of our receivers which are intended for powerful speaker reproduction, but it is not necessary that you incorporate the components and wiring inside the cabinet of your set. They may be added externally and in the following manner. Connect one terminal of an L.F. output choke to the terminal marked L.S. positive on your set. Now connect the other terminal of the choke to the terminal marked L.S. negative on your set. Attach another piece of wire to the L.S. negative terminal on the set and take it to one terminal of a 2-microfarad fixed condenser. The other terminal of this fixed condenser should be connected to one of the terminals of your speaker. The other terminal of the speaker should be connected to the terminal marked negative L.T. on your set. Any well-known make of L.F. output choke, having an inductance of 20 to 32 henries and capable of carrying 50 milliamperes or more can be used.—ED.

Artificial Fading

SIR,—May I trespass upon your time for a few moments to thank you for giving me the solution to a problem which has been puzzling me for some time? In a recent issue of AMATEUR WIRELESS you mention an artificial "fade" effect produced by a faulty switch. I have experienced an almost similar occurrence.

I have a four-valver with two S.G. stages, and outdoor aerial and earth. My aerial and earth leads enter the house some four inches apart, the one terminating in plug and the other in a socket, a socket and plug being connected to the respective leads to the set.

For some time I have noticed periodic fading, which can immediately be cured by simply disconnecting and re-connecting the earth lead. This is only a temporary cure, and the fading sometimes occurs as many as ten times in an evening, while at others it may not be noticed for a week at a time.

I believe you have given me the clue to the mystery. R. P. J. (London, S.E.).

"Are Transmitters Ahead of Receivers?"

SIR,—I was interested in the article "Are Transmitters Ahead of Receivers?" in a recent issue of AMATEUR WIRELESS, especially the concluding remark that high-percentage modulation and high power signals necessitate the inclusion of power detectors, etc., in the receiving apparatus.

But surely, in this connection, you would have done greater justice to our foremost designers of receiving sets to have mentioned the new Science Museum receiver, by Messrs. R. P. G. Denman, A.M.I.E.E., and A. S. Brereton, M.A.

This remarkable receiver, incorporating, as it does, "band-pass" H.F. tuning, push-pull power grid detection (giving distortionless detection for modulation up to 90 per cent. and negligible distortion for 100 per cent. modulation), followed by "paraphase" L.F. amplification, shows a frequency-response curve which, between 50 and 8,000 cycles, departs from the mean by less than one decibel.

Such a performance is strictly comparable with that of the latest 50-kilowatt Western Electric transmitter, and as both are the best of their kind, this would have been a fairer basis of comparison than the set of curves shown.

J. B. W. (Reading).

I agree entirely with your correspondent's remarks on the high performance of the new Science Museum set, but my comparisons were based upon *average* receivers, in which category no one could place the Science Museum receiver.

When all sets, or even 50 per cent. of existing sets, approach the perfection exemplified we can congratulate ourselves. As no commercial set can be produced regardless of expense, that time is a long way off. On the other hand, the general use of such transmitters as the 50-kilowatt Western Electric model is within the realm of immediate practical politics.

ALAN S. HUNTER.

