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As some of the arrangements and specialties described in this Journal may be the subjects of Letters Patent the amateur and trader would be well advised to obtain permission of the patentees to use the patents before doing so.

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Modern Wireless

Vol. XX. No. 81. BRITAIN'S LEADING RADIO MAGAZINE September, 1933

Our Exhibition Number—Novel Designs—Colonel Dawnay of the B.B.C.

THIS special Exhibition Number of MODERN WIRELESS will be on sale the day the Exhibition opens at Olympia. The biggest show of its kind ever organised, the Exhibition will be open from 11 a.m. to 10 p.m. daily until August 24th.

On other pages of this issue, you will be able to read in concentrated form about the dozens of interesting stands and displays at the Exhibition. But, however interesting you may find these descriptions, we can assure you here and now that all the literary efforts in the world and all the photographs in the world could not do justice to the magnificent feast of radio which is spread out for your benefit at Olympia this year.

As every reader knows, there have been many extraordinarily interesting developments in radio technique during the last few months, and at Olympia you will find that these original developments have been even further developed; and sets incorporating the latest inventions will undoubtedly hold your interest.

If you possibly can, visit Olympia this year. New valve designs, permeability tuning, television developments, and a hundred other things of novelty and outstanding interest await your inspection.

MODERN WIRELESS, as usual, has a stand at the Exhibition—on the plan, Number 11. You and your friends will be very welcome, and if you have any technical questions to ask, come along and see our expert and put your problems before him.

The Famous Diodion Series

As might be expected in an Exhibition Number, novelty is the keynote of the receiver designs in this issue. The first set is another of the famous and popular Diodion series.

We have called this set the "Diodion-Plus," and for obvious reasons. It certainly has many things which entitle it to be described as novel. For example, it has a double-diode-triode rectifier.

The set is enclosed in a modern cabinet design, while its synchronous electric clock and its dual speakers go far to entitle it to be called the latest word in radio receiver design.

In addition to the above, the "Diodion-Plus" incorporates multi-mu screened pentodes, and a 3,000-milliwatt output pentode, so that sensitivity and volume are two of the outstanding features of the set's construction.

A Complete 5-Metre Station

FOR the more technically-minded constructor, we give in this issue the first details of a complete five-metre transmitting and receiving station. This is the sort of transmitter used by the enthusiastic band of amateurs who, as this editorial is penned, are investigating the habits, possibilities, and potentialities of radio waves of a frequency about 60 megacycles.

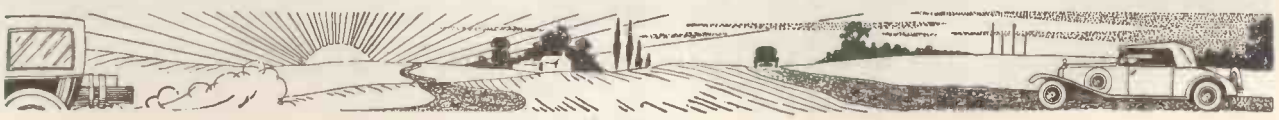
The actual construction of a transmitting and receiving set to deal with such frequencies is not a very difficult task and, what is even more important these days, the cost is low. So here is a fine opportunity for readers of MODERN WIRELESS to join the group of research workers who are helping to solve the problems surrounding the use of a very fascinating and rather mysterious band of wavelengths.

New B.B.C. Appointment

READERS of the "Daily Mail" were surprised and interested the other day in an article suggesting that Colonel Dawnay, the new Output Controller of the B.B.C., might eventually become the Director-General.

The fact is, of course, that Sir John Reith—like any sensible head of a huge organisation—wishes to emulate the equally sensible methods of a captain of a ship. The captain of a ship never keeps a watch; he never has any specific duty as regards routine; but he is there and ready for any emergency. By picking a sound and reliable staff, and appointing departmental heads, Sir John Reith naturally frees himself from a good deal of red-tape routine work. Thus we have the reason for the appointment of Colonel Dawnay as Controller of Output, the appointment of Mr. Eric Maschwitz as Director of Variety, while Mr. Val Gielgud will in future concentrate all his energy and talent on radio drama.

As for Colonel Dawnay becoming Director-General, there have been rumours before of Sir John retiring. The rumour now is that the end of 1935 may see an ex-Guardsman controlling British Broadcasting. Well, it's a long way to 1935, but we venture to think it would be just as well not to count one's chickens before they are hatched.



G. P. Kendall's extraordinary success as a set-designer is due—apart from his technical knowledge and ability—to his firm belief in the unending possibilities of radio progress. His keen determination to improve on " the best yet " has always been backed by remarkable originality of thought.

THE RETURN OF G. P. KENDALL B.Sc.

To Design Sets Exclusively for MODERN WIRELESS

IN this issue of " M.W." we announce an event of outstanding importance to every wireless constructor in the country : G. P. Kendall is returning to his first love, and will once more be providing the British amateur through this paper with set designs of the superlative quality for which he has been known since the earliest days of the movement.

It is now more than ten years since he was first connected with MODERN WIRELESS, and this journal is proud to announce that it has regained his services and thereby assured its readers of a really absorbing time this next season in following the work of one of the most outstanding set designers and writers of the day.

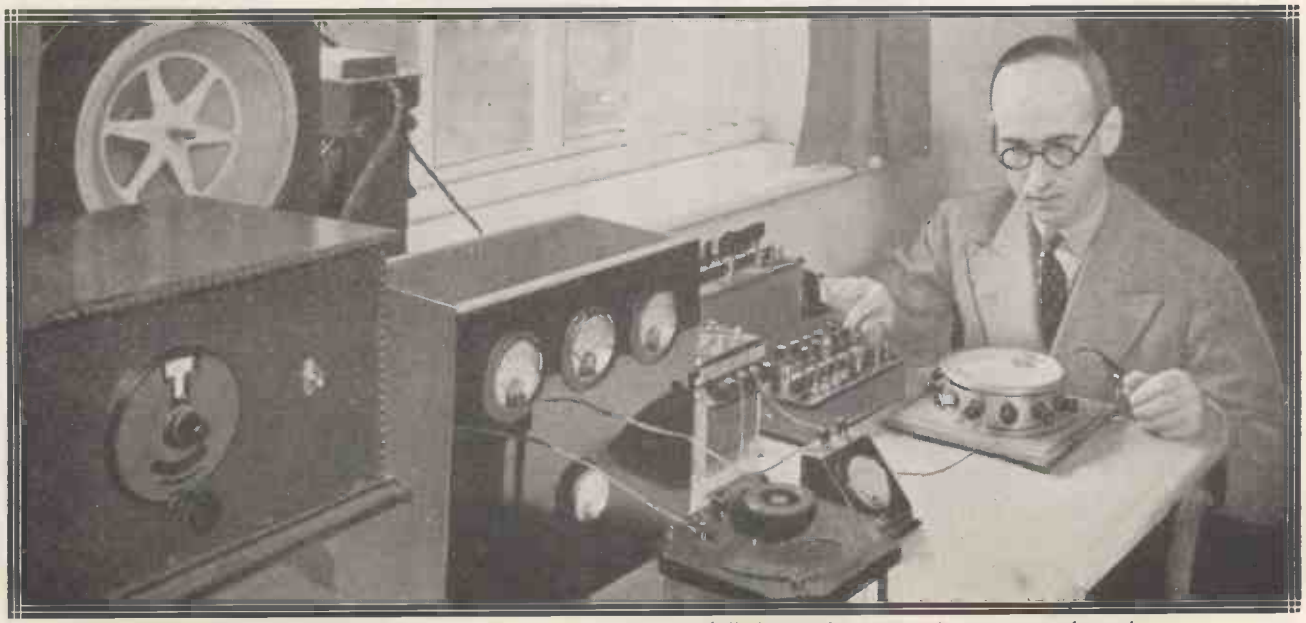
Early Experiments in Radio

Mr. Kendall never talks about himself, so probably the biographical notes which follow will be new to even the oldest readers of " M.W." Born in 1898, at Leeds, he is the son of Emeritus Professor P. F. Kendall, D.Sc., F.R.S. His first interest in radio took the form of a schoolboy's experiments with spark coils and coherers, soon followed by a keener concern brought in by the war, when he took a course at the North-Eastern Schools of Wireless Telegraphy in 1916, and qualified for the P.M.G. first-class operator's " ticket."

Wide Reading of the Sciences

His first practical wireless experience came in 1918, at the Army Signal School at Dunstable, and when the war was over he found himself possessed of a radio knowledge which many would have considered an adequate equipment for a career. He, however, thought otherwise, and in the course of his student days at the University of Leeds he pursued a course of omnivorous reading of all the sciences which bear on radio. During his studies for the degree of Bachelor of Science, incidentally, he had the privilege of working under Professor Whiddington, who carried out so much of the research done at that time on the newly-discovered thermionic valve.

After taking his degree, he held for a time a teaching appointment while taking a post-graduate course of



Though essentially a practical set designer, Mr. Kendall also carries out much pure research work

study, and he was at that time becoming known as one of the leading amateur radio experimenters in the country, taking a prominent part in organising the amateur movement in the north of England.

Full Time Association with Radio

The call of wireless soon became so strong, however, that he realised that it could only be satisfied by a full-time association, and in 1923 he joined the editorial staff of MODERN WIRELESS, and to this paper and its sister journals he devoted himself for the next eight years. Of his work during that period there is little need to tell the reader, for it is a part of the history of the development of amateur radio in this country. His genius as a designer of receivers of exceptional efficiency and his gift of lucid and interesting explanation soon made him one of the truly notable figures in practical radio journalism.

Probably the secret of his extraordinary success as a designer, apart from his technical knowledge and ability, lies in his firm belief in the unending possibilities of radio progress. His keen determination to improve on "the best yet" has always been backed by remarkable originality of thought and a complete refusal to be shackled by fixed ideas, and from what he has told us lately we know we are safe in predicting that this characteristic will make quite a flutter in the world ere long.

In the past it has done so many times, for almost all his more important sets contained some sort of a break-away from accepted practice, often such a pronounced one that the theory merchants were shocked and said that it wouldn't do. They were wrong, of course, and time proved them to be so, and in any case, G. P. K. never did take any notice of people who think that the insecure theories of so young a science as radio are to be treated as sacred.

One of his most famous sets is an excellent illustration of this: the "Magic" Three, the most successful and popular home-constructor design of all time, was evolved at a period when short waves enthusiasts made a sort of cult of their hobby, and their high priests were never tired of proclaiming that no one could get real results unless he used a special short-wave set containing all sorts of funny stunts which only they understood. Nevertheless, the "Magic" Three was a high-efficiency set which covered all waves down to about 20 metres. Such all-wave circuits are an accepted type nowadays, but at that time it must have required a certain amount of courage to set out to convert the home constructor to their use in the face of so much "expert" opposition.

Real Advance in Set Design

Our older readers will no doubt be able to recall many other examples; such names as the "Titan" Three, the "Comet" series, and the 1928 "Solodyne" are sufficient to bring back memories of real advances in the science of set design, all marked by the most cheery disregard for the moth-eaten conventions of their time.

This happy gift of being able to shake off all preconceived ideas and face a problem with an entirely open mind stood Mr. Kendall in good stead when it was discovered that the coming of the Regional scheme meant selectivity troubles for hosts of people in the London area. Almost overnight, it seemed, he produced the Brookmans Rejector, a truly remarkable device which turned all the usual vices of wavetraps into virtues and

(*Continued on page* 226.)

Mr. Kendall designed the famous "Magic Three," which was the most popular design ever placed before the home constructor.

THE NATIONAL RADIO EXHIBITION
OLYMPIA, LONDON, AUG. 15—AUG. 24

A condensed guide to the more interesting components, accessories and sets shown by the Radio Industry at the great annual display.

Unusual interest and importance attach to this year's Exhibition owing to the many great technical advances now showing for the first time.

Stand 11

AMALGAMATED PRESS, LTD.

Here is to be found the leading radio magazine of the country, "Modern Wireless."

On view there are sets and units that have been built from recently published constructional details, and in attendance all the time will be technical representatives who will be pleased to answer any questions concerning radio.

Of particular interest to "M.W." readers are the "Diodion-Plus" receiver and the 5-metre transmitter and receiver that are described elsewhere in this issue. These sets will be on view so that all can examine them, and if desired ask questions concerning their construction and operation.

Other exhibits of exceptional attractiveness have been arranged, including a Cathode Ray Television Viewer, and the sets that constituted our special "Land, Sea and Air" supplement contained in last month's issue of "M.W."

Don't forget Stand 11, opposite the main entrance, where you will be gladly welcomed and at which you may reckon on finding as much radio assistance as it is in our power to give.

Come and meet *us* there, and tell your friends to meet *you* there as well.

Stand 46

AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT CO., LTD.

Though a great deal of ingenious coil-winding gear is being shown here, the home constructor will find this stand of particular interest to him in view of the array of meters that are to be seen. These include the famous "Avometer," of which two different models are exhibited, while for the first time the "Avominor" is to be seen.

This instrument is intended to provide for the non-technical man the facilities previously offered only by the "Avometer," and it enables any normal test to be made with ease and accuracy.

EVERY LISTENER'S NEED is studied in the new sets, this typically attractive model being a new Marconiphone product.

Stand 35

BAKER'S SELHURST RADIO

This stand has a particularly attractive display of loudspeakers, in that the exhibitors, Messrs. Baker's Selhurst Radio, are specialists in moving-coil loudspeakers, which they have been manufacturing since as far back as 1925. Their instruments range from special super-power types for use in cinemas to really moderately priced loudspeakers of the permanent-magnet type.

Among the latter type of reproducers are models with transformers designed for use with the latest forms of L.F. amplification—Q.P.P. and "Class B." It is interesting to note also that many of the cabinet speakers shown by this firm have tone-control units incorporated in them.

"M.W." is on Stand No. 11

Apart from the most attractive range of loudspeakers, one or two useful accessories are to be seen on this stand, including a special rectifier unit for running D.C. speakers on A.C. mains, and a tone control and needle-scratch filter.

Stand 45

BELLING & LEE, LTD.

Belling & Lee, Ltd., is a firm to which all constructors have occasion to be grateful. Their terminals, links, and so on, which form one of the features on their stand, have done much in enabling an attractive finish to be put on home-built receivers.

Among these small but important items are fuses and fuse holders in a large number of designs and sizes, all of which are very accessible for quick charging of the fuse element. One of these particularly worthy of note is the "Wanderfuse," an ordinary wander-plug incorporating an internal fuse.

The Belling-Lee twin terminal mounts, that can be fixed to the base-board in two different positions, are well known to all. They are showing a form of twin terminal which requires no mount and takes any form of tag or wire.

While discussing this stand we must mention the S.G. anode connectors, "twintap" plugs—for taking two tappings from one battery socket—and also the Belling-Lee pick-up and "clip-on unit pick-up." The latter solves the problem of how to use a pick-up on a portable gramophone,

PICKING UP A PICK-UP ?

If you are acquiring a pick-up and tone arm, remember that this Garrard model is supplied for 37s. 6d. complete with volume control, or without for 5s. less.

on which there is seldom room on the motor-board for attachment of a pick-up in the ordinary way.

Stand 42

BENJAMIN ELECTRIC, LTD.

A reduction in the prices of some of their well-made components will prove a strong magnet to the stand of the Benjamin Electric, Ltd. Among the items of particular interest on this stand are the following components:

First of all, two for "Class B" amplification. A driver transformer designed for use with all types of

A CLIMAX !

An attractive modernistic note is struck by this Climax model, the T.C.III, which operates from alternating current mains.

"Class B" valves, and a tapped output choke of high inductance to provide proper matching between the "Class B" valve and the loudspeaker. The prices of these two components are 10s. 6d. and 11s. each respectively.

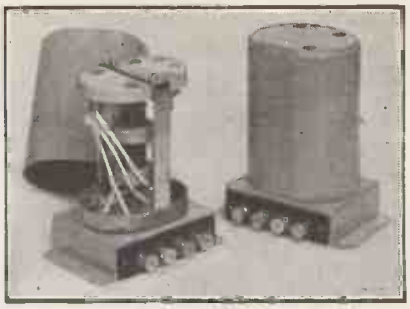
Then there is the famous Benjamin Transfeeda—a complete resistance-fed transformer unit for 11s. 6d., a well-made push-pull battery switch, and a range of valve holders which have won for themselves an enviable position.

Altogether a stand which holds one's attention for some time.

Stand 22

BLOCK BATTERIES, LTD.

New ideas in radio technique are not so frequent as ever to fail in pro-



British Radiophone, of "Radiopak" fame, have been quick to grasp the need for compact coil-units of all kinds, and the sound electrical and compact mechanical construction of their products is well illustrated above.

ducing a minor sensation, and the comparatively recent introduction of Block L.T. batteries was far from an exception. The manufacturers of these compact, plateless accumulators, which will hold their charge for amazingly long periods, are exhibiting their products on Stand 22 at Olympia.

The low-tension batteries alone would be enough to make every visitor, whether battery or mains user, stop at this stand; but the new Block high-tension accumulators will ensure a lengthy stay by those lucky enough to visit the Exhibition in person.

These H.T. accumulators are made on the same lines as the L.T. ones, and are remarkably low in price. They are about half the size and weight of the average H.T. accumulator, and like their brothers—the L.T. cells—will hold their charge for several months.

They are made in 30- and 60-volt sizes and have a capacity of 5,000 milliamp. hours. In dimensions they are no longer than super-capacity dry batteries.

Stand 102

BOWYER-LOWE & A.E.D., LTD.

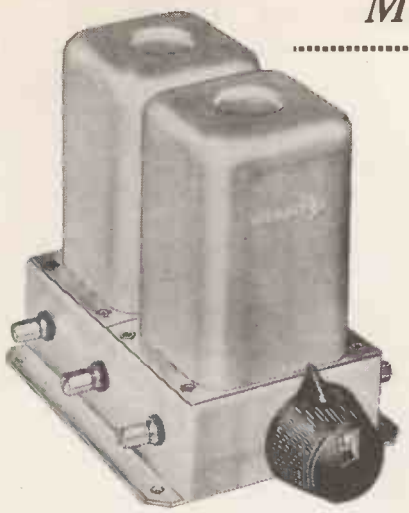
A large range of pick-ups and volume controls are shown on this stand which displays the exhibits of

BLOCK BUILT

The famous Block method of construction includes remarkable compactness amongst its many advantages, and this year the firm is introducing two H.T. sizes—60 and 30 volts—each of 5,000 milliampere-hour capacity.

Meeting Every Radio Need

WELL SCREENED



This 2-coil unit is a Wearite product.

Messrs. Bowyer-Lowe and A.E.D., Ltd. Features of pick-ups made by this firm are counter-balance weights, swivelling heads for easy needle-changing, and ball-bearing movement for the arm.

Special steps are taken to " match " the pick-ups for use with average moving-coil speakers, so that natural reproduction is obtained. Also, certain variations in the frequency-response curve are available to customers' order.

TIME FOR RADIO

Plain station names on the dial and an electric clock are noteworthy points of this Ferranti design.

The volume controls are available in linear or log-law type, the latter providing a variation of volume proportional with the knob movement. A special log-law double fader for use on radiograms is also available.

Other items shown on this stand are parallel-fed transformer units and all-electric record-playing units. The latter are available for A.C. or, to special order, for D.C.

Stand 124

BRITANNIA BATTERIES, LTD.

The exhibits of Britannia Batteries, Ltd., will be better recognised by many under their trade name of Pertrix. These batteries are one of the most popular in use to-day.

The range of Pertrix batteries is amazingly wide. For instance, there is a special battery, or a suitable one, for practically every portable set in use.

The batteries shown by this firm include L.T. accumulators and G.B. batteries as well as dry H.T. batteries. Among the latter are special batteries for Q.P.P. amplification, and an extra large capacity battery for giving up to about 45 milliamps.

The dry batteries exhibited by this firm are made under a special non-sal-ammoniac process, and " No self-discharge " is one of the feature claims made for them. It can be said that, without doubt, every battery user will find his wants covered by the Pertrix range.

Stand 97

THE BRITISH BLUE SPOT COMPANY, LTD.

Apart from their loudspeakers, for which they are best known, the British Blue Spot Company, Ltd., is showing other interesting items, including pick-ups, battery-operated receivers and mains disturbance eliminators. An extra attraction to this stand is the fact that quite a number of this firm's lines have been reduced in price —always a welcome feature.

The latest range of loudspeakers made by this firm include models especially designed for " Class B " work and for use as extension speakers with " Class B " amplification.

Two battery model Blue Spot receivers are shown, both employing the same type chassis. One is a table model and the other a pedestal model.

The sets are calibrated in wavelengths, have single-knob tuning and employ two stages of variable-mu H.F. amplification. A feature of the reaction is that it does not interlock with the tuning.

YOUR H.T. SUPPLY

The Grosvenor Electric Battery Co., Ltd., is displaying new types this year on Stand 126.

HIGH-VACUUM

The new " Hivac " valves have spiral-slotted pins for providing firm and yet resilient contact areas with the sockets of the valve holders. Note also the sound mechanical construction of the electrode supports.

SUPERHET WITH A.V.C.

Automatic volume control is one of the many attractive features of this H.M.V. Superhet " Concert-Seven," which retails at twenty-one guineas. It also incorporates a static suppressor and a threshold sensitivity control.

What to Choose and Where to Find It

Stand 38

BRITISH GENERAL MANUFACTURING CO., LTD.

Several new lines are being introduced this month by British General, in a wide range of components for home constructor radio. These include an all-wave tuner, a parallel-fed coupling unit, and a screened H.F. choke, while reductions in price are to be noted in the "Victory" transformer, the "Triumph" transformer (7–1 ratio), band-pass coils, dual-wave coils, and other parts.

The reductions are by no means small, being in the nature of 3s. in the case of the first-mentioned and one or more shillings in the cases of the others.

Stand 118

THE BRITISH RADIOPHONE, LTD.

From the home-constructor's point of view, the British Radiophone stand has one of the most appealing displays of the Show. The outstanding feature of the display is undoubtedly the "Radiopaks."

These packs, which greatly add to the simplicity of home construction, consist of a specially matched and wired assembly of three screened coils and triple-gang condenser which can be used in a large number of different circuits.

A most useful range of wire-wound volume controls and potentiometers is shown, including models with incorporated on-off switches. Another interesting range of components is provided in the gang condensers. These are available with two, three or four sections, and a special model is made for superheterodynes.

Other items worthy of mention are the Radiophone pick-up with its neat

DRY RECTIFIER H.T.

This representative Atlas H.T. unit, using a Westinghouse metal rectifier, works on mains with any frequency between 40 and 120. Note the strong construction with ample ventilation slots.

motor-board mounting, the fixed condensers of all capacities and voltage types, and the special Receptru screened down-lead for interference elimination and better reception.

Stand 52

BRITISH ROLA, LTD.

All sets, large or small, mains or battery, need loudspeakers to reproduce the received broadcasting. And those speakers can be found in the immense range of the British Rola Co. No matter how powerful the set, or how compact the receiver design one or more types of Rola speaker units can be chosen to fill the bill admirably.

A COMPLETE UNIT

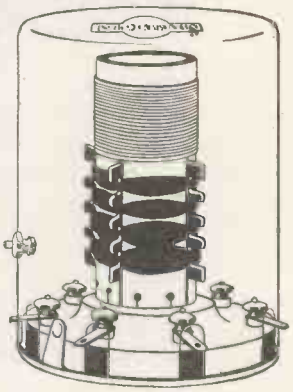
This unit comprises a Rola permanent magnet moving-coil loudspeaker with a properly matched "Class B" amplifier attached. When connected to a battery receiver it converts it immediately to "Class B" output. The price is £3 11s with valve and £2 17s. without.

This vast choice that is offered by Rola is the result of many years' experience in the design and construction of moving-coil loudspeakers, and a goodly assortment is to be seen on the stand at Olympia.

The exhibit covers typical examples of permanent magnet types, chassis with mains energised fields, low-tension models and various types of dual speaker assemblies. In addition, of course, "Class B" is well catered for with specially designed speakers. So roll up and take your choice: there are plenty from which to choose.

UNDER THE SCREEN

The compact nature of the Sovereign coil allows ample space between the windings and the screen, which latter, incidentally, is fitted with an accessible earthing terminal.



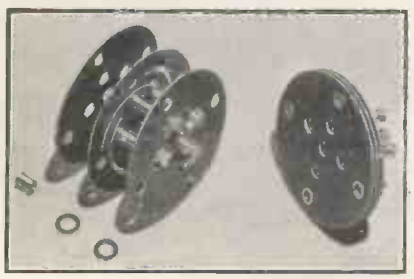
Stand 122

A. F. BULGIN & CO., LTD.

Although specialists in the smaller radio components such as switches, resistances, meters, etc., there is hardly a single radio component that is not made in one form or another by Messrs. A. F. Bulgin & Co., Ltd., who therefore have a most comprehensive display on their stand.

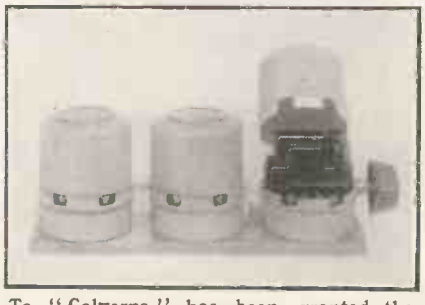
In view of this we shall have to confine our remarks to some of the

ON THE CHASSIS



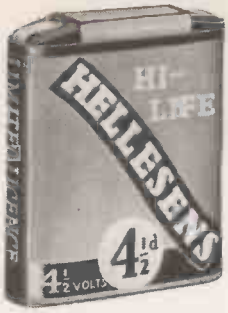
That the "Lectrolinx" valve holders have set a high standard in meeting specialised requirements and in overcoming the problems of permanently good connection is well exemplified by these up-to-date models.

FEATURING FERROCART



To "Colverns" has been granted the exclusive right of marketing Ferrocart coils for home constructors in this country. The very compact nature of the linked units is one of their many obvious attractions.

High-Lights at Olympia



Made by one of the oldest-established firms in the battery industry, the Hi-Life series fully maintains the high standard of excellence associated with the name of Hellesen.

new lines which this firm has introduced for the new season. Chief among these we would pick out the "Controlatone" and the double-pole change-over toggle switch.

The "Controlatone" provides an ideal method of adjusting the response to high notes in a set, and can be quickly added to any receiver. The new toggle switch is similar to other toggle switches, except for the extra contacts. Its compactness and quick make and break will thus be appreciated.

Other new lines of interest include a colour dial-lighting system in which the colour varies with the waveband, "Class B" driver transformer and output choke and anti-interference

FOR QUALITY AND WORKMANSHIP

A fine moving-coil loudspeaker from the R. & A. range. A grill is provided to protect the cone from accidental damage, and an output transformer is built into the chassis.

units consisting of banks of condensers with correctly proportioned capacities.

Stand 83

CARRINGTON MANUFACTURING CO., LTD.

How many sets are spoiled to all intents and purposes by being housed in rough-looking or unsuitable cabinets—if they are placed in a cabinet at all? They may be excellent technically, but the value of any receiver is greatly reduced if it is not properly finished off.

Here you will find a variety of cabinets that will enable you to suit the most widely different types of sets, and at a cost that will surprise you. Small sets or radiogramophones, all can be effectively housed in "Camco" cabinets, and a vast choice

SMOOTHED SUPPLY

Designed for supplying H.T. and also L.T. trickle charging, this efficient Telsen A.C. mains unit has an H.T. output of 28 milliamps at 150 volts with separate detector and S.G. tappings.

of styles await the home constructor at Olympia or at the London show rooms in Hatton Garden.

Stand 125

CELESTION, LTD.

The simultaneous use of two loudspeakers mounted close together is often assumed to be quite a recent innovation. In view of this it is interesting to note that Messrs. Celestion, Ltd., were handling dual and triple speakers so long as six years ago.

This firm is showing on its stand a most comprehensive array of energised permanent-magnet and dual loudspeakers. An interesting outfit exhibited is known as the Celestion "Reetone" matched speaker. It employs two speaker units, but with different mechanical resonance points, the idea being thus to avoid "boom."

Suitable "Class B" input transformers are available for Celestion loudspeakers, and an interesting scheme is the provision of cabinet-type speakers which incorporate a complete "Class B" stage. This, of course, ensures proper speaker matching.

Many improvements and modifications have been made in the Celestion speakers for the coming season, so that they will without doubt continue to be held in high esteem.

Stand 91

H. CLARK & COMPANY, LTD.

The focus of interest on the Atlas stand will undoubtedly be the two receivers, the A.4 and the B.4, in their attractive new cabinet designs.

The A.4 is a four-valve A.C. mains

A GOOD PICK-UP

The popular B.T.H. Junior pick-up made by Messrs. Edison Swan, Ltd. Bakelite is employed in the construction, and a volume control is incorporated in the tone-arm pillar.

model which incorporates two H.F. pentodes and a power pentode and provides an output of 3 watts. An Atlas energised moving-coil speaker, with the new cone, is used in this receiver, which is priced at only 12 guineas.

The B.4 is a battery model making use of "Class B" output to give 2½ watts. This model is very reasonably priced, while both the receivers are guaranteed for twelve months.

INCREASES YOUR OUTPUT

Baker's "Selhurst" speakers are known to almost everyone. Here is a combined speaker and "Class B" converter. A tone selector switch is also included in this ingenious unit.

Representative of Modern Design

The interest which the receivers will cause must not be allowed to obscure the Atlas mains units, which have been enhanced both in appearance and by the introduction of new models.

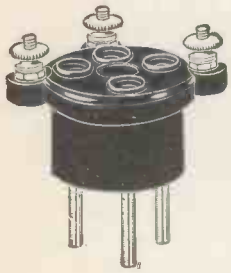
Four of these new models have been made available for "Class B" and Q.P.P. sets. The most expensive of these units costs only £6 10s., and this includes grid bias and L.T. trickle charger. A D.C. unit can be bought for as little as £1 19s. 6d.

The high reputation which Atlas products enjoy should be considerably enhanced by this display.

Stand 84

CLIMAX RADIO ELECTRIC, LTD.

On this stand is a display of most attractive instruments. Among the



This handy little component plugs into the detector or L.F. valve holder and enables a gramophone pick-up to be used with receivers not incorporating radiogram switching.

sets to be seen here, and made by Messrs. Climax Radio Electric, Ltd., is a particularly outstanding design.

It takes the form of an all-electric transportable receiver which, nevertheless, has all the advantages of the console type. This apparent impossibility is attained by making the instrument in compact form and providing it with a handsome and solid pedestal from which it is instantly removable.

Another interesting receiver, but this time battery operated, is the M.C.III. Housed in an attractively designed table cabinet, this three-valve receiver is priced at £9 15s., but is available from the makers on hire-purchase terms.

The models on this stand are certainly worthy of careful consideration by prospective set buyers.

Stand 70

E. K. COLE, LTD.

Complete sets of wide variety are the main attractions on this stand,

ALL COMPLETE

Designed for the battery user, this Epoch "Class B" conversion unit and speaker will appeal to those who seek real power output with maximum economy.

Two types of portable amplifier are being marketed by Messrs. Heayberd during the coming season. Both the 5- and the 10-watt models are suitable for use on radio or pick-up, and a special pilot lamp is provided to indicate when the amplifier is "live."

VERY SENSITIVE

This attractive Ormond cabinet speaker is only one example of the many models listed by this well-known firm.

together with a range of mains units that worthily uphold the fine "Ekco" tradition for power packs that has been built up during a number of years of constant endeavour.

All sorts of power packs are available, some for small sets and others for larger sets with greedy power valves, and for the latest "Class B" receivers with their demands for steady voltage over widely fluctuating anode currents.

Stand 66

THE COLUMBIA GRAPHOPHONE CO., LTD.

The stand of the Columbia Graphophone Co., Ltd., carries an extremely comprehensive range of receivers and radiogramophones. An idea of the wide variety is obtained from the facts that the cheapest is under £5 and that a model at 90 guineas is shown.

Some of the outstanding instruments, starting at the top of the list for price, are as follows:

Columbia "Autoradiograph De-Luxe Ten." A console type super-

FOR RECORD REPRODUCTION

One of the pick-ups from the Belling-Lee range. The model shown has a volume control built into the tone arm.

het with automatic record-changer and delayed automatic volume control. It is calibrated in wavelengths.

There is a seven-valve "Autoradiograph" for 43 guineas to run on A.C. mains, and two particularly interesting A.C. or D.C. four-valvers.

The battery user is well catered for, an outstanding battery instrument being the "C.Q.A. Battery Radiograph." This employs four valves, and has an improved form of Q.P.P. output. There are also two- and three-valve battery models.

Finally we would mention the balanced armature speaker and combined pick-up and carrying arm. Both of these are on show.

Stand 56

COLVERN, LTD.

The name Colvern immediately conjures up visions of tuning coils of

Low Prices and High Efficiency

all types and tuning coils which are highly efficient and reliable. It is thus quite natural that they should play such a large part in the Olympia display.

On their stand, Messrs Colvern, Ltd., are exhibiting coils for all types of circuits, including superheterodyne arrangements. But the main feature of their display consists of Ferrocart coils.

Messrs. Colvern, Ltd., are the sole agents in this country for Ferrocart coils, the first of the new type iron-cored coils, for which they have purchased the British rights. The range of Ferrocart coils is very wide and includes suitable inductances for ordinary and single-dial superheterodyne circuits as well as for straight circuits.

The efficient factory of Messrs. Colvern, Ltd., is not entirely devoted to making coils, and examples of their other lines, including variable resistances and wire-wound fixed resistances. are exhibited on their stand.

IN FOUR TYPES

Siemens, Ltd., make four main types of H.T. batteries—for small sets taking up to 7 milliamps, a ten-milliamps "Standard," a "Power" type for up to 20 milliamps. They also make the Super-Radio, which can give up to 30 milliamps

Stand 89

A. C. COSSOR, LTD.

Just as you will not quite know where to start looking (if you are lucky enough to visit the Radio Show), when you come to the display of Messrs. A. C. Cossor, Ltd., so is it difficult to decide just where to start in writing a description of it. However, since most readers of MODERN WIRELESS will connect this firm most strongly with valves, perhaps we had better consider these first.

The range of Cossor valves shown is tremendous, so it is impossible to attempt to cover it. We must content ourselves with mentioning some of the outstanding valves of recent introduction.

The Cossor 240B. was one of the first "Class B" valves available, and played quite an important part in the development of this form of amplification. Another "Class B" valve, the 220B., is available. It has an output about half that of the 240B., but consumes less filament current.

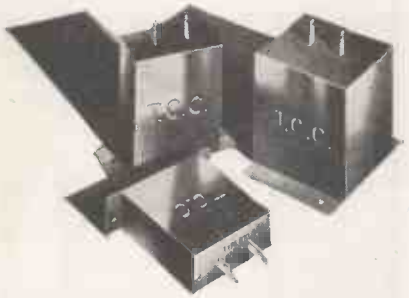
Two interesting mains valves are the D.D./Pen., a double-diode pentode valve for automatic volume control, and the M.V.S./Pen, a variable-mu mains H.F. pentode.

KNOWN BY ALL

The universally popular 66K. "Bluespot" has this year been joined by a range of moving-coil loudspeakers of the mains energised type.

VERY USEFUL

These handy little midget jacks are an attractive product of the Igranic Electric Co., Ltd.



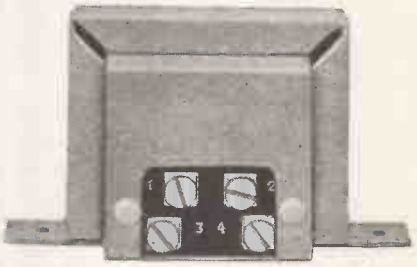
If you want to be amazed at the variety of condensers now available, pay a visit to Stand 98, where "T.C.C.'s" have a remarkable display of up-to-date types for all radio purposes.

Finally there is the D.V.S.G., a 16-volt filament indirectly heated D.C. mains valve. It takes ·25 amp. heater current and is for running in series with other valves.

As usual, kit sets form a big attraction at this stand and several models are available. These kit sets are also available in complete form, together with a large range of other receivers not supplied as kits.

Other items shown include loudspeakers and mains transformers.

CHOKE FOR "CLASS B"



This Benjamin "Class B" output choke is right in the first class for constructional efficiency.

Stand 82

THE EDISON SWAN ELECTRIC CO., LTD.

One of the most interesting stands at the Show, aptly sums up that of the Edison Swan Electric Co., Ltd. On the Ediswan stand is a most varied assortment of radio gear made by this famous firm.

So far as valves are concerned, an interesting feature is the reduction in the prices of many of them, which recently took place. Although not exactly valves in the ordinary meaning of the word, interesting exhibits in the valve class are the vacuum thermal-delay switches and the cathode-ray oscillograph tubes. One of the latter was used in the special television outfit submitted on the "M.W." stand. They are ideal for this class of work and give a very clear image.

From valves we go to batteries, both L.T. and H.T. The latter are shown in standard, portable and super-capacity types.

There is also an interesting range of B.T-H. pick-ups and loudspeakers. It will be remembered that B.T-H.

New Season's Products

made the original British Rice-Kellogg instruments, and the modern B.T-H. speakers are improvements on the original patterns.

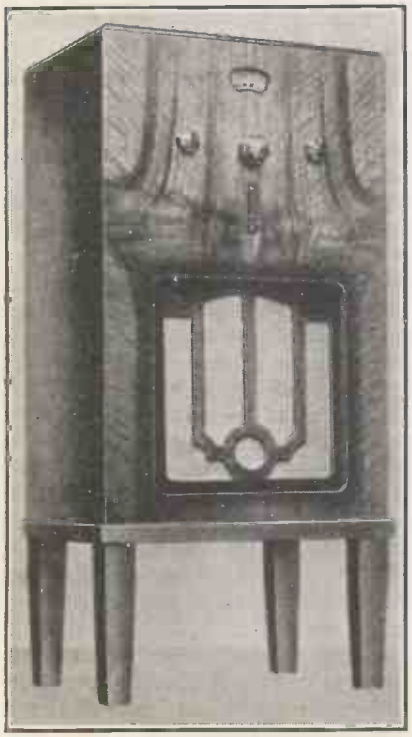
Stand 2

EPOCH RADIO MANUFACTURING CO., LTD.

A novel break-away from the vast range of moving-coil speakers manufactured by this famous firm is introduced on August 15th. It is the "Super-Dwarf" speaker for portable and motor-car receivers. It has a 5-inch diaphragm, is of the permanent magnet type, and is obtainable with ordinary or "Class B" transformer, or in a dual unit with another speaker.

A second new speaker is the redesigned A.2, while many other models have been redesigned and improved. All models are available with "Class B" transformers, but in addition there is an Epoch special adaptor combination "Class B" speaker that is ready to attach to any set, converting it automatically into a "Class B" receiver with speaker already provided. Finally a high-class "B" adaptor at a low price is being introduced.

"CLASS B" OUTPUT



Known as the Model 3456, this attractive Cossor four-valver includes "Class B" output stage and a moving-coil loudspeaker.

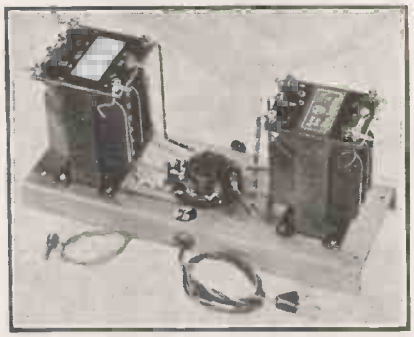
Stand 57

THE EVER READY CO., LTD.

Big batteries, small batteries, medium-sized power supplies, all figure in large numbers in the comprehensive range of dry cells produced by Ever Ready. And the name is never belied either, for reliability is the watchword at the North London factory where the batteries are made.

Just think of it. If you want a battery for your two-valver, to give

EASY CONVERSION



This W.B. conversion chassis will appeal to "Class B" enthusiasts. The "driver" transformer, seven-pin valve holder and output transformer are ready wired and mounted on a metal base, so that there is no difficulty in adapting an existing set to the "Class B" system.

60 volts H.T., Ever Ready can supply, and they can also supply you with an H.T. source if you want to run a multi-valve receiver taking a lot of milliamps.

Grid bias is well catered for, and so are such important things as torches, spotlights, police lamps, medical sets, cycle lamps, among a score or more everyday uses for the dry battery. The Ever Ready stand at Olympia shows a fine collection of the various types marketed by the famous battery makers, and we warrant that visitors to it will be amazed at the variety that is offered.

Stand 74

FERRANTI, LTD.

An attempt to describe the Ferranti range of products in a paragraph or two would make the quart in a pint pot look like child's play.

This compact Bowyer-Lowe record-playing unit incorporates an electric turntable, pick-up and volume control. It enables practically any receiver to be easily converted to a radiogramophone with the minimum of trouble.

The new range of receivers is of particular interest, and includes several superheterodyne circuits, the "Lancastria," the "Arcadia" and the "Gloria" being outstanding examples. Cabinet design seems to have received even more attention than usual, and the modern idiom in furniture has been adapted extremely well to the needs of radio. Several models incorporate as standard the new Ferranti synchronous electric clock.

As regards components, the Ferranti stand will again prove the home

FOR BATTERY USERS

The latest Columbia product is a battery radiogram with multi-mu H.F. amplification and push-pull pentode output. The complete receiver is listed at 20 guineas.

Consolettes are Popular

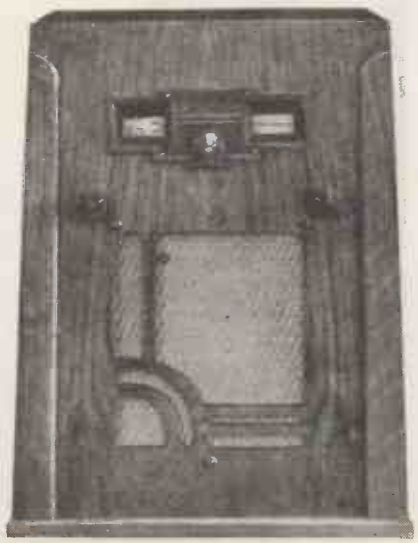
Known as the Lancastria Consolette, this pleasing-looking receiver is made by Messrs. Ferranti, Ltd.

constructor's paradise. The transformers, condensers and resistances which have for so long made famous the name Ferranti will continue to be to the fore, but special interest is sure to centre around the " Class B " apparatus.

Here you will find the " Class B " speaker-amplifier which enables the constructor to add a stage of " Class B " amplification to his set in the easiest possible manner. The P.M. moving-coil speaker is fitted with special driver and output transformers and the Ferranti H.P.2 valve, so that the whole unit is the production of one firm—a guarantee of excellence.

Incidentally, two quite new D.C. mains energised speakers will be found on Stand 74 in the main hall. This is a stand which should not be missed under any circumstances, more especially as a really interesting novelty will be introduced in the form of a constructor's television kit on the Scophony system. This alone would be worth a visit.

A FINE FOUR



One of the new Columbia designs. The set includes a moving-coil loudspeaker and a pair of output valves in push-pull

Stand 34

FULLER ACCUMULATOR CO., LTD.

One would naturally expect the electrification of country districts to have some effect upon the manufacturers of batteries. " Not a bit of it ! " is the silent reply of the Fuller Company's stand.

Far from there being any diminution in the types of batteries available, several new models have been added to the already extensive range.

EASILY VIEWED DIAL

The slope of the top front part of this Telsen receiver, on which the escutcheon is mounted, makes the dial readings particularly convenient to see.

The most useful of these is the "M.D.G." in the L.T. Mammoth range. Have a look at it while you are at the stand. Its sturdy construction, special plates, grease-cup terminals and new " non-slip " carrying handle are features worth noticing.

The non-spill portable models, high-tension units and triple capacity high-tension batteries will all be very much in evidence, while it is interesting to note that the process of manufacture includes a machine which automatically rejects cells which are not absolutely perfect.

In an age of progress, Fuller batteries are more than holding their own.

Stand 119

GARRARD ENGINEERING & MANUFACTURING CO., LTD.

The close co-operation between radio and the gramophone has brought with it new requirements in the way of gramophone motors suited to the needs of electrical reproduction.

You have only got to look at the Garrard Automatic Record-changing unit to see that this firm has not been content to follow with the crowd.

The simplicity of this unit, which will play up to eight records automatically, is only equalled by its absolute dependability, and the fact that it is suited to any mains voltage enhances its popularity.

On the same stand you will be interested in the famous " 201 " induction motor—the type which is used by the B.B.C.; while the range of spring motors has been improved wherever possible, so maintaining the traditions of the firm.

The Garrard pick-up, by the way, is worth examining. While suitable for the connoisseur, it will stand up to any amount of hard work.

Gramophone enthusiasts should lose no time in finding Stand 119; they won't find it so easy to get away.

A FRAME AERIAL VALVE

The Mazda S215VM illustrated here is specially designed for frame aerial reception, but may be used on an outdoor aerial if the input is limited. It is of the variable-mu type.

Radio Items of Renown

This holder for the new 7-pin valves is an addition to the present well-known range of Benjamin valve holders.

Stand 80

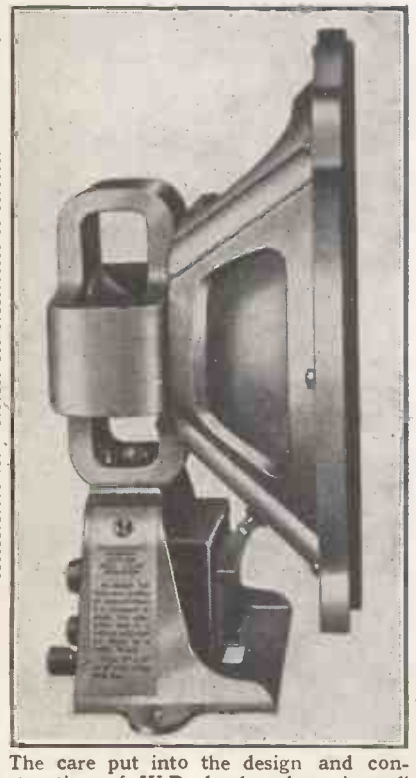
THE GRAMOPHONE CO., LTD.

H.M.V. occupy one of the largest stands at Olympia this year in The Grand Hall, and the exhibits are arranged with fine effect. The stand is modern is design, and the idea of showing complete sets with glass panels and cabinet sides introduced last year has resulted in five of the H.M.V. models being shown in this manner this year.

Chassis of the other sets are on view, and so are various models of loudspeakers and pick-ups, record players, and playing desks.

Of the complete sets the most outstanding is probably the "Superhet Autoradiogram Seven," which is a last word in commercial design incorporating superhet reception, automatic record-changing, automatic volume control and an ingenious static suppressor control.

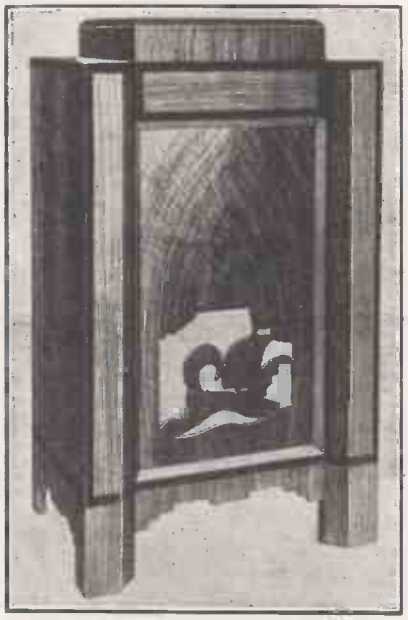
SOLID CONSTRUCTION



The care put into the design and construction of W.B. loudspeakers is well illustrated by this permanent magnet model.

A new type of moving-coil speaker set at an angle provides an extremely high degree of quality, and the set delivers an output up to 2·5 watts.

A SUPER WITH A.V.C.



Made by Messrs. Varley, this splendid receiver is a mains superheterodyne radiogram employing automatic volume control.

Of the other sets we single out for special attention the "Concert Seven," the "Superhet Lowboy Seven," and the "Superhet Selective Five." In addition, the record lover will be interested in the "Auto-Electrogram," which is a record player of the automatic changing type, of high quality and superb finish.

Stand 126

GROSVENOR ELECTRIC BATTERIES, LTD.

Recent radio developments have not made the battery-maker's lot a very happy one. However, despite Q.P.P., "Class B" and the like, Grosvenor batteries are no less up to date than they have always been, and a number of new models suitable for the new methods of low-frequency amplification will be seen on Stand 126.

Owners of portable receivers, in particular, should visit this stand if only for the fun of trying to belie the claim that there is a Grosvenor battery for every portable!

Since the needs of nearly two hundred different makes of receivers have been carefully studied, the laugh is generally with the makers.

The triple blue line super-power model is a fine piece of work, while the extent of the standard range must be seen to be believed.

Stand 54

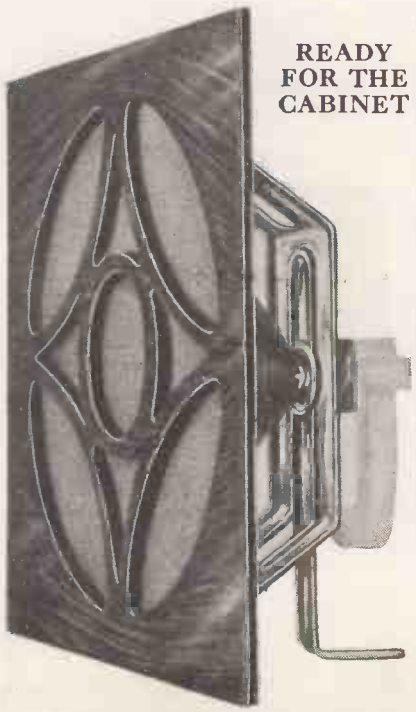
HARLIE, LTD.

The would be radiogramophone enthusiast might well be excused for a little hesitation at seeing so many firms anxious to provide his needs. However, if he hesitates at the Harlie stand he will be anything but lost, for here is a firm which owes its success to the best of all advertisements—the "satisfied customer."

The Harlie tone selector and scratch filter is too well known to need commenting upon, but in addition the stand will display a wide range of products ranging from pick-ups to microphones.

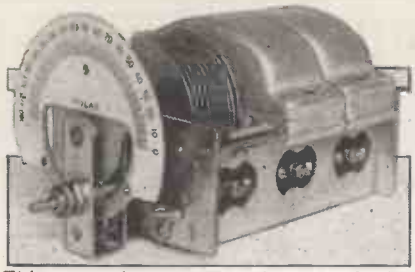
The "de-luxe" pick-up has a response curve which is well worthy of study, for this instrument is very moderately priced, while there are

READY FOR THE CABINET



A well-known Blue Spot unit and speaker chassis in its latest form. Note the leg fixed to the metal work.

Components for Constructors



This ganged component is one of the range of Polar variable condensers made by Messrs. Wingrove and Rogers.

many who will fall for the attractions of the "Fix-a-Gram" unit which provides, in effect, a portable radiogram!

A multiplicity of "gadgets" such as automatic stops and pilot lights will keep the Olympian visitor interested for as long as he wants.

Stand 16

F. C. HEAYBERD & Co.

"Class B" apparatus is likely to attract the attention of all constructors who have followed the progress of radio developments during the past few months, and those who visit the Heayberd stand—as all will sooner or later—must see the special mains units which have been designed for "Class B" amplification.

These units make use of a neon stabiliser tube which ensures absolutely constant voltage regulation, and are interesting on this account as well as because they are supplied

FOR RELIABLE L.T.

A feature of this Fuller low-tension accumulator is the method of marking the terminals with moulded + and — signs

in kits which the constructor can build up for himself.

The usual range of Block condensers, resistances and potentiometers will be shown here, and those who like to charge their batteries at home will be interested to hear that the Heayberd home chargers have now been completely redesigned.

It is also welcome news that the majority of mains transformers in this range will be fitted with special plugs and sockets which will make them even more fool-proof than at present.

It can be no easy job to improve upon Heayberd products—which is probably the reason why you will find so many old friends on this stand.

Stand 106

HELLESENS LTD.

A complete range of batteries for radio is to be found on this stand, which should not be missed by the

ON STAND NO. 55

One of the many Multitone exhibits shown in their display at Olympia.

man with a depleted purse. The new "Hi-Life" range of H.T. and G.B. batteries is most interesting in that it is the original range previously in the higher-priced class, but now selling—incidentally in a brightly coloured carton—at really popular prices.

The old range is now replaced by a new series of super cells which involve a new patented process. Greater capacity and power are secured without increasing the size of the battery.

Hellesens' stand might well be the goal for the footsteps of the "not-on-the-mains" constructor who can be sure of finding what he wants.

Stand 108

HIGH VACUUM VALVE CO., LTD.

Brooks may run on for ever—but even the best valves need replacing sooner or later. Which is why there is always room for any *good* new valve.

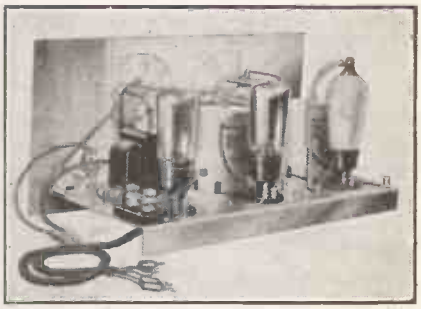
The Hivac firm certainly entered on production at about the most hectic time in radio valve design, but they have been able to keep pace very well with this rush of progress. So that on Stand 108 this year you will see a new range of entirely British valves for every radio purpose.

Most interesting, probably, are the two multi-grid pentodes which give outputs of 500 and 750 milliwatts, while a specially designed "Class B" output type will also be seen.

All these valves are in the battery class, but a range of A.C. models will be available directly after the Show and will probably be seen on the stand.

The Hivac firm has successfully catered for the constructor who must

MADE BY LISSEN'S



Screened-grid high-frequency amplification is employed in this three-valve Skyscraper 3 Kit.

have a moderately-priced valve, and for this reason alone their stand is worth a visit.

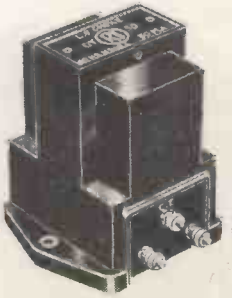
Stand 86

IGRANIC ELECTRIC CO., LTD.

"We are proud," say the Igranic Company, "to present our products for the coming season because they are our contribution to the marked

ONE OF MANY

Made by Radio Instruments Ltd., this component is typical of their wide range of radio transformers



progress in the rapid development of an industry the like of which has not before been witnessed."

Items of Interest to All

Stand 86 is proof of the truth of this statement. There are several most interesting innovations here. Among them will be seen the "Igranicor" coils, remarkable because the ferreous core is not solid but is built up from thin laminations like the core of an L.F. transformer. These coils are available for ordinary broadcast wavelengths or for short waves. This range is quite in keeping with the standard of excellence usually associated with Igranic products.

The Igranic fixed condensers in metal cases are another needed contribution to present-day methods of receiver construction, and are certain of a welcome, since they are a new departure for this firm.

Several models of loudspeakers will also be seen, including the new Q.P.P. and "Class B" ranges of moving-coil instruments, the prices of which are extremely moderate.

Altogether an interesting stand.

Stand 116
JACKSON BROTHERS, LIMITED

The vogue for iron-cored tuning coils makes accurate matching in gang condensers an even greater necessity than in the past, and the alterations made to J.B. condensers for this very purpose warrant a visit to the stand.

MULTI PURPOSE

A moving-coil combined measuring instrument shown by the Automatic Coil Winder Co.

Once there, the workmanlike appearance and rigid construction of the hundred and one models which will be shown will keep the visitor there for much longer than he intended.

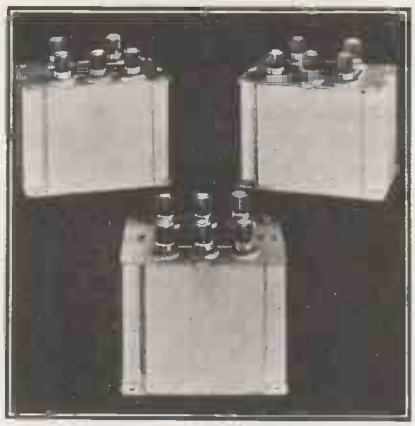
Special new features include a solid dielectric condenser, as well as a straight-line tuning dial which, if it is as efficient as it looks, should prove one of the most interesting exhibits on the stand. A short-wave dial with ratios of 8 to 1 and 150 to 1 is also likely to have its adherents.

None of the old favourites will be missing from the J.B. stand which is one of the "Olympian" homes of the condenser.

Stand 37
LECTRO-LINX, LTD.

The strength of a chain is, so rumour has it, in its weakest link, which means that it's no use building a receiver of expensive transformers, condensers and valves if the terminals, plugs, and valve holders are at fault. It's the little things that count—count so much that you will find the whole of the Clix stand filled with the little things of radio.

BULGIN TRANSFORMERS



Three transformers in the Bulgin range of components which covers almost all items used in home construction.

Most interesting of these you will find is the new anti-microphonic valve holder which has been designed to fit in with present conditions of receiver construction which demand a return to some form of holder which is impervious to air pulsations. This valve holder is also particularly suited to short-wave work.

THE WESTECTOR

For full-wave detectors. This is one version of the now well-known Westector made by the Westinghouse Company.

One of the fine instruments made by the Radiogram Development Company.

You should leave time, though, to see the neat chassis-mounting valve holders (seven-pin type, of course), with floating socket mounting; the non-corrosive spade terminals; and the socket terminal strips.

You will come away from the Clix stand with a new attitude towards set construction—and your reception should benefit. As you will find at the stand—it's all a matter of connection!

Stand 72
LISSEN, LTD.

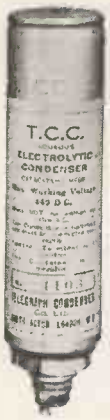
"There is a Lissen part for every radio use," so runs the motto inscribed on all catalogues published by the famous component and accessory firm. We agree, for a visit to their stand at Olympia will well and truly drive home to everyone how extremely wide is the tremendous range of parts manufactured by Lissen. Be it battery or transformer, complete set, or kit of parts, it can be obtained from either the factory at Isleworth or one of the subsidiary works. As is well known, the parts include coils, transformers of all sorts, condensers, resistances, valve holders, and so on, while the wide range of dry and wet batteries needs no introduction.

FOR H.F. WORK

The PM 12M Mullard valve is a screened-grid amplifier of the variable-mu battery type with a short grid base.

Of the kits of parts that are sold by Lissen, Ltd., perhaps the "Sky-scraper Three" is the best known, though the recently introduced Q.P.P. and "Class B" kits should be carefully examined by visitors to the exhibition.

Better Components Available this Season



FOR D.C. WORKING

Electrolytic condensers enable considerable saving in space. Here is one made by the Telegraph Condenser Company for working on voltages up to 440.

We must not forget the new-process extended-grid valves that are among the wide interests covered by Lissen, and of which a full range in battery and mains types is available.

Among the complete sets we particularly like the look of the three-valve band-pass receiver, which is available for A.C. operation at a price of 17 guineas with moving-coil speaker or 14 guineas with a balanced armature model. Other sets are the three-valve battery receiver, the two-valve all electric, three-valve "Popular" battery set, and the two-valve "Popular" battery receiver.

FIVE OF THE BEST

Some of the mains transformers made by Heayberd. They list a large range of power transformers for radio purposes.

Stand 77

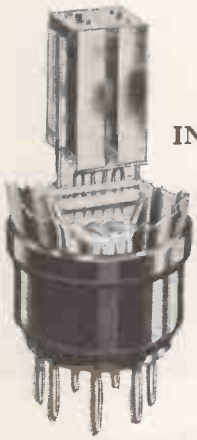
MARCONIPHONE, LTD.

The unbreakable valve has created more interest in radio circles than any other development during the last twelve months, and so it is right to assume that the main object of attraction on the Marconiphone stand throughout the Radio Exhibition will be the Catkin valve display. There they are, the all-metal valves, in grand array, looking most business-like, though somewhat unusual.

Variable-mu screened-grid valves, detectors, pentodes—all are to be seen with the metal anodes, and in some cases the perforated metal casing over them. Unbreakable, to all intents and purposes, and conveniently small.

The glass valve is not wholly neglected, of course, for the majority of the Marconi valves are still of the glass envelope type—the Catkin method of construction is being adopted gradually, and it will be some time yet before the glass valve will be banished from the Marconi lists.

But the valve exhibits form only a section of the stand; complete receivers, gramophone pick-ups, and loudspeakers also provide an imposing array of radio merchandise. The new five-valve all-mains transportable superhet, for instance, at 15 guineas, deserves special mention, for it is the latest thing in the Marconiphone range. It has a big brother in the



INSIDE INFORMATION

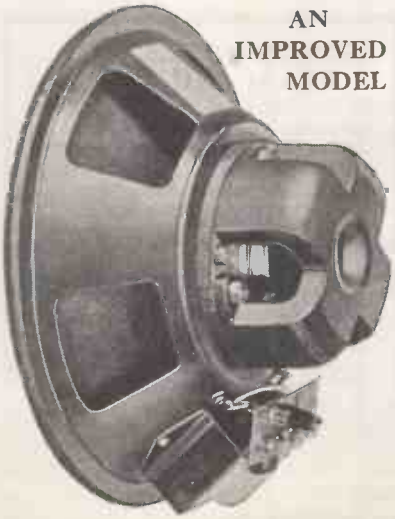
This is what the inside of a Class B valve looks like. It is of Cossor make and the square construction of the anodes should be noted.

all-electric radiogram, Model 274, which is capable of providing an undistorted output of 2,000 milliwatts.

Stand 71

MULLARD WIRELESS SERVICE CO., LTD.

The exhibit of this famous firm is arranged to display to the fullest



AN IMPROVED MODEL

Many modifications and improvements have been incorporated in the new Celestion loudspeakers, one of which is illustrated above.

advantage the widespread range of valves manufactured by the Company for all radio uses, and also the numerous electrical and mechanical improvements that have been embodied in the valves since last year.

Most important among the battery valves is the new "Class B" type, P.M.2B., while the short grid base multi-mu S.G. two-volter, P.M.12M., will attract much attention. New anti-microphonic structures have been introduced in the valves since last year, and the models showing how this is achieved make very interesting exhibits.

MARCONIPHONE PICK-UP

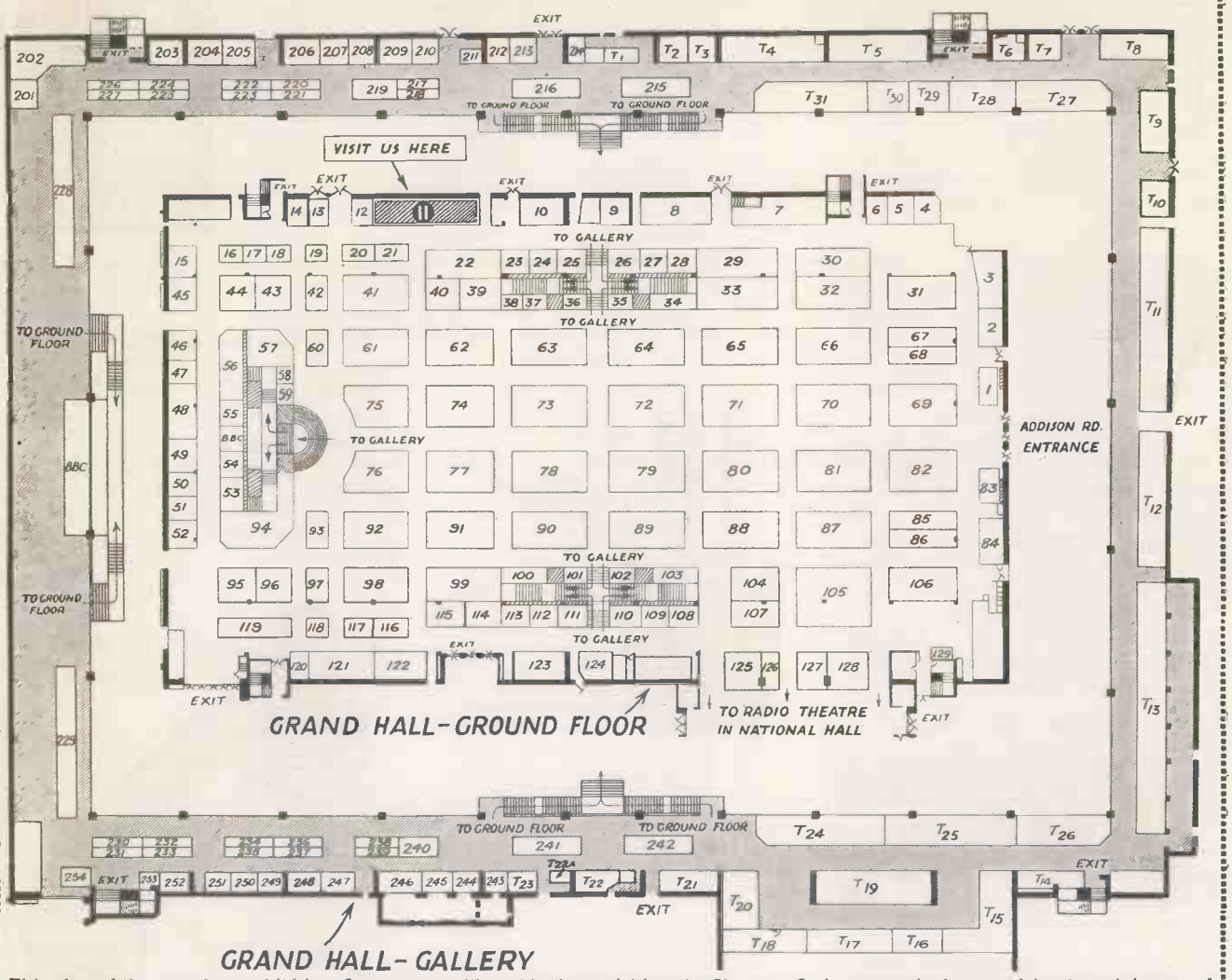
A well finished pick-up and arm by a firm of repute. The flex connections come out beneath the motor board.

Among the mains valves, visitors should look out for the new multi-mu H.F. pentodes; also the double-diode-triode, which is the latest arrival to the Mullard range. New output pentodes are also to be seen, capable of giving very generous output wattages and being of both the directly and indirectly heated cathode types.

A new range of indirectly heated D.C. mains valves is appearing at Olympia for the first time, the current consumption being as low as ·18 amp. The range comprises two types of screened pentode, one of which is a multi-mu valve, a triode detector, a double-diode-triode, and a pentode output valve.

In addition to the large variety of battery and mains receiving valves being shown, a representative collection of transmitting valves is to be seen. (Continued on page 268)

HOW THE STANDS ARE ARRANGED IN GRAND HALL AND GALLERY



This plan of the complete exhibition floor space will enable those visiting the Show to find any particular stand in the minimum of time. The stands in the gallery are shown around the outside of those on the ground floor.

FIRMS AND THEIR STAND NUMBERS

The names of these firms, which have representative displays of all that is best in radio, are arranged in alphabetical order, together with their stand numbers, for convenient reference.

Name of Firm.	Stand No.
Amalgamated Press, Ltd.	11
Automatic Coil Winder & Electrical Equipment Co., Ltd.	46
Bakers Selhurst Radio	35
Belling & Lee, Ltd.	45
Benjamin Electric, Ltd.	42
Block Batteries, Ltd.	22
Bowyer-Lowe & A.E.D., Ltd.	102
Britannia Batteries, Ltd.	124
British Blue Spot Co., Ltd.	97
British Broadcasting Corporation	—
British Ebonite Co., Ltd.	207
British General Mfg. Co., Ltd.	38
British Pix Co., Ltd.	204
British Radiophone, Ltd.	118
British Rola Co., Ltd.	52
British Thomson-Houston Co., Ltd.	209
Bulgin & Co., Ltd., A. F.	122
Carrington Manufacturing Co., Ltd.	83
Celestion, Ltd.	125
Chloride Electrical Storage Co., Ltd.	241
Clarke & Co. (M/cr.), Ltd., H.	91
Climax Radio Electric, Ltd.	84
Cole, Ltd., E. K.	70
Columbia Graphophone Co., Ltd.	66
Colvern, Ltd.	56
Cossor, Ltd., A. C.	89
Dubilier Condenser Co. (1925), Ltd.	T.25
Edison Swan Electric Co., Ltd.	82
Electro Dynamic Construction Co., Ltd.	240
Epoch Radio Mfg. Co., Ltd.	2
Ever Ready Co. (G.B.), Ltd.	57
Ferranti, Ltd.	74
Fuller Accumulator Co. (1926), Ltd.	34
Garrard Engineering & Manufacturing Co., Ltd.	119
General Electric Co., Ltd.	90
Graham Farish, Ltd.	205
Gramophone Co., Ltd.	80
Grosvenor Electric Batteries, Ltd.	126
Harlie, Ltd.	54
Heayberd & Co., F. C.	16
Hellesens, Ltd.	106
High Vacuum Valve Co., Ltd.	108
Hustler, Simpson & Webb, Ltd.	62
Igranic Electric Co., Ltd.	86
Jackson Brothers (London), Ltd.	116
Lamplugh Radio, Ltd.	219
Lectro-Linx, Ltd.	37
Lissen, Ltd.	72
Loewe Radio Co., Ltd.	245
Marconiphone Co., Ltd.	77
Mullard Radio Valve Co., Ltd.	71
Multitone Electric Co., Ltd.	55
New London Electron Works, Ltd.	107
Oldham & Son, Ltd.	123
Ormond Engineering Co., Ltd.	99
Osborn, Charles A.	202
Osram Valves	92
Philips Lamps, Ltd.	81
Pye Radio, Ltd.	73
Radio Gramophone Development Co., Ltd.	79
Radio Instruments, Ltd.	41
Reproducers & Amplifiers, Ltd.	44
Siemens Electric Lamps & Supplies, Ltd.	31
Six-Sixty Radio Co.	95
Slektun Products	47
Sound Sales, Ltd.	213
Sovereign Products, Ltd.	101
Standard Telephones & Cables, Ltd.	96
Telegraph Condenser Co., Ltd.	98
Telsen Electric Co., Ltd.	88
Vandervell, Ltd., C. A.	228
Varley (Oliver Pell Control, Ltd.)	85
Westinghouse Brake & Saxby Signal Co., Ltd.	32
Whiteley Electrical Radio Co., Ltd.	128 & 129
Wilkins & Wright, Ltd.	20
Wingrove & Rogers, Ltd.	93
Wright & Weaire, Ltd.	1

The exhibits in the gallery are every bit as interesting and important as those in the body of the hall, and this review of some of the outstanding displays and items among them will be of interest both to visitors and to those unable to see the Show.

Stand 207

THE BRITISH EBONITE CO., LTD.

Where would radio be without ebonite? True, someone might find a good substitute, but be that as it may, the British Ebonite Co., Ltd. do much to ensure good insulation and convenient coil formers. A wide range of their productions, well illustrating the excellency of the material employed, is exhibited.

Although ebonite coil formers of the 6-rib type are those most commonly met with by constructors, there are two-dozen-odd types of Becol formers made by the British Ebonite Co., Ltd. They are available in standard lengths of 3 in., 4 in., and 6 in., but may be had in any lengths desired.

The ebonite panels available in all standard sizes are shown in mat, polished and mahogany finishes.

An exhibit of particular interest is the Becol 6-rib coil former and clip-in base. Six contacts are available, no pins are employed, and it is impossible to insert the coil incorrectly even in the dark.

Stand 204

THE BRITISH PIX CO., LTD.

Every listener will be familiar with the Pix aerial fitting made by the British Pix Co., Ltd. It is on show, together with other Pix products, on Stand 204.

Among the other exhibits are invisible strip aerials for indoor use, and a whole range of the remarkably attractively priced valves made by this firm. These include 2- and 4-volt battery valves and indirectly-heated A.C. valves. Rectifiers are included as well.

There is also an entirely new line exhibited on this stand. It is the "Modula" armchair control.

The "Modula" enables a set to be controlled from a distance. Incorporated in a moulded bakelite case, it is supplied complete for 2s. 11d. Special weighted leather strips are available with the instrument, for hanging it on the arm of an easy chair.

This is certainly a most ingenious little gadget, and one that should prove very popular at Olympia.

FOR NON-RESONANCE

This handsome Lamplugh speaker cabinet is known as the "Timpani-Tone Cabinet," and is made of a material consisting of a sheet of metal between two layers of wood.

Stand 241

CHLORIDE ELECTRICAL STORAGE CO., LTD.

If it's batteries that you want to look at when you go to Olympia look at the Exide and Drydex range.

Even such a fine range as Drydex has always been can be bettered, apparently, because three new types have been added this year. Two of these are ordinary H.T. types, but including 9-volts grid bias, and both are very reasonably priced. The third is a new 120-volt type, also not at all expensive.

The range of portable batteries has been increased so that it covers every well-known receiver, while cells of extra capacity have been added to the new types for Q.P.P. and "Class B" output work.

Exide accumulators are there in great profusion. The normal discharge cells have a capacity range of from 6 to 120 ampere hours, while the special "Mass" type, which hold their charge for long periods, have provision for gravity bead indicators if needed. Unspillable cells for portable receivers are also shown.

H.T. accumulators in the Exide range will include a 10,000 milliamp. and a 5,000 milliamp. unit, which are available in 60-volt blocks for stacking.

Here is paradise, indeed, for the battery user!

Stand 205

GRAHAM FARISH, LTD.

The fact that the firm of Graham Farish has always realised the importance of catering for the constructor's smallest need is probably the reason why this stand will be crowded during the run of the exhibition.

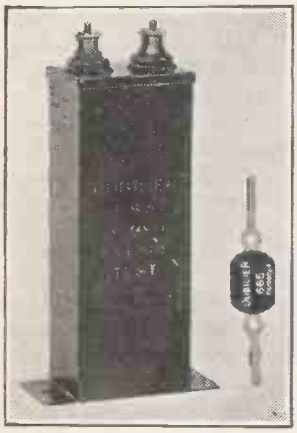
Some Star Displays of the Gallery

The Graham Farish "Filt" and the Graham Farish "Gard" are both of them examples of the attention paid to detail, and both these well-known products will be on view as usual.

Almost every year the increased volume of business produced by the exhibition has necessitated increasing the factory space accordingly. This year the bull has been taken properly by the horns, and visitors to Stand 205 in the gallery will see exhibited the first products of the new factory which has increased manufacturing facilities by 50 per cent.

Home constructors who realise the excellent work which Graham Farish have done for them will pay an early visit to the gallery.

IN ALL SIZES



Dubilier fixed condensers need no introduction. They are available in a most extensive range, the two shown being a high voltage condenser and a small capacity one for receiving sets.

Stand 219

LAMPLUGH RADIO, LTD.

If you want to find something new, then a visit to the Lamplugh stand would seem to be indicated. With one exception, the whole range of "Silver Ghost" products is entirely new!

The permanent magnet moving-coil speakers—four of which will be seen on the stand—are fitted with an entirely new diaphragm, a Lamplugh production, which can be supplied to suit listeners' preferences. Thus if you want the high notes you get a diaphragm which gives them; if you want the lower frequencies, they're there for you; or a third diaphragm will provide an even balance. All these speakers are suitable for "Class B" output.

The "Timpani-Tone" baffle is another new product on this stand which should be examined for its ingenious construction, while the "Antistat" aerial unit is one of the most interesting contributions towards interference-free reception which has been seen for some time.

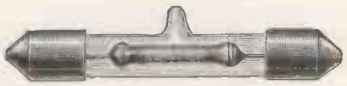
No, there's no lack of novelty here—and novelty of the right kind, too.

Stand 245

LOEWE RADIO COMPANY, LTD.

The association of Loewe Radio

SAFELY SEALED



A feature of Loewe small fixed condensers and fixed resistances is that they are sealed into a vacuum.

with resistances is probably as complete as the association of Swan with Edgar, or of ham with eggs!

It would, therefore, be something of a disaster if vacuum resistances were not a feature of the Loewe stand.

At the same time there are other exhibits of this firm which should not be missed. These include a combined pick-up and volume control at a very moderate price, a full range of paper condensers, and the Loewe seven-valve superhet. This latter is an extremely pleasant looking receiver for A.C. mains, and covers a wave-range from 19 to 2,000 metres.

Here is a stand which will appeal first to the constructor and afterwards to the ordinary listener—a good all round show.

A USEFUL RANGE

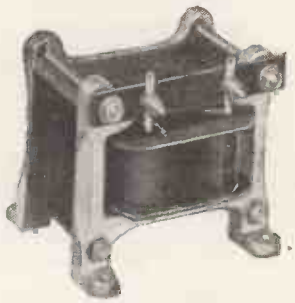
Both mains and battery valves are available in the Pix range, made by the British Pix Company.

Stand 202

C. A. OSBORN.

The housing of a radio receiver is one of the most important parts of its design, especially if it is of the radiogram variety or has an enclosed loud-speaker. But whatever the problem in the choosing of an attractive and efficient cabinet, Messrs. Osborn, who have been suppliers of radio cabinets ever since radio broadcasting began, will be able to help.

SOUND SALES PRODUCT



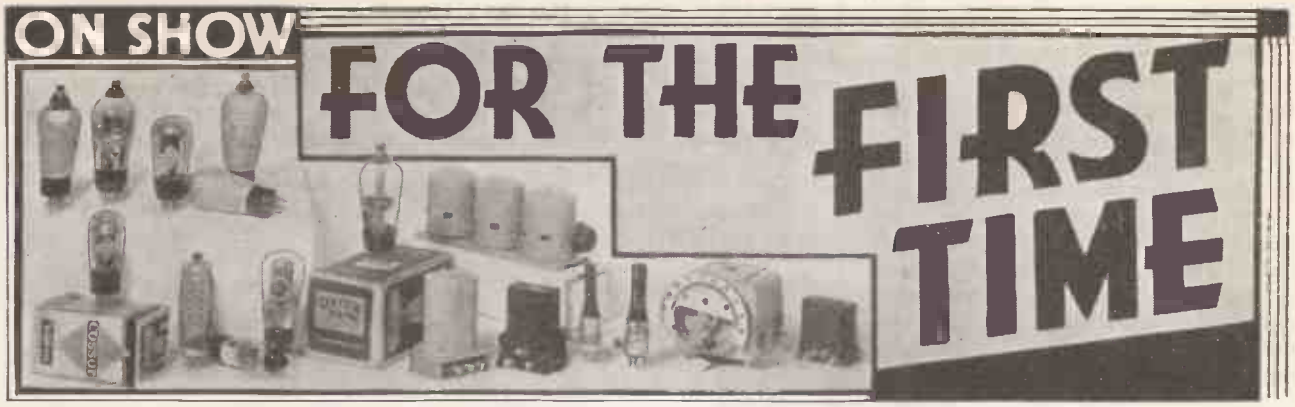
Sound Sales, Ltd., have a fine range of components for low-frequency working, the sound construction of which is typified by the component illustrated.

Some really beautiful examples of the woodworker's art are to be seen at their stand, and the attendant on duty will be pleased to assist everyone who requires advice.

(*Continued on page 273*)

REPRESENTATIVE GRAHAM-FARISH PRODUCTS

On the left of this group of components are two power type "Ohmite" resistances, to the right of which is seen a binocular and an ordinary H.F. choke.



THE First Time. What excitement that phrase conjures up! What hopes of future success and achievement! Whether it is applied to persons or to things it carries with it an air of romance that inevitably arouses more than passing interest in the minds of all who hear it.

The Newcomers

Something new. That is what it infers, and that is exactly what it means as applied to a number of components and accessories that are to be presented at their first radio "court," the National Radio Exhibition, this year.

Some of them have been discussed in public before, and in some instances they have "come out" already, but this is their first radio show, and so we salute them, and wish them and their manufacturers the best of luck.

One of the great attractions of Olympia is sure to be the ranges of Catkin valves that are to be seen on the Marconi and Osram stands, as well as in sets marketed by other radio concerns. Unbreakable valves have been the dream of the constructor and manufacturer for many years, and now they have arrived. Good news indeed.

Advances in Valves

As a matter of fact it is very largely a valve show this year, if the new arrivals are to be considered as the main attraction, for we have an abundance of fresh additions for the radio fraternity to welcome. Among these are the many multi-grid and multi-purpose valves, such as the double-diode-triodes, which have largely revolutionised the commercial set designs to be seen.

The double-diode-triodes are presented by Mullard, Osram, Marconi and Mazda, while both Mullard and Cossor have gone one farther (as a matter of fact Cossor have gone two farther) in the matter of electrodes, having produced respectively the double-diode-tetrode and the double-diode-pentode.

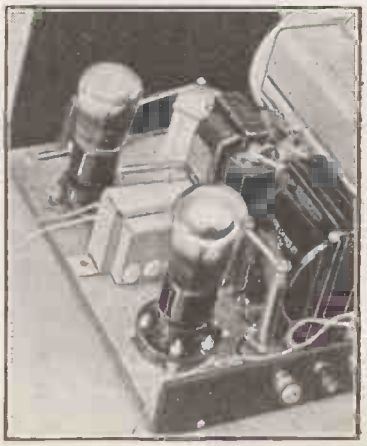
All the valves are for the main purpose of supplying pure rectification and at the same time automatic volume control and L.F. amplification. They are of the mains types, for A.C. working, and should have a very full future during the next year.

Other valves of note are the Class B types which have already got well away on the market though this is their first official introduction *en masse* to the public. With them must be coupled the large range of components, transformers and chokes, to say nothing about the loudspeakers that have been brought out to meet the new conditions of amplification that the Class B valves introduced.

As so many important new contributions to better radio figure in this year's Wireless Exhibition, this special article has been penned to introduce the outstanding newcomers to our readers.

By FREDERICK LEWIS.

"CLASS B."



The new "Class B" method of low frequency amplification is one of the great innovations this year. Here is a typical set employing the method, with its great economy of H T. current for large volume.

Special Components

R.I., Sound Sales, Varley, Ferranti, Wearite, Benjamin, W.B., Telsen, etc., have all been hard at work turning out the necessary L.F. components, while the speakers with special transformers, or with complete adaptors attached, have been dealt with by such famous concerns as Celestion, W.B., Epoch, R. & A., Blue Spot, to mention a few.

The new valves have also meant increased activity among the valve-holder makers, for 7-pin holders are required, and these have been supplied by W.B., Ferranti, Telsen, Benjamin, Clix, etc., in both baseboard and chassis types.

But we have not come to the end of the valve débutantes yet, we must extend a welcome to the Screened Pentodes, both multi-mu and ordinary types, and to the new short grid base multi-mu screened-grid valves that have been introduced by Cossor and Mullard. Fine little valves these, which make the design and control of battery receivers very much easier.

A Battery H.F. Pentode

One of the first battery-operated multi-mu pentode H.F. valves should be making its bow at Olympia before the Show is over, unless our information is incorrect, for we understand that Mazda are well on the way with a valve of this description, and are eagerly awaiting its début.

Such an amplifier should make a great deal of difference in the performance of a battery receiver, and with

the aid of Class B amplification there seems to be no need for the battery set to drop behind any of the normal medium wattage mains receivers at all in the way of either sensitivity or power output.

Apart from what might be called straight receiving valves, there have been developments in transmitting and other types of valves. Many of these are to be seen on the various stands of the valve manufacturers, and they, too, should be among those to receive acclamation at their first radio " court."

There we shall see the Cossor stabilising valve, a two-electrode valve designed to provide steady voltage control in mains units built for operation with Class B and Q.P.P. receivers. It controls the output voltage by virtue of the load it places on the unit, the current passed by the valve (which is across the output) increasing with the pressure, and vice versa, so that when the unit voltage tends to rise the valve automatically applies more load, thus keeping the load, and therefore the voltage of the power pack, sensibly constant.

Short-Wave Valves

Short-wave transmitting valves, really short-wave valves of new design, including a screened-grid type, are being presented by Mullard, who have turned out some types specially for the very high-frequency bands such as 5 metres. These valves are at the moment undergoing tests in the various short-wave stations run by our research staff, and we hope to report on their operation in the near future.

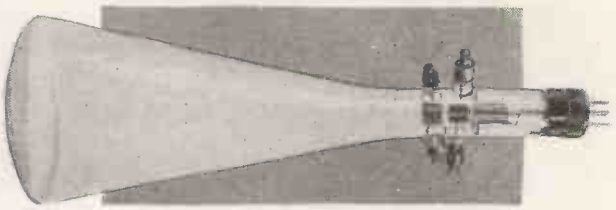
The cold valve, too, must have a hearty " handshake," for it is unique in its class, and is a very clever adaptation of the well-known Westinghouse mains rectifiers.

The valve people have not had it all their own way, however, for the coil designers have been steadily at work during the last ten or twelve months on the problem of iron-cored inductances, with the result that we must again take off our hats and say " Welcome."

Quite a number of iron-cored coil designs are to be seen for the first time at Olympia. New Ferrocart inductances are present, as are also a series of coils with various iron alloy and dust cores from the factories of Telsen, Varley, Wearite and Igranic.

FOR TELEVISION

The new Ediswan Cathode Ray Tube.

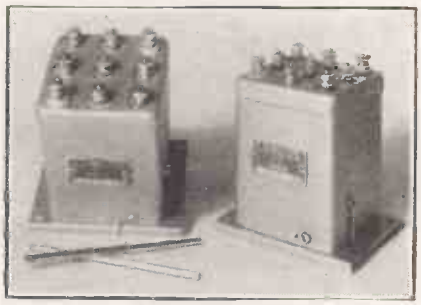


Coil Developments

The iron-cored coil has come in with a great rush, and we should hear a good deal about it during the next twelve months, when it will be used extensively in set designs emanating both from the manufacturers' laboratories and from those of the home constructor journals.

Of the merits of the iron-cored coil we do not intend to speak here; suffice it to say that it has very definite advantages over the ordinary inductance where a screened coil is required, for it enables that close screening to be obtained without loss of inductance and without the need for great big " gasometer " cans.

AN UNBROKEN RANGE



" No-Gap " Tuning Coils, which have a range of approximately 160 to 2,000 metres without a break !

Remarkable Compactness

Most of the coils are built round some form of dust-iron (or iron-alloy) core, and the sizes attained are remarkable in their smallness. This will greatly facilitate the work of the set designer, whose life is essentially one of trying to pack things into the smallest space consistent with efficiency of operation. And coils have in the past been none too easy to deal with in this respect, for the overall diameter of the canned variety has always tended to be on the large size.

Following the tuned iron-cored coil we shall undoubtedly have, and there may be at the Show, different designs of iron-cored H.F. chokes and super-het intermediate transformers. These again will largely assist in the design of sets, for again compactness will be achieved, not only without loss of efficiency, but actually with gain in performance.

An Ingenious Idea

A particularly ingenious idea has been incorporated in the Radio Instruments iron-cored constructor coils, which are specially designed with the idea of simplifying the work of the set builder, so that if desired he can drop them into an existing set without upsetting things.

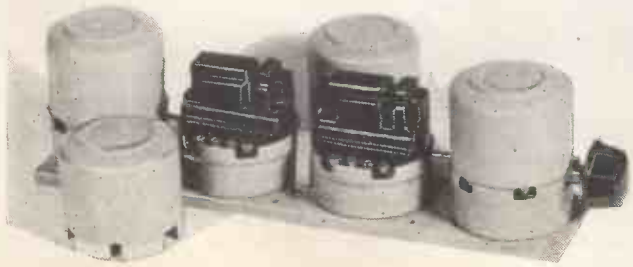
The coils have adjustments on the cores of both the long and short-wave coils, and this enables the user to adjust their inductances so that he covers the same range of wavelengths (or very nearly so) as he did with the air-cored coils which he has taken out to be replaced by the iron-cored variety.

DON'T FORGET TO VISIT US ON STAND No. 11

This is a good idea, for it enables him to suit the coils to his existing set much more closely than is usually the case when coils are changed, and makes the tuning of stations easier from the start, for he can nearly (if not quite) set the coils so that the dial readings on his condenser remain the same as before for the various stations.

No Waveband Restrictions

Another iron-cored coil we must welcome at the Exhibition is one that is not being shown by the manufacturers, who have no stand there, but



THE NEW IRON CORES

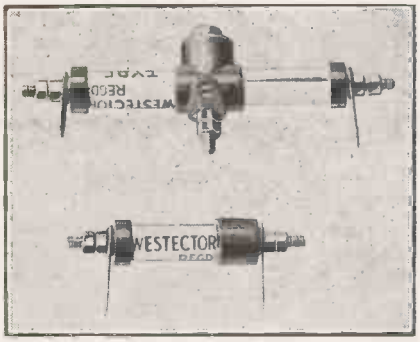
Some typical Colvern Ferrocart coil unit assemblies.

Many Wonderful Improvements This Year

which will be seen for the first time on our own in a special set design. It is the Lewcos "No Gap" coil, which is the result of a suggestion made by our Chief of Research to cover the whole of the wavebands used by European broadcasters.

A very wide range of wavelengths is obtained, the coils covering from 160 to 2,000 metres without a break, with three switching positions instead of the usual two. They are of the iron-

THE "COLD VALVE"



The "Westector" though only about as big as a grid leak, can do the work of a detector valve.

cored variety, and they are obtainable in single, or ganged units, and also as superhet inductances.

These coils were used last month in our "Airman" Two, and this and another set using the coils is to be seen on our Stand.

Incidentally, Varley and Sovereign have sprung one of the biggest coil surprises of the year by producing their condenser-less tuning units. In the case of Varley it is a "permeability" tuner consisting of a ganged band-pass arrangement needing no tuning condenser whatever, the tuning being controlled by varying the inductance of the coils by means of variations in the positions of the iron cores.

Permeability Tuning

Permeability tuning is yet young, and it has still to be tried out in general practice, but the idea is sound, and it should have an excellent future.

Seeing by radio has for many years been in the background among the possibilities pigeonholed for future release when it had reached greater perfection. This year many firms have decided that it is time something was done about letting the public "see for themselves" what progress has been made, and visitors to the Show will be surprised at the number of television viewers of various types that are to be examined.

Cathode Ray Television

Revolving mirror drum viewers vie for popular attention with oscillating mirrors, while alone in its conception and of particular interest is the all electrical method introduced to the public by our contemporary, "Popular Wireless," a few months ago in collaboration with the Edison Swan Electric Co.

This is the Cathode Ray method of television reception, and it is to be seen on our stand, No. 11. It can be operated from batteries and requires but a small radio input, while the whole outfit is completely noiseless in its working, no mechanical parts being used at all.

This new arrival is sure to meet with a great deal of attention, as will the special cathode ray tube designed for it and shown on the Ediswan stand. It is possible that the new black and white screen Ediswan tube will also be on view before the Show is over, as this has recently been developed with excellent results.

Automatic Volume Control

Naturally there will be a tremendous number of complete set designs, constructor's kits, and so forth to be seen, and among these there are many ingenious ideas incorporated. The A.V.C. utilised by R.I. in their superhet radiogram is worthy of mention, for it is one of the most successful that I have heard.

Strangely enough it does not make use of any of the new A.V.C. valves, such as the double-diode-triode, but the control is arranged from the ordinary triode rectifier. It has, too, a useful arrangement whereby the tuning can be made silent in between stations, so that in districts where noisy reception is likely to be encountered there is silence until a station is tuned completely in.