BROADCAST TELEPHONY

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

Metres	Kilocycles	Station and Call Sign	Power (Kw.)
GREAT BRITAIN			
25.53	11,751	Chelmsford (5SW)	15.0
*200	1,500	Leeds	0.16
*242	1,238	Belfast	1.2
*261	1,148	London Nat.	68.0
*288.5	1,040	Newcastle	1.2
288.5	1,040	Swansea	0.16
288.5	1,040	Stoke-on-Trent	0.16
288.5	1,040	Sheffield	0.16
288.5	1,040	Plymouth	0.16
288.5	1,040	Liverpool	0.16
288.5	1,040	Hull	0.16
288.5	1,040	Edinburgh	0.4
288.5	1,040	Dundee	0.16
288.5	1,040	Bournemouth	1.2
288.5	1,040	Bradford	0.16
*301	995	Aberdeen	1.2
*309.9	968	Cardiff	1.2
*356	842	London Reg.	45.0
*376.4	797	Manchester	1.2
*398.9	752	Glasgow	1.2
*479	626	Midland Reg.	38.0
1,554	193	Daventry (Nat.)	35.0
AUSTRIA			
*246	1,220	Linz	0.6
*283	1,058	Innsbruck	0.6
*352	851	Graz	9.5
*453	666	Klagenfurt	0.6
*517	578.5	Vienna	20.0
BELGIUM			
206	1,460	Antwerp	0.4
212	1,415	Binche	0.2
216	1,391	Chatelineau	0.25
216	1,391	Brussels (Conference)	0.25
243	1,235	Courtrai	0.1
244.7	1,226	Ghent	0.25
245.7	1,229	Schaerbeek	0.5
338.2	887	Forest	3.0
*500	590	Brussels (No. 1)	1.2
CZECHO-SLOVAKIA			
*263	1,139	Moravska-Ostrava	11.0
*279	1,076	Bratislava	14.0
293	1,022	Kosice	2.5
*342	878	Brunn (Brno)	3.0
*487	617	Prague (Praha)	5.5
DENMARK			
*281	1,067	Copenhagen	1.0
1,153	260	Kalundborg	10.0
ESTONIA			
401	748	Reval (Tallinn)	0.7
FINLAND			
*221	1,355	Helsinki	15.0
291	1,031	Viborg	15.0
*1,796	167	Lahti	54.0
FRANCE			
210	1,430	Radio Touraine	0.2
223	1,351	Fécamp	0.7
235.1	1,275	Nimes	1.0
240.4	1,248	Béziers	0.3
249.5	1,202	Juan-les-Pins	0.5
256	1,171	Toulouse (PTT)	1.0
265	1,130	Lille (PTT)	1.0
*272	1,103	Rennes (PTT)	1.2
286	1,049	Montpellier	1.2
*287.2	1,044.6	Radio Lyons	0.5
295	1,016	Limoges (PTT)	0.8
304	918	Bordeaux (PTT)	1.0
308.9	971	(Vitus) Paris	1.0
316	950	Marseilles (PTT)	1.5
328.2	914	Grenoble (PTT)	1.2
329	911.8	Poste Parisien	1.2
345.2	869	Strasbourg (testing shortly)	15.0
370.4	810	Radio LL (Paris)	0.5
385	779	Radio Toulouse	8.0
447	671	Paris (PTT)	1.0
466	644	Lyons (PTT)	2.3
1,446	207	Eiffel Tower	15.0
*1,725	174	Radio Paris	17.0
GERMANY			
31.38	9,560	Zeesen	15.0
*218	1,373	Flensburg	0.6
*227	1,319	Cologne	1.7
*227	1,319	Münster	0.6
*227	1,319	Aachen	0.31
232.2	1,292	Kiel	0.3
*239	1,256	Nürnberg	2.3
246	1,220	Cassel	0.3
*253	1,184	Leipzig	2.3
*259	1,157	Gleiwitz	5.6
*270	1,112	Kaiserslautern	0.25
*276	1,085	Königsberg	1.7
*283	1,058	Magdeburg	0.6
*283	1,058	Berlin (E)	0.6
*283	1,058	Stettin	0.6
*317.8	944	Bremen	0.3
*319	941	Dresden	0.3