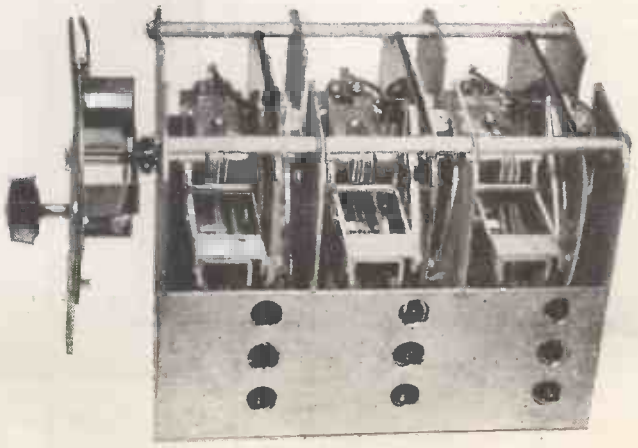
LOOK OUT FOR—	ON THESE STANDS.
Catkin Valves	11 77, 90, and 92.
Screened-grid pentodes	82, 71, and 89.
Double-diode valves and "Class B" valves	71, 82, 89, 77 and 92.
The "Cold" valves	32.
Iron-cored coils	85, 41, 86, 1, 88, 56, 11.
Permeability tuners	85, 101, 11.
"Class B" components	85, 41, 86, 1, 88, 213, 74, 42, 118, 55, 72.
"Class B" speakers	42, 97, 52, 209, 125, 82, 2, 35, 74, 44, 128-9.
Television apparatus	11, 74, 82, 213.

Ferranti Television Outfit

Among the kits of parts must be welcomed the Ferranti television receiving outfit, which is a new development of unusual interest. This operates on the oscillating mirror principle, and it is remarkably inexpensive to build.

VARIABLE IRON CORE

This is a revolutionary new development in tuning, in which variation of the iron core of the inductance makes a variable tuning condenser quite unnecessary!



"M·W's" RECORD REVIEW

There are some real gems to hear this month—high-lights in musical enjoyment. Some of them are compositions by the masters, and they are of such delightful character, eminently seasonable in their lightness of style, as to offer as attractive a batch as we have had for some time. Several ***must*** *go into your collection of records without delay . . . . . .*

Orchestral Records

THIS month the place of honour is Bach's. I have long tried to dispel in the ordinary listener's mind that abominable heresy that Bach means Sunday afternoon Cantatas.

Now H.M.V. and Columbia have come to my aid. First, with the No. 5 Brandenburg Concerto (on H.M.V. DB1783-4). The orchestra is the Ecole Normale of Paris and the soloists Cortot, Thibaud and Cortet.

There is no space here to describe adequately this masterpiece. Like its family, it trips along sparkling with all the colours of vivid movement, flashing from orchestra to one artiste or another as each new picture is built up. Try, say, the last inch of side two of the first record and see what Bach really means in the hands of genius.

Then two more which utterly confound our heretics—*The Air on the G String* and *Gavotte in E for Strings*—Columbia DX475. These arrangements are played by the British Symphony Orchestra under Sir Henry Wood.

There is no lovelier piece of music than the first; it is simply enchanting. If you want a word to describe the second, it is just—homely. Thus Bach as he really is. Hear these and join the enthusiasts.

Mozart comes in too, with some slender fragments. There are *Six German Dances* on Parlophone R1561 and two. Here are dainty things—early waltzes, really—of very considerable charm. But I feel that the Berlin Grand Symphony Orchestra are over-weighty for such pieces.

The recording is very luscious, and it will attract far more people than it will offend. Taste is the only criticism; I would not say that any artistic crime has been committed!

Light Music

Strauss and Offenbach make a good start, so the overtures to *The Queen's Lace Handkerchief* and *The Betrothal at the Lantern* can be safely recommended.

The second is the better, closing on a real wedding note. This record (H.M.V. C2570) is quite a feather in the caps of Dol Dauber's Salon Orchestra.

Next, *A Russian Night at the Hungaria* (Columbia DB1146). And what a night! I don't know a better in its class than this of Colombo's Tzigane Orchestra. The Gipsy melodies and the stirring march are really splendid.

Back to Strauss for *Acceleration Waltz* on Parlophone R1571. Said to have been written on a carriage journey and is a musical reflection of the trip. Edith Lorand's Orchestra play it very well indeed. Another ideal tea-time record is Marek Weber's *Potpourri of Waltzes, No.* 3 (H.M.V. B4454). You know the style—pleasant to a degree.

Vocal

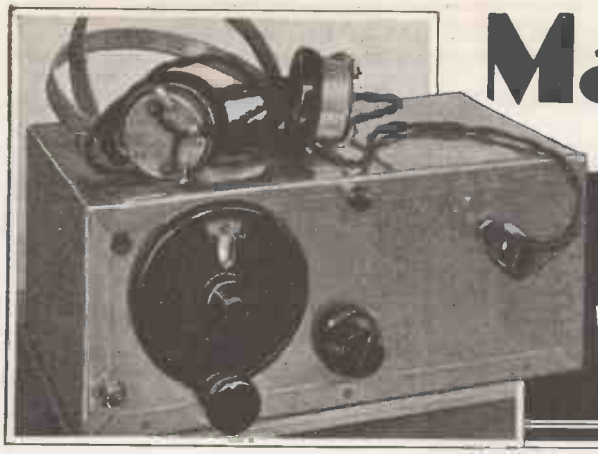
The luxurious voice of Richard Crooks is heard in two quite modern songs *In My Garden* and *Neapolitan Love Song* (T Amo) on H.M.V. DB1876. If these were sung by a singer of lesser calibre, they would not be outstanding, but he endows them with such perfect expression as to make a really charming record.

One of the daintiest little ballads *Just Because the Violets* is quite perfectly sung by Walter Glynne on H.M.V. B4426. With its companion *Bird Songs at Eventide* this record is quite a necessity for the collection. But the undoubted gem of the month is Gigli's record H.M.V. DA1292. One Neapolitan song record you must have, and this is it. On no account miss hearing *Lucia, Lucia* and *'A Canzone 'e Napule.* It brings Naples to you in every gloriously sung syllable.

(*Continued on page* 275)

BREAKING THE SILENCE OF YEARS

These pupils of a New York school for the deaf were treated to their first song—from the singer on the right—by means of the special apparatus shown. It transmits sound vibrations through the bone near the ear.



Making a 5-METRE RECEIVER

Although it works on the almost incredible frequency of sixty million cycles per second, this 5-metre receiver is not difficult to make or to operate. It uses standard parts, and has the outstanding advantages of very small size and low weight, in addition to providing its owner with access to radio's most interesting experimental waveband.

By the "M.W." Research Dept.

IN order to provide a receiver of universal appeal to the 5-metre enthusiast and also one suited to the newcomer to this waveband we decided to design for MODERN WIRELESS readers a receiving unit in a metal box completely self-contained with integral H.T., L.T., and grid-bias batteries.

For the constructor of the transmitter described elsewhere in this issue the receiver will prove suitable, as its dimensions are such that it fits neatly below the transmitter, so forming a complete station for either mobile or stationary use.

This feature is, however, merely complementary to the main design of the receiver, which sets out to provide a simple means of enabling anyone to explore the ether on 5 metres.

Design Problems

The receiver is a simple arrangement of an old type of circuit adapted to ultra-short waves, and is a very small three-valve affair. It is easy to handle and is remarkably sensitive.

The main trouble in the design of the normal short-wave receiver is to obtain tuning of sufficient breadth to avoid the rotation of the condenser being too critical for easy accurate adjustment. On 20 metres the sharpness of tuning that is experienced, let alone the usual troubles encountered with reaction control, is one of the main difficulties of rapid searching. and below that wavelength the trouble rapidly increases.

The apparently obvious way to get over the problem is to use a superhet circuit, which would give comparative ease of control and good sensitivity. This would appear to be so until one very important point about the transmission of ultra-short waves is remembered—this is, that in the very high frequencies the use of crystal control is a thing that has yet to be perfected, and so far no crystal-controlled transmitters are being used.

Frequency Control

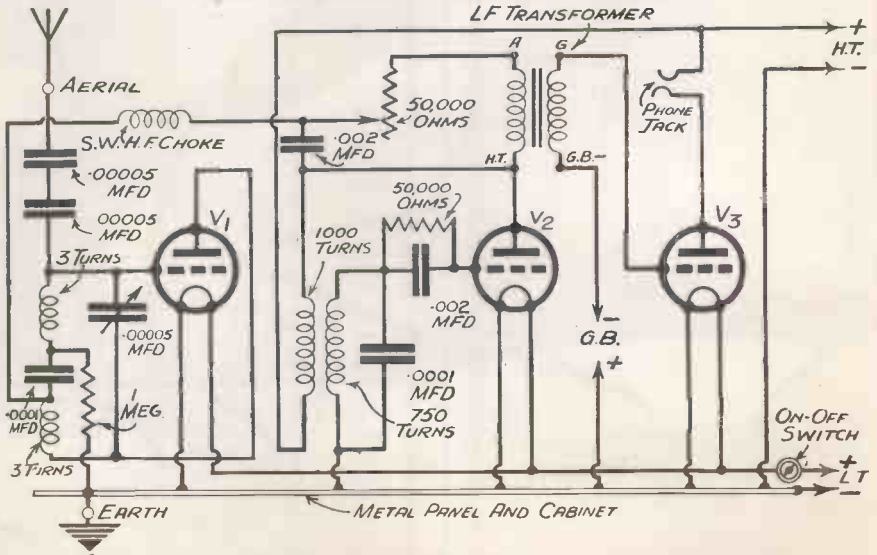
This is because the use of the ordinary quartz crystal as a direct control is so far impracticable, and though special crystals of tourmaline have been tried, their use is by no means perfected. Frequency doublers are being experimented with and other schemes are to be tried, but so far the transmitters with which the vagaries of the wave itself are being tested contain plain choke modulated circuits without carrier frequency stabilisation

Circuit Revival

Now this type of modulation causes a considerable amount of frequency modulation to take place which renders the reception of the wave impracticable for telephony on any very sharply tuned receiver, such as the straight det.-L.F. or a superhet. What is to be done about it?

There is luckily an easy way out of the difficulty, and that is the use of a super-regenerative circuit, similar to that introduced by Armstrong some years ago. Down on 5 metres a super-regenerative set is both sensitive and beautifully flat in tuning, allowing searching for stations to be carried out with remarkable ease, and holding the modulation of a received transmission perfectly.

A SUCCESSFUL "SUPER" CIRCUIT



On such short wavelengths as 5 metres the best type of receiver is the super-regenerative arrangement. The one shown in circuit form above has proved extremely successful under all conditions. The first valve is the detector; while V_2 is the super-regenerative valve, V_3 being an ordinary L.F. amplifier with the headphones in the anode circuit.

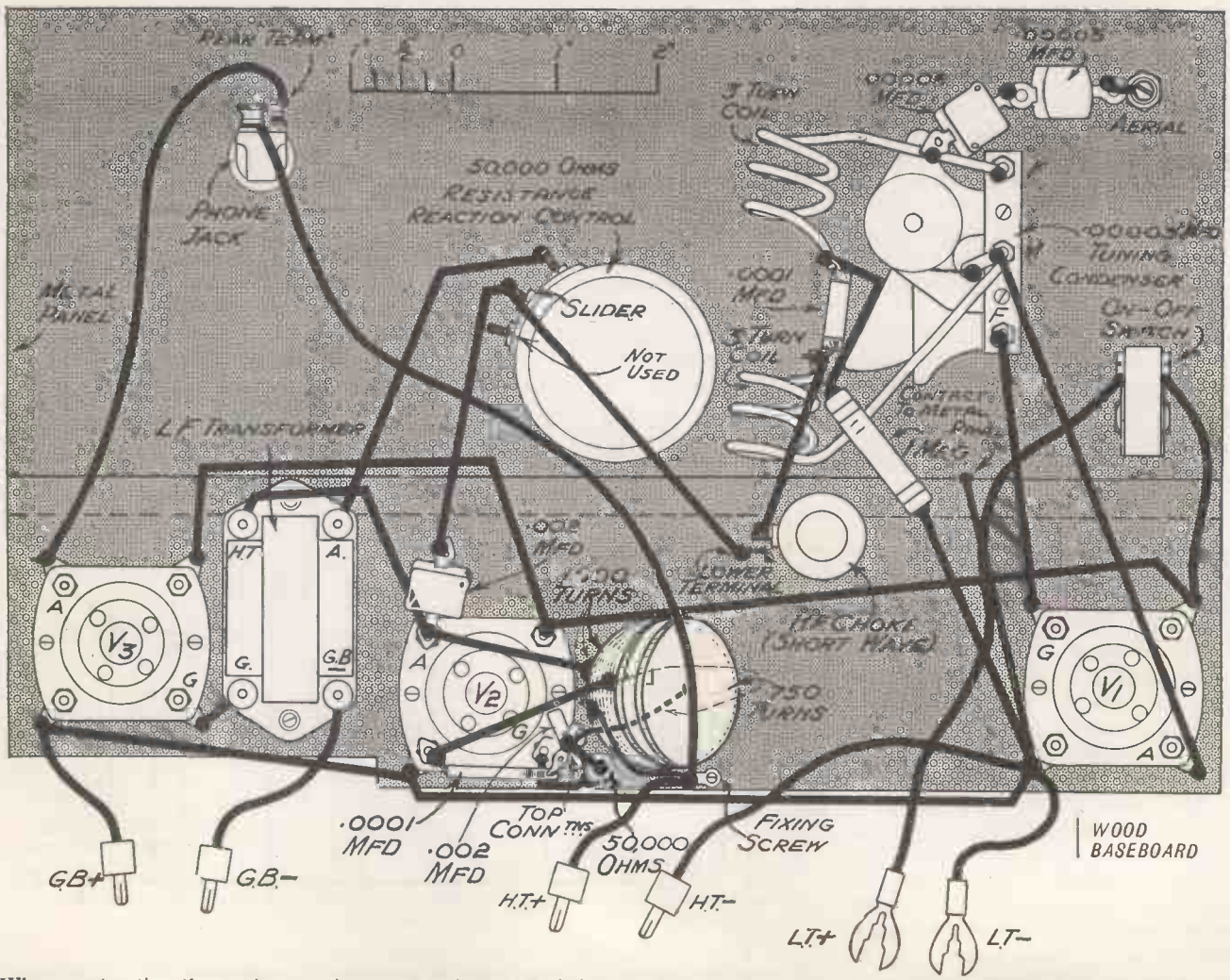
WHAT YOU WILL NEED FOR 5-METRE RECEPTION

Component.	Make used by Designer.	Alternative makes of suitable specification recommended by Designer.
1 metal cabinet complete with panel, 12 in. x 7 in. x 5 in.	Magnum	—
1 wood baseboard, 12 in. by 3 in.	Peto-Scott	—
1 ·00005-mfd. variable condenser	J.B.	—
3 four-pin valve holders	Benjamin "Vibrolder"	W.B., Telsen
1 50,000-ohm potentiometer, wire wound with insulating bushes	Igranic	Watmel, Lewcos
1 L.F. transformer	R.I. "Hypermite"	—
1 short-wave H.F. choke	British Radiogram	—
1 ·00005-mfd. fixed condenser	Dubilier 665	T.C.C.
1 ·00005-mfd. do.	T.C.C. type M	Dubilier
1 ·0001-mfd. do.	T.C.C. type M	Dubilier
1 ·0001-mfd. do.	Dubilier 665	T.C.C.
2 ·002-mfd. do.	T.C.C. type M	Dubilier
1 50,000-ohm resistance with wire ends	Dubilier 1 watt	—
1 1-megohm grid leak with wire ends	Goltone	Dubilier
1 special super-regenerative coil (1,000 turns)	Colvern	—
1 do. do. (750 turns)	Colvern	—
1 toggle on-off switch	Bulgin S.80	—
1 'phone jack	Igranic P71	—
1 'phone plug	Igranic P40	—
1 insulated aerial socket and plug	Belling & Lee type 1070	—
1 earth terminal	Belling & Lee type R	—
1 vernier dial	Igranic "Indigraph"	—
4 wander plugs	Belling & Lee	—
2 accumulator spades	Belling & Lee	—
2 yards insulated sleeving	Goltone	—
3 yards 18 S.W.G. tinned copper wire	Goltone	—
2 feet No. 12 S.W.G. tinned copper wire	—	—
2 yards single rubber-covered flex	—	—
Screws, etc.	—	—

There *is* a drawback—in the rushing sound which accompanies their operation—but as this is quenched by the received carrier, *unless it is very weak*, this is not so great a drawback as might at first sight be thought.

The principle of the regenerative circuit is well known, being the use of a reacting detector, which is not

Easy to Wire—and Easy to Work



When constructing the receiver, an important point to watch is to make sure that all the wires and components are rigidly fixed, and where possible, use solder in preference to screwed terminal connections. The earth terminal forms one of the fixing screws and goes through the panel and the flange of the cabinet front against which the panel abuts.

Completely Portable in Every Respect

allowed to go quite into oscillation, its oscillation being quenched by another valve just as it reaches the spill-over point. In this way the valve is kept at its most sensitive setting, a state of affairs that is very much nearer oscillation than can be obtained by manual reaction control.

Controlled Oscillation

Thus in the 5-metre receiver we have a detector that is set to be just oscillating at 5 metres, the exact wavelength being tunable in the usual way. Next we have coupled to it a quenching valve that is oscillating at a frequency just above audibility. This stops and releases the regenerative effect of the detector in such a way that to all intents and purposes the valve is always on the spill-over point without actually breaking into oscillation. Thus it is always in the most sensitive condition.

Following the quenching valve we have an ordinary L.F. amplifier. The set, therefore, is in reality a two-valver, with the difference that the detector is cunningly set at a state of feed-back which renders it exceptionally sensitive without creating any need for tricky reaction control.

The degree of reaction of the detector circuit is controllable by an anode circuit resistance of about 50,000 ohms, which is variable so as to provide a variation of anode potential, and therefore reaction.

The construction of the set is a very simple affair, being just a straightforward baseboard assembly, with home-made tuning coils and quenching inductances. As a matter of fact, these latter can be obtained commercially, but it is an easy job to wind them at home if desired.

There are four controls, which are fixed on the metal panel which fits into the metal box containing the receiver. These are the tuning condenser, the resistance which is used to set the degree of reaction, the telephone jack, and the on-off switch.

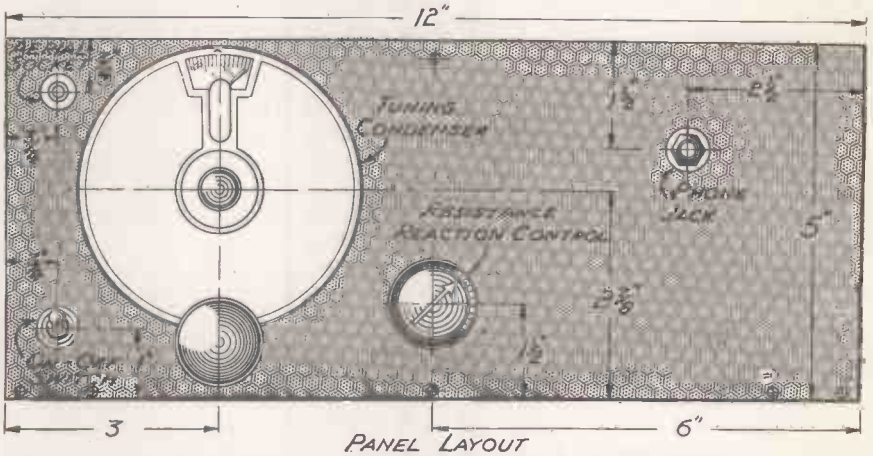
With the exception of the on-off switch, all the panel parts must be insulated from the panel. In the case of the variable condenser this is easily carried out by making the hole through which the spindle passes large enough to clear the surrounding metal, the condenser being held to the panel by the three tapped and screwed pillars.

These are insulated from the body of the condenser so that they do not thus automatically earth it.

The variable resistance and the phone jack have ebonite bushes so that the insulating of them from the metal is not difficult.

The anode and the grid coils are comparatively closely coupled together, being mounted about 2 in. apart and almost on the same axis.

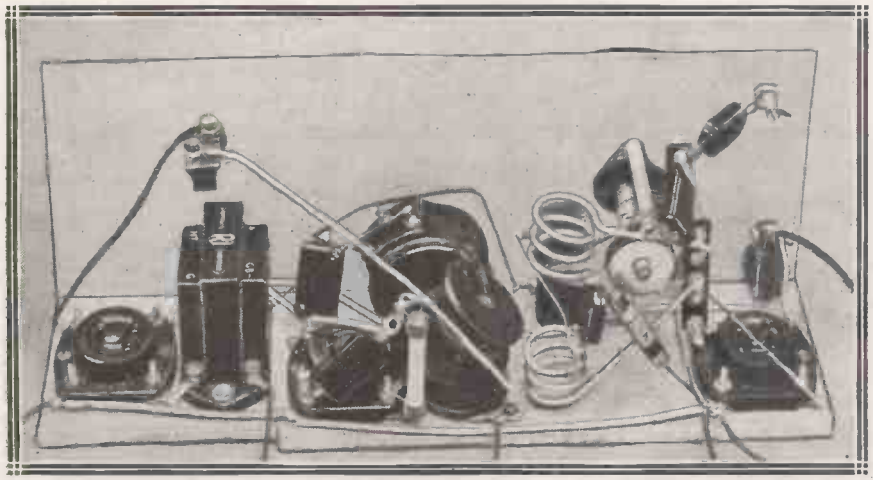
PERFECTLY STRAIGHTFORWARD CONTROL



PANEL LAYOUT

There is nothing difficult about the control of the receiver. The degree of super-regeneration is adjusted with the reaction knob, and the tuning—which incidentally is very flat—by the vernier dial. Unlike other short-wavers, the slow-motion gear is quite a refinement and it is by no means essential.

READY TO PLACE IN ITS CABINET



Here is the completed receiver Note how short and direct the connecting wires are, and also the thickness of the wire in the tuning coils. This latter point is most important, as it is essential that the coils be absolutely rigid.
The two super-regenerative coils can be seen in the foreground, the anode coil at the bottom and the grid winding on top.

Winding the Coils

The coils consist of three turns each on an inch diameter former, the former being removed after winding, and they are made of 12 gauge tinned copper wire. They are capacitatively coupled together by means of a condenser of ·0001 mfd., as well as having inductive coupling, and it will be noted from the circuit that the two coils are tuned by the same variable condenser, a centre connection between the coils being taken down to earth through the grid leak.

The ·0001-mfd. condenser acts, of course, not only as a fixed reaction coupling condenser between grid and anode circuits, but also as the grid condenser for the valve.

The L.F. output from the detector is taken through a short-wave choke,

which may be of the usual 10-metre commercial type, to the L.F. transformer, via the reaction control resistance already mentioned.

Coupled to this circuit is the anode of the quenching valve, the circuit of which contains two large inductance coils, one on the anode and the other in the grid circuit. These coils are so arranged that the valve is in a state of constant but slow oscillation.

ACCESSORIES AND VALVES

1 pair headphones—B.T.H.
1 60-volt H.T. battery.—Ediswan; Pertrix, Ever Ready, Drydex, etc.
1 2-volt portable type accumulator—Exide J.W.J.7 ; Oldham, etc.
1 4½-volt grid-bias battery—Drydex, Siemens, Marconiphone, Ever Ready, Ediswan, Lissen, Pertrix, etc.

VALVES :
Detector.—Micromesh P.B.1.
Oscillator.—Mazda H.L.2., Marconi and Osram H.L.2., Cossor 210 H.L., Mullard P.M.1.H.L.
L.F.—Mazda L.2., Marconi and Osram L.2.B., Mullard P.M.2.D.X., Cossor 210 Det.

The coils are made from 36 gauge wire (double silk-covered) wound on formers with flange outside diameters of about 1½ in., and with centres consisting of a small piece of wood, such as a match. The sides can be made of cardboard, or the whole former can be an ebonite bobbin.

The two coils have 1,000 and 750 turns on them respectively for the anode and grid coils, and are placed in position so that they couple at an angle of about 45 degrees. The exact amount of this coupling has to be decided with the set in use—an easy matter, for the coils are stuck in place with Chatterton's compound, which makes quite a firm enough fixing, but allows easy alteration of coupling.

Recommended Valves

The rest of the set, however, especially the detector coil, must be very securely mounted, for the slightest alteration in the positioning of the parts or wiring in the tuned circuits will upset the operation of the receiver and render calibration difficult, if not impossible. And to be able to calibrate a set on this wavelength is one of its most important features.

In designing the 5-metre receiver we tried several models, some which slid into the cabinet from the back, and others which slid in from the front. The former proved to be more accessible, for they could be slid in and out without the batteries being disturbed or having to be disconnected, thus facilitating adjustments to the receivers without the necessity of having to make and re-make battery connections.

The choice of valve for the receiver is important, especially the detector, which must have a low minimum self-capacity. Those we have given in the list of parts have been tried and found to be satisfactory, and we can recommend them. That is not so say that all others are unsuitable, but so far we have not had opportunity to try them out properly, and when dealing with the elusive 60-megacycle frequencies the only way to know is to test.

Testing for Oscillation

It is essential that the detector oscillate right down to the bottom of the tuning band, which fact can be tested quite well with the quenching valve out of its socket. Unless the detector is satisfactory in this regard it may be difficult to get the receiver operating right down to 5 metres.

For this oscillating test we set the reaction control resistance at "maximum"—that is, with the maximum H.T. applied, and minimum resistance in circuit.

The H.T. voltage applied is about 60 volts, while the grid-bias voltage depends on the L.F. valve employed. Any sort of short aerial can be used for reception of the ultra-short waves, and the usual earth, or often no earth at all. This latter alternative should be tried, and the earth used or discarded according to results.

The test of the receiver is not difficult, but one or two things have to be set before it is ready for regular reception. In the first place the detector has to be tested as already indicated, and must be capable of oscillating right down the scale with the resistance control fully turned to the right. As a matter of fact, probably it will be found that the valve will oscillate easily.

Adjusting Coupling

If it does not, an increase of H.T. or slight alteration in the degree of coupling of the two 3-turn coils may help. Again, another valve may cure the trouble, though if the one specified is used no difficulty should arise on this account.

The best setting for the coupling of the two coils is that which provides oscillation of the valve over all the settings of the resistance except at the full left, when the maximum resistance is in circuit. At this point, or just before reaching it, the valve should stop oscillating. This gives us a convenient and sure way of controlling the degree of oscillation of the detector, and in the operation of the set this feature is very important.

After the detector valve has been checked the quenching valve should be inserted and the reaction resistance set fully to the right. If the set squeals, reduce reaction until the squeal stops. It should then give place to a rushing sound.

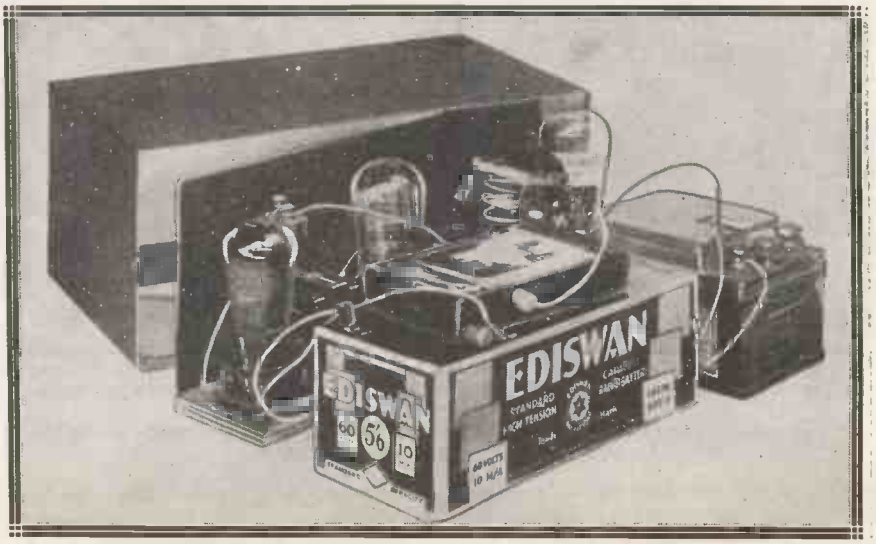
Reversing a Coil

If this squeal or rushing noise is absent try the effect of tightening the coupling between the two quenching coils. Should no rushing sound now prevail, it is probable that the coils are in the wrong relation with regard to one another, and the top one should be turned over.

Now alter the coupling until the

(*Continued on page* 276)

IT IS ENTIRELY SELF-CONTAINED



As far as portability goes, this receiver is a masterpiece, the set, H.T. battery, grid bias and L.T. accumulator being all contained in a strong metal box. A telephone jack is used for connecting the phones.

"I Have a Song to Sing-O!"

FOLLOWING on my remarks about the tune which was broadcast three times in ten minutes, comes the welcome news that the B.B.C. has at last decided to take a hand in this matter of song "plugging" by outside dance bands.

In future, hotel orchestras who play in the late evening programmes will be paid a fee as though they were in the studio. Forty pounds is the sum mentioned. Authorities at Broadcasting House will thus have control over what is played.

It only remains to make adequate arrangements for avoiding duplication in the studios. I believe that the periodic meetings between heads of programme departments have been stopped. When a dance band in the studio repeats most of a variety programme which has preceded it, then it's time they started again.

The Modern "Miss Bouncer"

"Little Miss Bouncer
Loves an announcer
Down at the B.B.C."

Do you remember Flotsam and Jetsam singing this in the Savoy Hill days? And now a real Miss Bouncer has come to light and her name is Mabel. A letter in an evening newspaper tells how this farmer's "darter" is "that struck on the voice of one of them announcers she's no heart for her work."

Lest history repeat itself, I beg Flotsam and Jetsam to take the first opportunity of reviving the story of Miss Bouncer so that Mabel may take warning before it is too late!

Incidentally, we may yet find the elegant young men of the theatre stage door congregating in Portland Place. The B.B.C., "as an experiment," has now appointed a lady announcer.

A Rare Occurrence

A recital by Miss Cecil Dixon, such as we had a few days ago, is so rare that listeners may be excused for forgetting that she is one of the earliest and most hard-worked of broadcasting artists.

Born in the Fiji Islands, Miss Dixon has spent most of her life in London. She probably knows the inside of Savoy Hill and Broadcasting House as well as anybody. Her voice used to be well known to all who looked forward to the gaps which were filled, as often as not, by her music. In very gentle tones she would whisper to the microphone "That was a Nocturne by Chopin."

HOT MUSIC being announced by Duke Ellington during his recent B.B.C. broadcast which gave a send-off to his tour of Britain.

To-day she is so constantly in demand by singers and players who value her work, that chances of hearing her solos have become less frequent.

Humour in Vaudeville

The B.B.C.'s impression of a typical American programme did something to show that the humour position over there is not much better than it is in this country.

The "New Yorker" published the other day a burlesque radio cross-talk programme. Like all good burlesque it was almost indistinguishable from the real thing. Here are two specimens:

"Straight" Man: "Why did your brother steal forty cents?"

Comic: "He thought the change would do him good."

"Straight" Man: "Do you mean to tell me you sat in the cage reading with a lion on either side of you?"

Comic: "Yes. I was reading between the lions."

(Note.—In the case of a gag as good as this, it is all right to use it several times in one programme.)

You recognise these as old friends? I thought so. Radio humour, or the lack of it, seems to be much the same all the world over. John Tilley and Hugh E. Wright have done their best to freshen things up. Many of the others don't realise the difference between a smoking concert and a broadcasting studio.

An American broadcasting official said to me the other day: "If you're going to be vulgar on the air, then put it over with a swing; don't be apologetic about it."

Radio Play Topics

However, America has been after some of our radio plays. They've already got "Squirrel's Cage" and "The Flowers are not for You to Pick," and have their eye on others.

Good News for "the Ordinary Listener"

Sweden does most for this international exchange of microphone plays. Twelve British and several American writers were represented last year in the Stockholm programmes.

The B.B.C.'s Director of Plays tells me that he has made arrangements for a production of the English version of that popular film "Emil und der Detektiv." The author originally wrote this for the radio. It ought to broadcast very well, and someone is going to get a really good part.

Do You Listen— or Hear ?

The sad gentleman who said that his wireless set had two controls—his wife and his daughter—must have agreed with Mrs. Mary Hamilton when she made her first public speech since her appointment as a Governor of the B.B.C.

"I am afraid," she said, "there are still many of the five and a half million listeners who do not listen at all; they merely hear."

An otherwise perfectly sane man told me the other day that his set was turned on at seven o'clock in the morning as an accompaniment to shaving, and was still in full blast when he got home from work in the evening.

It is generally those who use radio as a background to conversation, or bridge, or even reading, who are most vehement in this condemnation of the programmes.

"I can't stand radio plays; I never listen to them," wrote a reader in Leamington Spa last week.

Real listening is an exceedingly difficult thing. Modern home life does not make it any easier.

All Cut and Dried

Radio authors are more considerate than film scenarists or mystery story writers. J. C. Cannell, who was responsible for "Cabaret," which I chose as the best light entertainment for July, went to the trouble of borrowing a double bass (where does one borrow a double bass ?) and a packet of pins, in order to prove that his murder was not only possible but, after a little practice, quite simple.

No "subtle, unknown poisons" for him, for which be many thanks. However, there is a danger in such broadcasts, as the "Radio Times" suggests. What if a double bass player should now take it into his head to polish off one or two harmless dancers at the Savoy ?

In the Programmes

HUGH E. WRIGHT

Do you remember the sinister Porter in the "Ghost Train" ? Hugh E. Wright certainly remembers it, for it was he who first created the part in London and afterwards played for a year in Australia.

A comparative newcomer to the microphone, Hugh E. Wright proved

an instantaneous success as a humorist. One of the best compères the B.B.C. has presented. A composer of fine nonsense verses which he reads better than any of the Broadcasting House poetry readers. Was one of the original "Follies" and wrote a great deal of Pelissier's material. Last month he joined the select ranks of those who rush from theatre to the studio in their make-up for a variety show. This is a proof that he is indispensable and is intended as a compliment though in reality a great nuisance. Booked up for many future broadcasts to the great delight of listeners. A B.B.C. find who must never be lost.

Massed Bands from the Midlands

Don't despise the provincial programmes. The disappearance of some of the provincial studios will never be forgiven in such towns as Bournemouth. Anyhow, from the Midland Regional comes one of the best band programmes of the year on August 17th. The bands of the Irish Guards, the Life Guards and the Coldstream Guards will be heard from the Shrewsbury Flower Fête.

Midland Regional has been responsible for much that is excellent in radio entertainment. Robert Tredinnick, for instance, who has a variety gramophone concert in the programme on August 16th, and the revues of Charles Brewer.

Olympian Entertainment

The specially-built theatre-studio which will be the centre of attraction at the Radio Exhibition at Olympia this year will now seat 2,000 people.

Various B.B.C. producers and artists have no cause to bless the Exhibition. Most of them are on holiday at this time of the year and the daily revue and vaudeville has meant an all-round packing of bags and desertion of the seaside. I hear that one producer has been dragged back from central Europe.

The result ought to be something very, very good. Those of you who won't be at Olympia will hear both the shows broadcast "from the spot."

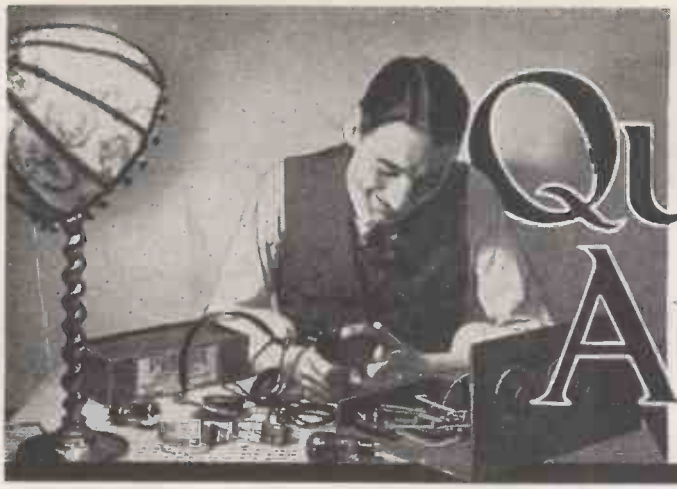
Incidentally, the B.B.C. has gone to some trouble to warn me that the preliminaries of such a gigantic exhibition involve a good deal of arranging and re-arranging and that actual details are often not settled until the eve of the opening date. So if you arrive at Olympia and find there isn't a studio at all, or that it only holds 10 people, don't blame me !

A Welcome Return

It will be hailed as welcome news by many thousands of listeners that Sir Walford Davies returns to the microphone in the evenings next autumn with a series of "Keyboard Talks."

No broadcaster has succeeded to a greater degree than Sir Walford in combining the cultural with the entertainment side of microphone work and for years, until the state of his health rendered it imperative that he should give up part of his evening work, his "Music and the Ordinary Listener" was a weekly feast.

PATRICK CAMPBELL.



QUESTIONS ANSWERED

Peculiar Fading

D. S. E. (Birmingham).—"My set, which is a simple detector and one L.F., has recently developed a curious fault. When I switch on I can receive fairly well for a few minutes. Then my reception dies away, the fading effect being accompanied by distortion, especially on the Midland Regional. If I switch off and wait for five minutes, then switch on again, everything is normal for a few minutes, when the fading away commences again."

There is, of course, the rather obvious possibility of the L.T. battery being at fault. Probably you have already assured yourself on this point by having it tested. If so, substitute another grid leak for your present one, and make sure that the grid leak wiring is in order. A defective leak will often produce puzzling symptoms similar to your own.

Insufficient Control

A. A. N. (Watford).—"Although my three-valve receiver is equipped with a multi-mu S.G. stage, I find that the volume from the London Regional and National transmissions is far too great for comfortable listening. Is there a method of cutting down the volume due to these powerful near-by stations without modifying the design of the set?"

The easiest and at the same time effective method is to join a resistance in series with a switch across the aerial and earth terminals. The switch is, of course, an ordinary "on-off" type of reasonably low self-capacity—one of the push-pull variety will do.

The best value for the resistance can be found by experiment, or alternatively a variable can be used. Generally 50 ohms is a satisfactory value. When the switch contacts are "closed," the resistance will be brought into circuit and the volume cut down for local listening. The switch is then "opened" for receiving the more distant stations.

Stage "Gain"

C. H. T. (Canterbury).—"What is the relative difference in the amplification given by resistance-capacity, choke-coupled and transformer L.F. stages? I know that the transformer is superior in this respect, but is the difference very marked?"

The amplification given by either a resistance-capacity or choke-coupled stage can never exceed that of the valve in whose anode circuit the resistance or choke is joined.

Hence the theoretical magnification with a valve having a mu of 20 could never be greater than this figure, and in practice would be considerably less.

An R.C. stage, for example, might have a working magnification of 10–13, but in the case of a transformer there is the step-up ratio to take into account.

Here the voltages developed across the primary are multiplied by the turns ratio, with a consequent increase in the overall amplification, and the step-up is definitely much greater than either of the other two methods.

A Portable Problem

P. C. (Barnstaple).—"I recently built a three-valve portable which gives very satisfactory results in my own home, and also in the open. The other day I took the set into a friend's house and, to my astonishment, found that the results were nothing like so good, and, in fact, in one room little could be heard, however much we tried."

Assuming your friend's house to be in your particular locality, it is difficult to understand why the results should be so poor as compared with those normally obtainable in your own home.

Local screening, however, suggests itself as a probable reason for the trouble, and it is quite possible that your friend's house may:

(a) Have a certain amount of metal work in its construction;

(b) Be shielded by a metal structure or lie in a valley, so that absorption of the waves takes place before they reach the receiver.

Pentode Decoupling

N. C. T. (Brixham).—"What values of decoupling resistance and condenser do you advise me to use in connection with a pentode?"

Presumably you are referring to the decoupling values for the priming-grid, in which case 5,000 ohms and 1 mfd. are suitable. A higher resistance would reduce the voltage too much, but a larger condenser may sometimes be used to advantage.

The Viscountess Snowden, J.P.

How many times when listening to Budapest's programmes have you wondered what Hungary and Hungarian broadcasting methods were like? A recent visit to the country enables our distinguished contributor to give first-hand impressions of this popular broadcaster.

THE language difficulty always stands in the way of a proper understanding of the institutions of foreign countries. Particularly is this true of a country like Hungary, whose language is so hard to learn that it is spoken only by themselves. Nevertheless, I endeavoured to learn something of its broadcasting service during my recent visit to that country.

The first thing that struck me was the ignorance of the people whom I met day by day of their own broadcasting system.

Nobody could tell me off-hand where the wireless building was. Nobody with whom I spoke appeared to have a wireless set.

Everybody thought it rather curious that I should be interested in such things, and the name of the Sir John Reith of Budapest was utterly unknown!

This did not mean that radio has no interest for the general body of

PROGRAMME PERSONALITIES

Budapest employs the three announcers whom you see above, and the light orchestral combination (left) is very popular with the station's listeners.

ON BROADCASTING IN HUNGARY

Hungarians. Like a certain class of English person, those indifferent people I met have the means of direct access to cultural affairs, and so regard with good-natured contempt the *popular* means of entertainment and instruction.

I was told by the programmes director, later in my visit, that more than 600,000 licences were taken out last year. This is not bad for a country with a population of not more than eight millions.

Thirty Shillings a Year

A wireless licence in Hungary costs 42 pengoes a year. The equivalent of this in English money varies with the rate of exchange, but in normal times it is about thirty shillings.

The people are very poor in Hungary. The war, the revolution, the depreciation of their currency, the burden of reparations and taxation, as well as the loss of their most profitable territories, have made of one of the richest countries in Europe one of the poorest. Yet be it noted that 600,000 of them are willing to pay three times the fee that it costs an English listener for the delights of broadcasting.

Half the Hungarian licence fee goes to the Post Office. The other half is spent on programmes and administration. In this country, last year, the Government took 5s. 1d. out of every licence fee of 10s., so we are rather worse off in this respect than the Hungarians.

The Viscountess Snowden has devoted her life to the betterment of the people's cultural welfare, and with such an interest at heart it is easy to appreciate how greatly she values broadcasting. An ex-Governor of our own Broadcasting administration, she is particularly well-equipped to comment on the broadcasting activities of another country.

In Budapest the Radio Company is attached to the Press. Indeed, if I rightly understood the official who spoke of these matters, it actually belongs to the newspaper agency, the Telegraph Bureau. Probably this means that the largest number of shares are owned by the newspaper.

The building in which the radio is housed is part of the newspaper building. It is approached through a square, stone-flagged courtyard. The newspaper offices are exactly opposite the wireless studios.

Insufficient Space

The present building is inadequate for their needs, and bears a poor comparison with Broadcasting House; but an enlarged and improved place is in course of erection on the site of the present one, and it is hoped that it will be ready for use before the end of the year.

I picked my way carefully along the planks and through the dust and debris to have a look at the fine new studios which are being built.

I had not been in Budapest very long before one of the radio chiefs called on me and offered me the hospitality of their microphone. I was to choose my own subject, and to be unlimited in time. I agreed to speak very briefly the night before I left.

It was then I discovered that the radio staff in Budapest live under a

Conducting an Orchestra with Coloured Signs

heavy strain, one which is an addition to the constant and inevitable strain under which the providers of programmes everywhere work. Generally it is the susceptibilities of the ordinary listener which cause anxiety. In Budapest it is also the political susceptibilities of the surrounding countries.

Although my written speech was innocuous to the last degree, and was delivered at eleven o'clock at night when most listeners would be in bed, I was asked to delete or modify one sentence. It was feared that the Czech Government—always a severe censor of Hungarian wireless—might take offence, with possible penal consequences to Budapest.

The Offending Sentence

The sentence expressed "the hope that peace founded on justice might one day come to Hungary." What but a disturbed conscience could take offence at so simple a prayer as that?

My speech was translated by a charming and clever young man, very much like those who abound at Broadcasting House; but the announcer was a woman with a very beautiful voice, natural and sweet, and in this very unlike the rasping tones and affected style of so many women speakers at the English microphone.

A tour of wireless studios is no new experience for me. I was reminded, as I went round the Budapest studios, of the provincial studios in England in 1927. They are on the same sort of scale, with a similar simplicity of adornment.

One distinctive feature of the Budapest studios which has not yet made its appearance at Broadcasting House, is the mechanical conductor.

LYDIA DE BEÖTHY

A charming Budapest announcer with (to English ears) a most romantic-sounding name.

The orchestra is guided and controlled by coloured interpretive signs, worked by electricity.

A flesh-and-blood musician cannot be wholly dispensed with, for he it is who works the signs; but he need not be seen, and the baton is dispensed with.

I understand that neither the conductor nor the orchestra care much for this method. It is serviceable when a conductor is not available. The signals can be worked by any competent musician, but nothing can compensate for the personal touch, whether in music or anything else.

Special programmes are prepared for the peasant folk, whose interests are different from those of the townspeople, and whose hours of labour and of sleep are not the same.

The magazine of the Radio Company is called "The Rádióélet." Like the "Radio Times," it contains programmes and articles of interest. The copy I have before me as I write contains a picture of a tall radio mast set up amidst shorter ones. This tall mast is in course of erection and, when completed, will be taller than the Eiffel Tower.

They were all very proud of this enterprise.

The Man in Charge

I cannot remember the name of the director of the Hungarian wireless. Hungarian names are difficult for English folk, but I do remember that he is quite as tall as Sir John Reith and a good deal broader!

I asked him if he knew any of our wireless people, and was told that Sir Charles Carpendale, for whom he expressed the warmest admiration, was the only person connected with British broadcasting with whom he had come into contact.

Our gallant Admiral's patient and courageous efforts at International Radio Conferences to maintain peace and effect progress, it was said, had won him the regard and admiration of all those who knew him in this work.

HINTS FOR THE SET BUILDER

who fits his own loudspeaker and works in wood or metal.

Perfect Joints

CUTTING either wood or metal so that the resulting surface or edge makes a perfect joint with another piece of similar material is extremely difficult for the average home constructor.

A right-angled cutting block enables the constructor to cut square-sectioned wood or metal with a fair degree of accuracy, but where the material is rod or tube, a special block of the above type is not always sufficient.

It is suggested that after the material has been roughly cut, it is placed in the angle formed by two pieces of wood fixed at right angles. A V block is thus formed, and by rotating the material and using the end of the V block as a guide, plane or file the material.