*325	923	Breslau	1.7
*360	833	Stuttgart	1.7
*372	806	Hamburg	1.7
*390	770	Frankfurt	1.7
*418	716	Berlin	1.7
*453	662	Danzig	0.25
*473	635	Langenberg	17.0
*533	563	Munich	1.7
560	536	Augsburg	0.3
*566	529	Hanover	0.35
576.1	520.7	Freiburg	0.3
*1,635	183.5	Zeesen	35.0
1,635	183.5	Norddeich	10.0
HOLLAND			
31.28	9,599	Eindhoven (PCJ)	30.0
*299	1,004	Huizen (between 11.40 a.m. and 5.40 p.m. B.S.T.)	8.5
*1,071	280	Huizen	8.5
*1,071	280	Scheveningen-Haven	5.0
*1,875	160	Hilversum	8.5
HUNGARY			
210	1,430	Budapest (Csepel)	1.0
550	545	Budapest	23.0
ICELAND			
*1,200	250	Reykjavik (shortly testing)	16.0
IRISH FREE STATE			
*224.4	1,337	Cork (1FS)	1.5
*413	725	Dublin (2RN)	1.5
ITALY			
25.4 and 80		Rome (3RO)	9.0
247.7	1,211	Trieste (testing)	3.0
273.2	1,098	Turin (Torino)	8.5
332	905	Naples (Napoli)	1.7
379.5	790	Genoa (Genova)	1.5
*441	680	Rome (Roma)	75.0
453	662	Bolzano (1BZ)	0.2
*501	599	Milan (Milano)	8.5
LATVIA			
*525	572	Riga	12.0
LITHUANIA			
*1,935	155	Kaunas	7.0
NORTH AFRICA			
365.4	821	Algiers (PTT)	13.0
416	721	Radio Maroc (Rabat)	10.0
1,350	222.2	Tunis Kasbah	0.6
NORWAY			
364	824	Bergen	1.0
369	813	Frederiksstad	0.7
453	662	Nidaros	1.2
455	659.3	Porsgrund	1.5
*495.8	605.7	Oslo	0.5
POLAND			
214.2	1,400	Warsaw (2)	1.9
234	1,283	Lodz	2.2
244	1,229	Cracow	1.5
*313	959	Wilno	0.5
*335	896	Poznan	1.9
381	788	Lvov	2.2
*408	734	Katowice	16.0
1,411	212.5	Warsaw	14.0
PORTUGAL			
240	1,247	Oporto	0.25
320	937.6	Lisbon (CTIAA)	0.25
ROMANIA			
*394	761	Bucharest	16.0
RUSSIA			
720	416.6	Moscow (PTT)	20.0
800	375	Kiev	20.0
824	364	Sverdlovsk	25.0
1,000	300	Leningrad	20.0
1,060	283	Tiflis	10.0
1,103	272	Moscow Popoff	40.0
1,200	250	Kharkov	25.0
*1,304	230	Moscow-Stchelkovo (C.C.S.P.)	100.0
1,380	217.5	Bakou	10.0
1,481	202.5	Moscow	20.0
SPAIN			
251	1,193	Barcelona (EAJ15)	0.5
266.7	1,125	Barcelona (EAJ13)	10.0
*349	860	Barcelona (EAJ1)	8.0
368	815	Seville (EAJ5)	1.5
407	737	Madrid (España)	1.0
424	707	Madrid (EAJ7)	2.0
460	652	San Sebastian (EAJ8)	0.5
SWEDEN			
135	2,222	Motala	30.0
231	1,301	Malmo	0.75
*257	1,166	Hörby	15.0
299.6	1,001	Falun	0.65
*322	932	Göteborg	15.0
*436	689	Stockholm	75.0
*542	554	Sundsvall	1.5
*770	389	Ostersund	0.75
1,223.5	244	Boden	0.75
*1,348	222.5	Motala	40.0
SWITZERLAND			
318.8	943	Basle	0.65
*403	743	Berne	1.1
*459	653	Zurich	0.75
680	442	Lausanne	0.6
760	395	Geneva	1.5
1,010	297	Basle	0.25
TURKEY			
*1,200	250	Istanbul	5.0
1,961	153	Ankara	7.0
YUGOSLAVIA			
307.3	978.6	Zagreb (Agram)	0.7
430.7	696.5	Belgrade	3.0
574.7	522	Ljubljana	2.8