Removing Burrs

When working in aluminium, difficulty is always experienced in making a perfectly clean hole—unless the correct tools, etc., are available. The usual practice is to clear the burr by means of a countersinking bit; to save time in changing from the drill in use to the countersinking bit, it is suggested that a large Archimedean or spear type drill be obtained and this fixed permanently into a suitable handle, such as a file handle or a plain piece of wood.

Mounting the Loudspeaker

Many modern houses are fitted with a service hatch between the kitchen and dining-room, which is rarely if ever used.

The aperture formed by removing the hatch door, or doors, makes an excellent position for mounting a loudspeaker, for in this position a single loudspeaker fulfils a dual purpose, and the wall surrounding the aperture makes a really excellent baffle.

Having removed the door, or doors, a baffle should be cut of sufficient size so as to overlap the framework of the hatch, this baffle can now be either screwed into position or arranged on hinges, so that the hatch can be used for its correct purpose when it is required.

The M.W. "DIODION-PLUS"

Designed and Described by

K. D. ROGERS

QUALITY—

is the basis of the famous Diodion designs, all of which employ the two-electrode rectifier system, with its straight-line distortionless detection.

This A.C. model is the latest and best of them all, and is fittingly accommodated in the unusually handsome cabinet shown here.

PERFORMANCE

Incorporating the very latest advances in technique, the "Diodion-Plus" is a radiogram de-luxe, capable of truly amazing results.

Its special features include Dual Loudspeaker, Ferrocart Coils, Band-pass Tuning, Electric Gramophone Motor, and Synchronous Clock.

THE "DIODION-PLUS"

uses the new multi-mu H.F. pentodes and a double-diode-triode, the output valve being one of the recently-introduced pentodes. It will deliver a power of 3,000 milliwatts.

AT the last Radio Exhibition at Olympia we introduced to our readers a specially designed battery receiver called the "Diodion." It contained in its circuit a diode rectifier, which ensured for it a purity of reproduction that was astonishing, and at the same time allowed this to be accomplished with remarkably sharp tuning and simple coils.

Sensitivity, too, was of a high order, with the result that the set created considerable interest among home constructors who wanted quality reception from a battery set without elaborate apparatus that would be costly to obtain and to operate.

That original Diodion was to be the forerunner of a series of sets bearing the name Diodion in their titles, and covering a large sphere of usefulness. All have been based on the two-electrode rectifier, with its straight-line detection, and all have been capable of providing clean, well-defined reproduction.

Both A.C. and D.C. models followed the various battery types of Diodion receivers that have been published in MODERN WIRELESS during the last twelve months, the last being the powerful A.C. Diodion that was described a short time ago, and was capable of providing an undistorted output of some 5,000 milliwatts.

In answer to a number of requests from readers with A.C. mains, however, we are giving a further design of the Diodion series, brought right up to date with modern cabinet design and dual speaker reproduction.

It is a real last-minute receiver, being a radiogram de-luxe, with electric clock combined in a cabinet that is a particularly attractive example of furniture.

The circuit makes use of the new multi-mu H.F. pentodes and a double-diode-triode valve. The output is provided by a recently introduced pentode valve, the P.M.24M, which will deliver a power of some 3,000 milliwatts, more than enough for any household.

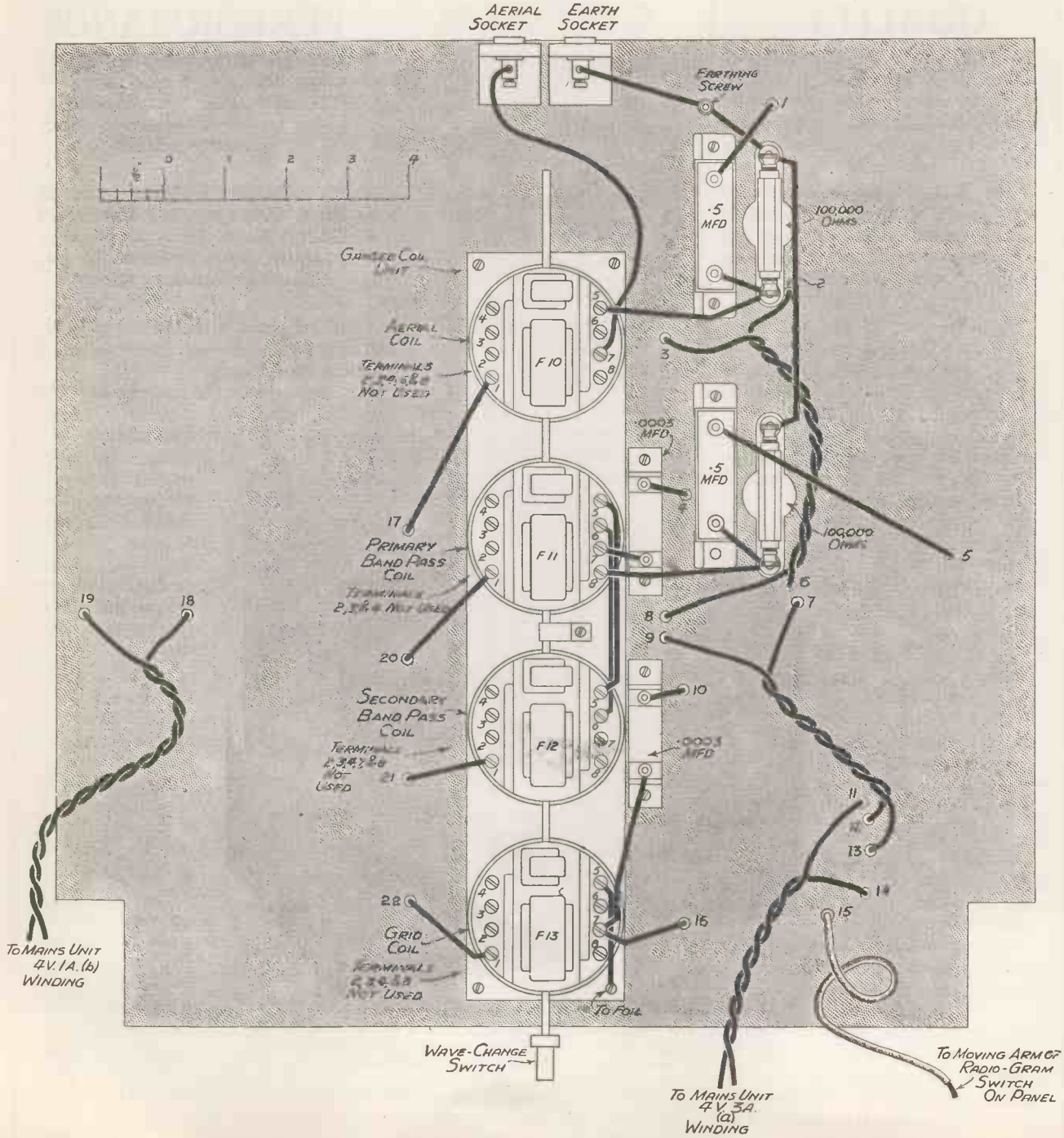
The cabinet is arranged so that the loudspeaker is a good height from the floor, a very important point if the reproduction is to sound natural, and one that too few designers consider sufficiently. Above the speaker is the synchronous electric clock, an attractive ornament and valuable timepiece, which is a most convenient addition to any radiogramophone.

Below the loudspeaker fret is the receiver, the controls of which are arranged on the front of the cabinet. Under these is a small drawer which on pulling out reveals a complete pick-up and electric turntable equipment.

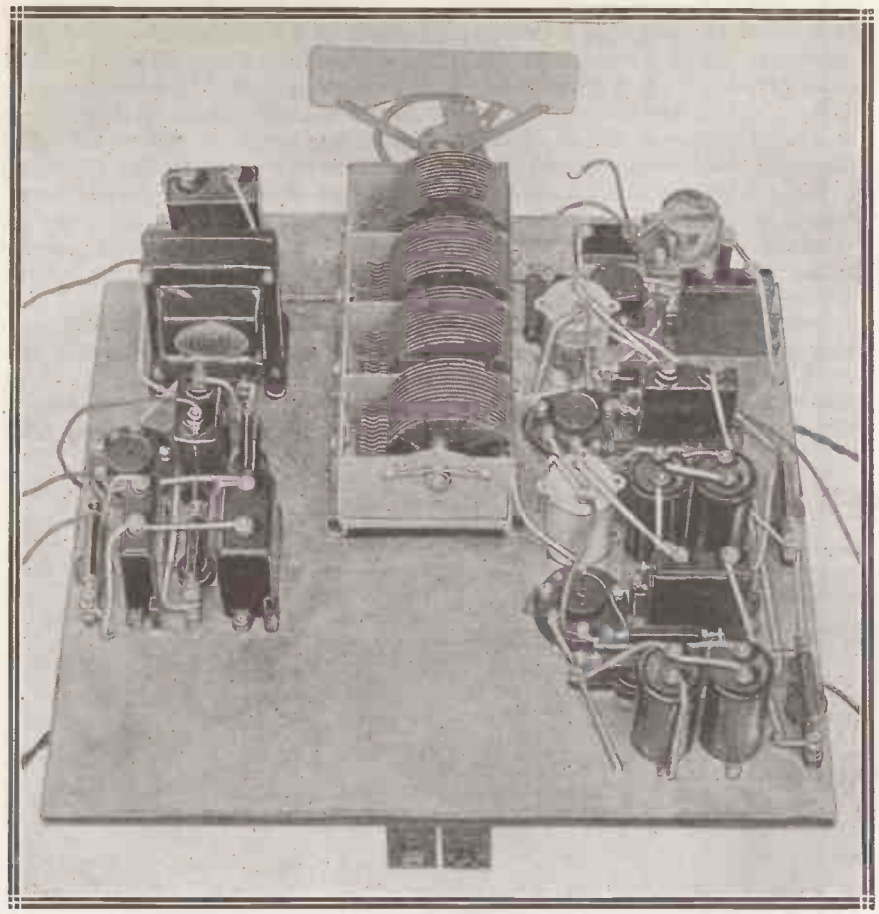
To the right and left of the centre portion of the cabinet, which, it will be seen from the photographs, is built somewhat on the grandmother clock principle, are cupboards which will hold a goodly number of twelve- and ten-inch gramophone records.

The whole cabinet is built of thick wood, with attractive walnut finish, so that not only is it good to look at, but acoustically efficient. The balanced speakers, too, go to provide straight-line reproduction, free from resonance and peakiness throughout the whole range.

A very strong point in the design of the cabinet used for the "Diodion-Plus," which title we have given this set owing to its added attractions over the others of the famous series, is the extent to which the whole of the apparatus is accessible.



How the wiring is arranged underneath the baseboard. The two connections to the foil covering on the top are made by screws passing right through the baseboard (marked "Earthing screw" and "To foil"), and care should be taken to ensure a perfectly sound electrical joint.



The top side of the baseboard carries the two H.F. stages with the four-gang condenser and detector and output valve circuits.

a feature that is not often present in radiogramophones.

From the back of the cabinet, the receiver, the electric motor and the mains unit, to say nothing of the speakers and the clock mechanism, are open to inspection without any need for the constructor to get into various attitudes of contortion. He can stand up and get on with the task of examination, or fitting up with the greatest of ease.

The power pack is a simple affair, and is situated in the "ground floor" of the cabinet, so that everything is easy to hand, and at the same time logically positioned, while the roomy nature of the cabinet prevents any chance of crowding, with its attendant disadvantages.

Sensitive and Selective

Let us have a closer look at the circuit employed in the construction of the receiver portion, which is of the very latest design. A most important feature of this is the fact that Ferrocart coils are used, so that the tuning is not only sharp, but the sensitivity of the set is assured.

The coils are arranged to couple two H.F. pentode valves together and to the diode rectifier in the following way: The aerial is fed into the first Ferrocart coil by the usual method

THE PARTS AND SUITABLE MAKES FOR THE "DIODION-PLUS"

Component.	Make used by Designer.	Alternative makes of suitable specification recommended by the Designer.
1 four-gang ·0005-mfd. tuning condenser	Radiophone (with cover and right-hand trimmers)	—
1 vernier dial for above	Polar (full vision—horizontal drive)	—
1 set of four-ganged coils	Colvern Ferrocart F10, F11, F12, and F13	—
3 five-pin valve holders	W.B.	Benjamin, Telsen, Ferranti, Lissen,.
1 four-pin valve holder	W.B.	Lissen, Ferranti, Telsen, Benjamin
1 seven-pin valve holder	Wearite	Ferranti, W.B., Benjamin
1 four-pin valve holder	Benjamin "Vibrolder"	—
1 L.F. transformer	Ferranti A.F.5	R.I. Lissen, Varley, Telsen
2 screened H.F. chokes	Bulgin H.F.10	Telsen, Wearite
1 do. do.	Graham Farish H.M.S.	Bulgin, Telsen, Wearite
2 50-mfd. fixed condensers	T.C.C. type 521	—
2 2-mfd. do.	T.C.C. type 50	Dubilier, Ferranti, Telsen, Igranic, Lissen
1 2-mfd. do.	Dubilier B.B.	Telsen, Ferranti, Lissen, Igranic, T.C.C.
2 1-mfd. do.	T.C.C. type 50	Ferranti, Dubilier, Igranic, Lissen, Telsen
2 ·5-mfd. do.	Telsen type W.228	Dubilier, Ferranti, T.C.C.
1 4-mfd. do.	Dublier L.S.B.	T.C.C.
4 ·1-mfd. do.	Dubilier type 9200	—
1 4-mfd. do.	T.C.C. type 80	Dubilier
2 ·0003-mfd. do.	Dubilier type 620	Lissen, Ferranti, Telsen, T.C.C.
1 ·01-mfd. do.	T.C.C. type "S"	Telsen, Ferranti, Lissen, T.C.C.
1 ·0001-mfd. do.	T.C.C. type "S"	Ferranti, T.C.C., Telsen, Lissen
2 200-ohm resistances with horizontal holder	Graham Farish "Ohmite"	—
1 500-ohm do.	do. do.	—
2 1,000-ohm do.	do. do.	—
1 5,000-ohm do.	do. do.	—
2 8,000-ohm do.	do. do.	—
2 20,000-ohm do.	do. do.	—

Component.	Make used by Designer.	Alternative makes of suitable specification recommended by the Designer.
1 25,000-ohm resistance with horizontal holder	Graham Farish "Ohmite"	—
1 ½-megohm do.	do. do.	—
3 100,000-ohm do.	do. do.	—
1 1,000-ohm resistance with vertical holder.	do. do.	—
1 ½-megohm resistance with wire ends	Goltone	Dubilier, Igranic, Lissen
1 mains transformer	Sound Sales type D.P.	—
1 twin fuseholder and fuses	Belling-Lee type 1033	Bulgin
1 pair terminal blocks	Goltone R.36/171	Belling-Lee
2 insulated sockets and plugs for aerial and earth	Belling-Lee 1077	
1 5,000-ohm potentiometer	Igranic 2235/5	Bulgin, Lewcos, Varley, Watmel
1 25,000-ohm do.	Watmel	Igranic, Varley, Lewcos, Bulgin
1 rotary radiogram switch	Bulgin type S.86	Tunewell
1 rotary on-off switch	Bulgin type S.85	Tunewell
2 matched loudspeakers	Rola F.5.6500M and F.5.6500-04/58	—
1 electric gramophone motor	Garrard 202a	—
1 pick-up	Belling-Lee	—
3 knobs	Bulgin K.14	—
1 knob	Bulgin K.13	—
1 mains plug	Goltone 47R.80/90	Belling-Lee, Bulgin
1 cabinet with electric clock	C.A.C.	—
1 "Metaplex" baseboard, 16 in. × 16 in. × ⅜ in.	Peto-Scott	—
1 baseboard, 16 in. × 6 in. × ⅜ in.	Peto-Scott	—
10 yards twin flex	Goltone	
3 yds. single screened flex	Goltone	
8 yds. sleeving	Goltone	
2 yds. 18 S.W.G. tinned copper wre	Goltone	
3 anode connectors	Belling-Lee	
Insulated staples, screws, etc.	—	

In addition to the components and valves listed will be required ONE Ediswan thermal delay D.L.S.1.

of autotapped winding, the grid winding being connected to the grid circuit of the first pentode valve.

The output of this valve is shunt-fed into a band-pass arrangement of two of the Ferrocart coils, thus ensuring a very high degree of selectivity. The band-pass is followed by another multi-mu pentode valve, whose output is shunt-fed into a tuned coil across the diode rectifier.

Saving a Valve

This rectifier takes the form of the two diodes of a double-diode-triode valve, the output from the diodes is applied to the triode portion of the same valve, so that the use of this type of valve results in a saving of one valve, for it is well known that diode rectification in a set requires an extra stage of low-frequency amplification as compared with the use of a leaky grid or other amplifying detector.

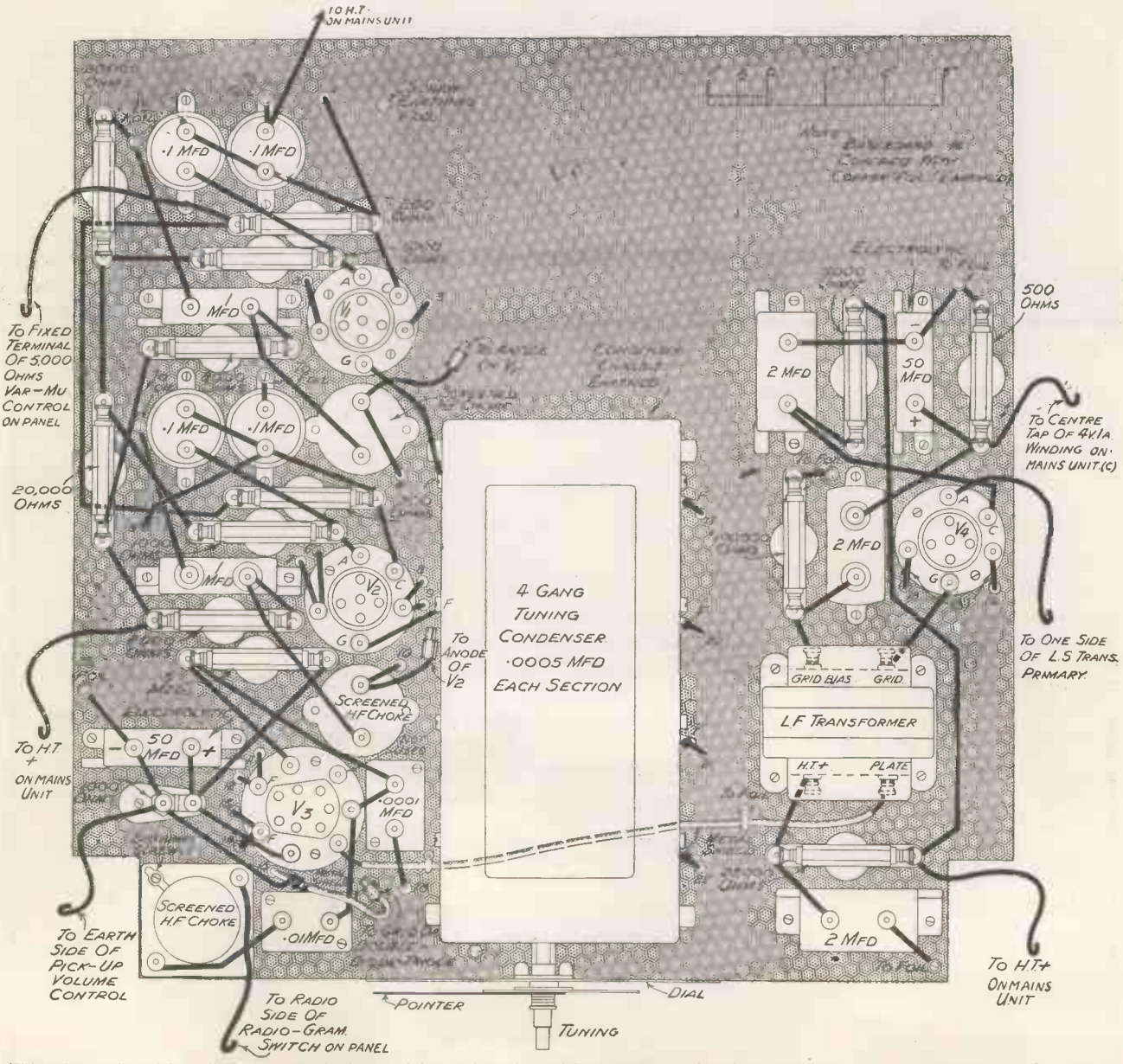
This extra stage is provided by the triode section of the double-diode-triode valve, and this use of the valve, where no automatic volume control is applied, is quite a new departure. It enables the fullest L.F. amplification to be obtained with the best form of rectification, and complete control over the volume by means of a simple potentiometer scheme.

Following the L.F. output of the triode is a transformer-coupled pentode output valve. This valve is of the directly-heated filament type, and, as mentioned before, is capable of providing ample output power. The pentode is coupled to the two loudspeakers through the pentode transformer provided by the speaker manufacturers to match the pentode employed.

Speaker Connections

This ensures that the valve is properly coupled to the loudspeakers, whose speech coils are connected in parallel. The mains-energised fields

Above the Main Baseboard



This, the main wiring diagram, should be used in conjunction with the "under-baseboard" diagram on another page, the holes through which the various wires pass having corresponding numbers to facilitate connecting up. The valves are inserted as follows: H.F. pentodes in V_1 and V_2, a double-diode-triode in V_3, and an L.F. pentode in V_4.

Provides an Undistorted Output of 5,000 Milliwatts

of the two speaker units, too, are connected in parallel, providing a mains choke which is placed in series with the full output from the mains-power pack in the bottom of the cabinet.

This choke is all that is necessary for the successful smoothing of the output from the power pack, for the whole of the current taken by the anodes and screens of the valves pass through this choke. Obviously, the choke system must have resistance, as it has to act not only as a choke, which is but a supplementary duty that has been placed on the speaker, but as a means of energising the field magnets of the two speaker pots.

This means that a certain electro-magnetic force must be applied by the energy passing through the two pots, and this force is provided by the anode current of the set. Obviously, this anode current must pass through a large number of turns on the windings of the pots, for the force is dependent on what is known as the ampere turns of the magnets—that is, the number of turns times the current (in amperes) flowing.

Careful Design

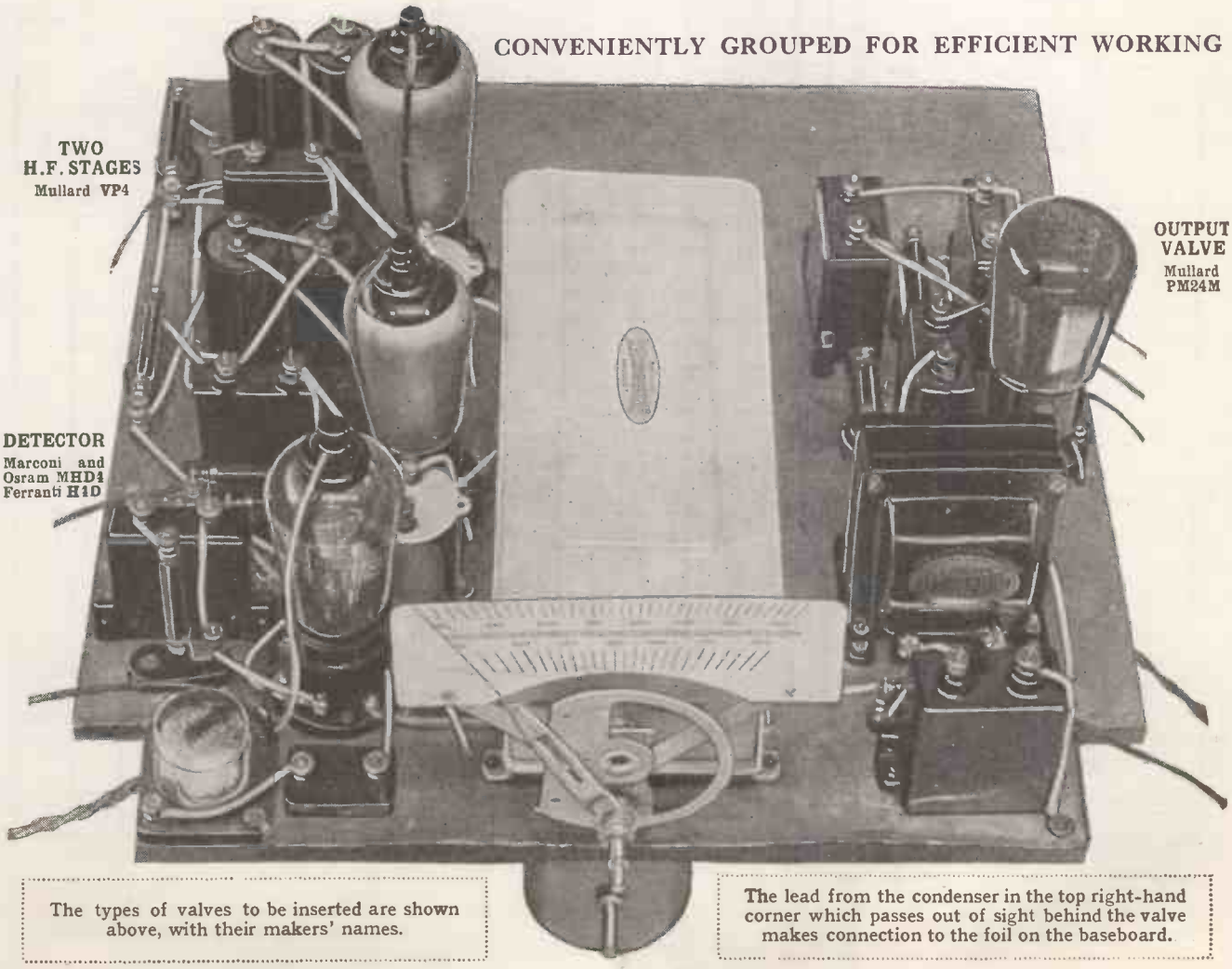
In order to provide a strong field it is necessary to have a large number of turns, for the current is small. Thus the resistance of the field windings is naturally high, that of each of the speakers in this case being about 6,500 ohms. As they are in parallel, this resistance is reduced to half that figure, but at the same time the current passing through each section is but half the total current of the set.

All this has to be thought out when the design is being considered, and in the case of the "Diodion-Plus" the result is that the set, valves and all, and the speakers, have been matched as regards this power supply so that efficient working shall be obtained from both sections.

The total H.T. current of the set is about 65 milliamps. and this is split up so that the two pots of the speakers get 32 or so milliamps. each. This current is driven through the 3,000 odd ohms of the speaker arrangement by the power pack whose total voltage output must, of course, be such that with the voltage drop caused by the loudspeakers the potential reaching the anodes and screens of the valves will be correct (or sufficiently nearly so; it does not matter if it is a volt or two below).

In this calculation the resistances of the various decoupling resistances, transformers, and voltage potentiometers must be considered, so that it becomes immediately apparent that the constructors who decide to copy

CONVENIENTLY GROUPED FOR EFFICIENT WORKING



The types of valves to be inserted are shown above, with their makers' names.

The lead from the condenser in the top right-hand corner which passes out of sight behind the valve makes connection to the foil on the baseboard.

the design must not in any way deviate from many of the parts (or values thereof) and valves specified.

We mention this because at first sight it is not always obvious why certain parts and valves cannot be changed in mains designs of this magnitude. But when the question of voltage adjustments is considered it becomes clear how even a slight alteration can completely upset the whole apple-cart, and throw the voltages wrong all over the set.

A Vital Point

We stress this voltage business because it is one of the most vital, and yet not often sufficiently realised, parts of the design of a mains receiver, especially where the energisation of the loudspeaker pots is undertaken from the output of the mains power pack supplying the anodes of the valves in the set.

In too many instances the inclusion of the speaker in the anode circuits results in the starving of at least the output valve of the receiver from the point of view of H.T., and in this way commences a vicious circle.

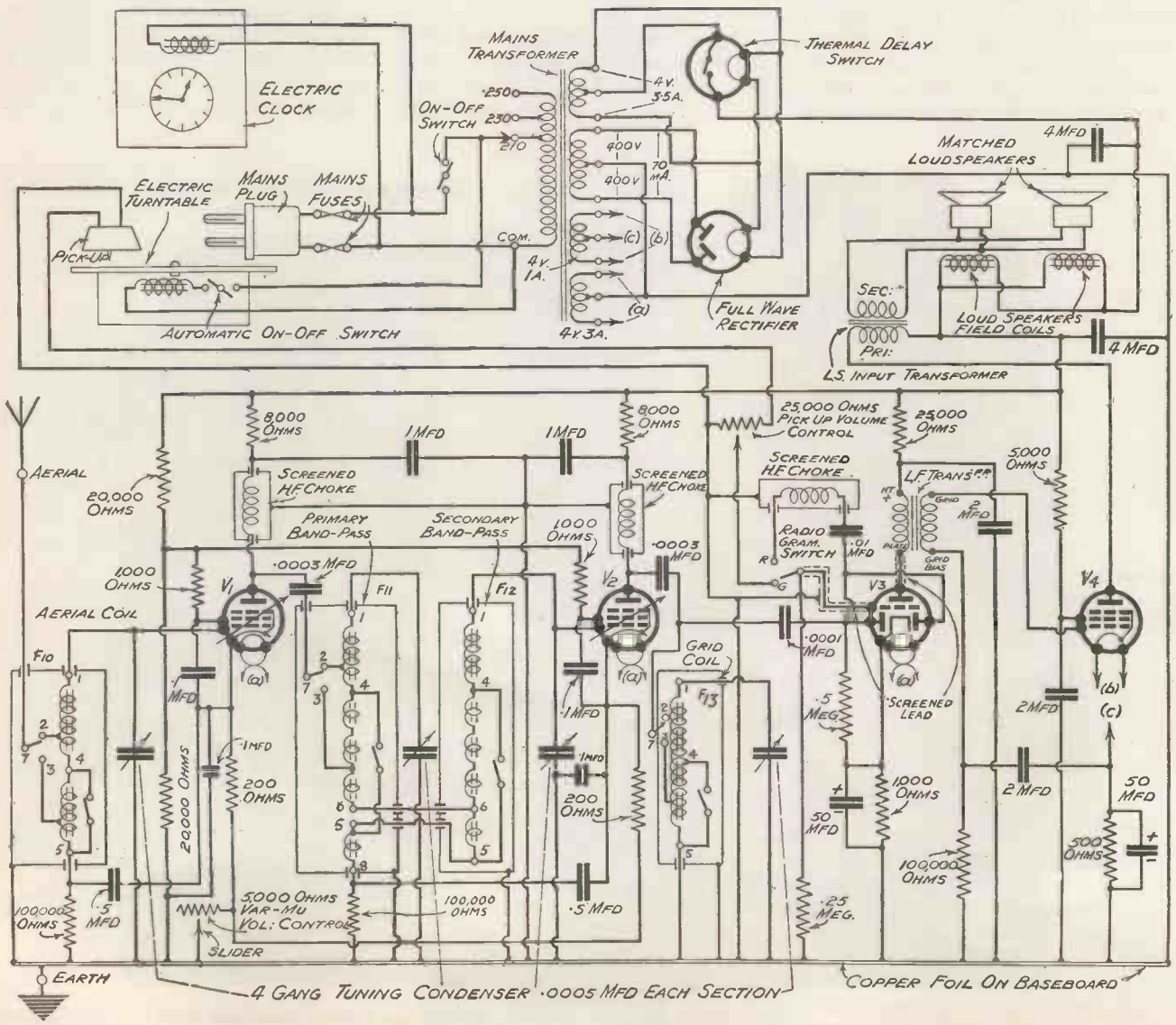
The reduction of anode potential of the valve results in reduction not only of lack of output power, but also in reduction of anode current. This in turn reduces the field strength of the loudspeaker pot, and thus reduces the sensitivity of the loudspeaker. We therefore lose on both counts—reduction of output power and at the same time reduction in the efficiency of the speaker.

The construction of the receiver is not difficult, largely owing to the spacious nature of the cabinet, for there is not the slightest need to cramp the design in any way. The front of the cabinet forms the panel, and on this are mounted the various control knobs, such as the on-off switch and the radiogram switch, which are mounted above the baseboard level, and the two volume controls, which are fixed below that level.

Control Positions

The tuning and wavechange controls protrude through the cabinet front, one above the other, for the Ferrocart coils are fixed under the baseboard in such a position that they come directly under the four-gang tuning condenser. This

One of the Most Interesting Circuits Ever Published



Two multi-mu H.F. pentodes followed by a double-diode-triode and a power pentode in the output stage form the basis of this outstanding design. Matched dual loudspeakers, vacuum thermal delay switch, synchronised electric clock and electric gramophone motor are a few of the special features of this up-to-the-minute receiver.

The Latest Set of a Famous Series

disposition is important, for it makes for short, efficient wiring, and thus for successful operation of the receiver.

A straight-line tuning escutcheon is employed with the gang condenser, so that the appearance of the front of the cabinet shall maintain its rectangular theme of design, while above the loudspeaker fret is a rectangular clock face which is in complete harmony with the rest of the scheme.

Earth Connections

The baseboard is supplied by the makers of the cabinet, so that there is no trouble in making this fit, and all that has to be done is to cover it with copper foil on the upper side, to which foil quite a number of the earth points of the circuit are to be taken.

It should be noticed that the connections to the variable condenser are taken from both sides—that is, the fixed vanes are connected to the soldering tags on either side of the condenser unit, and so connection can be made to them on either or both sides.

This is done to facilitate the wiring of the coil unit, situated under the baseboard, to the rest of the circuit, the moving vanes of the condenser being in connection with the frame of the condenser and thence to the metal foil via the feet.

The chassis of the coil unit is connected to earth by means of a bolt that goes right through the baseboard, with a screw head and washer making contact with the foil. This efficiently connects the chassis of the unit to the earthed circuits, and all earth connections of the coils themselves can be made under the baseboard by means of connections to the chassis of the coil unit.

Screening Leads

The wiring diagram shows these points, and others of similar nature, very clearly, and it should be followed carefully when the set is being built so that an exact copy is produced.

Throughout the construction care must be exercised that no short-circuiting between any of the parts or the wiring takes place to the metal foil or other earthed points. This is particularly necessary where leads run through the baseboard, and the insulation runs the risk of being cut by the sharp edges of the foil.

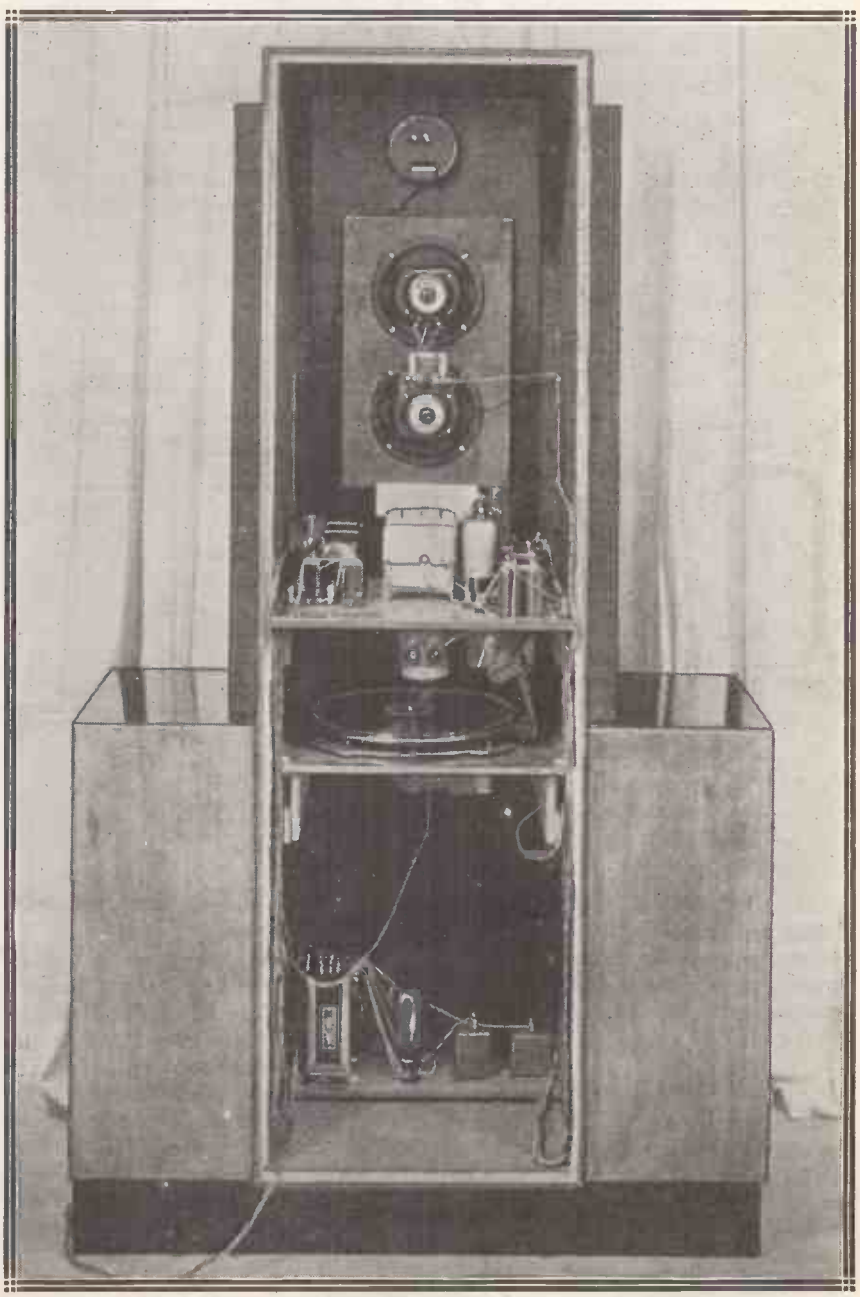
Wherever possible it is advisable to run the leads in the air, without their touching earthed or other components, but in the case of the lead between the anode terminal of the L.F. transformer and the anode of the triode section of the D.D.T. valve, this is impossible. In this case, however, the lead is of the screened rubber-covered and metal-shielded variety.

The lead from the terminal at the top of the double-diode-triode, too, is screened so that it shall not pick up stray L.F. impulses from the heater wiring, and so introduce hum into the reproduction.

This is important, because this lead is the grid lead of the first L.F. valve, and it has to be carried through the baseboard to the change-over switch for gramophone or radio.

The screened H.F. chokes are essential parts of the design, for if ordinary chokes are used instability

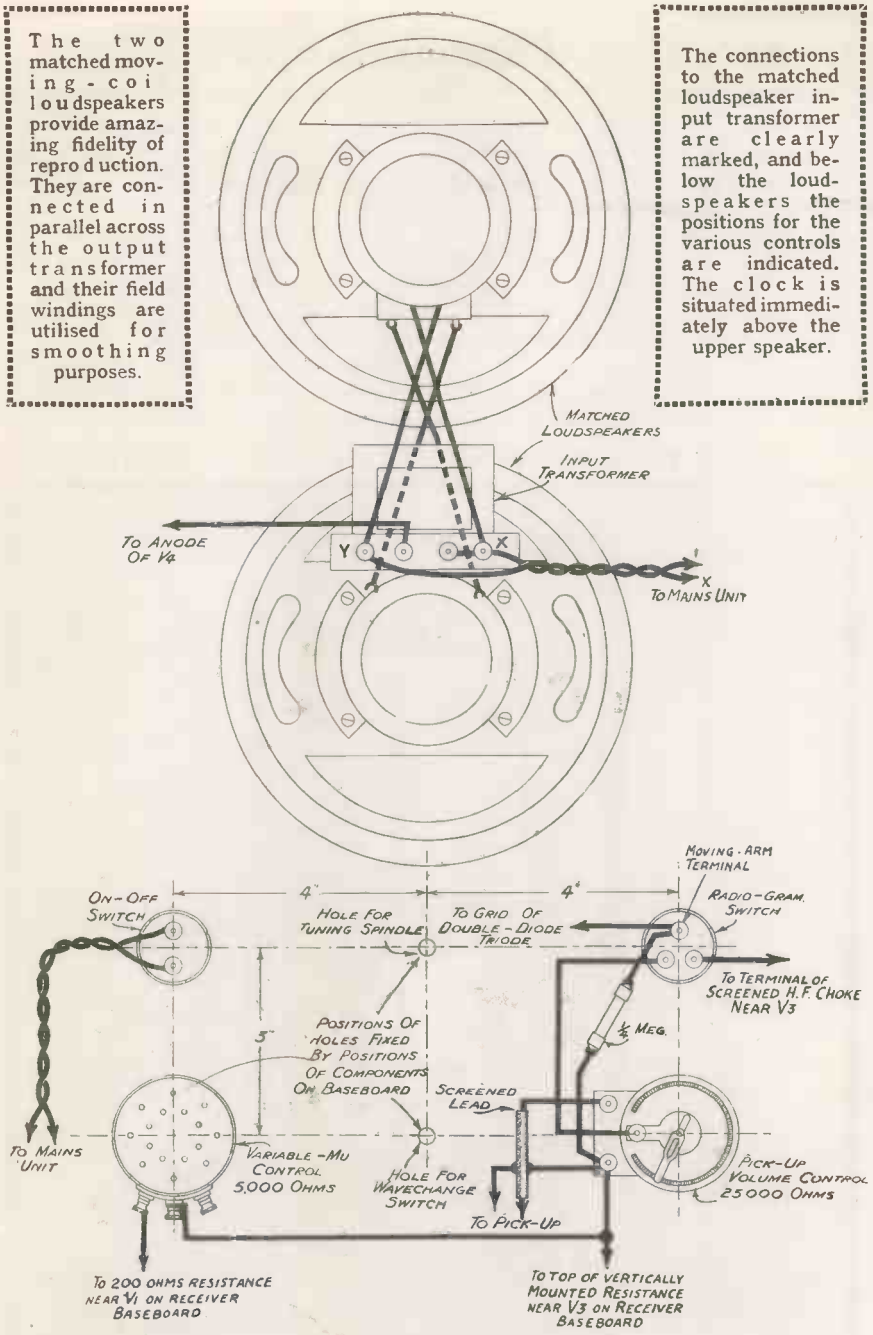
SEPARATE COMPARTMENTS FOR EACH SECTION



The radio section is shown just below the dual loudspeakers in the top compartment. Immediately under this is the drawer containing the gramophone motor-board, and right at the bottom the mains equipment is arranged on a separate power pack baseboard.

The two matched moving-coil loudspeakers provide amazing fidelity of reproduction. They are connected in parallel across the output transformer and their field windings are utilised for smoothing purposes.

The connections to the matched loudspeaker input transformer are clearly marked, and below the loudspeakers the positions for the various controls are indicated. The clock is situated immediately above the upper speaker.



on the H.F. side of the receiver is almost certain, owing to interaction; and as the two H.F. pentode valves are capable of a great degree of amplification, instability must be avoided at all costs.

Testing Out

Many of the leads, those between the set and the controls on the front of the cabinet, have to be made by means of flex, so that the appearance of the receiver in its baseboard form is not very complete. These connections should be fitted to the set, and left in convenient lengths until the final assembly is undertaken, which will be after the set has been tried out on the bench.

For this trial, after the mains-power pack has been built, the "panel" components should be laid out on the bench or table, or else fitted to the front of the baseboard on temporary wooden panels, and connected up in the proper manner to the flex leads.

The volume control for pick-up need not be connected, for there is hardly need to test this part of the receiver, the main idea in the test being to enable the set to be ganged properly, a task that is not easy to accomplish when the set is installed in the cabinet.

The mains unit details are simple in the extreme. The complete circuit of the outfit shows how the power pack is connected to the set, and the theoretical circuit of it, while the separate wiring diagram and photographs give adequate details of its construction.

Note that the vacuum thermal delay switch, which is essential in a set of this description to prevent voltage rise above the normal limit while the valves in the set are heating up, is placed in the positive H.T. circuit. This is because the heater of the switch is connected in parallel with the rectifier valve heater, and so is connected to the positive side of the valve.

In order that there shall not be any considerable difference of potential between the switch heater and the switch contacts the latter are connected in series with the positive side of the rectifier output.

Supplying Power

The separate diagram of connections shows how the power pack and the set are connected together and to the dual loudspeakers. These connections must be carried out carefully, for the fields of the speakers and the two speech coils must be connected in parallel, and the H.T. feed to the set is split on the "smoothed" side of the loudspeaker fields.

This is because it is convenient, when the set is housed in its cabinet, to take the connection from H.T. to the output transformer (which is the speaker input transformer) direct to the set side of the field windings, a lead of a matter of an inch in length. The H.T. to the rest of the set, however, is taken by a longer lead from the mains pack at the junction of the "smoothed" side of the loudspeaker field and one of the smoothing condensers in the pack. This is difficult to explain fully in words, but a study of the diagrams will show exactly how the connections are taken.

Feeding the Heaters

The two speakers should be used in the preliminary tests because of the resistance and smoothing required from the field windings. If other speakers are tried the voltage applied to the set will be wrong.

H.T. negative is connected to one of the round Dubilier condensers at the H.F. end of the set, while the heater supply is taken along a pair of flex leads, as shown in the diagrams.

Good to Look At and Acoustically Efficient

With the mains taps on the transformer at the correct voltage, and the fuses duly inserted in the fuse holder, the set is switched on by means of the on-off switch connected to the set by one of the groups of flex leads, the mains plug being inserted in a convenient power or lighting socket.

In the case of testing the set with the control switch in position it is necessary to mount the switch on a piece of wood or ebonite firmly fixed to the baseboard, for on no account should this vital component be allowed to lie about in a movable state. If it is so allowed there is danger of it touching the foil on the baseboard, shorting the mains, and causing quite considerable damage.

Adjusting the Trimmers

With the set in operation, connected to aerial and earth, the trimming should be carried out in the usual way with a short screwdriver, care being taken not to touch live parts of the receiver while the adjustment is being carried out.