All wavelengths marked with an asterisk have been allotted according to the *Plan de Prague*.

TOWARDS PERFECTION

MR. WATSON WATT, in a recent lecture on "What is Wrong with Wireless," regards the loud-speaker as the weakest link in the broadcast chain, because of its failure to reproduce musical notes in their proper perspective. Next in order of demerit comes the output or power valve, closely followed by the microphone at the transmitting end, with its tendency to "blast" on the louder passages.

Mutual interference, or overlap, between the many stations now operating in the narrow band of wavelengths available for broadcasting, is another matter calling for urgent reform. Fading and atmospheric disturbances remain the most difficult obstacles still to be overcome by the radio engineer. B. A. R.

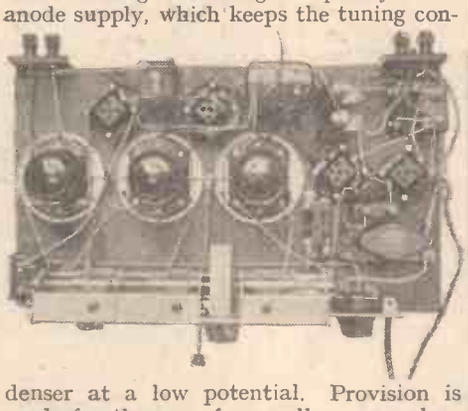
AUDIBLE "LIMITS"

THE lowest frequency which an acute ear can detect as a definite note or tone is about 20 cycles a second, whilst the highest is roughly 20,000 cycles. From the point of view of intensity, as distinct from frequency, the human ear is more sensitive to high-pitched notes than to low. As intensity increases, a point is reached where the sound causes physical pain. If the faintest audible note is reckoned as unity, the loudest that can be borne without giving rise to pain is approximately one million times as strong. M. B.

THE MULLARD ORGOLA FOUR-VALVER

GREAT interest at Olympia centres on the new Mullard Orgola receivers, and particularly on the Orgola Four. This is designed on up-to-date lines with two screen-grid stages and provision for a pentode output, and is sold as a kit, complete with valves and cabinet, for £13 12s. 6d.

There are many points of interest in this new Orgola. The dual-range coils are operated by one control on the panel, which makes for simplicity in tuning. A rotary aerial coupler is provided and this allows adjustment of selectivity. The coupler may be set in one position for the reception of local stations at the greatest strength, while a slight adjustment enables critical selectivity to be obtained on distant stations.



The new Mullard Orgola Four. (Above) A front-of-panel view and (right) a plan view showing the layout

Single dial tuning is, of course, provided and an interesting point is that there is a thumb adjustment for aerial tuning correction. This additional fine control of balancing does not complicate tuning.

An interesting point in the circuit is the shunt feeding of the high-frequency valve anode supply, which keeps the tuning condenser at a low potential. Provision is made for the use of a small power valve, super-power valve, or a pentode. Battery cords are provided.

The panel appearance of the Orgola is very neat, and as the design of the whole set is on straightforward lines it is bound to become popular.

Let "A.W." Solve Your Problems

Postcard Radio Literature

Easy Set Maintenance

MOST amateurs are now overhauling their H.T. and L.T. supply arrangements. A good idea in this respect is the battery service offered by Radio Service (London), Ltd., 125 Toriano Avenue, London, N., and by means of which fully charged high-tension and low-tension accumulators can be hired for any period, with regular collection and delivery anywhere within twelve miles of Charing Cross. Obviously this excellent idea overcomes the need for a large initial payment. For small quarterly charges you can have a never-ending source of high- and low-tension current. A leaflet can be obtained giving full details. **54**

Gramo-Radio

If you have a wireless set then you must have an arrangement for electrically reproducing gramophone records. There are plenty of pick-ups to choose from, and you will be interested in the latest Edison Bell pick-up and arm which is fully described in a folder I have just received. One of the advantages of gramo-radio reproduction is that you can control volume, and Edison Bell make a good volume control which sells at the modest price of 3s. 9d. This also is described in the leaflet. **55**

A Handy Meter

I expect every amateur by now has heard of the Wates' Multi-Purpose Volt-Amp Meter. Not everybody knows how these meters can be used to the best advantage, and set users should get the new leaflet from Wates which shows how these most inexpensive meters can be used for practically every set-testing purpose. **56**

New Philips Sets

Here is some news about the latest Philips sets and speakers. A large illustrated folder has just arrived which shows some interesting new H.T. eliminators, speakers, and radio gramophones. This is worth having for one's file of new components. OBSERVER. **57**

GET THESE CATALOGUES *FREE*

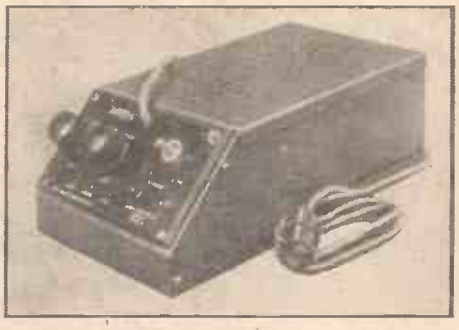
Here "Observer" reviews the latest booklets and folders issued by well-known manufacturers. If you want copies of any or all of them FREE OF CHARGE, just send a postcard, giving the index numbers of the catalogues required (shown at the end of each paragraph), to "Postcard Radio Literature," "Amateur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

A NEW H.T. UNIT.

PARTICULAR interest attaches to the new A.C. 188 mains unit produced by H. Clarke & Co. (Manchester), Ltd., of Atlas Works, Old Trafford, Manchester.

This concern has, of course, had long experience in the manufacture of mains apparatus, and this new unit, which is a combined high-tension supply and trickle charger, is well up to the usual Atlas standard.

The A.C. 188 unit is housed in a metal cabinet measuring 10 in. by 5¼ in. by 3½ in., and is of a suitable size to slip into the battery compartment of practically every cabinet and portable receiver. The unit works on alternating current supplies of 200-250 volts and 40-120 cycles. A special model 189, at the same price, £6. is available for 100-125 volt supplies of the same periodicity-range.



This new Clarke's Atlas mains unit will supply your set with high tension, and trickle-charge the accumulator

The Westinghouse metal rectifier is incorporated, and two variable tappings of 0-100 and 0-120 volts respectively, and one fixed tapping of 150 volts are provided. The high-tension current output is 25 milliamperes.

We have found on test that the voltage output is quite constant and this new Atlas unit does not show any tendency to hum or cause low-frequency interaction. Tappings are provided so that the trickle charger can be connected to 2-, 4- or 6-volt accumulators.

It should be noted that the address was omitted in the Burton advertisement in last week's issue. Messrs. Burton's address is, of course, Progress Works, Bernard Street, Walsall, Staffs.

"Amateur Wireless and Radiovision." Price Threepence. Published on Thursdays and bearing the date of Saturday immediately following. Post free to any part of the world: 3 months, 4s. 6d.; 6 months, 8s. 9d.; 12 months, 17s. 6d. Postal Orders, Post Office Orders, or Cheques should be made payable to "Bernard Jones Publications, Ltd."

General Correspondence is to be brief and written on one side of the paper only. All sketches and drawings to be on separate sheets. **Contributions** are always welcome, will be promptly considered, and if used will be paid for. **Queries** should be addressed to the Editor, and the conditions printed at the head of "Our Information Bureau" should be closely observed. **Communications** should be addressed, according to their nature, to The Editor, The Advertisement Manager, or The Publisher, "Amateur Wireless," 58-61 Fetter Lane, London, E.C.4.

ONE OF THE BEST

Says Mr. J. H. Reyner, the Technical Editor of "A.W."

IDEAL FOR RADIOGRAMS NO INTERFERENCE

No brushes or commutator to cause interference. No belt. The motor runs smoothly and silently, without variation in the revolution speed even with largely fluctuating mains current. 12" velvet-covered turntable, automatic brake and cut-out. For 100-130 and 200-250 v. A.C. 7¾" × 5½" × 5⅞".

£4/17/6 (without Unit Plate, £4/10/0).

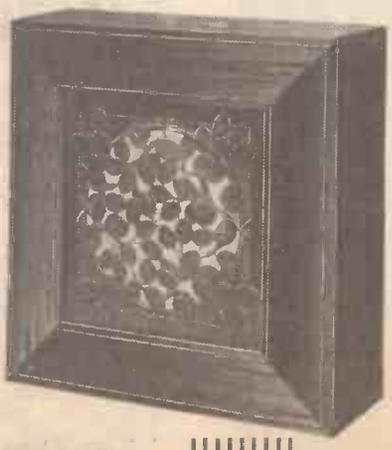
Super Pick-up and Arm, £2/2/6. Portable Gramophone Cabinet fitted with Paillard Motor, Super Pick-up and volume control, £8/15/0 complete.

PAILLARD ELECTRIC INDUCTION MOTOR

Write for full details:

APOLLO GRAMOPHONE CO., LTD.
4-5 Bunhill Row, London, E.C.1

THE "HONESTY" DE LUXE SPEAKER



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This speaker will manifest itself as a unique production incorporating all that is best tonally and visually.