The trimmers should be adjusted to minimum at first, and then in the usual way gradually altered until the maximum strength from a low wavelength medium band station is obtained, the volume of the station being kept down all the time by adjustments of the volume control, which is connected to the pentode H.F. valves (the control that is to be fitted on the right of the " panel " when the set is in the cabinet).

The weakest station it is possible to hear should be chosen as a final check of the trimming, the wavelength being as far down the medium waveband as it is possible to tune on the set, and the trimmers being so set that they come into tune at the lowest capacity possible—that is, they should not be screwed up any further than is absolutely necessary to produce accurate ganging.

Fitting into Cabinet

When the trimming has been done, the whole of the outfit can be placed in position in the cabinet. In this respect it is of value to note that the cabinet can be obtained drilled and cut ready to take the components used by the author, so that no drilling for panel controls, tuning-dial escutcheons, or the clock need be carried out. The drawer containing the motor and pick-up can even be obtained ready cut to take the electric motor, a great saving in time and trouble.

In the wiring of the set and the rest of the apparatus in its final form in the cabinet, care must be taken that the wiring of the mains is carried out correctly. This is important, for the electric clock must be connected to the mains input on the set side of the fuses in the power pack, but it must not be controlled by the on-off switch of the set—it must be " on " always.

So from the fuses we take the leads to the clock, and from the latter we drop down again to the mains switch on the set, from whence we divide and go to the power pack and to the electric motor, for the switch controls this latter as well as the set.

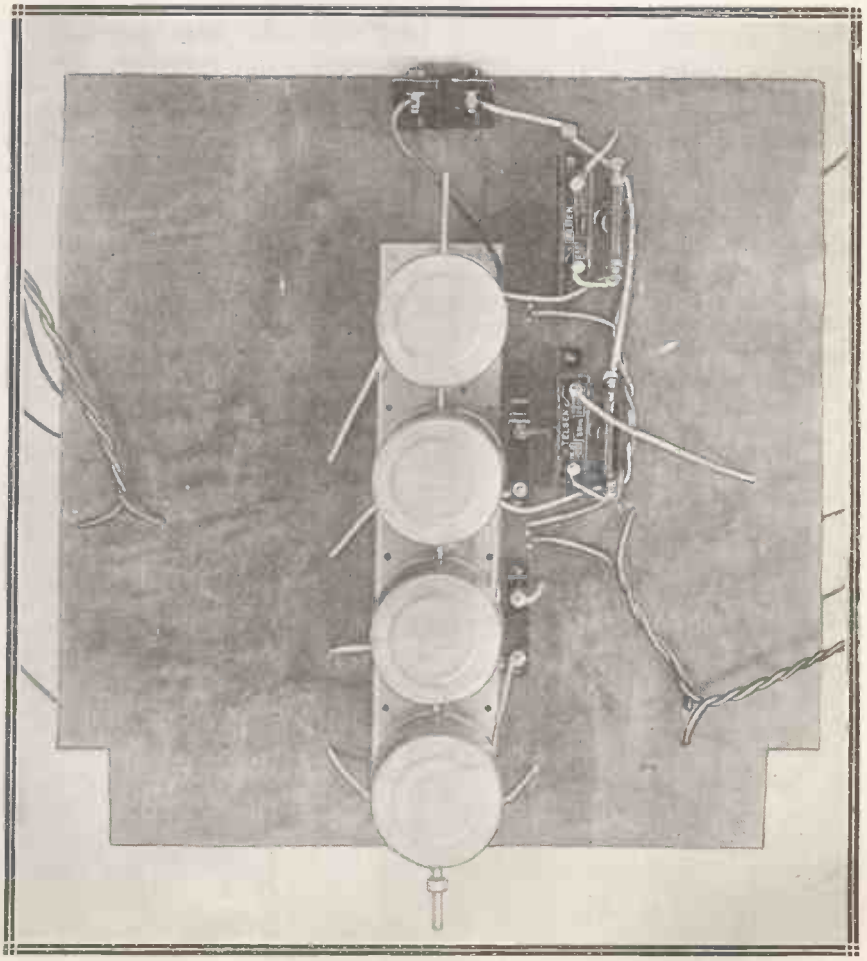
This point is rather a fine one, for although the electric motor has a switch of its own, we consider it important that it be controlled by the master switch of the set so that it cannot by any chance be set running without the set being on. This greatly reduces the possibility that the motor should be switched on either accidentally or else left going when the set has been switched off.

Mounting the Turntable

The two speakers are fitted in position on a piece of five-ply cut to overlap slightly the fret in the cabinet. There is no need for any other baffle, for the thickness of the cabinet is ample.

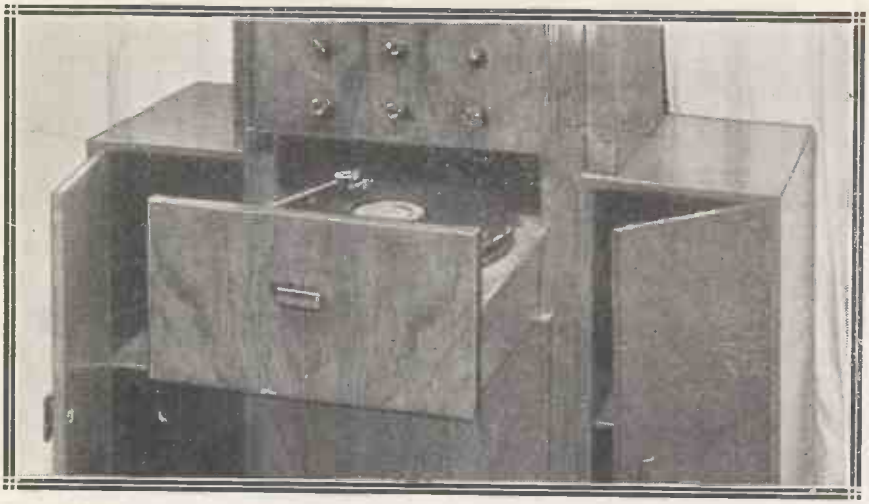
In the mounting of the electric motor and pick-up, should makes other than those used by the designer be used, care will have to be taken that not only does the pick-up track properly, but that it swings in such a way that the automatic stop on the electric motor is actuated correctly.

UNDERNEATH THE BASEBOARD



The coil assembly is mounted on the underside of the receiver baseboard immediately beneath the gang tuning condenser. An arrangement which lends itself to short wiring.

SELF-CONTAINED GRAMOPHONE SECTION



The pick-up and motor-board are arranged in a drawer which can be pulled out when required, the side compartments completely solving the problem of where to keep the records.

With the motor and pick-up used in our original design the switch is tripped at the right time and there is no need to worry about the matter, other than to adjust the relative positions of the pick-up arm and the swing arm of the switch so that it trips at the right moment.

Cabinet Improvements

Since the original " Diodion-Plus " as illustrated here was constructed, the makers of the cabinet have made a very definite improvement in its design.

The motor-board is situated in the same position as shown in our illustrations, and the drawer front is similar. But on pulling the drawer open, one notices the difference in arrangement.

Instead of a plain drawer coming out with the motor and pick-up mounted on it, the front of the drawer hinges over forwards until it is horizontal. At the same time the motor platform inside rises and comes forward in a horizontal plane.

Thus the motor and the pick-up come right to the front of the cabinet, making them very accessible, a feature that is most praiseworthy. To the constructor of the set this will not make very much difference other than the allowance of perhaps a little longer flexible connection to the pick-up and the motor.

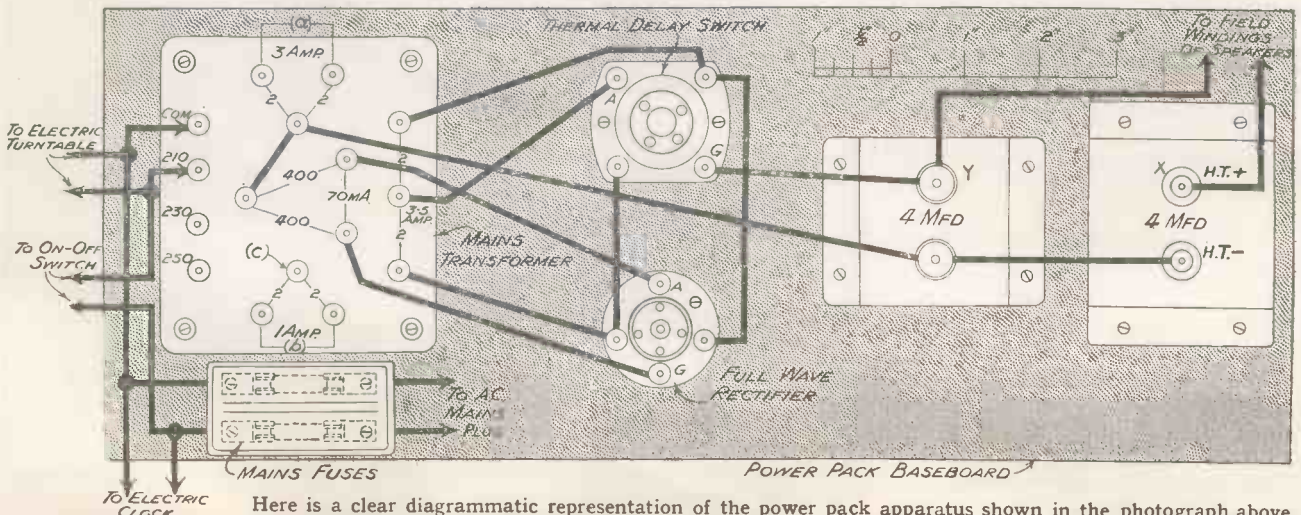
The new design will be supplied to makers of the " Diodion-Plus " automatically, they will not be sent the exact model as used by us, the difference being that which we have just pointed out.

THE POWER PACK

The vacuum delay switch may here be seen on the right of the rectifying valve.

It is important to connect the electric clock correctly. If the clock is connected on the set side of the mains switch it will be stopped every time the set is switched off.

A Choice of Rectifiers for the Power-Pack



Here is a clear diagrammatic representation of the power pack apparatus shown in the photograph above. The transformer input terminals should be chosen to suit the voltage of the mains. Into the rectifier valve-holder may be inserted either the Marconi and Osram U14, Mazda UU 120/500, Cossor 460 BU or Mullard DW4.

FREQUENCY FAKING

By GEOFFREY ELTRINGHAM

THE days of an unquestioning faith in the "straight-line" amplifier seem to be coming to an end at last, and a more enlightened view of radio design is taking its place. It has now been realised that a perfect straight-line frequency response is rarely desirable in any kind of set except the purely "local" type. On the contrary, it is now quite common to find that the L.F. circuits are carefully "faked" to compensate for the known defects introduced by the tuning circuits, loudspeaker deficiencies, and so on, and to reduce such nuisances as heterodyne whistles, background noise and mains hum.

An Intriguing Subject

The whole subject of tone faking is a most intriguing one, and I think perhaps the reader may be interested in practical details of some of the methods which are suitable for the use of the experimenter, as distinct from those which are only effective in the hands of the commercial designer. The latter, of course, tends rather to the use of such special devices as transformers with tuned windings or other schemes to make them give a response curve of some particular shape. These are not available to the amateur for the most part, nor are they very well adapted to his purposes because they lack flexibility in his hands.

There are exceptions, to be sure; notably those special types which will give curves of many different shapes by the use of variable capacities or resistances in conjunction with them. Now, these devices are very clever, and I have the greatest respect for their designers, but they do not appeal to me very strongly because I feel that when I use them I am merely exploiting someone else's brains, and I prefer to work things out for myself.

Easily Understood

The devices which I shall be describing in this article, therefore, will

The question of tone control is one of paramount importance to all discerning experimenters, and while there are many excellent examples of "ready-to-fit" tone-compensating devices available to the purchaser, most amateurs will welcome advice—such as this article gives—which will enable them to do their own response correcting.

be such as lend themselves to exact control by the amateur in accordance with rules which he can readily understand. In other words, they enable him to feel that he has really done the job on his own instead of being dependent on the brains of another.

Let us first see that we understand quite clearly what is meant by tone control. Well, in practice it almost invariably means an alteration in the

BOOSTING THE BASS

One of the earliest expedients adopted for the control of frequency response was the baffle-board. The larger the area of the baffle the better the low-note radiation, and, of course, adjustment of baffle size offers a means of controlling low-note output when desired.

relative proportions of the highest and the lowest frequencies present in the reproduced speech and music. It is upon these frequencies that our special devices operate, and we do not, as a rule, concern ourselves very much with those of the middle register.

It is true that this is not always strictly correct in theory, for there are cases in which the compensation should take the form of a characteristic which rises uniformly from the lowest to the highest frequencies. This, however, is not a very easy effect to produce, and the other method can be made to yield results which are satisfactory to a normal ear, even if they do not represent theoretical perfection.

Excessive Boom

To get down to cases, let us take first the common enough trouble of excessively bassy, boomy reproduction. This was very fashionable only a comparatively short time ago, but people are now beginning to realise that is but little better than the still older error of no bass at all. The cause is generally a loudspeaker with a prominent bass resonance, and the simple-sounding remedy of another and better speaker is not one which can always be adopted. Some suggestions for electrical methods of effecting a cure may, therefore, be welcome.

If the set contains a resistance-coupled low-frequency stage the matter is comparatively easy, for it will be remembered that to obtain full bass response from such a stage the capacity of the grid condenser and the resistance of the leak must bear a certain relationship to each other. If that ratio is departed from in one direction the result will be a proportionate reduction in bass response, which is exactly what we want.

The Speaker Does It

This may sound like treason to the experimenter who has been brought up to regard proper bass reproduction as something almost sacred, but he must remember that the peak in his speaker is giving him in effect an excess of bass, and a slight reduction at some other point will quite likely result in something which the ear will recognise as an improvement.

It may be objected that this course will lead to a heavy loss amongst those bass frequencies which fall *below* the resonance point of the speaker, but this is not, as a rule, a matter of much moment. The bass resonance of the average speaker is of considerable width, and it usually falls very near the bottom limit of the musically important range of frequencies. It is really a matter for trial, for it is easy enough to make the test, and the ear should be the final arbiter in all such cases.

Working It Out

Now, the accepted rule for full bass response from a resistance-coupled stage is that the arithmetical product of the value of the grid-leak resistance (in megohms) and the condenser capacity (in microfarads) shall not be less than ·006, but may with slight advantage be a trifle bigger, say, ·007. Thus, a condenser of ·006 mfd. and a leak of 1 meg. will serve, other satisfactory combinations being ·01 mfd. and ¾ meg., 1 mfd. and 75,000 ohms, and so on. In practice it will often be observed that somewhat higher ratios still are employed, but they cannot yield any improvement in bass and they are apt to increase the tendency to "grid choking" in the event of overloading taking place.

To secure the desired reduction in bass all that we have to do is to reduce suitably the resistance-capacity

ADDING COMPONENTS

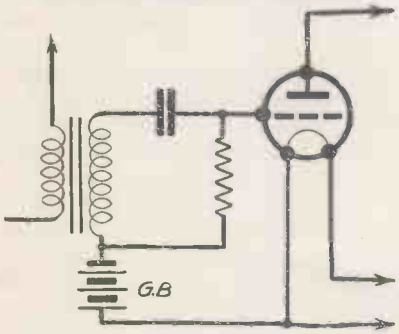


FIG. 1.

By equipping a transformer-coupled stage with an otherwise unnecessary grid-leak and condenser combination a reduction of bass notes may be secured by suitable adjustment of the values of the two extra components.

ratio in one or more of the L.F. stages. It will usually be sufficient to do it in one stage, and for a first trial a product value of ·003 should be tested. This will generally be easiest to effect by a reduction in the grid-leak resistance, and if you provide yourself with a small handful of well-assorted values you should soon be able to find one which softens down the effect of the speaker resonance peak and yet leaves a satisfying amount of bass in the reproduction.

So far so good, but what about the case of the set which is transformer-coupled throughout? Here we have no leak and condenser to juggle with, and it looks as though things were going to be difficult. It is sometimes

SELECTING FREQUENCIES

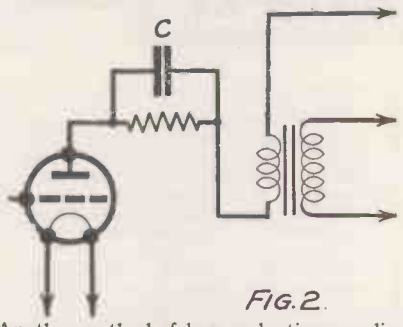


FIG. 2.

Another method of bass-reduction, applicable when the set employs only one transformer, is a resistance in series with the primary. Middle and top frequencies are passed to the transformer by the condenser.

suggested that the desired effect can be got in these cases by mis-adjustment of the ratio of the output transformer; but this is apt to be a dangerous expedient, introducing various objectionable effects.

The Best Scheme

In my experience it is very much better just to insert an otherwise unnecessary grid condenser and leak, and adjust their values exactly as before. I show in Fig. 1 the necessary connections, but not the values of the components, because these will depend upon whether the device is placed in the first or second amplifying stage.

In the first stage a condenser of ·003 mfd. is convenient, and with this a leak of 1 meg. will usually produce a definite drop in the bass response which will serve as a starting-point for aural tests. For a transformer feeding the output valve a lower resistance is desirable from the viewpoint of avoiding grid-choking, but if it is made too low its shunting effect on the transformer will lead to a drop in the upper frequencies, and so defeat our object.

Suitable Valves

A fair compromise can usually be achieved with a condenser of ·005 or ·006 mfd., and a resistance of ½ meg., but the method is not ideal in this position, and should be confined to first stages when possible. Where there is only one L.F. stage, and this is transformer-coupled, it is probably better to use some other device, such as the one you will see illustrated in Fig. 2.

Here a resistance of some 10,000 ohms is connected in series with the primary of the transformer, and would produce a general reduction of volume were it not for the presence of the by-pass condenser C. If this condenser is of a suitable capacity it will shunt the middle and higher frequencies past the resistance quite freely, while still possessing a sufficiently high reactance to the lower notes to waste a good deal of their available voltage and so reduce their strength in the output.

Alter the Resistance

This is a method of bass-reduction which will be found very easy to adjust and control, for it is particularly flexible. The severity of its effect can be governed by alterations in the value of the resistance, higher resistances increasing the effect to a marked extent. The figure of 10,000 ohms which I have quoted, by the way, gives only a mild action.

The capacity of the condenser determines the point on the frequency scale at which the device begins to function. A capacity of ·05 mfd., for example, will usually begin to have some effect at about 150 cycles, and as the frequency is reduced below this point the suppressing action in-

BY-PASSING HIGH NOTES

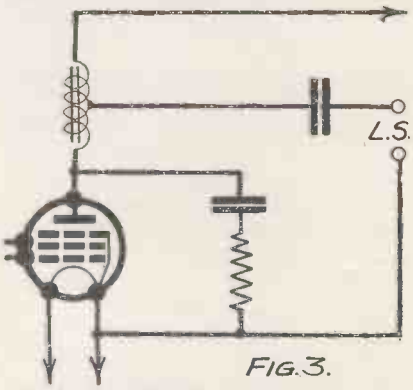


FIG. 3.

"Pentode shrillness" is customarily dealt with by a by-pass condenser between plate and filament. The addition of a resistance prevents any undesirable L.F. tuning effects for which the condenser might otherwise be responsible.

creases rapidly. This is quite a good value to try for a start, but it is impossible to lay down any definite rules here, because so much depends on the primary inductance of the transformer.

If the inductance is high you will have to use a correspondingly high value for the resistance, also possibly

Long-Range Sets Require Sharp Top-Note Attenuation

a smaller capacity for the condenser. In such a case you might start with 20,000 ohms and a capacity of ·02 mfd. and then proceed by ear as before.

Now let us have a look at the other end of the frequency scale, and see what can be done here in case of

DIFFERENTIAL AMPLIFICATION

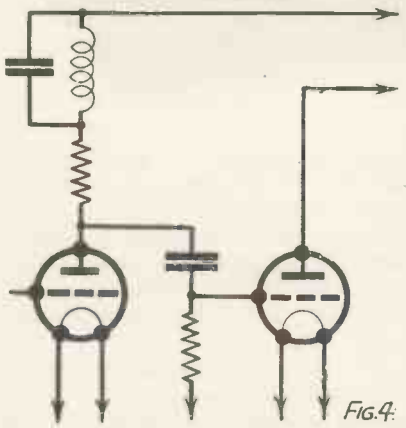


FIG. 4.

The circuit formed by the choke and condenser possesses high impedance to frequencies above a certain point. The load in the valve's anode circuit becomes differential and greater amplification of high notes is effected.

need. We sometimes find that we have an excess of the upper frequencies, usually as a result of the use of a pentode output valve. The correction here is very easy to apply, and since the usual method is pretty well known, I will deal with it only briefly, just to make these notes complete.

Easy to Remove

The higher frequencies are much easier to remove than to put back, and all we need as a rule is a by-pass condenser at a suitable point in the L.F. circuits. The usual place for this is in the anode circuit of the output valve, and there is no need to seek for a more suitable one.

A condenser of some ·002 to ·005 mfd. will normally remove any tendency to "pentode shrillness" if placed in parallel with the output circuit or, better still, connected between plate and filament of the output valve. To prevent this condenser from introducing any undesired low-frequency tuning effects it is customary to place a resistance in series with it, as I have shown in Fig. 3. This can be of some such value as 5,000 to 10,000 ohms, for it is in no wise critical.

In modern highly selective receivers we are far more likely to be faced with a deficiency of upper frequencies than an excess, and a good deal of work has been done in devising methods for boosting them up to normal again in the L.F. circuits. They become attenuated, as the reader probably knows, whenever extremely sharply tuned circuits are used without elaborate and accurate band-pass devices, and it is now considered that such devices are hardly worth the trouble they involve.

Increased Selectivity

The modern trend seems to be in the direction of simple but very sharply tuned circuits, plus some form of tone correction in the L.F. circuits to restore the weakened upper audio frequencies to health and strength. This, by the way, is the case I had in mind a little while ago when I mentioned an instance in which we really want a correction of a progressive kind giving steadily increasing amplification all the way up the frequency scale, but in practice this is rarely attempted. Quite good results can be obtained by the method almost universally adopted, in which correction is applied mainly to the upper register.

So far as the amateur is concerned this is rather a difficult matter when transformer coupling is used, but quite an easy one when there is a stage of the resistance type available for his operations. In such a case the usual practice is to use a mixed impedance in place of the pure resistance for coupling purposes, so that the effective A.C. resistance of the plate circuit tends to rise at the higher frequencies and give an increase in the amplification.

An Extra Stage

To make this effective, of course, there must be a sacrifice of amplification in the middle and lower register. Hence a tone-corrected stage of this type cannot be arranged to give quite the normal amount of "gain," and so we often find that an extra stage is provided in the more elaborate type of set for the express purpose of tone correction.

The simplest kind of upper frequency correction can be obtained by reducing the ordinary coupling resistance to a value equal to the impedance of the preceding valve, and then placing in series with this a small inductance of the order of half a henry. The impedance of such a coupling as this will be determined almost entirely by its ohmic or D.C. resistance for all low and medium frequencies, but at the upper frequencies the inductance begins to play its part, and as the frequency goes up so the total impedance rises, sending up the amplification of the stage correspondingly.

This is the type of correction which should be used by the purist who wants the utmost possible perfection of reproduction, but alas, it is really only suitable for the purely local kind of receiver. The drawback inherent in the method is that it gives a form of correction which acts right up through the range of higher harmonics and almost up into the radio-frequency range.

Heterodyne Interference

The inevitable result is that it makes all sounds with a basis of higher frequencies louder than they would otherwise be, and so all such nuisances as heterodyne whistles, atmospherics, and general background noise become

VARYING IMPEDANCE

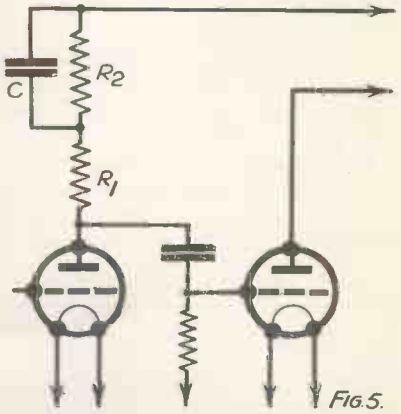


FIG. 5.

The total coupling load between the two valves comprises R_1 and R_2, but for medium and high notes R_2 virtually ceases to exist owing to the by-pass action of the condenser. The first valve therefore amplifies medium and high frequencies to a less extent than bass notes.

distressingly prominent if it is used in a long-distance receiver.

For long-range sets, therefore, it is usual to employ such a form of correction that the rising curve only goes a certain definite distance up the frequency scale, and then drops away again as sharply as possible. The

(*Continued on page* 274)

TROUBLE TRACKING

FAULT finding is by no means a difficult operation if it is tackled methodically and not haphazardly. Naturally, the average listener does not possess the testing instruments and specialised knowledge of the service engineer, but common faults are usually traceable with the help of quite simple equipment.

For example, continuity tests can be readily carried out with the aid of a pair of headphones and a dry cell. Those who do not happen to have any phones on hand will find a loudspeaker a satisfactory substitute.

The Connections

And the connections are quite straightforward. One terminal of the dry cell (don't use an L.T. accumulator for this work) is joined to one terminal of the phones or speaker. The remaining dry cell terminal is connected to a length of flexible wire, preferably terminating in a testing prod, although this is, of course, not essential.

The remaining terminal on the phones or speaker is then joined to another length of flex, likewise terminating in a testing prod.

Thus our test circuit consists of a 1·5-volt cell in series with the phones or speaker, with a couple of lengths of flexible wire for making contact with the terminals of the suspected component.

Suppose we wish to test an H.F. choke for continuity, or, in other words, see whether there is a break in the winding.

The procedure is simple. The choke is temporarily disconnected from the set by removing the existing leads from its terminals.

Then one of the two flexible test leads is brought into contact with one choke terminal, and the second flex lead momentarily flicked against the other choke terminal.

This month the Chief of the "M.W." Query Department deals with the problem of "home-servicing," and shows that elaborate testing equipment is by no means essential for tracing common faults.

If the choke winding is unbroken, the result of this intermittent contact will be a loud plonk or click in the phones or speaker, thus indicating a flow of current from the cell through the testing circuit and the choke winding. This plonk will occur each time the circuit is completed by flicking the testing lead against the choke terminal.

For Many Components

On the other hand, a broken winding will result in silence. Just think of the various components to which this test can be applied.

In addition to H.F. chokes, there are tuning coils, L.F. chokes and transformers, resistances, gramophone pick-ups, etc.

Moreover, the test can be employed for variable condensers when a "short" between the fixed and moving vanes is suspected. If the condenser is O.K. there will be no plonk when the test leads are brought into contact with the moving and fixed vanes terminals.

Always remember, however, that the existing connections should first be removed from the component under test, otherwise the result may be misleading owing to continuity being effected via some other component in the circuit. For instance, variable condensers are normally joined up to tuning coils, or, in the case of a reaction control, to a reaction winding, and the presence of these windings may produce evidence of a short when in fact no such short exists.

But the "phones and dry cell" scheme is not very much use for testing out fixed condensers. It is true that it will detect a complete short circuit between the two sets of plates, a fault which does not often occur with the modern component.

Small fixed condensers are best tested by the substitution method—that is, replacing with a spare of somewhere near the same value. No test, apart from a capacity bridge, is likely to show an internal disconnection—and this is not an unknown fault by any means.

Large fixed condensers, such as those used for decoupling can, however, be tried out without difficulty.

The condenser is removed from the set, or its two leads can be disconnected, and then joined for a few seconds across a source of voltage, such as an H.T. battery. Incidentally, it is, of course, unwise to carry out this test if it is suspected that the condenser has a dead short internally, otherwise the H.T. may be damaged.

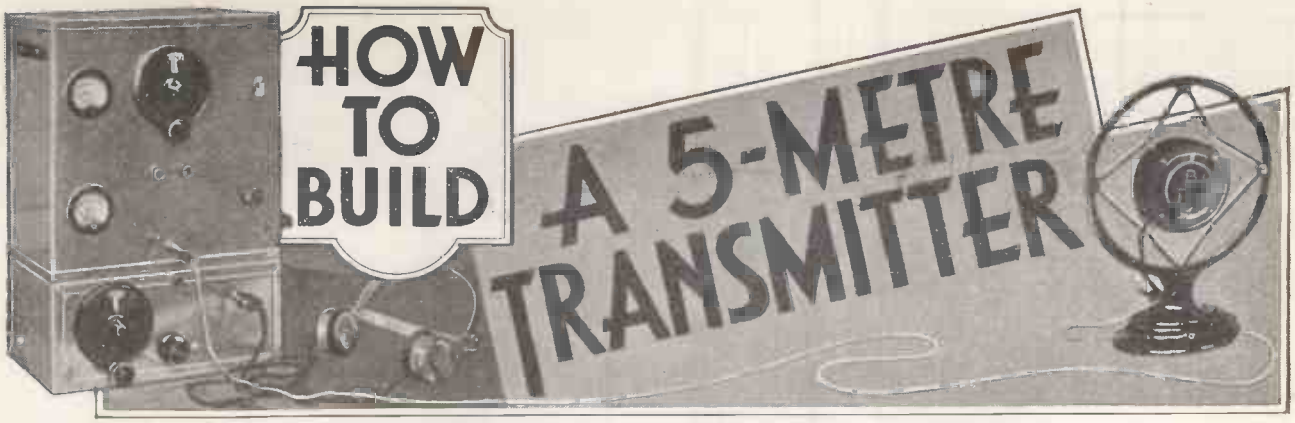
Spark Test

At the end of a few seconds remove the battery and leave the condenser for, say, ten minutes. Then momentarily short its two terminals with a piece of wire or the blade of a screwdriver. If the condenser is O.K. a small spark will be noticed at the instant the wire makes contact with the terminals, thus proving that the component has the ability to hold a charge.

Actually a non-leaky condenser will retain a charge for several hours

A MAINS UNIT TIP

The use of a large condenser across the + and — terminals of a mains unit will often result in a smoother supply, especially if the unit is being worked close to its maximum current output



HOW TO BUILD A 5-METRE TRANSMITTER

THIS is the age of speed, and radio, in common with other branches of science has done much to speed things up. Communication between the corners of the earth is almost instantaneous, thanks to radio transmission and reception; while the direction of boats and even aircraft, by its invisible power, is rapidly becoming a successful *fait accompli*.

Frequency Acceleration

But not only has radio helped to speed up our daily life, it is itself being speeded up in no uncertain fashion. Not that the radio waves are travelling any faster—that would be almost inconceivable—but the impulses of which the waves consist are reaching their destinations in ever-increasing numbers per second. In other words, the wavelengths are steadily getting shorter.

Are you fascinated with the idea of getting out of the rut—casting aside old methods and breaking entirely new ground? Up to the present very little is known about the behaviour of ultra-short waves, and tremendous possibilities are open to those who are sufficiently interested to carry out experimental work.

Here, and in other pages in this issue, full constructional details are given of a complete portable 5-metre outfit which, when built, will give you a fine start in this remarkably interesting field.

Designed by the "M.W." Research Dept.

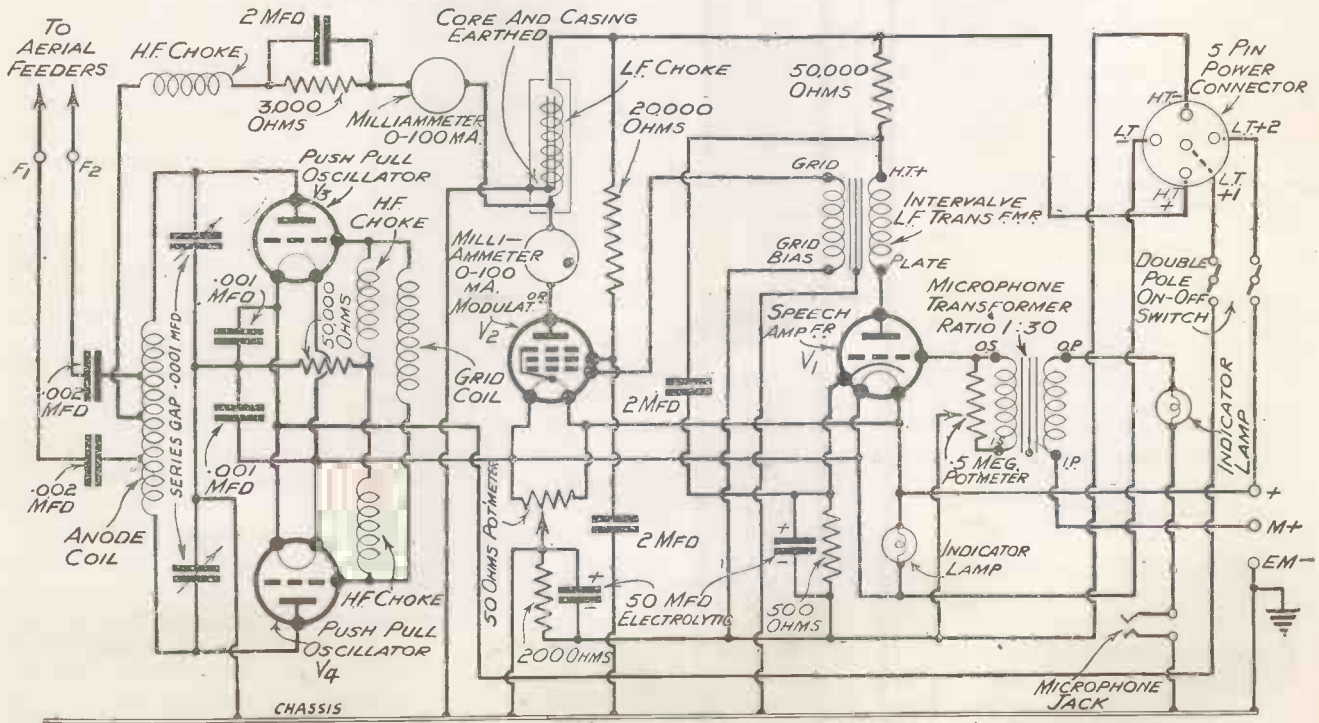
Not long ago we were aghast at the prospect of the possibilities of transmitting radio on a wavelength of 100 metres, a frequency of a mere 3,000,000 cycles per second—3 megacycles—for broadcasting was going on with frequencies much slower than this. But transmission and reception were accomplished at this phenomenal "speed" and we began to get used to the so-called short waves.

Getting Lower

Later some optimistic amateurs tried doubling the frequency and transmitted around 50 metres, 6,000,000 cycles; success crowned their efforts and confirmed their optimism. The 100 metres began to appear not so short after all.

After 50 (or 40 to be exact, for the

The Magic Link to a New Technique



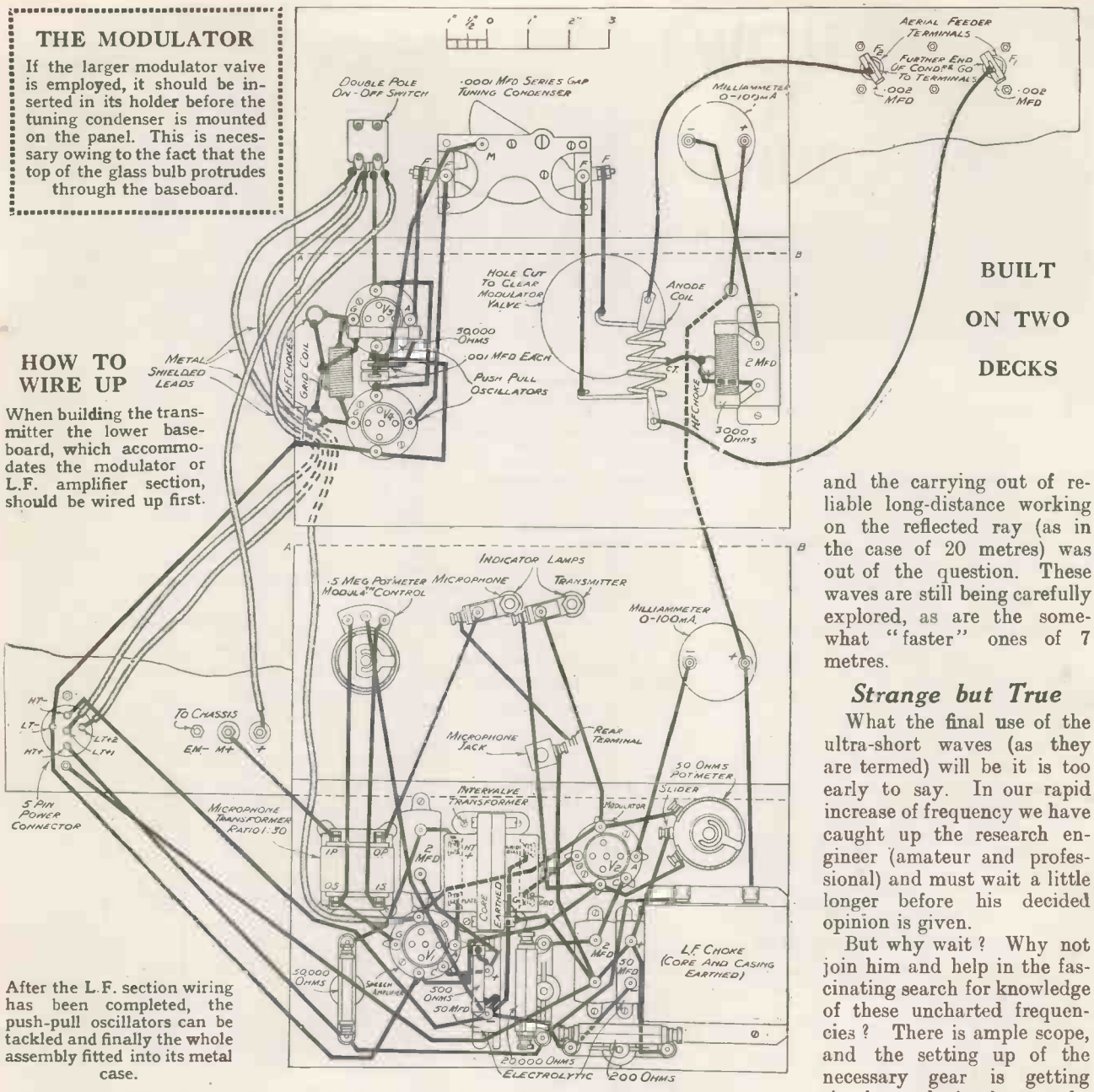
Although at first sight it may look somewhat complicated, the transmitter circuit is really very simple. V_1 and V_2 comprise nothing more than an ordinary L.F. amplifier in which a microphone takes the place of a pick-up. V_3 and V_4 are a pair of oscillators in push-pull, and it is these that supply the power to the aerial, the carrier wave being modulated by the output from V_2.

THE MODULATOR

If the larger modulator valve is employed, it should be inserted in its holder before the tuning condenser is mounted on the panel. This is necessary owing to the fact that the top of the glass bulb protrudes through the baseboard.

HOW TO WIRE UP

When building the transmitter the lower baseboard, which accommodates the modulator or L.F. amplifier section, should be wired up first.



After the L.F. section wiring has been completed, the push-pull oscillators can be tackled and finally the whole assembly fitted into its metal case.

BUILT ON TWO DECKS

amateur band was officially delegated to that figure) came 20 metres, twice as "fast" in their impulses as the 40 metres, a speed of 15,000,000 cycles—15 megacycles. Again a great deal of success was achieved, and nowadays broadcasting on wavelengths round about 20 metres is a daily occurrence.

Skip Distance Effects

Much was learned about the behaviour of these short waves (the 100 metres was by now definitely not considered short) and the peculiar skip distance fading effects were studied in detail. The waves were definitely practicable for commercial use, and are regularly used to-day, as anyone with an ordinary short-wave receiver will know.

What about the faster frequencies? Down dropped the enthusiasts and soon found themselves working on 10 metres, a mere 30,000,000 cycles per second. Here the behaviour of the waves became very unusual, for the skip distance had increased, and the waves more often than not had to be looked upon as useless for long-distance transmission owing to that fact.

Similarity to Light

They were, in fact, more optical in nature than radio, and though quite long distances could be worked with the direct rays, reflection from the upper atmosphere was very uncertain, and the carrying out of reliable long-distance working on the reflected ray (as in the case of 20 metres) was out of the question. These waves are still being carefully explored, as are the somewhat "faster" ones of 7 metres.

Strange but True

What the final use of the ultra-short waves (as they are termed) will be it is too early to say. In our rapid increase of frequency we have caught up the research engineer (amateur and professional) and must wait a little longer before his decided opinion is given.

But why wait? Why not join him and help in the fascinating search for knowledge of these uncharted frequencies? There is ample scope, and the setting up of the necessary gear is getting simpler and simpler as the frequency of the waves increases. A peculiar fact this, but it is true.

Consequently, when we again drop down the wavelength and come to the hectic speed of 60 megacycles (5 metres) we find that the construction of a transmitter and receiver is one of the simplest things on earth.

Research Opportunities

And the 5-metre band is an uncharted one. Few have yet explored it, though what has so far been gleaned by the few shows that the band has more than common attraction. It is fickle, and there is nothing more fascinating to the radio enthusiast than some little problem that is elusive; something that defies

There's Plenty of Scope on Five Metres

his theory and worries his practical efforts to nail it down.

The 5-metre wave has all the necessary qualities to make it the most fascinating wave yet explored, as well as the easiest on which to get something going. The simplest transmitter and receiver will give results from which experiments can spring, so that there is no complicated engineering to be considered before the intending researcher can get to work.

Making Discoveries

That is the beauty of unexplored territory, for none can say you nay. You must find out for yourself, starting off with a few accepted principles and then branching forth on the uncharted waves in quest of radio knowledge.

And who shall say what we shall find down there on 5 metres? The waves certainly seem to be perverse, being very optical in nature, and often refusing to go anywhere that the light wave from the place of transmission will not go. That is, the transmitter and receiver have to be in theoretical "sight" of one another —or so it seems at present.

Breaking Records

And yet the record distance of 190 miles has been reached (by our contemporary "Popular Wireless") on low power, starting from the height of the Crystal Palace and ending in Yorkshire! Was this an optical effect or did the waves curve round the earth's surface? That is one of the many things we want to know.

We in the Research Department of MODERN WIRELESS have been carrying out a lot of experiments on the 60-megacycle band, both with fixed and mobile stations, and daily the number of amateurs who are taking up the wavelength is increasing.

Room for Everyone

Readers of "M.W." could easily join us in our researches if they are prepared to get together some simple gear, and to build a small transmitter and receiver, such as those to be described here. They need a licence from the Post Office, of course, which will enable them to carry out experiments on a waveband of from 5·005 to 5·35 metres. It seems a very restricted band until one realises the number of kilocycles it represents. In practice, some idea may be obtained of its width by the fact that it would be possible to get some 4,000 stations into it, allowing a width of 10 kilocycles per station! So there is plenty of room for us all, isn't there?

Before we go on to the actual description of the transmitter which we suggest as a start for the 5-metre amateur, we must state definitely that the reception of I.C.W. and telephony on this band is not difficult. The receivers we use normally, though they will probably be changed in the near future, are based on a system of reception that is little used elsewhere (if ever), but which makes tuning remarkably flat, and as there is no interference down on 5-metres, this flatness is an unmitigated boon. But more of the receiving side later.

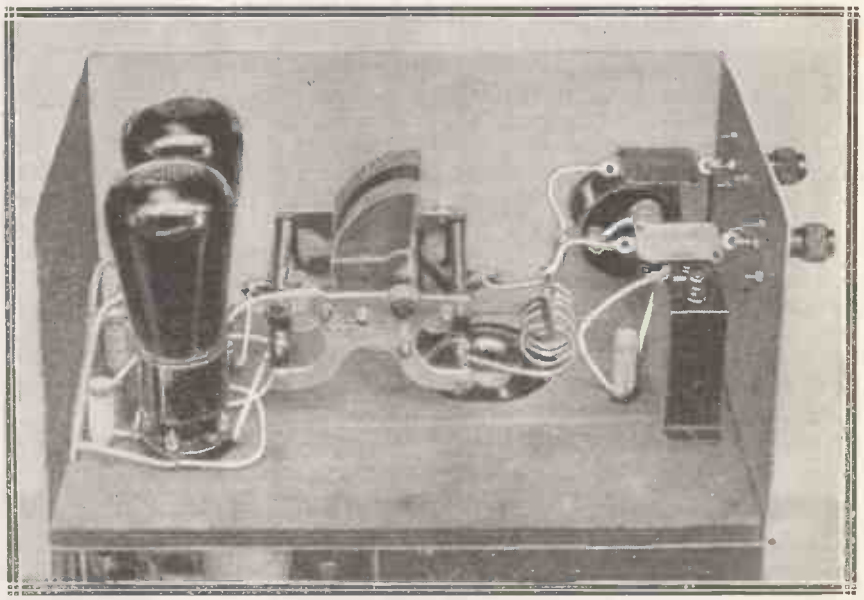
As a start in the exploration of 5 metres it is most convenient to have a compact transmitter design that can be used easily as a portable station if desired. Such has been our aim in the design of the 10-watt transmitter illustrated here.

It is built in a compact form in a metal case, and whether used as a fixed or mobile station, is both convenient and efficient. The circuit employed is quite a normal one, consisting of a modulation amplifier feeding into a push-pull oscillator stage.

Choke modulation is employed through a common H.T. feed to the centre of the anode coil between the two oscillator valves. The aerial feed is tapped off the anode coil from two points equidistant from the centre, or earth potential point.

Parallel non-radiating feeders to the aerial are employed, the aerial being of the current-fed half-wavelength type, the two horizontal portions being fed each from one of the feeder lines, and measuring a quarter wavelength each. This part of the outfit is fully discussed in a later article on the subject.

PUSH-PULL FOR HIGH EFFICIENCY



These two valves have to oscillate at the tremendously high frequency of 60 million cycles per second. High efficiency is difficult to obtain at these frequencies, and it is for this reason that a push-pull circuit was decided upon. Note the clips on the coil which enable the coupling to the aerial to be varied.

The grid coil need not be situated near the anode coil in order that oscillation shall take place, for the fact that the former is roughly tuned to the correct frequency by the size of coil and the valve capacities is sufficient to induce oscillation.

Voltage Requirements

As a common feed is used for H.T. supply to the modulator and the two oscillator valves, it is necessary to arrange that the correct voltages reach the valves by means of a resistance in the anode feed to the oscillators. These valves require an anode potential of 200 volts, while the modulator used needs a matter of 400 volts H.T.

This size of modulator is necessary if the oscillators are to be fully modulated, and if the useful power

THE COMPONENTS YOU WILL REQUIRE

Component	Make used by Designer	Alternative makes of suitable specification recommended by Designer
1 special metal cabinet complete with baseboards, or sheet aluminium (16 gauge) to dimensions shown in diagrams	Magnum	—
1 ·0001-mfd. variable condenser	Cyldon Series Gap	—
1 vernier dial	Igranic "Indigraph"	—
1 2-mfd. fixed condenser	T.C.C. type 80	Dubilier
2 2-mfd. do.	Dubilier B.B.	T.C.C.
2 50-mfd. do.	T.C.C. type 521	—
2 ·002-mfd. do.	Dubilier 670	T.C.C.
2 ·001-mfd. do.	Dubilier 665	—
1 L.F. transformer	Ferranti A.F.3	—
1 microphone transformer, ratio 1 : 30	B.T.H.	—
1 L.F. choke	R.I. type D.Y.11	—
1 50,000-ohm resistance with horizontal holder	Graham Farish "Ohmite"	Dubilier
1 20,000-ohm do.	Graham Farish "Power Ohmite"	—
1 200-ohm do.	do. do.	—
1 3,000-ohm power resistance	Dubilier "Spirohm"	—
1 500-ohm resistance with wire ends	Dubilier 1 watt	—
1 50,000-ohm do.	Dublier 1 watt	—

Component	Make used by Designer	Alternative makes of suitable specification recommended by Designer
1 ½-megohm potentiometer	Igranic "Megostat"	—
2 four-pin valve holders	W.B.	Benjamin, Ferranti
2 five-pin do.	Lissen	W.B.
1 five-pin do.	Ferranti chassis type	Clix
3 H.F. chokes	British Radiogram	(See text)
1 grid coil	British Radiogram	(See text)
1 anode coil	British Radiogram	(See text)
2 0-100 milliammeters	Bulgin type M.C.10	Ferranti
2 indicator lamps	Bulgin type D.16	—
1 jack	Igranic P.71	—
1 plug for same	Igranic P.40	—
1 double-pole on-off switch	Bulgin type S.88	—
1 five-pin connector plug	Bulgin type P.3	—
1 50-ohm baseboard potentiometer	Igranic	—
5 terminals	Belling-Lee type B	—
1 insulating bush	—	—
1 terminal strip 3½" x 2"	British Radiogram	—
2 crocodile clips	Bulgin type C.R.	—
1 yard single-screened flex	Goltone	—
4 yards insulated sleeving	Goltone	—
5 yards 18 S.W.G. tinned copper wire	Goltone	—
Screws, flex, etc.	—	—

of the transmitter is to be the full 10 watts. Smaller valves can be used throughout for a power of about 6 watts, and in this case the anode voltage can be reduced throughout.

Modulator Load

It is important that the modulator work into the correct, or somewhere near correct, impedance load if the full power of which it is capable is to be obtained. In the case of this transmitter, with oscillator valves giving 10 watts, we have a load of something over 3,000 ohms into which the modulator has to work.

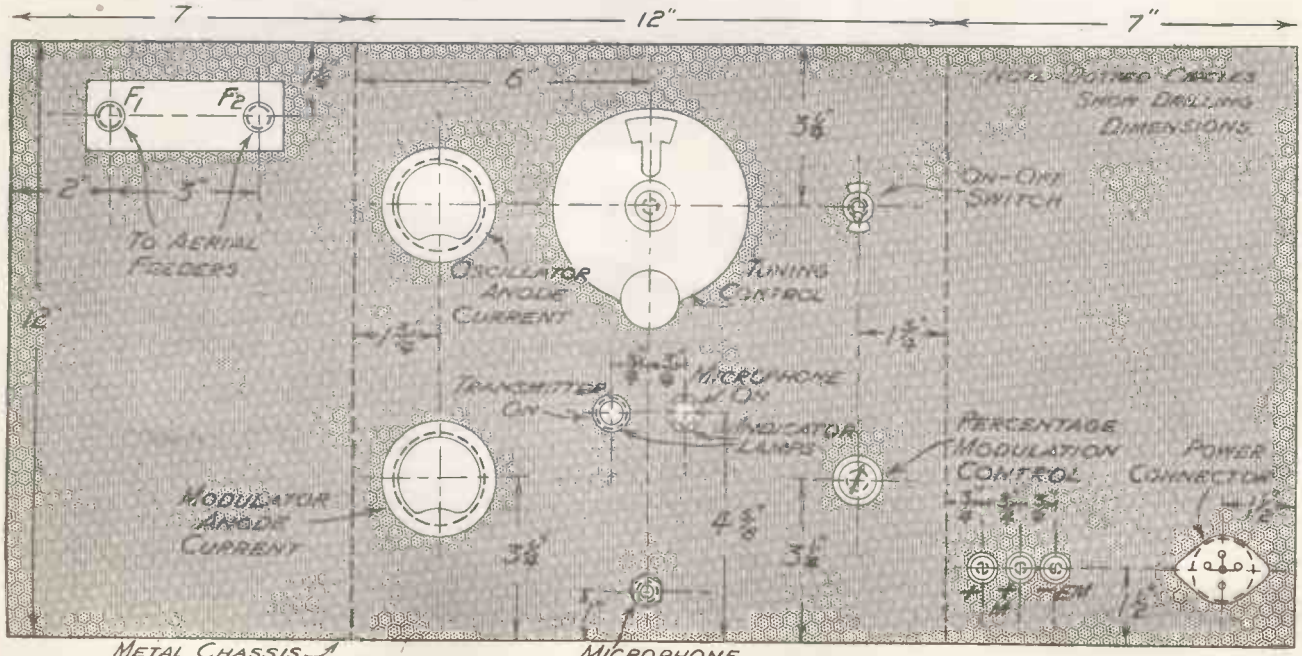
Thus the modulator should be of the order of the P.P.5/400, which requires just under this figure for optimum load. This is the ideal, but in practice, if we want to keep the transmitter down in size we come against a snag here. The microphone is a fairly sensitive one, but it is not likely to load fully a P.P.5/400 valve unless it is fed through two stages of L.F. first.

This means three valves for the modulation section of the transmitter, and more space required. Moreover, it is necessary to get the full output power possible from the P.P.5/400 if we are to modulate fully, for we need 5 watts for this.

Satisfactory Solution

There is a way out of the trouble which we have used with great success. This is to use a valve that is capable of delivering much more than 5 watts, but running it not at its maximum efficiency. This valve is

An Easy-to-Make Metal Cabinet



DETAILS OF PANEL FRONT AND SIDES

The vertical dotted lines indicate the points at which right angle bends are made to form the sides of the case. The lid and back are also in one piece.

It Operates from a 12-Volt Car Battery

the P.T.25, which is a pentode having a large amplification factor, and capable of providing 10 watts output when fully loaded, with a grid swing that is considerably less than that required for full load of the P.P.5/400.

Biasing the Modulator

It requires, however, a greater ohmage for optimum output load, so that at 3,000 ohms or so we do not get the full power developed by the valve. As we do not need more than half its power this does not matter, and we can, on the other hand, fully load it with one stage of L.F. amplification. A useful point when the design of a compact transmitter is under consideration.

The bias of the modulator valve is obtained in the usual way, by means of an anode circuit resistance, but the value of this resistance is less than that which would be expected, for it has to carry also the anode current of the oscillator valves.

The construction of the transmitter is not difficult if it is tackled systematically. The first thing to do is to make the metal box according to the diagrams, or else to obtain it ready made from the firm mentioned in the list of components.

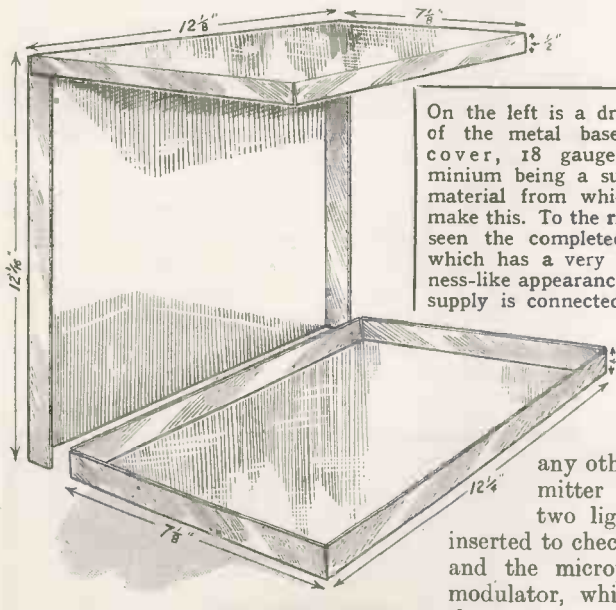
Power Supply Details

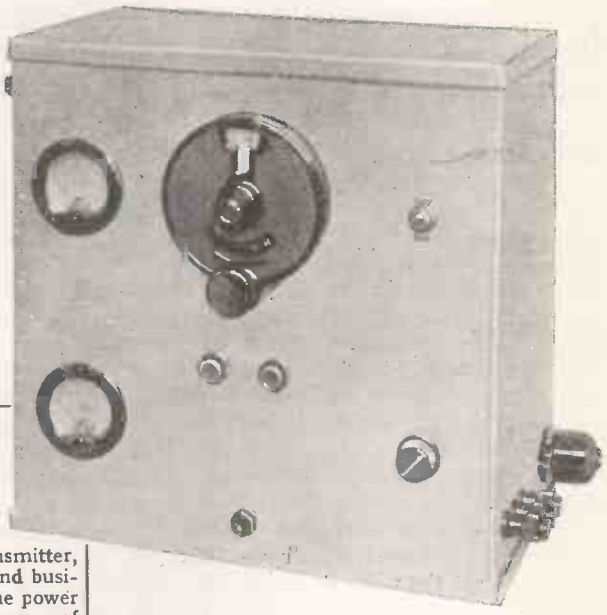
Next, the modulator unit is constructed as if it were an ordinary L.F. amplifier. It will be noticed from the diagrams that the L.T. feeds for the two sections of the transmitter are split. This is so that they can be used separately, 2-volt valves being employed in the oscillator unit (when less than 10 watts is required) and 4 volts for the modulator. When the leads are linked together the whole outfit is supplied with the same power source.

This is further discussed later on in this article.

The H.T. for the transmitter can be supplied either from a power pack when the set is used at home, or else from a car generator when the transmitter is to be employed as a mobile station.

The modulator unit should be carefully tested before any other part of the transmitter is commenced. The two lights on the panel are inserted to check the filament circuit and the microphone circuit of the modulator, while the milliammeters show the output from either modulator or oscillator.





On the left is a drawing of the metal base and cover, 18 gauge aluminium being a suitable material from which to make this. To the right is seen the completed transmitter, which has a very neat and business-like appearance. The power supply is connected by means of the plug seen on the right.

Loudspeaker Test

The method of testing the modulator is to connect the microphone by plugging into the jack in the front and applying either A.C. or battery L.T. to the five-pin socket feeding the set. If A.C. is used, the two terminals nearest the front of the box (of the group of three on the side) should be connected to the two poles of a 4½-volt dry cell to supply the microphone current.

If a battery is used to supply the L.T. for the modulator, which is probably preferable for the first test, these two terminals can be linked together, for then the L.T. battery will also supply the necessary power for the microphone. The bulb in the microphone light indicator should, by the way, be of the ·06 amp. type, while the other bulb (in the filament circuit) should be of the 4- or 6-volt type.

The on-off switch is arranged to break the filament circuits of both the oscillator and the modulator sections, so that in the event of different L.T. voltages being employed they are both controlled properly.

When testing the modulator section the loudspeaker is used in place of the oscillator valves, and is connected through a fixed condenser between the anode of the modulator valve and earth. In this way the quality and the power of the modulator output can be tested and everything passed O.K. before any further work is done on the transmitter.

After the modulator section has been tested it is left in position in the cabinet and the oscillator section is commenced. This fits into the cabinet above the modulator and has a baseboard which is covered on the lower side with a sheet of metal. This is essential to screen it from the modulator section.

Making the Coils

The coils for the oscillator section are easily constructed. The aerial or anode coil consists of six turns of 12-gauge tinned copper wire wound on an inch former, the latter being removed after winding. This is fixed

A.C. Mains can be Used if Desired

THE ACCESSORIES AND VALVES

ACCESSORIES	MAKERS
1 microphone	B.T.H.
1 12-volt accumulator	Exide
1 H.T. generator, 400 v., 125 m.a	Electro Dynamic Construction Co. (see text)
2 portable masts	Laker (see text)
Aerial wire, insulators, etc.	

VALVES

10-watt input :	5-watt input :
Oscillators.—2 Mullard A.C.064.	Oscillators.—2 Marconi or Osram P.2.
Speech Amplifier.—Mazda A.C.2/H.L.	Speech Amplifier.—Mazda A.C.2/H.L.
Modulator.—Marconi or Osram P.T.25.	Modulator.—Mullard P.M.24M.

to the two stator sections of the series gap condenser, and from the coil go two leads from clips to the two aerial feed condensers.

The rotor of the series gap condenser is earthed to the chassis by means of the three fixing screws, but it is important to note that in the construction of the set the modulator valve must be in position before the oscillator condenser is finally fixed in position because the valve has to protrude through the hole cut in the oscillator baseboard, which hole comes partly under the condenser. Unless the valve is in position before the condenser is mounted it will not be possible to get the valve in its holder.

Preventing Hum

The two anti-parasitic chokes in the grid circuit of the oscillator are wound with 24-gauge insulated wire on ½-in. formers, and contain about 35 turns. The other H.F. choke can be of the same size. The grid coil consists of five turns of 24-gauge wire on a piece of wood about ½-in. in diameter.

Note that the filament feed wires are of the shielded variety. This is to prevent hum induction when the transmitter is used on A.C., while a balancing potentiometer is connected across the filament input and is adjusted by means of a screwdriver running through a hole in the baseboard below the uppermost milliammeter. It is necessary to so position this potentiometer that a screwdriver so inserted will easily find the slot in the adjusting screw.

Small Valves

And now a few words about the use of smaller valves for lower power transmission, which is useful where short distance tests are being conducted. Instead of the two A.C.064 valves for oscillators we can use a couple of 2-volters, the P.2 valves being quite satisfactory.

For this purpose it is necessary to supply a 2-volt feed to the oscillator portion of the set, and as the " small " valves in the modulator section to be used with the P.2's will take four volts L.T., the oscillator L.T. feed must be independent.

Dual L.T. Supply

To achieve that we have arranged the L.T. plug to have two positive sockets, and in the case of 4-volt valves being used, these two are joined together. When the oscillator valves are of P.2 type, the 2-volt positive supply is connected to the centre of the five-pin holder, and the L.T. 4-volt positive to the left-hand filament socket.

This allows the two different L.T. voltages to be used without trouble.

The modulator valves recommended with the 2-volt oscillators are Mazda A.C.2H.L. and Mullard P.M.24M., the latter being the modulator and the former the first L.F. amplifier stage.

Using A.C.

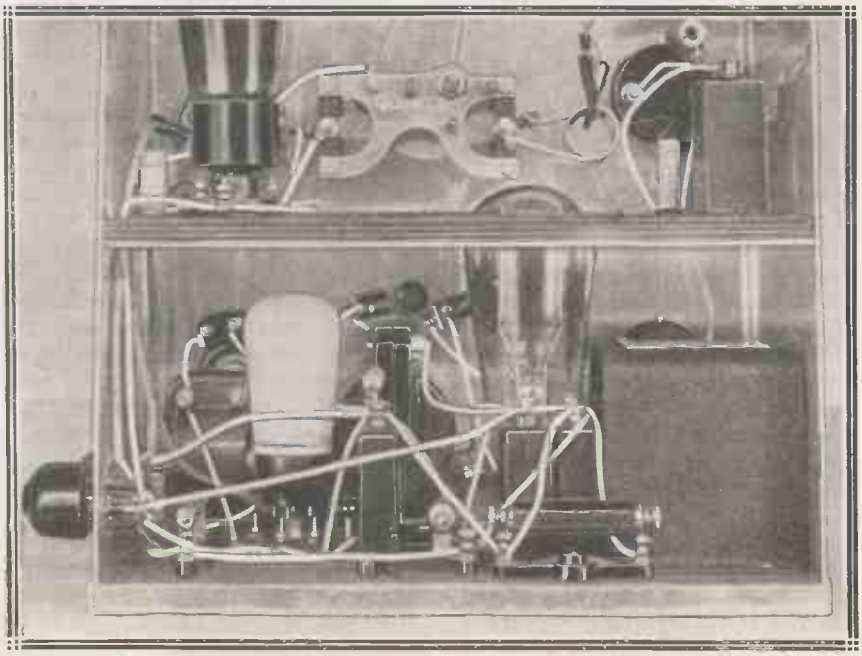
The other sockets on the power plug are, of course, used in the same way whether two separate filament voltages are used, or a common L.T. supply. They are " grid " socket connects to H.T.—, the " anode " socket takes H.T. positive, and the remaining filament socket is joined to L.T. negative.

The alteration of the power supply will not affect the connections of the microphone, and the use of the modulator L.T. battery as microphone battery is perfectly simple.

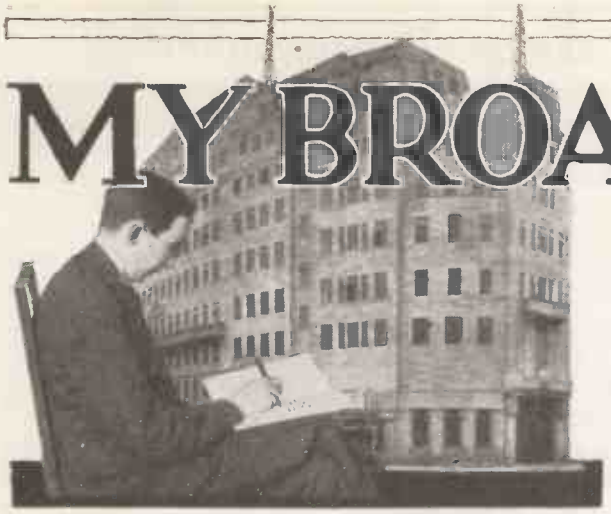
In the case of the transmitter being run off A.C., it is necessary to insert a 4·5-volt dry battery between the centre and back terminals of the three on the side of case, as mentioned before. It is not satisfactory to use A.C. as a microphone energisation current.

The testing of the oscillator and the transmitter as a whole are dealt with in the practical article a few pages farther on, so there is no need to go into the matter here, and we can pass on to the next step in the construction of the complete 5-metre station—the receiver.

WHERE THE SPEECH IS AMPLIFIED



Here is a close-up of the modulator section. The small valve on the left is the speech amplifier, while the " Big Bottle " in the background is the modulator proper. As you will see, there is no wasted space !



MY BROADCASTING DIARY

Our Own Broadcasting Correspondent keeps a critical eye on the affairs of the B.B.C., and each month, for the benefit of listeners, comments frankly and impartially on the politics and personalities controlling British Broadcasting.

The Dance Band Problem

Is Henry Hall to have a brother orchestra at Broadcasting House?

This is one of the questions of the moment to be decided by the B.B.C. as an outcome of its fight against song-plugging. It has already been realised that if the new anti-plugging method of paying dance orchestras for broadcasts is to work, a tremendous sum will have to be allocated for the purpose each year. To do the thing properly something like £50,000 would be necessary, but the Governors do not feel justified in granting more than £15,000. Even then there seems to be no certainty in the system, for it may still be worth while—and possible—for a dance band leader to indulge in a little profitable song-plugging.

Relays to Cease?

Opinion at Broadcasting House is fast drawing to the conclusion that the only effective method of combating the menace (as they regard it) is to run two dance orchestras and thereafter refuse to relay outside dance bands. In the long run it would probably prove cheaper, but listeners would miss the variety of outside broadcasts. The most sensible thing seems to be to let matters rest as they are. What listener cares if his favourite tune is "plugged" by half a dozen orchestras, anyway?

The Regional Scheme

On the technical side, the most vital question to be settled at Broadcasting House just now is the fate of the Regional Scheme. The new Lucerne Plan has upset all preconceived arrangements and made it necessary in the interests of law and order in the ether to consider seriously whether two if not three B.B.C. stations should be closed down.

The opening of the high-powered, long-wave station at Droitwich (now being built) will make two of the medium-wave Nationals—London and the Northern—more or less redundant, for anything from these two stations will also be obtainable from Droitwich. There are other areas which urgently require a better broadcasting service—the Highlands, for instance—and parts of north-east England. Shall we see the National transmitter at Brookman's Park transported to somewhere in the neighbourhood of Inverness?

B.B.C. Staff Anonymity

The rules of anonymity affecting the staff of the B.B.C. have recently been tightened up It is news to me, though, that they have been made to apply to relatives of the staff as well! Yet Mrs. Borrett, the new woman announcer, told newspaper representatives that the B.B.C. had forbidden her to give interviews and added, "My husband has received his instructions, as well." This is dictatorship, indeed.

As the anonymity rule now stands, only three or four of the big guns at Broadcasting House and the Regional directors are allowed to seek, or indulge in, personal publicity. These include, of course, such people as Admiral Sir Charles Carpendale, Major Gladstone Murray, Mr. Noel Ashbridge and Mr. Roger Eckersley. None of these seeks or wants publicity, and at least one has a horror of it.

Autumn Educational Talks

Mr. J. A. Scott Watson, Professor of Rural Economy at the University of Oxford, is spending the greater part of his vacation touring the countryside on behalf of the B.B.C. He is obtaining material for his autumn series of talks on Rural Britain, To-day and To-morrow.

A TUNEFUL HOME-COMING

This is Danny Malone, the young Irish Tenor, broadcasting from the Dublin-Athlone station while en route for his home in Belfast. This was Mr. Malone's first opportunity of visiting his family for six years.

This is one of the adult educational schemes of Mr. Charles Siepmann (about whom, by the way, there have been unfounded rumours of resignation). The idea is that Prof. Watson shall emulate Cobbett of Cobbett's Rural Rides fame, and make a careful study of life in the village

B.B.C. Progress in Television Development

and countryside throughout Britain. The talks begin on October 5th and will continue until December 21st. It needs such stunts as this to draw the attention of listeners to the adult educational talks. The idea of a professor wandering around the countryside looking for material appeals to the imagination and shows that at last the Talks Department's more serious branch is awakening to the value of showmanship.

Television Advances

Under the careful guidance of Mr. Eustace Robb, television on its artistic side is making great progress, and I hear that the Board of Governors is duly impressed. There is now every justification for the urgent demands for more space and in the autumn, when big television developments on the receiving side are predicted, it will become absolutely essential for another and larger studio to be found. The projected extension northwards of Broadcasting House provides for the growth of television, but although everything is ready for this enlargement of headquarters, no definite time has been fixed for the building, and it may even be years before television finds permanent accommodation.

Ulster T.T. Broadcast

Looking ahead at the programmes, I see that the chief outside broadcast during September is a relay from Belfast, on September 2nd, of the Ulster T.T. Motor Race. Among plays, first place must be given to Galsworthy's "Strife," which is being revived in the National on September 4th. Howard Rose, the B.B.C.'s senior producer, will be responsible for this. On September 7th, listeners will hear "The Mulberry Bush," by E. M. Delafield, which will be produced by the B.B.C.'s most youthful producer, Robin Whitworth.

As usual, the Proms. will be broadcast each evening throughout the month, while lovers of military band music will be given a treat on Saturday, September 9th, when the band of the Grenadier Guards, under the direction of Captain G. Miller, features in the National programme at 6.45 p.m.

A Musical Play

The B.B.C. has secured the services of Evelyn Laye to take her original part in "Waltz Time," the radio production of which will be broadcast in the National programme on Friday, September 8th. This musical play will be produced by C. Denis Freeman and Mark Lubbock.

Reception of Empire Transmissions

Neither changes nor improvements in the Daventry Empire transmitter seems to give better results in Australia and New Zealand. These two parts of the Empire express great dissatisfaction at the quality of reception and there is general disappointment. The experts think that the choice of the site of the Empire station may have something to do with the bad results obtained in the Antipodes, but others declare that at the present stage of radio science it is impossible to give a reliable programme service between Australia and the Home Country.

It seems rather early days to condemn such a boldly-conceived service, especially as for a time it must necessarily be more or less experimental.

THE RETURN OF G. P. KENDALL, B.Sc.

(*Continued from page* 174.)

provided just the immediate relief which was needed. And so his work went on during the eight years of his association with this journal, always striving to give his followers something better still, and succeeding at pretty frequent intervals. Eight years of this would make most people feel a little tired, and that is apparently what happened to Mr. Kendall, for he suddenly stopped all design work for the press and devoted himself entirely to commercial designing and production problems for the next two years.

That period is just over, and although he seems to have enjoyed it he makes no secret of the fact that he found the well-defined limits of commercial conditions rather irksome in comparison with the technical freedom of catering for an enlightened public like the readers of a technical paper.

Now he is back among us with two years' accumulation of energy and ideas, plus some experience which will help him to reconcile the often conflicting view-points of the amateur constructor and the commercial man who supplies his needs. Our readers will, we are sure, join us in extending to him a cordial welcome, the more so because we think they must share our own intense curiosity about his first new set. *Look out for next month's issue!*

IN THE LEEDS CONTROL ROOM

The control room at the new Leeds studios is a replica in miniature of the main control room in London. Here we see two of the control desks together with a portion of the amplifying equipment.

The WORLD'S PROGRAMMES

SPECIAL ILLUSTRATED SUPPLEMENT FOR LONG-DISTANCE ENTHUSIASTS

CONTENTS OF THIS FOREIGN PROGRAMME FEATURE

MEDIUM-WAVE MATTERS

Including an interesting report upon how medium-wave American stations can be heard during full summer conditions.

ARE any readers of "M.W." still able to receive American or South American stations on medium waves after the B.B.C. stations have closed?

It seems almost fantastic to ask such a question during full summer conditions, but this has been such a phenomenally good season for long distance that it would not be at all impossible for a British aerial to receive a recognisable programme over the three or more thousands of miles that separate this country from the transatlantic stations.

* * *

Undoubtedly the chief drawback to super long-distance results at this time of the year is the mutter of Nature's own wireless—atmospherics (or "X's") due to distant thunderstorms, etc. And although such interference has at times been severe it is not so bad generally as on the long wavelengths, and at some period we seem to be almost immune from it on medium waves.

(Modern sets are so sensitive that complete immunity can hardly be expected even in winter time, except in Polar regions, where the operators of wireless stations get almost perfect atmospheric-free reception.)

* * *

All round the dial there has been plenty to interest and divert the keen searcher during the past few weeks.

Near the top reading Budapest has been worth watching, and Munich has been getting over wonderfully on 533 metres.

Incidentally, this station has recently—like so many of the German stations—altered its interval signal.

A four-note bell call is now employed, the tune being taken from Wagner's opera "Parsifal," and consisting of the notes C G A E.

Steel plates struck by small hammers are used instead of actual bells to produce this melody, which represents the bells of the Holy Grail.

* * *

A little below Munich is to be found the new Vienna station (Bisamberg) on 517 metres. There has been a certain amount of dissatisfaction with this station in Austria, and the engineers admit that it is not yet working as well as it will. Nevertheless, it is often an excellent alternative to tune for, and it is hoped that the experimental stage will have been completely passed before many weeks are over.

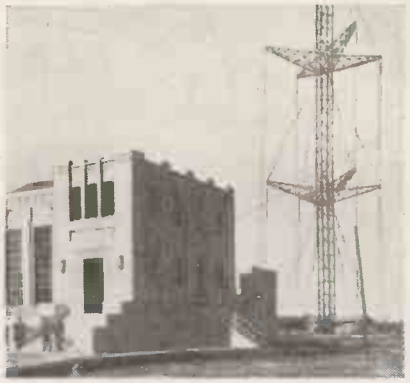
With its power of 100 kilowatts, Bisamberg should be a star turn during the coming autumn.

* * *

A little lower down is a group of excellent stations clustered round the North Regional—Prague immediately above it, Langenberg immediately below it, and Schweizerischer Landessender (better known as Beromünster) occupying the wavelength of 459 metres, a little below Langenberg's, with Lyons la Doua. on 465·8 metres, sandwiched between these latter.

* * *

According to the official lists, Lyons la Doua is a 1·5 kilowatt station. But there seems to be general agreement that that decimal point has been shifted one point to the right, and the station is actually using 15 kilowatts.



Certainly it gets over very strongly at times, and on a sensitive set can frequently be picked up clearly in broad daylight.

* * *

Lack of space forbids mention of the many other items of medium-wave interest which keep occurring, but room must be found for a note of welcome to Toulouse.

It will be remembered that the old "Ici Radio Toulouse" call, preceding excellent gramophone concerts, etc., was one of the most popular of all the Continentals. And there was great disappointment when a disastrous fire gutted the station some months ago.

Fortunately a new station was already erected and standing by, and after irksome governmental delays, permission was at last given to use this, as explained in our article last month.

* * *

Reverting to the matter of summer-time reception of American stations, it is reported that Philadelphia W C A U has been coming over well in the early morning. One observer states that reception of this station actually improves with increase of daylight, so it seems that the recent phenomenal transatlantic reception conditions are to outlast the summer.

PROGRAMMES FROM THE CONTINENT

I SEE that a gallant attempt has been made by the Union Internationale de Radiodiffusion, in its report on programme development during the past year, to select the most popular broadcasts of the year in different European countries.

Anyone who listens regularly to the Continental programmes must often wonder at the similarity which characterises their formation. One country may, perhaps, have a slight preference for opera over dance music; another may set greater value on radio drama than upon symphony concerts; but taking them all round, one is pretty safe in

REPORTING UP-TO-DATE. German radio reporters are always finding something new. Here is one describing his experiences at the anti-gas school of a Munich museum.

contending that the average programme of one country would be likely to please the listeners of another.

INTERNATIONAL RELAYS

The greater facilities for international relays have proved this point. British listeners, for instance, found the Viennese programmes last month just the kind of thing they would demand from the B.B.C. In the same way Scandinavian listeners have been surprised at the home-like atmosphere of relays from Italy; while Poles have, perhaps, welcomed a little light music from Switzerland as "just what the doctor ordered." The general position seems to be an abundance of light music throughout the Continent which acts as a permanent foundation to national characteristics more or less peculiar to each country.

Thus in France popular opinion would give first place to the commentaries on the "Tour de France"; Germany is said to enjoy talks on home and frontier lands; Czechoslovakians set most store by the remarkable mass physical exercises; Norway, less frivolous, revels in talks on foreign affairs.

There is plenty of entertainment value in foreign broadcasting, besides the fun of hearing distant stations. Here's a selection of items broadcast recently, to give you an idea of what you may hear.

And yet the weekly programmes of all these countries proves that where one isolated broadcast, or one weekly series, receives the popular award, light music holds pride of place throughout the year.

ALWAYS POPULAR

The extraordinary thing is that the light music seems to be the same in every country. Lehar, Ketelbey, Strauss, Waldteufel—their names appear over and over again, from Warsaw to Madrid, from Lahti to Palermo.

There are exceptions, of course. Sweden cannot be assessed without relation to its radio drama, far and away the most popular programme event (nearly three different plays a week were provided last year).

Germany, just at the moment, is being swept by a wave of martial fervour which brings military marches and soldier songs in its train. Austria has a new toy in the radio version of the Vienna Symphony Orchestra.

But on the whole the fine station orchestras which so many Continental broadcasters employ—orchestras like Nico Treep's at Hilversum, Emil Reesen's at Copenhagen, or Dyk's at Bratislava—may be heard almost any day, sometimes on two or three separate occasions, playing the familiar tunes by the same familiar composers.

WELCOME PROGRAMMES

The Vienna Symphony, the Paris Opera House, the Scala at Milan—all have their parts. They are like our own B.B.C. orchestras—when it comes to a popular vote it is Gershom Parkington, Fred Hartley or Reginald King who get the first places.

The listener to foreign broadcasting who is afraid that he will not be able to understand the programmes need have no qualms.

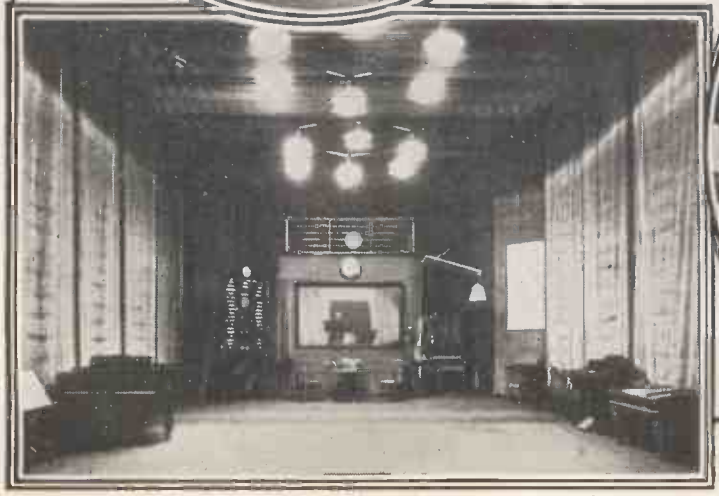
RADIO OPENING. The French Minister of the Interior, M. Camille Chantemps making a speech which was broadcast during the opening of the Avenue Paul Doumer recently.

THE MONTH ABROAD

POLAND. On the extreme right is a view of the transmitting apparatus at the Polish station of Batorego, probably better known to British listeners as Lwów. M. Petry, seen here in pensive mood, is the very capable director of this station which works on a wavelength of 381 metres with a power of 16 kw. Polish programmes have been getting more interesting lately, although time is still taken up for such items as anti-gas drill.

ITALY. Below, near the centre of the page can be seen part of the magnificent new radio building in Rome which was completed last year; and Maria Louisa Boncompagni, of Radio Roma, probably the most universally popular announcer in the world.

HUNGARY. Two views (below) of the largest studio at Budapest, with its soundproof cabinet.



Other People's Programmes

No. 8—AMERICA

This month we conclude the brief summary of American broadcasting begun in our August issue. The points for and against sponsored programmes are clearly brought out and the programme value assessed.

IT is a staggering thought to imagine the vast audiences which American broadcasting reaches—for the latest available figures assess the number of receivers in America at more than seventeen millions, giving at a rough estimate *sixty million listeners!*

Last month we considered how the National Broadcasting Company catered for many of these sixty millions, and now, when we come to look for a minute at the Columbia Broadcasting System, we find that, in the main at any rate, the two entertainment systems are more or less identical.

QUITE INFLEXIBLE

It is interesting to see how the programmes, relatively speaking, are practically inflexible, quarter-hour periods being the order of the day. Important events—the finals at Wimbledon, the landing of the Italian air armada at Chicago, these would be "important events"—can only be put on the air by arrangement with the advertiser who has bought that actual programme time. Whereas the B.B.C. can interrupt dance music, variety, orchestral concerts without any trouble if something of major importance turns up, the American broadcasting station can only do it with the entire consent of the sponsor and by mentioning the fact before the broadcast in the preliminary announcement.

ENTERTAINMENT VALUE

On the other hand, there is the certainty, day after day, that every programme will contain material of the highest class. Sponsored programmes in the United States rank, as a rule, considerably higher in entertainment value than those not sponsored, although their cultural tendency is much lower. It obviously pays the advertiser, as a general rule, to appeal to the masses rather than the classes, leaving the broadcasting system, as we saw last month, to provide the educational and religious appeal.

The Columbia programmes—there are, by the way, ninety-two stations in this chain—show that there is not the same paternal spirit in American broadcasting as there is in England.

THE PEN AND THE SWORD

"Hide your troubles in grandfather's whiskers" is the theme song of these two comedians who broadcast over the Columbia chain.

As for the actual programme material, some of the items of the Columbia chain make fine reading. What of the New York Philharmonic Orchestra, which plays for two hours every Sunday during three-quarters of the year? What of Toscanini and Bruno Walter, who conduct its music? These are offered as non-sponsored programmes during the autumn, winter and spring. There is the Philadelphia Symphony Orchestra, the Detroit Symphony, and many others who are heard from time to time, to say nothing of the orchestra of the Curtis Institute of Music. An orchestra composed entirely of students, it is nevertheless equal to many of the best in Europe.

SERIOUS TALKS

They take their music seriously in America. And so the musical critic of the "New York Times" comes along to the studio when the big orchestras are playing and speaks for a quarter of an hour or so in the interval. Tells the audience something of the music they are hearing, and the composers.

Finally, there is the studio orchestra itself. Not a large affair, rather like the B.B.C. Theatre Orchestra in composition, which deals with light and semi-classical music during the week.

What of the radio "stars" one hears so much about? Morton Downey and the Boswell Sisters, probably as well known in England as in their own country. Nat Shilkret and his band; Guy Lombardo and the Royal Canadians, as popular as Jack Payne. The Street Singer, Julia Sanderson, who played in the Savoy operas in New York, Fray and Bragiotti, Myrt and Marge, and, perhaps most popular of them all, Kate Smith.

ALWAYS POPULAR

They are all there, broadcasting week after week in the same familiar programmes and increasing their popularity with the number of their appearances.

"IN AMERICA THERE IS NO CENSORSHIP"

But there is no counterpart of our own Christopher Stone. The American listener will have nothing to do with gramophone records. I think he considers the Englishman little short of mad for allowing the B.B.C. to give him what he can get for himself in his own home!

There are Stone personalities, of course, but their realm is rather in the running commentary-news reporting line, at which American radio men excel.

AIR MANŒUVRES broadcast from the roof of a New York skyscraper.

Chiefly is this so because the American stations have to run their own news service in competition with the newspapers. The news bulletins take the form of an interpretation of facts from the newspapers. The broadcasters realise that radio can go hand in hand with the press, and their method of having regular talks by authorities on subjects in the day's news seems the most sensible and utilitarian method.

UP-TO-THE-MINUTE NEWS

At the same time there are commentaries and eye-witness accounts every day, while the foreign news is cabled daily from London. So there are occasions on which the radio, with a late news item, can "scoop" both the morning and the evening papers.

Public speakers, politicians and thinkers are brought to the microphone with great regularity, and opportunity is given on an average once a week for a leading European statesman to air his views on a subject of universal interest.

The talks side of the Columbia Broadcasting System is in the hands of a Public Affairs Committee of prominent public men—men such as Professor Butler of Columbia University—whose decisions have proved to be along popular lines.

HEALTHY COMPETITION

Those, then, are the programmes of the two big broadcasting systems of America. Though similar in main outline, they are diverse enough to act in healthy competition, and the huge audience which they reach has a system of alternative programmes which we in England may dream of but never hope to realise!

We are naturally drawn to attempt a comparison between American and other broadcasting -- between privately controlled and Government controlled broadcasting.

WHO IS THIS? No prizes offered for guessing the identity of this film favourite who does not seem at home with the "mike."

A letter recently received by the B.B.C. with reference to the Daventry Empire station contained the following paragraph:

"One of the most interesting points about British broadcasting is that your programmes are not cluttered up with advertisements. American broadcasting, on the other hand, is just one advertisement after another. Frankly, it is coming to the time when American listeners will tune away from their own stations and seek relief in the programmes from other lands."

That from an American gives one point of view. At the same time discussion on the matter would be never-ending, and differences of opinion never entirely removed.

I asked the representative of the National Broadcasting Company, resident in London, what he thought of the respective merits and advantages of the two sytems.

There was not time to discuss the question as long as we both should have liked, but it was clear that he understood the difficulties of broadcasting in Europe which make "freedom of the air," as it is enjoyed in the States, quite impossible. It was also clear that he considers his country to be more than fortunate in having a system under which listeners can hear speakers who are not obliged to take considerations of delicate character into account.

FREEDOM OF SPEECH

For in America there is no censorship beyond the ordinary dictates of decency. If a speaker says something of which a body of listeners disapproves, then those listeners are asked to appoint their own spokesman to reply.

This happened quite recently when

OPERA BROADCASTS from the Metropolitan Opera House, New York, come via the N.B.C. control room, from where a commentary on the music is also broadcast.

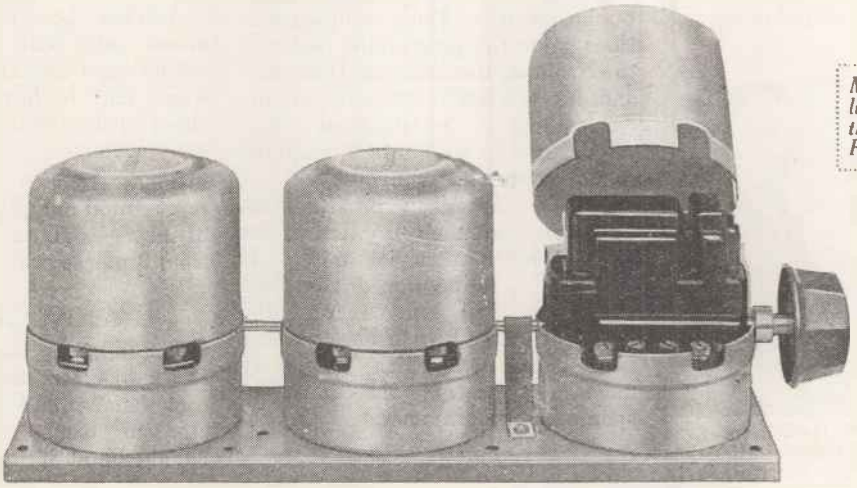
Bernard Shaw, on a visit to America, made a number of characteristic remarks which displeased a certain section of his audience.

On this occasion Father Walsh,

Why Ferrocart?

Because Ferrocart Coils are the result of years of experiment and intensive research into problems associated with the design of radio frequency coils.

The advantages of Ferrocart Coils are fully explained in a booklet we have written . . . . it also contains suitable circuit diagrams . . . .
May we send you a copy? . . . . It's free!



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STAND NO 56

There is now a Ferrocart Coil for practically every modern radio receiver . . . . from the modest straight set to the long range multi-valve Super Het.

Fit Ferrocart Coils in your receiver . . . . . note the difference . . . . . the high selectivity . . . . . and improved performance . . . . .

FOR THE "DIODION PLUS"	FOR THE "FIVE METRE" RECEIVER
1 set Ferrocart Coils.	2 Super Regenerative Coils.
Types F10, F11, F12, F13 at **50/-** per set.	Types SR10, SR75 at **5/6** each.

Send for the Colvern Ferrocart Booklet, R.L.12.

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GOVERNMENT AND PRIVATE BROADCASTING COMPARED

of Washington, was enabled to make a most spirited reply.

I have just finished reading, with more than ordinary pleasure, an article by William Hard, "Europe's Air and Ours." William Hard is an American of repute, and is recognised as being one of the outstanding broadcasters in the United States.

Hard says:

"There is far too much promiscuous condemning—I think—of governmental broadcasting. Equally, there is far too much promiscuous sneering at private broadcasting. Each system has its inherent and inevitable

ANGLO-AMERICAN RADIO relations were further strengthened this year when Major Gladstone Murray, of the B.B.C., and Mr. Aylesworth, President of the N.B.C., spoke "over the air" from New York.

disadvantages. Life would be too simple if we had to choose only between the all-good and the all-bad.

BOTH HAVE DISADVANTAGES

"That both private broadcasting and governmental broadcasting are burdened with disadvantages is clear enough to the observant trans-atlantic traveller. Private broadcasting is tempted towards accommodating itself, for instance, to all levels of popular taste, including those inhabited by the least developed portions of the population. Governmental broadcasting, on the other hand, is tempted towards accommodating itself (again for instance) to the temper of persons in power and to the defence of existing institutions against all elements of opposition and of proposed unconventional progress.

"The one certainty shared by governmental broadcasting and by private broadcasting alike is that they will arouse discontent."

To conclude, no survey of American broadcasting, however brief, would be complete without reference to the work of the Advisory Council of the N.B.C. This body, of which Mr. Owen D. Young is chairman, is quite independent of the broadcasting system, and it exists for the sole purpose of keeping the N.B.C. in touch with public sentiment.

They give their time and thought to the highly important work of this Council as a contribution to public service. Their recommendations guide the programme policy of the National Broadcasting Company, and, as a result, the tone of the "sustaining," "institutional" and "sponsored programmes" is altered as circumstances demand.

That is American broadcasting. There may be much to criticise, but there is much more to praise. At least, it is to be hoped that this description will remove from the minds of many British listeners any false impression which they may have had concerning the country of sponsored programmes. P. C.

FOR THE SHORT-WAVE LISTENER

Notes by Our Expert on the most recent conditions.

"SHOW TIME" is invariably a signal that another season's radio has commenced, and although we need not begin to think of winter yet awhile, most of us will be polishing up the old receiver for the long evenings that will be coming.

This being so, the time is opportune for me to give a few hints on the "best times" for the autumn season. The usual arbitrary distinction of "below 30 metres" and "above 30 metres" will be sufficient, although readers must realise that it *is* a makeshift. The groups of broadcast stations on 31 and 49 metres, however, do behave in rather similar manner, as do those in the regions of 25 and 19 metres.

Let us deal first with the stations below 30 metres. North America, represented by several U.S. and Canadian stations in the 25- and 19-metre bands, should be heard well between 3 p.m. and 10.30 p.m. (or sometimes later). The 19-metre band will commence, *and* fade out, rather before the other. Amateurs in the 21-metre band will follow almost exactly the behaviour of the 19-metre band rather than the 25. Australia and New Zealand, if heard at all, should be at their best in the early mornings (6 till 8 a.m.) and possibly in the afternoons—2 till about 4.30 p.m. Probably only amateurs will be heard below 30 metres.