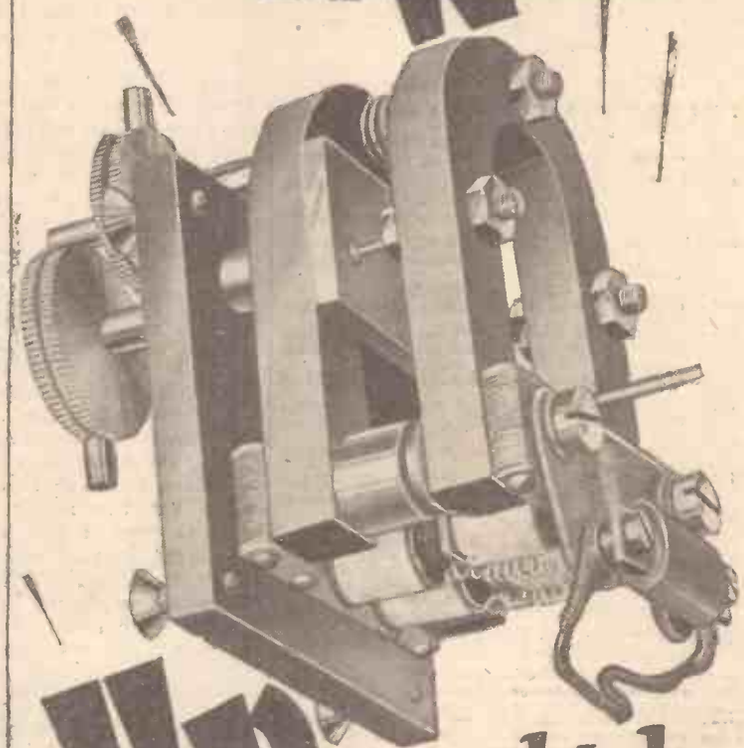
In the exquisitely designed repousse grills there is a natural simplicity accentuating the quiet dignity and beauty of the "Honesty" Speaker which cannot fail to appeal to the most fastidious.

Prices, in black (ebony finish) £6, in oak £7, in mahogany £7 10s. Supplied with brass or copper repousse grill. If finished with oxidized silver repousse grill 5s. extra.

Our complete range of speakers will also be seen at our Stand and Demonstration Room—do not miss them. If you cannot visit the Show send for free catalogue.

The SHEFFIELD MAGNET Co.
116/126 Broad Lane, Sheffield, England

POWER



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STAR UNIT

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reduced to 25/- formerly 36/-

A NEW GRAMOPHONE NEEDLE

GREAT claims are made for the new Electro-color needles marketed by Keith, Prowse & Co., Ltd., of 159 New Bond Street, W.1. An AMATEUR WIRELESS representative was present at a recent demonstration given by this firm in the Georgian Hall of the Piccadilly Hotel.

The inventor, Mr. Ramsay, was present at the demonstration of this new needle. He said : "We claim that the Electro-color needle gives perfect tone." But that is not the only claim made; in addition to tonal purity, the new needle is claimed to abolish surface noise or record scratch. Moreover, it is claimed that this needle cannot wear down gramophone records.

The new needle is an improvement on the well-known Burmese Colour needle, giving greater richness of tone and having greater structural strength. Probably the most important advantage of the new needle is that it will play at least as many records as can be played with a complete box of 200 steel needles.

As the cost of three Electro-color needles is 1s., the saving is obvious. Our representative was able to confirm the claims made for the needle.

Tests were made to show what the needle could do on the latest Electro-monic radio-gramophone. A Kriesler record did not prove anything; but the next record put on, of a song, was most impressive. So was the next record of a piano solo. The reproduction of the last two records was definitely better with the Electro-color needle than with an ordinary steel needle.

RECORD-MAKING AT HOME

IN these days of electrical amplification it is not surprising that the thoughts of experimenters have turned to home-recording. If one can reproduce electrical currents with a gramophone pick-up, surely by supplying current to a somewhat similar mechanism and replacing the usual needle with a cutter, it should be possible to record.

Apparatus on these lines has been in operation for some time. A special form of gramophone is usually employed, containing gearing which moves the cutter in towards the centres of the record. Metal discs are used for the records, a diamond or sapphire cutter being employed.