Asia may be expected in the afternoons only, and Africa (with the exception of the extreme North Coast which may be heard at almost any time) during the late afternoons and early evenings.

South America will probably be represented only by amateurs in the 21-metre band, and should be heard from 9 p.m. onwards.

ABOVE 30 METRES

The following times apply roughly to the 31-metre and 49-metre broadcast bands, and to the 42-metre amateur band. North America should be at its best from 10.30 or 11 p.m. until well after midnight.

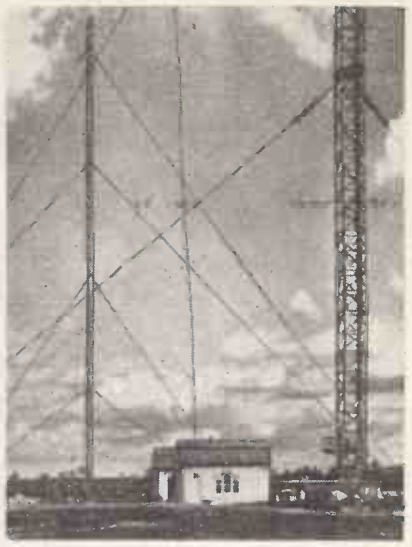
HISTORIC APPARATUS. The "hook-up" which was used many years ago for the original Nauen time signal.

South America will probably be best at just about the same times.

The only representatives of South Africa will probably be Nairobi and Johannesburg, both in the 49-metre group, and they should be heard soon after 6.30 p.m.

2,000 METRES AND BELOW

With notes on Switzerland's new Regional, Kalundborg's bad luck, another newcomer, and Lahti's increased power.



CONSIDERABLE interest has been aroused by the appearance of an unfamiliar station on Kalundborg's wavelength, or very close to it. And many who have heard the new-comer have decided that the language is Italian, and so have concluded that Italy has now joined the countries who possess stations worked on the coveted waves above 1,000 metres.

* * *

It is true that the language of the new station is Italian. But its nationality is Swiss.

Listeners will remember that Switzerland's two Regional stations, Sottens and Beromünster, respectively, speak French and German. The new station on long waves is called Monte Ceneri, and it will serve Switzerland's Italian-speaking population. The power is 15 kilowatts.

* * *

It was most unfortunate for Kalundborg that Monte Ceneri should settle down on 1,153·8 metres just now. For Kalundborg is testing out his new high-power station, and the Danish listeners may get a wrong notion of its quality if a burble from Monte Ceneri spoils what would otherwise seem like perfection.

The British listener, too, finds himself unable to appraise either station; and it must surely be the first time in radio history that two powerful stations should be testing new transmitters on an identical wavelength.

It is certainly a clear indication of the urgent and vital need for wavelength planning and co-operation.

* * *

The regular long-wave stations have all been in good form of late, although this is without doubt the most difficult season of the year for long-distance reception.

Radio Paris and Luxembourg continue to be the star turns in the London area. Other excellent programme providers are Warsaw, Königs Wusterhausen (Deutschlandsender) and Huizen on 1,411, 1,635, and 1,875 metres respectively.

Huizen, by the way, is announcing as "Hilversum" at present.

* * *

Probably this top end of the long-wave dial (Huizen is the longest of all the long-wavers, with the sole exception of Kaunas, the Lithuanian) is at present the most interesting to the British listener. For here, when Huizen has closed down, he may find another fine new station disporting itself.

This new-comer is "Radio Kootwyk," Holland's high-power long-waver; and judging by the high opinion held in Britain of Holland's older and lower-powered stations, one can assume that Radio Kootwyk will become a prime favourite.

* * *

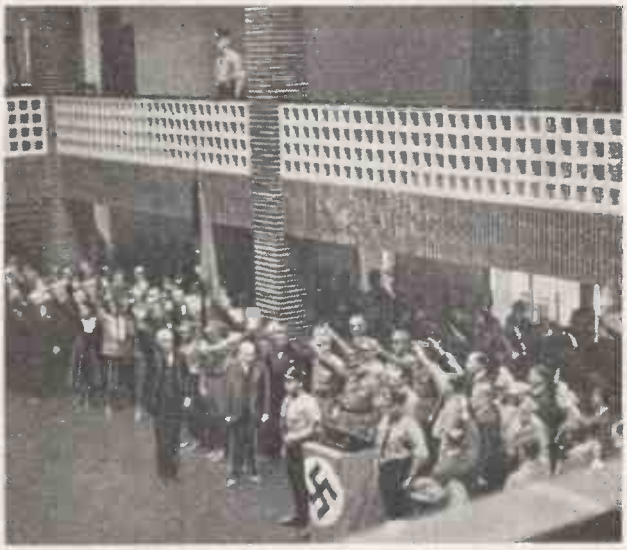
Before leaving the interesting subject of Dutch broadcasting it may be of interest to remark that Holland is one of the countries that did not see its way to sign the Lucerne Plan agreement. And now it produces a 50-kilowatter, in the form of Radio Kootwyk, as against the mere 8·5 kilowatts maximum power of the Huizen station and the 20-kilowatts (maximum) of Hilversum.

So not only the long-distance listener, but the European ether-sentinels as well, will tune for Radio Kootwyk with intense interest.

* * *

When tuning for Huizen or Radio Kootwyk, you may notice on the wavelength immediately below, that Lahti, the long-wave Finn, is now relaying Helsinki at considerable strength.

Lahti has recently been increased in power to 40 kilowatts, but, unfortunately, is swamped by Radio Paris and not well received in this country.



GERMAN RADIO. The scene in Berlin's Broadcasting House when Dr. Goebbels took over the radio services.

MODERNISE FOR DISTANCE

Owners of sets a year or two old may not be able to take full advantage of the very latest developments, but ways in which alterations that will improve distance-getting powers can be made, are dealt with below.

NOT everyone is able to take advantage of the latest developments in set design by building a new receiver fairly frequently. Admittedly the more modern a set the better for distant reception, but even so, older receivers can do quite useful work in bringing in foreign stations.

As a matter of fact, there is no reason why the user of an old set should not take advantage of some of the more recent improvements in receivers. There are ways in which an old-type set may be modernised with a view to increasing its sensitivity, selectivity, and ease of control where distant reception is concerned.

MULTI-MU'S

Take, for instance, the multi-mu S.G. valve. This may be fitted into almost any set that already has a screened-grid valve of the ordinary type.

Greater liveliness of the set and a convenient volume control will immediately be gained.

Quite often the using of a modern lively valve in a set originally designed for a less efficient valve will produce instability. The beauty of the multi-mu valve is that if this happens it is only necessary to reduce the valve's magnification by increasing its grid bias until the set is well under control.

The only extra components needed for the above modification are a potentiometer and L.T. switch. The latter is necessary to prevent the G.B. battery continually discharging through the potentiometer. Of course, instead of using an extra switch, a three-point one could be substituted for the ordinary L.T. switch.

One of the chief ways in which the modern set scores over older ones is in selectivity. There are many ways in which the selectivity of an old set may be improved, and their addition has been dealt with from time to time.

IMPROVING SELECTIVITY

Probably the two most useful are a series aerial condenser and an extra tuned circuit coupled to the set by a very small capacity. But it is possible in quite a large number of cases to substitute modern coils for older ones.

Most dual-range coils consist of a tuned circuit with some form of input tap or separate input winding and a reaction winding. So it is seldom that a modern coil, such as the iron-dust core type, cannot be adapted to an old set with considerable improvement in selectivity and sensitivity.

BEWARE OF INSTABILITY

The increase in efficiency produced by any modernising schemes is likely to tend to make a set less stable than it was before. This tendency can be overcome by fitting decoupling if such is not in existence on the set, or by increasing the value of the decoupling resistances or condensers.

Decoupling may even be added to L.F. high-tension leads as well as having it on the detector and S.G. valves. It need not be incorporated actually inside the receiver, external connection being just as effective.

This extra decoupling will enable other more modern high-magnification valves to be used in the detector and L.F. parts of the set. Since their use will put up the overall amplification of the set, they will make the reception of foreign stations definitely better.

PLENTY OF SCOPE

Actually there is no end to the number of modifications that can be made to a receiver to bring it up to date. The number which are attempted depends largely upon the experience of the constructor.

Such items as providing separate taps on the H.T. for the detector and screening grid are quite simple, and ones which almost anyone could carry out.

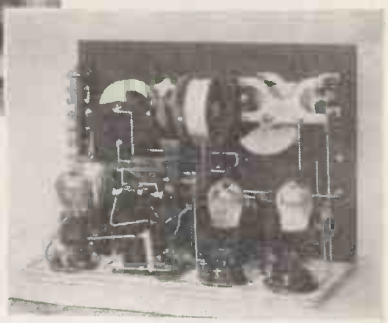
On the other hand, the inclusion in the set of differential anode coupling, which will provide a useful control over selectivity, is rather an advanced alteration which would require more skill.

The method of attack when adapting a scheme seen in a modern circuit is to note where the difference in connections start, and to see that any different components needed can be fitted in. The construction of the modern set should also be studied to see what extras in the way of screens and so on are necessary. And, finally, always make the alteration as an experiment first of all.

A. S. C.

A COMPARISON IN RECEIVERS

You may not be able to convert an old set like the one below into a modern receiver of the type seen to the left, but there are many ways in which it may be modernised that will enable more foreigners to be received.



"The World's Programmes" foreign news service keeps the long-distance listener *au fait* with the many changes and new arrangements of the world's broadcasters.

STATION INFORMATION

From all over the World, including News of a Reception Record secured by Great Britain

VIENNA. One of the disadvantages of the new mast-type aerial is already apparent.

If Vienna changes its wavelength on January 15th, 1934, as expected, the mast will have to be structurally altered, to enable it to radiate the right wavelength, whereas it would have been a very simple matter to alter a wire aerial.

* * *

ECOLE SUPERIEURE, PARIS. Although the power of this station is now only ·77 kw., it is not infrequently picked up quite strongly in this country.

* * *

ATHLONE. The Irish Free State Minister of Posts and Telegraphs stated some time ago that the cost of the Athlone high-power station has now almost been cleared, the year's revenue from licences having risen to £17,296.

* * *

MADRID. The Spanish Home Office has announced that its projected high-power station will have a maximum rating of 100, and not of 500 kw., as first announced.

* * *

NAUEN, GERMANY. The "Deutschlandsender" programmes on short waves are now transmitted under the following call-signs: D J A, 31·38 metres; D J B, 19·73 metres; D J C, 49·83 metres; D J D, 25·51 metres; D J E, 16·89 metres.

* * *

DUBLIN. For the benefit of crystal set users in the Dublin area the old station, 2 R N, has been put into service again, but on 217 metres instead of 413 metres, which wavelength is now occupied by Athlone.

* * *

FRANKFURT. The German engineers have not been entirely successful in their attempts to synchronise Trier and Frankfurt on the same wavelength (259·3 metres), complaints of the quality have recently risen in number.

* * *

SPAIN. The "Radio Galicia" station is now working, the allotted wavelength being 368·1 metres, which it shares with several other stations.

* * *

BRESLAU, GERMANY. The Breslau station, on 325 metres, usually gives a "physical jerks" transmission at 6.15 a.m.

* * *

MOSCOW. If the Lucerne Wavelength Plan goes through on January 15th, 1934, the present Radio Paris wavelength will be used by Europe's highest powered station, Moscow, which will employ 500 kw.

* * *

PITTSBURGH, U.S.A. The Pittsburgh programmes are now relayed from noon to 7 p.m. daily, upon a wavelength of only 13·93 metres, by W 8 X K.

CALCUTTA. The Calcutta station now operates on a wavelength of 49·1 metres.

* * *

MELBOURNE. The Australian Government is at present experimenting with long waves for broadcasting.

* * *

CRYSTAL PALACE, LONDON. At the time of writing the world's record long-distance reception of a 5-metre transmission is still held by Britain. This was attained from the Crystal Palace, during experimental broadcasts arranged by "Popular Wireless," the distance covered being almost exactly 200 miles.

* * *

PARAMARIBO. This station, which is situated in Dutch Surinam, has recently been strongly received on a wavelength of about 31·25 metres.

* * *

PARIS. The "Radio Vitus" station authorities have a fine new high-power station erected, but are unlikely to be allowed to use it because it is a privately-run concern, operating in a district already well served by existing stations.

(France has no active central broadcasting authority, like our own B.B.C.)

* * *

BUENOS AIRES. Unexpectedly good reception of the Daventry short-wave broadcasts has proved to be due to the realignment of one of Daventry's aerials, which happens to make it radiate specially well in the Buenos Aires direction.

* * *

BUDAPEST. The Budapest No. 1 (main) station works on 550·5 metres, and the alternative, Budapest No. 2, on 840 metres. The latter is an "in-between" wavelength, too low for most long-wave sets which cut off at about 1,000 metres; and too high for medium waves, which can usually only just reach up to the Budapest No. 1 wavelength.

* * *

DAVENTRY, EMPIRE SHORT-WAVE STATION. A new aerial was recently installed with the object of improving the reception of Daventry's short-wave service in Africa.

* * *

DENMARK. Although the Lucerne Plan permits Kalundbork to increase its power up to 60 kilowatts, it is not the intention of the Danish broadcasting authorities to do more than serve the station's listeners. It is anticipated that 30 kilowatts will suffice to ensure adequate national reception.

* * *

MÜHLACKER. The forthcoming alterations of power and wavelength will make it necessary for Mühlacker to close down for several weeks during the autumn. Arrangements have been made for the old Stuttgart transmitter to step into the breach

* * *

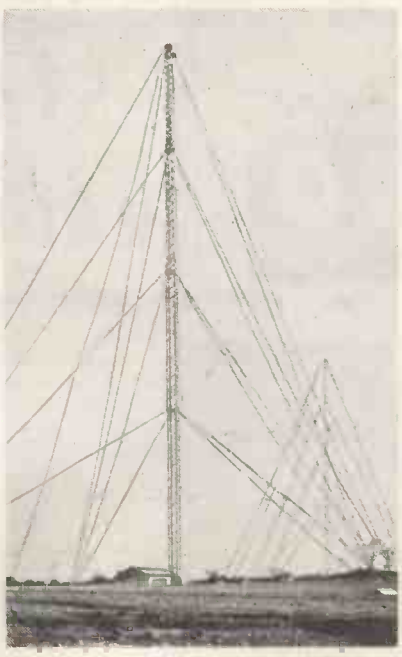
BISAMBERG. A serious act of sabotage occurred at the new Viennese station, Bisamberg, soon after it was placed in regular operation.

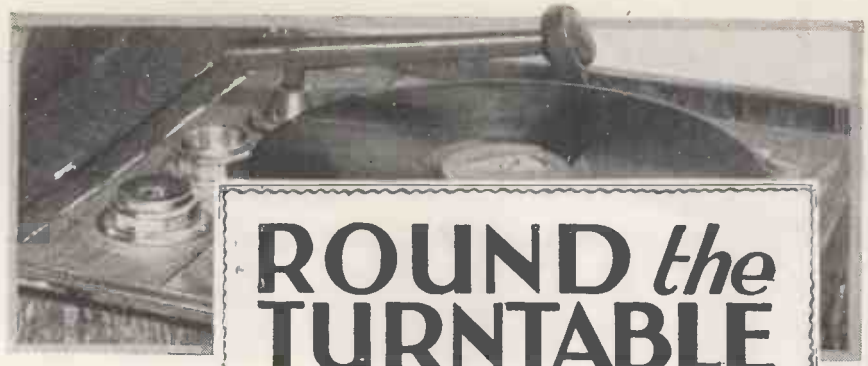
Somebody turned off the anode-cooling water supply, and had this not been discovered quickly very serious damage would inevitably have resulted

* * *

ST. AGNAN, TOULOUSE. This is the site of the new high-powered Toulouse station, which has taken over the programmes and wavelength of the popular Toulouse station which was destroyed by fire.

It is not allowed at present to use greater power than that employed by its predecessor.





ROUND the TURNTABLE

Some Novel Gramophone Records—The Course of a Star—An Ingenious Needle Box.

By TONE ARM.

THERE are some peculiar gramophone records in the world, aren't there? I know several "fans" who make a hobby of collecting all the unusual discs they can lay their hands on, and some of them have very fine collections, too.

A Unique Collection

But the prize must naturally go to the makers of the records themselves who inevitably have every facility for the building up of a unique collection. Probably H.M.V. have the finest library of records in existence, for they have copies of every disc that has made been by them from 1897, and representing every language and dialect known to the civilised world.

The extent of their library of peculiarities was exemplified by a recent recital given in London, during which some very unusual records were played. The theme of the recital was to demonstrate authentic music of all nations, and a particularly interesting programme resulted.

Unusual Recordings

Some of the discs held recordings of tribal music from Africa, and one contained the musical (?) results of a whole village of thousands of natives playing at once; while another contained the noises emitted by the zalka, a sort of harp which is played by the toes of the instrumentalist. It has an "octave" of 64 notes!

An Indian record that is contained in the H.M.V. library provides music from a collection of flutes that are operated by the *noses* of the players, though in fairness to the peculiar method of playing it must be said that the result is not so very different from that achieved by some of our own flautists.

Another record has as its chief instrument animal teeth, which are mounted in hard clay and struck with a flint. This record emanates from the Amazon.

Naturally we are fascinated, and perhaps somewhat horrified, by the noises emitted from some of the quaint instruments that are recorded on these discs, but I wonder if the results are all that different from those of some of the hottest dance bands. Certainly rhythm is present in these native dances, or in many of them, and the matter of tunefulness rather rests with personal opinion.

RECORDING A HIT.

Ray Noble (conducting) the famous dance music orchestrator and composer recording one of his hits at the H.M.V. studios.

Do you ever trouble to follow any of the careers of famous recording artistes who have specialised in syncopated music, for most of them have had rapid and eventful rises to fame?

Raie Da Costa, the popular pianist who records for H.M.V., for instance, has had a varied career, for she originally intended to become a dancer, and trained in classical, ballet and national dancing. She won many awards, and then Fate stepped in and she had to give up. The cause was merely a slip in the bath, which resulted in an injured hip.

Embracing a New Career

After some time in hospital Miss Da Costa, who had spent many of her hours of enforced leisure composing piano pieces, decided to take up the piano as a career. For three years she studied assiduously under Tobias Matthay, with the result that she carried out several successful concerts at the famous London concert halls.

But syncopated music was coming in, so Raie turned her attention to that type of composition as applied to the piano, and when she recorded for the gramophone companies she played some of the latest popular hits in syncopated rhythm.

To her surprise she found the sales of these records were much higher than she expected, and since those days she has practically confined herself to the recording of light music.

A Good Idea

Isn't it amazing how simple the best ideas are? The latest "stunt" that I have seen (it is not yet on the market, having only just been patented) is a new fixing for a needle box on the motor platform of a gramophone.

Normally, unless there are several needle cups to hold the different types of needles that the enthusiastic gramophile requires, it is necessary to put up with the inconvenience of several boxes littering the board, unattached, and readily spillable.

Easily Fitted

How often have I, for instance, wished that that wretched box would not spill part of its contents every time I go to open it; that it could be fixed in position.

Now this bugbear is (or soon should be) removed, for by the simple process of stamping a couple of tongues on the bottom of the needle-box it can be firmly fixed in a small bar screwed to the motor board. With three or four of these bars, it is possible to fix or remove needle-boxes with the greatest of ease. I hope some bright firm will market the idea.

IRON CORED COILS

MAINS UNITS!

ELECTROLYTIC CONDENSERS

ALL MAINS SETS!

RESISTORS

BATTERY SETS!

Outstanding to the TELSEN

TELSEN "CLASS B" OUTPUT CHOKE

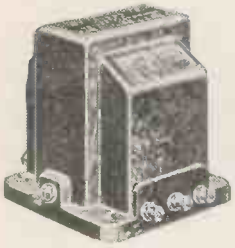
For matching to any M.C. speaker having either a high resistance speech coil or a low resistance coil and input transformer. D.C. resistance, 220 ohms per half winding. Total inductance 18 henries

Price - 8/6

TELSEN "CLASS B" OUTPUT TRANSFORMER

For matching to M.C. speakers having low resistance speech coils. Primary resistance 200 ohms per half winding.

Price - 8/6

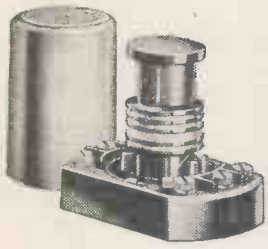


TELSEN "CLASS B" DRIVER TRANSFORMERS

Made in two ratios covering the requirements of all the "Class B" valves available at present. Supplied with comprehensive instructions.

Ratio: (Overall) 1-1 (Primary to Half-Secondary) 2-1 Price 8/6

Ratio: (Overall) 1.5-1 (Primary to Half-Secondary) 3-1 Price 8/6



TELSEN IRON-CORED SCREENED COILS

The smallest and most efficient tuning coils ever designed. Excellent magnification and selectivity. Can be used either as aerial tuning coils or H.F. transformers.

Single Coil - Price 8/6

Twin Matched Coils - Price 17/-

Triple Matched Coils - Price 25/6

H.T. UNIT AND L.T. CHARGER FOR A.C. MAINS

For input voltages between 200 and 250 at 40 to 100 cycles.

Charges 2, 4 or 6 volt accumulators at 0.5 ampere - Price 97/6

H.T. AND L.T. UNIT FOR A.C. MAINS

Similar to above but with the L.T. charger replaced by a centre tapped transformer winding capable of supplying 2.5 amps. at 4 volts - - Price 67/6

H.T. UNIT FOR D.C. MAINS

For input voltages of 200 to 250 volts.

Price 35/-

TELSEN "CLASS B FOUR" KIT

Less cabinet and moving coil speaker - - - £3/17/6

(Valves and Batteries extra.)

TELSEN "CLASS B FOUR" KIT

Complete with cabinet and moving coil speaker - £5/17/6

(Valves and Batteries extra.)

TELSEN "CLASS B FOUR" KIT

Constructor's Outfit - Price 5/6

TELSEN "CLASS B FOUR" KIT. "Class B" establishes its tremendous superiority beyond all question in this astounding Telsen Kit Set. It represents a triumphantly successful application of "Class B" principles by Telsen Technicians, giving an undistorted output of nearly 2 watts with the use of only ordinary batteries. Never before has any home constructor been able to build so sensational a set, so easily and so cheaply, as he can with the brilliant new Telsen "Class B Four" Kit.

TELSEN LOW VOLTAGE ELECTROLYTIC CONDENSERS.

Ideal where a very high capacity with a fairly low voltage is required. Very compact, with wired ends for easy suspension in the wiring.

25 mfd. at 25 volts - - - -	2/6
50 mfd. at 25 volts - - - -	3/-
25 mfd. at 50 volts - - - -	3/-

TELSEN SMALL TUBULAR CONDENSERS.

Very small, yet quite as efficient as the larger types. Tested up to 1,500 volts. Wired ends make them very suitable for suspension in the wiring.

Capacity	Price
·0001 mfd./·005 mfd. - - -	1/-
·01 mfd. - - - - - -	1/3
·1 mfd. - - - - - -	1/6

TELSEN HIGH VOLTAGE ELECTROLYTIC CONDENSERS

Supplied with special bracket and terminal for mounting on any type of baseboard or chassis.

275 working peak voltage

Capacity	Price
4 mfd. - -	3/6
6 mfd. - -	3/9
8 mfd. - -	4/-

500 working peak voltage

Capacity	Price
4 mfd. - -	4/6
6 mfd. - -	5/-
8 mfd. - -	5/6

TELSEN 7-PIN VALVE HOLDERS

Accommodate the latest types of valve, such as "ClassB" valve. Terminals numbered according to standard R.M.A. system.

7-pin Solid Type 1/6

7-pin Anti-Microphonic Type - - 1/9

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CLASS 'B' COMPONENTS & KITS!

and amazing REDUCED PRICES!

TELSEN "464" A.C. MAINS RECEIVER

Telsen's previous experience in the all-mains field has been an invaluable aid in the production of this superb new all-electric receiver. It has that lasting perfection which means the practical elimination of the "servicing" bugbear. Its brilliant circuit incorporates every conceivable ultra-modern refinement, including the new Telsen Iron-Cored Coils, Variable Tone Control, New Type Moving Coil Speaker, Single Knob Tuning, Wave-length Calibration etc., in a beautiful Walnut-finished cabinet providing really astounding selectivity with amazing sensitivity, exceptional volume and wonderful tone.

Price £9.9.0. *Or can be had for* 15/6 *down and 12 equal payments of* 16/9.

TELSEN "AIR MARSHAL"

The ultra-selective, ultra-modern circuit of this wonderful Telsen three-valver makes it the most efficient set of its type ever produced—yet it is simpler to operate, cheaper to run and costs less to buy. It is absolutely self-contained in a beautiful cabinet of modern design, finished in either Walnut or Oak and is supplied complete with valves, batteries and either Moving Iron or Moving Coil loudspeaker.

With Moving Iron loudspeaker £4.17.6. *Or can be had for* 9/6 *down and 12 equal payments of* 9/6.

With Moving Coil loudspeaker.. £5.5.0. *Or can be had for* 10/- *down and 12 equal payments of* 10/-.

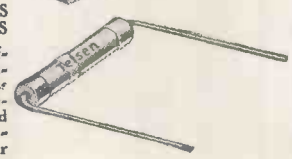
TELSEN BAKELITE DIELECTRIC REACTION CONDENSERS Entirely re-designed. Now incorporate several valuable improvements with no increase in price, the whole unit being also now enclosed in a strong dust-proof bakelite case.
·0003 mfd. and ·00015 mfd. - 1/9
·0001 mfd. - 1/9
·00075 and ·0005 mfd. - - 2/-

TELSEN AERIAL SERIES CONDENSER WITH SWITCH Built on similar lines to the new reaction condensers, providing an ideal selectivity and volume control.
Max. Cap. mfd. ·0003 - - 2/-

TELSEN DIFFERENTIAL CONDENSERS Similar in design and construction to the reaction condensers.
·0003 mfd. - 2/-
·00015 mfd. - 2/-
·0001 mfd. - 2/-

TELSEN RESISTORS WITH WIRED ENDS

Negligible self-capacity and inductance. Noiseless in use. Value remains unchanged under all circumstances. Power rating of ½ watt and 1 watt: 250, 500, 1,000, 1,250, 5,000, 10,000, 20,000, 25,000, 50,000, 100,000, 250,000, 500,000 ohms resistance. Price 1/- Power rating of 2 watts: 250/100,000 ohms resistance. Price - - 2/-



3 and 6 watt types can be supplied on demand.

No.		Reduced to
	CHOKES	
W.74	Binocular H.F. Choke	3/6
W.75	Standard H.F. Choke	1/6
W.221	Short Wave H.F. Choke	2/6
W.68	40 hy. L.F. Choke	4/9
W.69	100 hy. L.F. Choke	4/9
W.71	Output Choke	6/3
W.72	Tapped Pentode Output Choke	6/9
W.172	Power Pentode Output Choke	9/6
W.302	Smoothing Choke 28 hy.	12/6
	COILS	
W.76	Dual Range Aerial Coil	5/6
W.154	H.F. Transformer Coil	4/6
W.216	Screened Coil	7/-
W.287	Twin Matched Screened Coils	14/6
W.288	Triple Matched Screened Coils	21/6
W.290	Band Pass Coil Unit	14/6
W.292	Band Pass & Oscillator Coil Unit	21/6
W.293	Oscillator Coil	7/6
W.294	Intermediate Frequency Transformer Coil	7/6
S.330	Superhet Coils	21/6
	TUNING CONDENSERS Air Dielectric	
W.130	·00025 mfd.	2/6
W.131	·00035 mfd.	3/6
W.132	·0005 mfd.	3/6
W.339	Single condenser Unit	7/6
W.306	Twin Ganged	12/6
	With dust cover, 2/- extra	
W.307	Triple Ganged	17/6
	With dust cover, 2/6 extra	
	PRESET CONDENSERS	
W.152	·0001 mfd.	1/3
W.151	·0003 mfd.	1/3
W.150	·001 mfd.	1/3
W.149	·002 mfd.	1/3
	FIXED CONDENSERS—Mica	
W.310	·01 mfd.	2/-
W.311	·02 mfd.	2/6
W.316	·05 mfd.	4/6
	VARIABLE RESISTANCES	
W.299	Hum Adjuster	2/6
	SELF-SEALING CONDENSERS	
W.232	·01 mfd. 500 volt test	1/3
W.230	·04 mfd. 500 volt test	1/3
W.231	·1 mfd. 500 volt test	1/6
W.229	·25 mfd. 500 volt test	1/6
W.228	·5 mfd. 500 volt test	1/6
W.227	1 mfd. 500 volt test	1/9

No.		Reduced to
W.226	2 mfd. 500 volt test	2/6
W.239	·01 mfd. 1,000 volt test	1/9
W.237	·04 mfd. 1,000 volt test	1/9
W.238	·1 mfd. 1,000 volt test	2/-
W.236	·25 mfd. 1,000 volt test	2/-
W.235	·5 mfd. 1,000 volt test	2/-
W.234	1 mfd. 1,000 volt test	2/6
W.233	2 mfd. 1,000 volt test	3/6
	SELF-SEALING BLOCK CONDENSERS	
W.175	4 mfd. 500 volt test	4/9
W.176	6 mfd. 500 volt test	7/-
W.177	8 mfd. 500 volt test	9/6
W.178	4 mfd. 1,000 volt test	6/6
W.179	6 mfd. 1,000 volt test	9/6
	DIALS	
W.141	Slow motion, Black	1/6
W.141A	Slow Motion, Brown	1/6
W.184	Illuminated Disc Drive	2/6
W.257	Small Disc Drive	2/-
W.313	"313" Disc Drive	3/6
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W.107	2-pt. Push-Pull	9d.
W.108	3-pt. Push-Pull	1/-
W.153	4-pt. Push-Pull	1/3
W.297	Mains Type	1/6
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W.308	Pentode Tone Corrector	2/6
W.314	Variable Tone Corrector	4/6
	TRANSFORMERS —Intervalve	
W.61	1·75-1 "Radiogrand"	9/6
W.59	3-1 "	6/9
W.58	5-1 "	6/9
W.60	7-1 "	9/6
W.66	3-1 "Ace"	4/9
W.65	5-1 "	4/9
	OUTPUT TRANSFORMERS	
W.62	1-1 "Radiogrand"	9/6
W.63	Multi-Ratio "Radiogrand"	9/6
	VOLUME CONTROLS	
W.296	50,000 ohms with Mains Switch Combined	4/6
	LOUDSPEAKERS, UNITS AND CHASSIS	
W.54	Loudspeaker Unit	3/6
W.159	"Popular" Chassis	5/6
W.170	"Major" Chassis	7/6
W.181	Loudspeaker	8/6
W.182	Loudspeaker	11/6
W.183	Loudspeaker	12/6

For full details, prices and catalogue numbers of the complete Telsen range (over 500 component parts, many of which have been improved in design at no increase in price) see the new Telsen Radiomag. Issue No. 5. Price 3d.

TELSEN FOR EVERYTHING IN RADIO

ANNOUNCEMENT OF THE TELSEN ELECTRIC CO., LTD., ASTON, BIRMINGHAM

ON THE SHORT WAVES

by W.L.S.

A FEW remarks on the ultra-short waves and their possibilities, followed by a short review of all the better-known short-wave broadcasting stations operating regularly.

The fascination of the short waves seems to be without limit. Enthusiasts of the high frequencies no sooner appear near to having fully exploited one aspect of their hobby when new spheres are opened up for them.

Our short-wave expert, W.L.S., points out this month how new interest is being introduced in his particular domain by virtue of the increasing use by amateurs of waves below 10 metres.

Below 10 Metres

Such a lot of interest is being taken in the ultra-short waves nowadays that I don't suppose an apology is necessary when I say that I have quite a lot to talk about on that subject.

The " ultra-shorts "—the generally accepted name for all wavelengths below 10 metres—are the newest development of the " short " waves, and, as such, are bound to be one of the most interesting pursuits of the short-wave enthusiast.

I like to think that there are not many short-wave folk who are content to run round their dials and listen to the ordinary broadcast between 16 and 50 metres. That in itself makes a sufficiently interesting business, but there is always so much else to be done that some of us simply can't bother about broadcasting when once we get going.

Renewed Enthusiasm

Only a few days back I was trying to account for the tremendous boom in 5-metre working among the amateur transmitters. The old-stagers have become blasé about being able to work the ends of the earth whenever they like, be it on 20 or 40 metres, and have taken to the " new game " with avidity. The new-comers, seeing all the old hands apparently in the throes of lunacy on the subject of the " ultra-shorts," conclude that there must be *something* in it, and likewise plunge in.

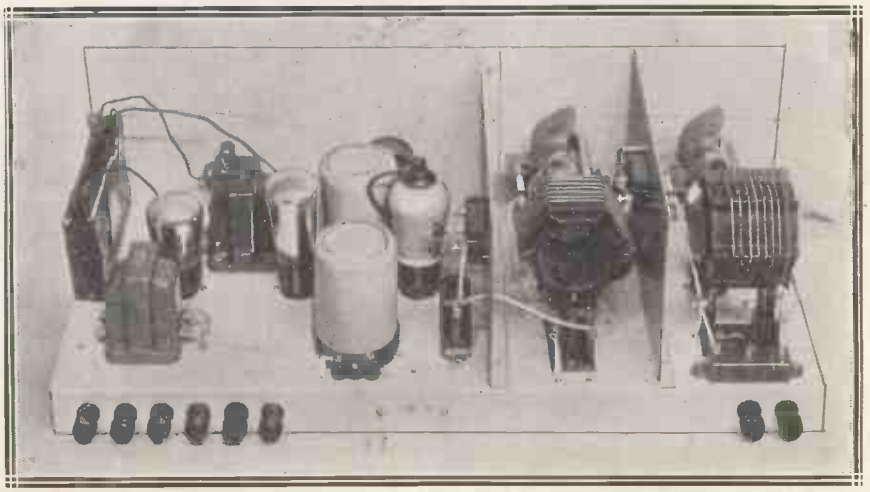
The result is, of course, quite a useful body of experimenters making use of the 5-metre wave. Some are just playing with it ; some are working hard to improve receivers and transmitters, and some are on the border-line between the two states.

Personally, although we managed to cover quite useful distances from the Crystal Palace tower, I don't think 5 metres will ever be a reliable wave for work over distances greater than 30 or 40 miles. But that doesn't worry us in the least ; its great charm is the extreme simplicity of the gear and the absolute ease and reliability with which communication over a few miles can be maintained with " vest pocket " apparatus.

Beating the Best!

After attending a recent demonstration of 5-metre transmission and reception, at which some *really* portable apparatus was shown, I was fired with the desire to go home and make something half the size of the smallest exhibit there. The result, after two hours' work the following morning,

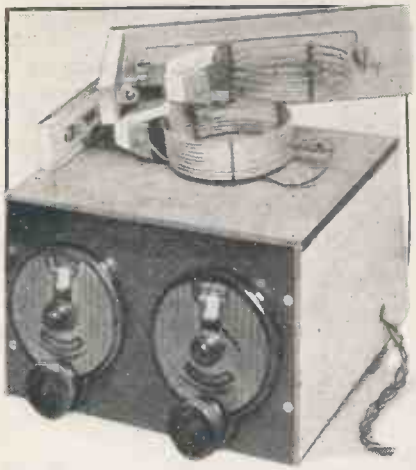
CONSTRUCTIONAL SIMPLICITY EXEMPLIFIED



One of the chief attractions of short-wave work is the simplicity of the apparatus employed. Even a powerful superhet, which will " get anything from anywhere " is remarkably free from complications when designed for short-wave reception.

was a 5-metre transmitter on a baseboard 4 in. by 3 in., which worked, and worked really well.

FOR REAL DX



Owners of broadcast receivers often envy the short-wave man's DX achievements, without realising how simply their own gear can, by means of such an adapter as shown here, be made to " go down " to the coveted province.

A certain Kentish amateur has built a complete set of equipment—transmitter, receiver, and power supplies—weighing only a few pounds, with which he can comfortably converse with his " home " station while walking about the streets of the town. Several Londoners have really portable gear for use in cars, with which they can chat either with the fixed stations towards which they are driving, or other mobile stations on the road.

Space to Spare

In all these tests there is the feeling that something new is being developed which gives the biggest thrill of all; and the amateur transmitter is probably doing more useful work than he realises by going " all out " for the ultra-short waves.

I was recently at a meeting at which a gentleman expounded a marvellous plan for reorganising the broadcast stations of the world. He suggested opening the present broadcast bands to commercial stations, and putting all the broadcasting stations of the world between 5 and 8 metres.

That would probably mean the end of " foreign programmes," but there *would* be room for them all, and many advantages of the ultra-shorts could be made use of for the benefit of local listeners.

I haven't the least idea that such a plan will ever be tried, or even suggested by anyone " in the know," but we all realise by now that nothing is impossible or too far-fetched to happen in the world of radio.

In case someone is reading these notes who does not know what the advantages of the "ultra-shorts" for communication purposes are, I will expound them herewith. First, there is such an *enormous* amount of " room." Work out the number of kilocycles between 5 and 8 metres, and you will see just how many stations could be accommodated there.

Limited Range

Secondly, the range being so limited by the " quasi-optical " properties of these waves, a station in, say, York, could operate on exactly the same wave-length as another one in London without the slightest fear of interference.

Thirdly, there is not a trace of static on these wavelengths. Man-made static is there in plenty, but that is mostly a matter of motor-car ignition. Such troubles as trolley-buses and electric motors are not so severe down there as they are on the short and medium waves.

Fourthly, the receiving gear is extraordinarily simple to make and operate, and the shortest of short aerials will work practically as well as the 100-foot " P.M.G." aerial.

At this point the diehards are probably stroking their whiskers and muttering " Not a very convincing case for the ultra-shorts." I agree—it isn't; but it shows their *possibilities*, and ten years ago no one would have believed that broadcasting on 20 metres could ever be the slightest use to anyone.

So much for the ultra-short waves, but you'll be hearing a lot more about them next month and the month after.

To ascend to the ordinary " shorts " is the next task. Let us start at the bottom end of the scale. The 14- and 16-metre broadcasting bands are not exactly full of stations just yet, but those that do work there are being well received by readers daily.

The two best and most regular stations are Pittsburgh (W 8 X K) on 13·9 metres and Bound Brook (W 3 X A L) on 16·87 metres. Chicago (W 9 X A A) on 16·57 is sometimes heard, but for consistency he does not compare with the former two.

Even at this time of year the band from 13 to 17 metres is practically a daylight band, and the afternoons and early evenings are the best times for logging these Americans.

Going up by the next step to the 19-metre band, we find rather more to interest us. My own log for the month shows Schenectady (W 2 X A D) on 19·56 as the most consistent station, with Pittsburgh (W 8 X K) on 19·72 as a close second. (I am excepting the Europeans, such as Radio Colonial, Zeesen, and Daventry G S F).

Efficiency Counts

T 14 N R H, the famous little station at Heredia, Costa Rica, has been heard once or twice, which, considering his exceptionally low power, is quite remarkable.

Chapultapec, Mexico (X D A), on 20·5 metres, can be heard all day on C.W., and at 8.30 p.m. on telephony, practically every day.

The next band on the upward trek is the 25-metre group of stations, which is the " Cinderella " of short-wave broadcast. I think fewer people listen on this band than on any other, which is a great pity, as it is one of the most interesting of the lot.

Leaving out the " big noises "—Rome, Pontoise, Rabat, Zeesen, and G S D and G S E, we can still find at least six interesting stations. From America we have the inevitable Pittsburgh (W 8 X K) on 25·27. He is probably the best of the bunch.

Then we have Boston (W 1 X A L) on 25·45—quite a good station nowadays—and Chicago (W 9 X A A) on 25·34. Our first Canadian on the upward trek is found on this band. Winnipeg (V E 9 J R) on 25·6 metres. He may be heard most evenings at 6.45, but I don't think he ever works at week-ends.

The 30-Metre Band

X D A (Mexico) has another wavelength here (25·5 metres), which means that he is either on top of, or underneath, Zeesen—usually the latter.

Funchal, Madeira (C T 3 A Q) works at the top of this band, on 26·83 metres.

Next we arrive at the band that has caused the burning of more midnight oil than all the others put together—31 to 33 metres, with a

Something Interesting from Early Evening to Midnight

slight overlap at the top end, stations being placed up as high as 35 metres, which is definitely outside the broadcast band.

The Americans are—no, not W 8 X K this time!—Schenectady (W 2 X A F), 31·48; Springfield (W 1 X A Z), 31·35; Philadelphia (W 3 X A U), 31·3; Long Island (W 2 X V), 34·68; and Ontario Canada (V E 9 B Y), also 34·68. These stations have been placed roughly in their order of merit.

In addition to all these, however, we have the "high spot"—Sydney, Australia (V K 2 M E) on 31·28, beloved of Sunday-morning listeners who have the energy to get up fairly early, and Melbourne (V K 3 M E) on 31·55, who serves the same purpose for the Saturday-morning people.

"Noisy Locals"

Add to these Heredia, Costa Rica, again, together with Bangkok, Rio de Janeiro, Guatemala City, and a whole crowd of noisy locals, and you have quite an interesting little group to experiment on!

I am elaborating on all these stations this month because I have kept a careful log during the past two or three weeks, to make sure that they *are* all reasonably easy to receive. I think it is time that the short-wave readers of "M.W." were told just what they should be able to get with an average receiver.

With a small parallel condenser that will spread out this 31-metre band and make tuning reasonably easy also, there is enough activity in this narrow section of the short-wave spectrum to keep one interested for weeks.

The charm of this band is that it is probably less affected by variable reception conditions than any of the others, and that there is usually something interesting going on from the early evening until well after midnight.

Out of Bounds!

Between the top end of this band and the next official broadcast band (49 metres) I have logged quite a number of interesting stations. I think we all know Radio Nations (Switzerland) on 38·7 and 40·3 metres. Then there is Bogota (Colombia) on 39·7, Bangkok, Siam (H S P 2) on 41, Singapore (V S 1 A B) on 41·7, and Guatemala (T G W) on 45 metres.

One day a serious crisis will arise in connection with all these broadcasting stations operating more or less unofficially out of the recognised broadcast bands. Where they will all be put I can't imagine; but some sort of smoothing-out operation will have to be done.

Fourteen Americans!

Now for the top band of all—46 to 50 metres. Here we meet our old love, Pittsburgh (W 8 X K), once more on 48·86 metres. He is very reliable, but no more so in this case than Bound Brook (W 3 X L), 46·69; Mason, Ohio (W 8 X A L), 49·5, and Philadelphia (W 3 X A U), 49·6.

In all there are fourteen American and Canadian stations working between 46 and 50 metres, including two recent additions—Kearny, N.J. (W 2 X C X), the short-wave version of the famous W O R, and Coytesville, N.J. (W 2 X A L), the "opposite number" of W R N Y.

Late Listening

If it's Americans you want, this is the band for them, but during the summer and autumn it often means fairly late nights before they are really good. In the winter there is quite a good crop of them by 10.30 p.m.

Other interesting stations in the same band are Bandoeng, Java (P K 1 W K), 49·02; Johannesburg (Z T J), 49·2; Nairobi (V Q 7 L O) 49·5; and H R B, Honduras, 49·96 metres.

Up above 50 metres there are several more isolated stations, but very few reports of reception are received, and most of them keep only irregular hours of transmission.

I hope that this short review of the better-known stations will have the effect of working up a little fresh enthusiasm among those regular readers who have been "cooling down" during the summer; and if it also encourages a few more to "break in" on short waves for the first time, it will have served its purpose.

As a matter of fact, much useful and interesting work can be done with a short wave set in summer time. It is an ideal time of year to experiment with portable receivers, and many enjoyable radio week-ends can be spent in the open.

It is not at all difficult to make up, say, a compact one-valver. And even when complete with 60 volt H.T. and small portable accumulator the weight should not be more than a few pounds.

ENERGISES AN AERIAL FOR AERIAL LISTENERS

Manufactured, designed and installed by the Marconi Company, this magnificent transmitter places Manchester's air port among the most efficiently equipped in the country. The circuit comprises master oscillator, one stage of power amplification, and a coupled aerial circuit.

ACOUSTICS And the LISTENER

Some interesting notes concerning the effects of room furnishings and loudspeaker position upon reproduction

By JOHN RUSTON, B.Sc.(Eng.), A.C.G.I.

IT is often considered that when, if ever, the loudspeaker is able to reproduce all sounds exactly the same as heard at the microphone in the studio, then the ideal of perfect reproduction will have been attained. This, unfortunately, is not the case, for after leaving the loudspeaker the sound has to reach the listener's ear, and in doing so may suffer severe distortion.

Beam Radiation

To begin, more sound is radiated in a beam along the axis of the speaker than in other directions, and this concentration of sound into a beam is more prominent for high than for low notes. Hence, although the reproduction may sound perfect when sitting directly in front of the speaker, the low notes will be over-emphasised when sitting at the side.

The position of the speaker will therefore affect the quality of reception, and in general it will be found best to place it in a corner of the room at the same height as the listeners' heads, so that they are as much as possible in front of it.

A Simple Tone Control

This will not necessarily be the best position, for if there is already a lack of low frequencies, the high frequencies can be reduced by turning the axis of the speaker away from the listener. By varying the position and direction in this way, quality can be adjusted to a certain extent.

Another factor which affects the sound after leaving the loudspeaker is reverberation—i.e. the tendency of the sound to linger in the room after the source has been cut off. Energy, of course, is required to produce sound waves, and they will persist until they have disposed of this energy. They strike the walls and furniture of the room, and if the surfaces of these absorb sound readily, little will be reflected back and the sound will die away rapidly.

If, however, there is little furniture, and the surfaces are hard and smooth, most of the sound waves are reflected, and the sound will take some time to die away, hence the echoing effect in empty rooms.

This reverberation is the same for all frequencies, and does not depend upon the position of the source of sound, and so it is conveniently measured as the "period of reverberation" of the room, which is the time taken for the sound to die away to one-millionth of its original intensity.