A development which will interest our readers has just made its appearance. This is a set of parts so constructed as to make home-recording possible with any gramophone. Only two screws are required for fixing, while the device can be operated from a two-valve set. Moreover, the whole outfit, including tracker, electrical cutter, microphone and six blank discs can be purchased for less than £5. This attachment, which we hope to review more extensively at a later date, is known as the Cairmor Home-Recorder.

By the way, those readers who are interested will find a complete article on the subject in the Show (October) issue of *Wireless Magazine*.

WHERE YOU WILL FIND THE "AMATEUR WIRELESS" AND "WIRELESS MAGAZINE" SETS AT THE EXHIBITION.

STAND No. 1.—"Amateur Wireless" and "Wireless Magazine."—James Band-pass Four, Five-point-three. *Wireless Magazine* Standard A.C. Mains Unit, Merlin Two, Exhibition Three, Linen-diaphragm Loud-speaker.

STAND No. 9.—Turner & Co.—Exhibition Three.

STAND No. 59.—British General Manufacturing Co., Ltd.—Merlin Two.

STAND No. 63.—Jackson Brothers.—James' Band-pass Four.

STAND No. 78.—S. G. Brown, Ltd.—Linen-diaphragm Loud-speaker (on demonstration).

STAND No. 145.—Telegraph Condenser Co., Ltd.—James' Band-pass Four.

STAND No. 202.—The Gripso Co.—Five-point-three.

STAND No. 211.—H. Clarke & Co. (Manchester), Ltd.—Exhibition Three.

STAND No. 227.—E. Paroussi.—Five-point-three.

STAND No. 239.—Westinghouse Brake and Saxby Signal Co., Ltd.—*Wireless Magazine* Standard A.C. Mains Unit.

The "A.W." Exhibition Three is also having a special display at **Selfridge's.**

AT THE QUEEN'S HALL

THE large crowds which continue to invade the "Proms." are a tribute to the improved playing of the B.B.C. Orchestra. We have heard good renderings of Beethoven's Fifth and Elgar's First Symphonies, and a competent performance of Tchaikovski's Sixth, but Wagner was crudely dealt with on Monday.

Some interesting items during the week have been a "Symphonic Impression" by Alan Bush and a concerto for two pianofortes by Arthur Bliss, each conducted by its composer; the first performance in England of Kodaly's "Summer Evening," and the playing by Felix Salmond of Ernest Bloch's "Schelomo" for 'cello and orchestra. Of these works the "Schelomo," with markedly Jewish characteristics, seemed the most profound.

Brilliant playing has marked the violin concertos, Arthur Catterall in Sibelius on Tuesday, and Jelly D'Aranyi and Odila Fachin in a magnificent Bach concert on September 10.

J.B. Chassimount Condensers

READERS should note that it is the new J.B. Chassimount condenser which is shown on page 329 of last week's issue of "A.W."

These new J.B. condensers are available in two, three, four, five and six-stage gangings, and are manufactured, of course, by Jackson Bros., Ltd., of 72 St. Thomas' Street, S.E.1.

A small broadcasting station has been erected at Tours (France); transmissions are simultaneously carried out on 210 and 40 metres.

Senator Uchida, president of the Wireless Telegraph Co., of Japan, has arrived in Sydney (N.S.W.) with a view to establishing wireless telephone communication with Australia.

PREPAID ADVERTISEMENTS

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

DEPOSIT SYSTEM

As the Publishers cannot accept responsibility for the bona fides of advertisers in this publication, they have introduced a system of deposit which it is recommended should be adopted by readers when dealing with persons with whom they are unacquainted. It is here explained.

Intending purchasers should forward to the Publishers the amount of the purchase money of the article advertised. This will be acknowledged to both the Depositor and the Vendor, whose names and addresses must necessarily be given. The deposit is retained until advice is received of the completion of the purchase, or of the article having been returned to and accepted by the Vendor. In addition to the amount of the Deposit, a Fee of 6d. for sums of £1 and under, and 1s. for amounts in excess of £1, to cover postage etc., must be remitted at the same time. In cases of persons not resident within the United Kingdom double fees are charged.

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