The smaller the period the more distinct are the sounds heard, and although this is an advantage when listening to speech with the sole object of hearing what the speaker has to say, it makes it sound dead, and robs it of any personality. Similarly for music, a very small period of reverberation makes it sound utterly lifeless.

Echo Effects

But the broadcasting studio also has a period of reverberation, and this must be added to that of the listener's room to give the apparent effect upon the sound, and since the period of a small adequately furnished room is quite small, the B.B.C. can adjust the period of the studio to suit the programme being broadcast.

Hence it is only when a heavily damped studio is being used, as during news and some talks, that the reverberation of the average room has any effect upon the quality of reproduction. If, however, the programme is being reproduced in a large room or hall, the period will have a marked effect upon the quality of reproduction, and steps may have to be taken to make it a suitable value in order to get good quality.

Absorbing Sound

Incidentally, the annual epidemic of spring cleaning will enable you to listen in a room devoid of carpets and furnishing and note how the sound lingers and becomes blurred.

This can be caused by articles in the room having natural periods of vibration at frequencies to which the ear is particularly sensitive, or by the whole or part of the air in the room having such a period. When sounds of these frequencies are produced a large part of the energy is absorbed in making the resonant article or

(*Continued on page 275*)

CHECKING THE "MIKES"

The room at the Royal Geological Museum recently used for the World Economic Conference was equipped with an elaborate speech-amplifying system. The engineer seen seated at the microphone control board is engaged in carrying out the careful tests necessary to eliminate any possibility of a breakdown occurring during a sitting.

IN PASSING

Assorted Jottings on Radio Themes

FROM a polite art, a means of growing wealthy, and a remover of inconvenient rivals, Murder—in print—has become the sport of democracy in peace time. The best murder books are the best sellers, and are, indeed, hard to beat as companions on long railway journeys or for bed books. A juicy murder now and then is relished by the wisest men, especially if the victim was found in a room devoid of windows and chimney, and with the door locked on the inside . . .

The Insolent Stowaway

Therefore let us close this joyous holiday season with a brief account of the Great Radio Murder. But please do not ask too many questions; I have not sufficient space for all the details. Use a bit of imagination, as you do when you are telling friends about the performance of your latest receiver. We're off. Hold your breath.

A JUICY MURDER

"Hard to beat as companions on long railway journeys, or for bed books."

Scene 1.

The stowaway on the *Maritana* was not only culpable in the legal sense, but insolent—a far worse offence. *He demanded bottled beer!* The skipper had been demanding bottled beer for months—and nothing had happened; and then comes this beach-combing, fly-by-night stowaway, with his Cockney frills, quoting the Board of Trade Regulations, the Foot-and-Mouth Disease Act and what-not—all in favour of liquor for lie-lows.

Many are the ways that have been devised for committing murder, but Pedro Uniter Ybarrez found a different one, and employed a radio receiver to perpetrate the deed.

Consequently the stowaway, who chose to call himself Dick Dunster—obviously a faked monicker—was hove on to the beach of Fairway Island, as a curse to the Mercantile Marine and an example to the world.

An Island of Mystery

Fairway Island is a speck on the map, but a menace to navigators who do business between Singapore and Borneo. Amongst the coast fraternity it is known as a Jonah of an island. It has no native population and is a bit of a mystery. Captain Hallwood landed there in the seventies and is still mourned by his widow. In 1901 the barque *Hilda*, out of Penang, landed a boat's crew there, and after three days sailed without them. In 1907 a scientific expedition came down in Fairway like a storm of bees, and only the cook, a Swede, came off, and he was insane. In 1918 Dick Dunster was dumped upon the island. Murder, if you like. So may suffer all miscreants who demand bottled beer on the Equator when the skipper himself is down to *crème-de-menthe* lozenges as a kick to his coffee.

Scene 2.

That Dick Dunster did not perish on Fairway was due to John Uniter, who found him asleep on the beach and took him home to a shack with which was associated sundry goats and fowls, besides a boy of eleven with a bush of red hair—Uniter's motherless son.

No Bottled Beer!

There was no bottled beer, but there were rest, water, sleep and shelter. The food was almost wholly vegetarian, mostly cold. The carroty kid, whose mother was Spanish, cultivated an intensive brand of jealousy and hated Dick splendidly—which amused Dick so much that he took to sticking verbal pins into him as frequently as possible.

Why Everybody "Croaked"

One day Dick asked Uniter how it was that everybody who landed on Fairway "croaked."

"There's a lot of natural carbunnick acid gas hereabouts and it's heavy. Lays in the hollers. Breathe *that* for a while—and I'll trouble you

"CARBUNNICK ACID GAS"

"There, lying pearly white under the noon sun, were dozens of skeletons, large and small"

for the name of your undertaker," replied John. "If you don't know the places you had better not go roaming."

"I Shall Kill You in Seven Days!"

"Hum!" said Dick. "Show us one place."

So John led the way to the top of a small hill and bade Dick look down. There, lying pearly white under the noon sun, were dozens of skeletons, large and small.

"Cap'n Hallwood's down there," said John. "The rest's mostly pig and goat."

After that excursion Dick kept pretty quiet. He was thinking hard, and he was trying to think what kept Uniter on Fairway. Uniter never did anything but eat and loaf about, but it was patent to Dick, from certain definite evidence, that Uniter had been doing a lot, and that he was only waiting for Dick's departure before he began again.

Dick Lays a Trap

Every train of thought which Dick set going ended at the same conclusion. *Pearls!* But, as Dick said to himself, "Pearls is bilge. Every bed from Sydney to Port Moresby is being worked. But—darn it!—there ain't nothing else it can be but pearls." And so Dick searched high and low for some convincing clue.

His investigations had to be conducted in the full light of day lest Uniter should become suspicious. On the face of things there was not an oyster knife, a bit of shell or even a boat. Not even a smell of decaying oysters!

It was the boy, Peter Uniter, who gave Dick the clue which was lacking. Suspecting that John Uniter would have primed the boy to be as "close" as a pearl oyster, Dick laid a trap. Choosing his opportunity when John was outside the shack, mending a fowls' house, he asked Peter if he could swim. Proudly the boy said that he could, as good as a Malay.

"Swim under water?" queried Dick, casually.

Hiding Place Disclosed

"No, but Pa can. He's a corker at holding his breath. *We don't need no divers.*"

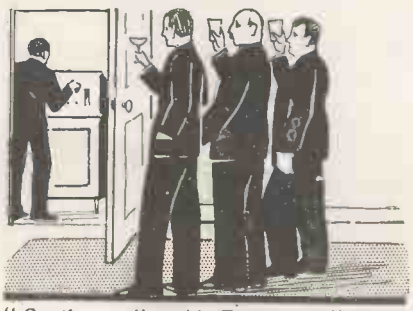
It was enough for Dick. Changing the subject so skilfully that Peter did not suspect how much he had, in effect, revealed, Dick lounged away to his next job—that of discovering where Uniter hid his pearls. This secret, too, poor Peter unwittingly disclosed by invariably sitting on one particular spot of the shack's floor whenever he and Dick were alone there. Sometimes Dick had entered abruptly to find Peter sitting elsewhere, but he noticed that within a short space of time the boy was roosting on the favourite spot. That, also, was enough for Dick.

ONE MONTH LATER

Dick Dunster paddled out to sea in a canoe with a fortune in pearls.

One month from the day when John Uniter gave harbourage to the marooned one, he was lying stunned, bound and gagged in the deadly hollow which contained Captain Hallwood's bones. There he died of poison gas—natural "carbunnick acid" gas—while Dick Dunster paddled out to sea in a canoe with a fortune in pearls under his belt and a boy with a bush of red hair glared after him with hate in his eyes and muttered the names of saints which he had often heard on the lips of his Spanish mother. For Dick had left many more pearls behind him.

THE FINAL TOAST



"Gentlemen," said Revenga, "let us drink to the dear departed."

Scene 3.

Fifteen years later. London. Mr. Richard Dunstan was faintly perturbed, for that well-known clubman and sporting patron had received an anonymous note which reminded him of the bad old days of long ago. The note said:

"I hope that you have ample supplies of bottled beer."

It was signed, "CO_2," which even Mr. Richard Dunstan knew as the chemical formula for "carbunnick acid gas."

In the bad hours of the night, about the time people die, Mr. Dunstan wiped a fine dew from his forehead and muttered: "Only that ginger brat knew."

He then switched on a light and greedily drank a bottle of beer.

Second Warning

Beside his breakfast plate, next morning, he found another note, signed, "Oysters," which read: "I shall kill you in seven days."

After that, breakfast seemed hardly worth while.

"Fearfully precise about his murders," thought Mr. Dunstan, as he breakfasted on a bottle of beer. "But it's a practical joke. That kid is probably 'on the beach' at Singapore." After the third day another note arrived.

"Death will come to you like a thief in the night; in fact, like a pearl thief." The signature was, "Pedro Uniter y Ybarrez."

Pedro—*Peter*. Uniter, *the father*. Ybarrez, the *Spanish mother!* It *was* that kid, then. How the deuce——

Thereafter, Mr. Dunstan took to liquors more potent than beer, and sought council of his closest cronies, Teddy Graham, the motorist; Bill Newham, the pugilist; and Percy Revenga, the Anglo-Argentine racing man, of money and influence. Yes, he would have these stalwarts round him. Percy would help him. So, to the Club.

Enter the Serviceman

While Mr. Dunstan was waiting at his club for his friends, the young man from the West End Radio Service Company sought and obtained admittance to his suite in Garrod Square Buildings. Jaggs, Dunstan's man, admitted him and left him to his work. He, Jaggs, was taking a little of his master's port, against the visit of his, Jaggs', mother-in-law, and paid scant attention to a mere mechanic. The young man did his work and quietly left.

Later, Mr. Dunstan and his bosom friends, Teddy Graham, Bill Newham and Percy Revenga, came to Mr. Dunstan's chambers to see the night

(*Continued on page* 267.)

NEW and IMPROVED

CONDENSERS AND RESISTANCES FOR

1933-4

SEE THEM ON

STAND 68

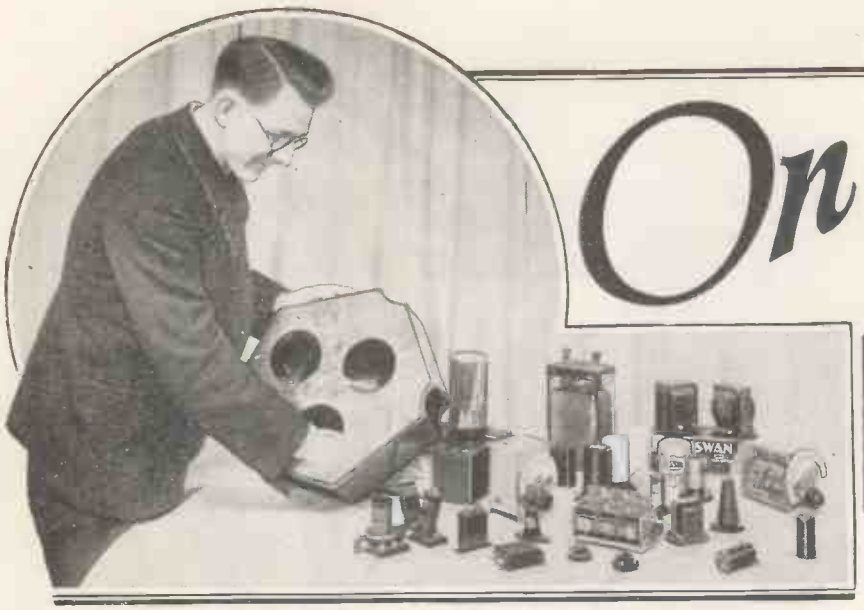
NATIONAL RADIO EXHBN.

The new Dubilier products mark a great advance in Condenser and Resistance design and will maintain Dubilier's established position as the foremost manufacturers of the highest quality products, at the lowest price levels. Write for new illustrated booklet fully describing the new and unique designs, or inspect them on the Dubilier Stand, No. 68, National Radio Exhibition, Olympia.

DUBILIER

CONDENSERS AND RESISTANCES

DUBILIER CONDENSER CO. (1925) LTD., DUCON WORKS, VICTORIA RD., NORTH ACTON, W.3



On the TEST BENCH

Our comments regarding some interesting new components.

Dubilier Interference Suppressors

WHEN a radio set is fitted to a car steps must be taken to prevent the ignition system from causing interference.

This can be done by fitting "suppressors" to the sparking plugs. A "suppressor" is a high resistance which stops the ignition circuit in which it is connected from oscillating and thus radiating high-frequency impulses.

But it must not be thought that one can merely join any kind of resistance in series with the plugs and obtain satisfactory results.

Firstly, the valve requires careful choice, and then the resistances must be so constructed that they will withstand the comparatively high temperatures and constant vibration encountered.

However, they are now available in a trustworthy and convenient form, for Dubilier are manufacturing suppressors for fitting to any car.

The Dubilier suppressors are of very robust construction and can be fitted by anyone in a matter of moments.

We have tested them in conjunction with the "M.W." car equipment described last month, and discovered them to be perfectly satisfactory. They killed the interference which was otherwise experienced and in no way affected the performance of the car.

A Good Slow-Motion Dial

In the new British Radiophone slow-motion dial, which is illustrated on this page, the scale remains stationary and in full view through the escutcheon aperture the whole time. Readings are taken by the pointer which moves along the scale.

This is a most attractive method and, we think, greatly to be preferred to a partially visible moving scale. The slow-motion mechanism of the Radiophone dial is extremely effective and there is neither backlash nor slip, nor any possibility of either developing. The drive is smooth and positive throughout the whole range of its action.

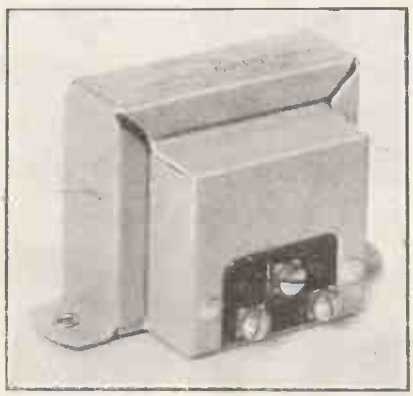
The scale is semi-transparent and dial lights are arranged at its back for an even, bright illumination.

Altogether, then, the British Radiophone dial is a first-class proposition and one that could be used with advantage on any set.

SMOOTH AND POSITIVE

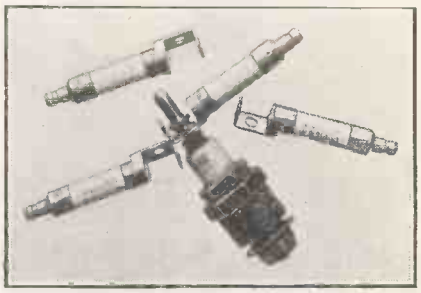
The British Radiophone slow-motion dial is an extremely good example of its type and performs its work with an entire absence of backlash or slip.

OUTPUT EFFICIENCY



The Benjamin "Class B" output choke provides no less than seven ratios and enables accurate matching to be achieved

EASILY FITTED



These Dubilier "suppressor" resistances form a ready means of preventing ignition interference with car, boat, or plane radio sets.

Car Radio Converter

We have had the opportunity of testing very thoroughly an anode converter for car radio made by the Electro Dynamic Construction Co.

The object of the device is to supply H.T., and it does this by taking six or twelve volts from the car battery and stepping them up to the required 150 volts (or 200/220 volts in the case of the other model available).

It is a small rotary converter and is built into a watertight metal box suitable for letting into the floor boards of the car.

It runs with exceptional smoothness

Some Interesting New Radio Productions

and there is no mechanical vibration or noise. The output is clean.

There are three models available and they supply, respectively, 15 ma. at 150 volts, 30 ma. at 150 volts, and 40 ma. at 200/220 volts.

Varley "Class B" Transformer

Almost coincident with the introduction of the Mazda "Class B" valve, Varley were on the market with a "Class B" driver transformer especially designed to work in conjunction with it.

It is styled the D.P.41 and has ratios of 1·5/1 and 2/1. The price is 15s.

Varley have, as will be well known, played a prominent part in the development of "Class B" amplification in this country, and they entered this field without faltering.

Right from the very beginning of the "Class B" era their "Class B" components have been recognised as being consistently above the average in all-round efficiency.

And their newest transformer maintains the standard of the range it joins. From which it will be gathered that in regard to such matters as primary inductance and D.C. resistance it is quite above criticism.

New Blue Spot Speaker

The Blue Spot 45P.M. speaker is a permanent-magnet moving-coil chassis. It is fitted with a matching transformer, and its design and construction are equally of very high standard.

The magnet, which has cadmium-plated pole pieces, is equipped with dust-proof shields, and the chassis is heavily copper-plated.

Special steps have been taken to eliminate all possibility of the speech coil warping and fouling the gap, and to ensure that moisture or temperature changes cannot affect the operation of the speaker.

By such means a high sensitivity is preserved without in any way jeopardising the instrument's reliability.

We have tested this new Blue Spot speaker under several different conditions and find it to be extremely satisfactory.

With a small two-valve set it operated in a manner which exalted the output.

When it was coupled to our standard amplifier it was found that it could handle nearly five watts without the slightest distress.

A frequency test from 50 to 6,000 cycles failed to bring out any noticeable peaks and showed that the 45P.M. has an even response from bass to treble.

It is a sound speaker from all view-points, and at 45s. is a wonderfully attractive proposition.

Benjamin "Class B" Choke

Successful "Class B" working depends largely upon close matching. This is probably widely realised in so far as the driver transformer is concerned, but it is equally important that accurate output matching should be obtained.

This can be done better with the Benjamin "Class B" choke than with any other component that has yet come to our notice.

It is not only that it provides no less than seven different ratios, but these ratios are skilfully arranged in close steps.

But the constructor is not left to undertake what would be the very tricky task of finding the right ratio by trial and error experiment. Benjamin provide an easy-to-read chart with the choke which at once indicates the ratio to use in any circumstance.

Of course, the component would still fail were it not designed in accordance with other definite requirements. But it is, and its D.C. resistance of 400 ohms and high inductance when carrying heavy current prove its general efficiency.

As a matter of fact, we have already had the opportunity of giving the Benjamin "Class B" choke practical tests in "M.W." sets, and these, too, confirm the above statements.

We can definitely recommend it to our constructor readers.

FOR "CLASS B" DRIVE

The latest Varley "Class B" driver transformer has ratios of 1·5/1 and 2/1, and is a highly efficient component.

COMPLETELY SCREENED

A FINE SPEAKER

The Electro-Dynamic car converter (left) is built into a watertight metal box and is specially suitable for use in conjunction with car receivers. The speaker on the right is the Blue Spot 45P.M. moving coil, and incorporates a matching transformer which can be seen attached to the chassis

PRACTICAL WORK ON 5-METRES

By F. BRIGGS.

If you have been thinking that 5-metre work is necessarily difficult, read this account, which is the result of practical experience. It tells of the simplicity of the apparatus employed and of the readiness with which the experimenter can get valuable information regarding the fascinating behaviour of ultra-short-waves.

MANY readers will, no doubt, want to take up 5-metre work. This waveband is easily the most fascinating, so little is really known about the behaviour of ultra-short waves, and nobody can tell for sure what their ultimate possibilities will be.

The 5-metre gear described in other pages is a splendid start for those who are interested. I have had both the transmitter and receiver working at my home station for some time, and the results have been most encouraging.

Power Supplies

When used as a portable, H.T. is derived from the generator illustrated on the last page of this article, a 12-volt car battery supplying the necessary current. The output of this generator is 400 volts at 125 milliamperes. The filament heating current for the valves can be derived from this same battery as well, if desired, although it is an advantage to use a separate 4-volt accumulator.

If a car is available to transport the gear from place to place, the additional battery is no disadvantage, for it can be tucked away in almost any odd corner. As, however, the valves take about 5 amps., the battery should have a capacity of at least 30 ampere hours. This will be sufficient for about six hours' work.

Making a Start

In my own portable station, I include a pair of steel Laker masts. They are 26 ft. high when erected, and fold up into a bundle about 8 ft. long, and although they weigh about 25 lb. apiece, they can be carried with ease lashed to the side of the car.

Many readers will prefer to commence their 5-metre "career" by building the receiver alone. This is quite a good plan, as it enables the enthusiast to get a fair amount of experience before going "on the air." And the experience gained will help him to decide on what lines he would like to experiment.

TESTING LOCATION

The receiver, being absolutely self-contained, is easily taken about from place to place and a great deal of useful information can be acquired in this way, the transmitter being left working at a fixed spot, say, on top of a hill. Really surprising effects are obtained, especially in the vicinity of large objects, such as trees, houses, etc.

As the article on the subject explains, the receiver is absolutely self-contained, and is, therefore, just the thing for taking about. The most important point regarding the receiver is the aerial.

Aerial Requirements

Quite recently I carried out some tests with another 5-metre station at Harrow, and it was found that when using an ordinary broadcast aerial for reception, about 60 ft. long, the utmost difficulty was experienced in getting anything like a decent signal in the headphones. When, however, a plain vertical aerial 21 feet long was strung up and hooked on to the coil one turn down from the top through a neutralising condenser, the strength was almost too loud to be bearable. This goes to show how important it is to have the right type of aerial.

By the way, I should have mentioned that if a large aerial is employed, that is anything over, say, 10 ft. long, it will nearly always be beneficial to use a small variable condenser having a capacity of about ·00005 mfd. in series. If this is omitted, it is quite possible that the load of the aerial will stop the receiver oscillating.

Tuning Not Critical

Another point about the receiver is that the H.T. battery is only 60 volts. This is quite sufficient, and as a rule no advantage will be gained by increasing it.

With super-regenerative receivers the background noise may become intolerable by increasing the volts on the anodes of the valves.

You will find tuning extraordinarily flat with this type of receiver. The cause of this flatness is really the transmitter. The ordinary self-oscillating arrangement as used to-day is a very unsteady affair as far as frequency stabilisation is concerned, and when modulated it may spread over many hundreds of kilocycles,

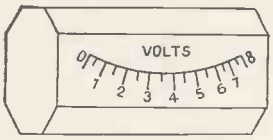
The Sherlock Holmes of Radio

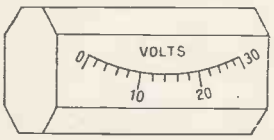
MEET THE GREAT RADIO DETECTIVE...!

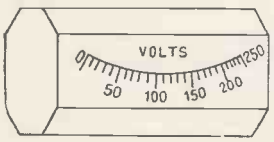
Radio's greatest boon! The Pifco ROTAMETER tracks down every radio trouble instantly. The octagonal knob on the Pifco ROTAMETER, with its eight marked faces—"The Sign of Eight"—is the key to the instrument's simplicity and accuracy. The eight dials are shown here.

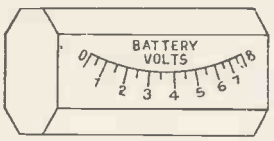
Radio testing is amazingly simple with the Pifco ROTAMETER. Just turn the octagonal knob according to the test desired and then connect the suspected component to the instrument. The needle gives its reading instantly on the dial. What could be simpler?

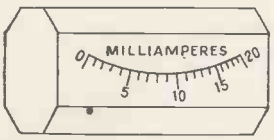
Ask your radio dealer to demonstrate the Pifco ROTAMETER to-day. If any difficulty, write direct to PIFCO LTD., High Street, MANCHESTER, or 150, Charing Cross Road, London, W.C.2.

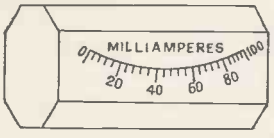


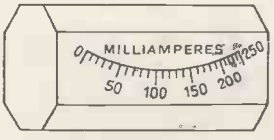


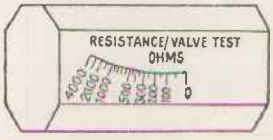












No other instrument in the world makes all the tests that the Pifco ROTAMETER does. Any component or circuit can be tested quickly and surely. Makes 100 tests. BRITISH MANUFACTURE.

RANGES:

1. *0–8 Volts. For low-tension voltage test.*
2. *0–30 Volts. For grid-bias voltage test.*
3. *0–250 Volts. For high-tension voltage test.*
4. *BATTERY TEST.*
5. *0–20 M.A. For individual valve test.*
6. *0–100 M.A.* } *For testing current taken by total valves in set.*
7. *0–250 M.A.* }
8. *FILAMENT AND RESISTANCE TEST (4,000 ohms).*

Finished in black bakelite case, complete with two 22-in. rubber-covered cables. Resistance 12,500 ohms.

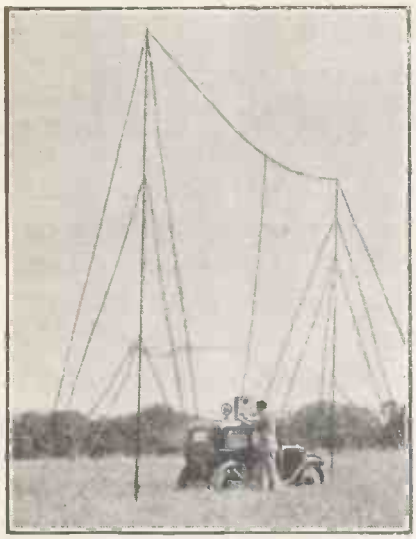
Dimensions: Height 4¾ in., width 3⅛ in., depth 1⅜ in., weight 12 oz.

Price

29/6

PIFCO ROTAMETER

INCREASING RANGE



If you have access to a car a pair of portable masts can be included in the transmitter equipment. These will increase the range tremendously, and as they fold up into short sections, they can be carried on the side of the car with comparative ease.

hence the ease with which it can be tuned in.

Of course, when the 56 megacycle band gets more fully occupied, something will have to be done about this spreading. The ideal arrangement would be crystal-controlled transmitters, but at these very high frequencies crystal control becomes a very complicated business, so it seems likely that a master oscillator-power amplifier type of transmitter will have to be developed.

Best Listening Times

However, those days are a long way off, and there is a lot to be learnt with the simple self-oscillating transmitter. In a way the broadness of the tuning is an advantage, especially when there are so few stations about, for it makes the finding of a transmission an easy matter.

When the receiver is in its most sensitive condition a loud rushing noise will be heard in the headphones, on tuning-in a carrier this noise will disappear, and the speech or music will be heard against a clear background. If there is only the carrier coming through this will be heard as a " hole " in the mush, the " depth " of the hole depending on the strength of the carrier. If a signal is very weak there is a possibility that it may not be sufficient to suppress the quenching hiss, but it usually allays it enough to make even weak speech readable.

Sunday morning and afternoon is about the best time to listen-in on 5 metres. If you live near London, or any other large town, there is seldom a week-end goes by without some station or other being " on the air." I live over twenty miles from London, and hardly a day goes by without my hearing something. As the interest in ultra-short waves increases and their possibilities are realised, so will the number of stations increase.

Transmission Tests

Now, turning to the transmitter, the operation of this part of the outfit is a little more exacting than the handling of the receiver. After you have tested the modulator and got that working well, you will have to start on the oscillator.

A SURE REMEDY

It sometimes happens that when reception is attempted in a moving car, the ignition system causes considerable interference. This difficulty can be surmounted by connecting "suppressor" resistances in series with the sparking plugs.

This should not be done until the whole transmitter is completed, however, for if this part of the set is used without the modulator, the loads on the various valves will be all wrong. In fact, the oscillators really draw their H.T. current *through* the modulator choke.

Choosing Valves

The first point to consider is the valves. Now, in the modulator section the first speech amplifier—V_1 in the diagrams—is a high mag. A.C. type of valve. This is essential, as there is only one stage before the modulator, and every ounce of gain it is possible to get will be required from this stage.

The next valve—V_2—is the modulator proper, the one used in the original set is a PT.25. This is a pentode; it was chosen on account of its large, undistorted output, which is somewhere in the region of 10 watts.

The power actually required fully to modulate a 10-watt carrier—the power usually allowed by the Postmaster-General—is 5 watts, so this valve should be capable of giving ample output. As, however, it has an optimum load of about 8,000 ohms, and in the actual set it works into something like 4,000 ohms, the full output of 10 watts will not be obtained.

Feeding the Oscillators

In practice it will probably be in the neighbourhood of 6 or 7 watts, quite sufficient for all our requirements.

This large pentode requires an anode potential of 400 volts, and a screen voltage of about 250. The anode current as read on the lower of the two meters will be somewhere around 63 milliamperes. But as long as the H.T. applied to the transmitter is somewhere between 400 and 450 volts all these different values will be sorted out automatically by the network of resistances inside the set.

The push-pull oscillators which occupy the upper " deck " have about 200 volts on their anodes, and the current as read on the upper meter will be about 50 milliamperes. This again will be applied automatically from the 400-450 volts supplied by the generator or mains unit.

When switching on the transmitter it is desirable to allow the filaments of the valves to heat up first of all. A period of at least 15 seconds should therefore be allowed between turning on the L.T. and H.T. supplies.

An Important Point

The first point to watch when trying the transmitter—no aerial is required for this test—is to see that the push-pull valves are oscillating. If they are functioning the upper milliammeter needle will be seen to vary as the tuning dial is rotated.

If they are not working properly

" HELLO—— "

A car is certainly a great boon with a portable transmitter, for in addition to carrying the gear, the lighting battery can be used to supply the power. Here you see an enthusiast calling up another station located several miles away

Join "M.W." in Ultra-Short-Wave Research

the needle will stick at about 80 milliamperes irrespective of the position of the tuning condenser. If the valves are allowed to stay in a non-oscillating condition for long they will be damaged, so this point should be watched very carefully.

Provided the coil—and method of mounting—is the same as in the original set, the 5-metre band will extend from about 5 degrees to 38 degrees on the dial. A very rough way of checking this up is to compare the position of the transmitter's carrier on the receiver with that of other received stations, but if the construction is followed in detail the chance of being out of the band is very remote indeed.

Aerial Length

Having got the transmitter working, the next thing to do is to erect an aerial. Now, this is a case where there is ample room for experiment. With ultra-short waves the aerial has to be cut exactly to size if the best results are desired. It should be exactly half a wavelength long, and as the band extends from 5·35 metres to 5·005 metres all that has to be done is to select the wavelength desired, and cut the aerial accordingly.

The aerial I use myself is 10 ft. 6 ins., which corresponds to somewhere between 5·3 and 5·35 metres. This seems to be a very good length, as it gives as much aerial as possible for radiating.

There are two methods of feeding the aerial—the voltage system and the current feed. To go into the matter properly would require many pages, so the only thing to do is to try and cover the essential points.

Selecting Coil Taps

The method adopted by myself and that recommended to the novice is the current feed. This means that the aerial must be broken at the centre and an insulator inserted. The feeder wires being attached here, one on each side of the insulator.

The best scheme is a properly tuned feeder arrangement with the wires spaced some three inches apart. But for initial experiments and portable work very good results can be obtained using ordinary twin flex.

The free end of the feeders, that is the end not attached to the aerial, should be joined up to the pair of terminals on the side of the transmitter. And the two clips moved about on the coil until the best results obtain. The centre point of the coil, where the H.T. is fed, should be taken as the zero point and the clips, one on each side, taken equi-distant from this point.

First of all, they should be set about half-way along the coil, then turn the tuning dial slowly until a point is found where the anode current of the oscillator valves rises slightly and then dips again. When it is at its peak it indicates that the set is in tune with the aerial and that maximum power is being drawn from the valves.

Getting 10 Watts

Having found resonance, the clips must now be adjusted until the optimum position is found. This will usually be about half a turn from the centre. It is indicated, as with the tuning, by a slight rise in anode current.

With everything adjusted, the oscillators should be taking about 50 milliamperes, this with an anode voltage of 200 gives the 10 watts allowed by the Postmaster-General. It is not a lot of power, but it is surprising what results can be obtained with an efficient transmitter under good conditions.

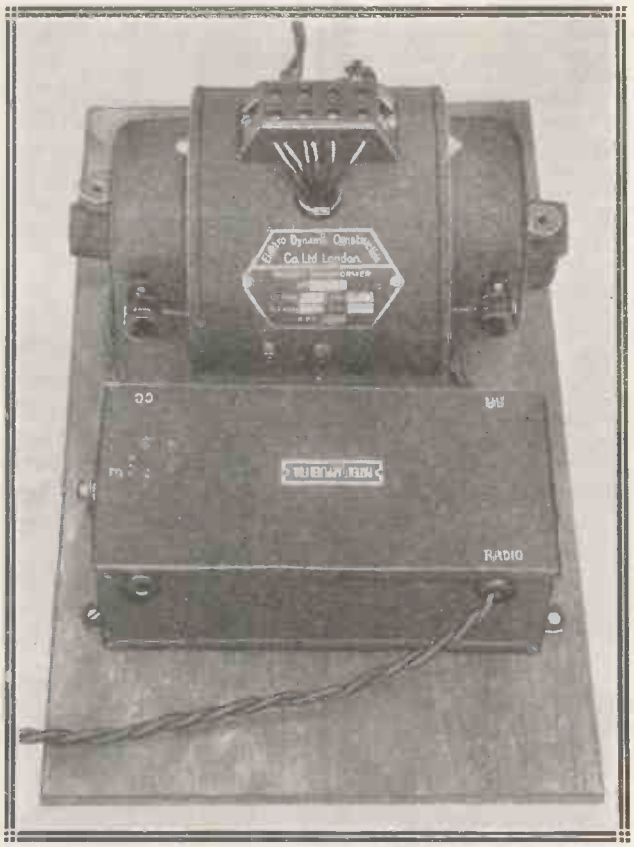
Continuing on the subject of aerials, it is important that as much height as possible is given to this part of the outfit. The range of a station, particularly on the ultra-short waves, increases tremendously as the aerial is raised higher above surrounding objects.

If optimum results are desired the aerial should be fed by properly tuned feeders instead of ordinary twin flex. They should consist of lengths of wire, similar to that used in the aerial, and spaced every five feet or so of their length.

Tuning the Feeders

The distance apart should be about three or four inches, and their length any odd multiple of a quarter wavelength. So if the aerial is cut for, say, 5 metres, they could be either $1\frac{1}{4}$, $3\frac{3}{4}$, $6\frac{1}{4}$, $8\frac{3}{4}$, and so on, metres long. This length business is very important as it decides the conditions for maximum energy transfer to the aerial. At the transmitter end the feeders should have a small neutralising condenser in series with each lead. The tuning procedure with this arrangement is quite simple for, after the resonance point has been found on the transmitter tuning, with the neutralising condensers at maximum, the latter should be adjusted for the highest. equal. feeder currents

WHERE THE POWER COMES FROM



This neat little generator supplies the H.T. for the transmitter. It runs from an accumulator, which can, if necessary, be the same battery used for heating the filaments. The weight is a matter of a few pounds only.

AT YOUR SERVICE

by OUR TRADE COMMISSIONER

HERE we are again, at another Radio Exhibition, and entering another year of radio endeavour and development. And aren't things developing quickly, too? During the last year, from the 1932 Show, we have seen some surprising and far-reaching advances in component and valve technique.

Many Developments

There have been Ferrocart coils, which have been considerably increased in their usefulness since last year, we have been introduced to the unbreakable Catkin valve, double-diode triodes and pentodes, screened pentodes, and a host of other valve improvements that show that Messrs. Marconi, Osram, Cossor, Mazda and Mullard have in no wise been resting on their laurels.

"Class B" has probably been the biggest excitement of the year, and with it have come a galaxy of valves, transformers, chokes and loudspeakers, to say nothing of special batteries and power units. In fact, "Class B," as will be seen by visitors to the Radio Exhibition, has provided scope for scores of manufacturers. It has thoroughly stirred up the radio industry, and a great deal of valuable trade has been done.

A Bigger Margin Desirable

The superhet has come to the fore in most of the complete set designs this year, and automatic volume control is used in a number of commercial sets. Gradually the maximum output powers of the sets are going up, but still I should like to see a little more margin between the average power that is likely to be used, and the "peak" power that is reached on the loudest passages of music, which must often be in excess of the maximum power.

But this margin will probably be increased gradually, for it is certain that the public will acquire a taste for power in their sets and will normally run them well towards the maximum.

Some trade news and views that will prove of interest to readers, whether or not they are connected with the radio industry. Members of the trade are invited to send items of interest or photographs to be included under this heading.

Car radio has begun to make its mark on the British market, though it is early yet to state to what extent it is likely to catch on. I cannot see it becoming really general, though my views are not held by many of my trade friends, who expect it to sweep the country before long, and would not be surprised to see a large percentage of cars so equipped in the next twelve months. I sincerely hope I am wrong in my outlook.

Special Components

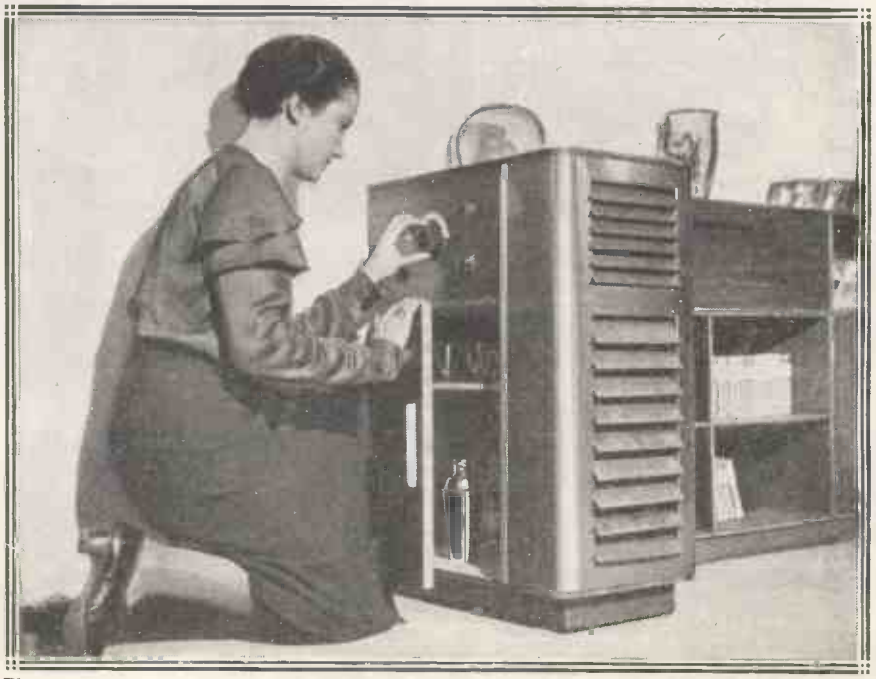
Certainly a good few manufacturers are getting ready with special valves, small loudspeakers, ignition suppressors and so forth. There is no doubt that a large number of people will fit up their cars for radio, and such firms as Electro Dynamic, who have a useful range of generators, Dubilier, who have a series of ignition suppressors, and the loudspeaker makers should do quite a useful trade.

Midget Receivers

Talking about car sets, we must not forget the new craze for midget receivers that has come to us from America. These tiny all-mains sets are wonderful in their sensitivity when the size is considered, though the quality leaves something to be desired in every case that I have heard; no wonder when the size of the loudspeaker is remembered. But no doubt this will be improved for the type of set is but young yet.

To assist in the advancement of research on the subject of midget sets,

JUST THE THING FOR THE FLAT-DWELLER!



The latest thing in radio is this ingenious arrangement which, in addition to the receiver and loudspeaker, contains a cocktail cabinet and a radiator.

Car Set Tested over 75,000 Miles!

Eta (Electrical Trading Association, Ltd.) have placed on the market a large series of valves of the American type with the corresponding American bases. These valves cover the full range of mains voltages as used in the States, and should prove very useful for those who are testing out American sets or carrying out experiments on the same lines.

It is of interest to the motoring public to know that Philips have just perfected a complete super-inductance all-electric receiver for cars. It measures only 18 in. x 8 in. x 6 in., and is completely metal enclosed.

Exhaustive Tests

The price has not yet been fixed, but the receiver has had a very thorough testing on the road, following tram tracks and going round electric power stations, in fact, anywhere where interference should be rife. Approximately 75,000 miles were covered during the road tests.

The results were splendid, and I understand that the set behaved

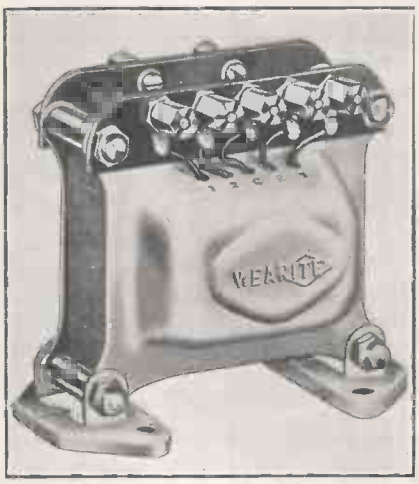
THREE VERY GOOD—

perfectly throughout, in spite of the terrible conditions imposed upon it. Automatic volume controlling is employed, and the compactness of the receiver allows it to be fitted almost anywhere in the vehicle. The aerial plate is fixed under the running board.

Addition to the Telsen Range

Telsen Electric have launched forth with tremendous energy this season, and have made a number of very interesting additions to their already bulging catalogue. Among the most notable of these is the "Class B" transformer and output choke, and the new electrolytic condensers. These latter should be of the greatest value to the home constructor, for although they are constructed on similar lines to those now on the market they are provided with an alternative method of mounting by means of a clip.

— "CLASS B" AMPLIFIER —



Thus instead of being forced to mount the condenser through a hole in the chassis or baseboard, alternative to making a bracket, one is given the opportunity of mounting with a specially constructed metal bracket which fits the short end spindle of the condenser—the positive terminal.

Three of the many "Class B" transformers that have been produced to meet the demands created by the new system of L.F. amplification. The makes are, from left to right, Varley, Wearite and Telsen

High-Voltage Valves

Two more valves of the full voltage mains type have been placed on the market by Ostar-Ganz, under the direction in this country of Eugen Forbat, 28–9, Southampton Street, London, W.C.2. These valves are the D.130 and the K.3560, selling for 17s. 6d. and 25s. 6d. respectively.

The first valve is designed for use as detector or first L.F. amplifier, and has an impedance of 40,000 ohms with a slope of 2.6 Ma/V. The rated amplification factor is 100.

The K.3560 is designed for power output and has an amplification factor of somewhere round 3, with an impedance of 500 ohms. The plate current taken at 220 volts is about 70 milliamps, and the optimum load resistance is of the order of 1,200 ohms. The maximum undistorted output should be in the neighbourhood of 4 watts.

Incidentally the prices of others of the Ostar-Ganz range of valves have been reduced, and full details will be gladly supplied to all who write to the above address for information.

How many H.T. batteries have their lives shortened by wrong use? Too often do we find that a battery does not last anywhere near its allotted span of life simply because it is asked to supply far too much current for the size of its cells, which have, of course, a definite economical current output.

Avoiding Waste

The result is that unsatisfactory results are obtained, and the receiver costs far too much to run. If set users would only study the requirements of their sets a little more, a great deal of this wastefulness (for it is sheer waste) would be avoided.

HOME CONSTRUCTOR PARTS

To help their customers the Britannia Battery Co. have issued a list of the appropriate Pertrix batteries to use with a matter of some 100 receivers, the batteries being graded into a "number of valves" classification, which will be invaluable to hundreds of set owners who are somewhat doubtful as to the best sizes and types of batteries to use with their receivers.

Send for that list to Britannia Batteries, 233, Shaftesbury Avenue, London, W.C.2, and you will find it full of the most valuable information.

FAULTS I HAVE FOUND by a SERVICE ENGINEER

HIS EXPERIENCE AT YOUR SERVICE

This series of really practical articles by a radio-fault-finding expert is proving of the utmost value to our readers. In the course of his duties our contributor meets the most difficult and unexpected problems, and his solutions and experiences are remarkably enlightening.

ONE of the most common and most obstinate faults that crop up in receivers which draw all their power from D.C. mains is the reproduction in the speaker of a low-pitched hum.

This hum is generally designated "mains hum," but in very many cases the term is inaccurate and liable to be misleading.

True "mains hum" is produced by a certain amount of ripple from the supply mains getting through to the set either by induction or by the use of inferior smoothing gear. The cure in such cases is obvious.

I have, however, come across many cases where the cause of the trouble could not be either of the foregoing, for the very simple reason that exactly similar receivers operate perfectly silently on other mains.

A Great Advantage

An engineer investigating obscure faults on good commercial receivers always has one great advantage—he knows that he is quite safe so far as the design of the receiver is concerned, and he can therefore concentrate on the weeding out of faulty components or exterior installation troubles.

Incidently, the owner of a receiver designed by MODERN WIRELESS is in the same envious position, and for this reason you and I—reader and engineer—will start level when we have to investigate and track down such a fault as hum.

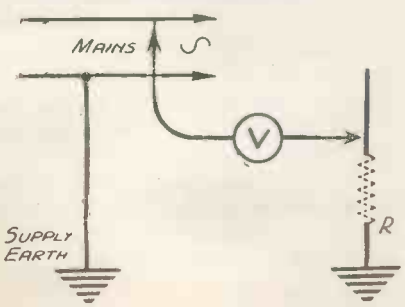
One thing is very certain—you will not come across a genuine case of "mains hum" on a MODERN WIRELESS set, so that if you are bothered with this type of trouble, it is fairly certain that the fault will be found in the "exterior installation troubles" category.

Common Troubles

One of the most common of these troubles is a poor earth connection to the receiver; this will often produce a queer, irregular note in the speaker—termed "hum feather" in engineering circles—which rises and falls in intensity and pitch; breaking the earth connection to the receiver often stops this sort of hum.

The first step is to check the earth connection to the set and make sure that this has a very low resistance; a high resistance across the earth lead will cause a voltage to be developed across it and thereby cause the "feather" noise.

CHECK THE EARTH CONNECTION



"A high resistance in the earth circuit will cause a voltage to be developed across it."

As I described earlier in this series, you can easily make a definite test of your earth connection by means of a low-resistance voltmeter joined across the unearthed supply main and the earth lead in question.

If your earth is free from resistance the full mains voltage will be registered by the meter. The presence of resistance in the earth will be indicated by the meter reading *less* than the full mains voltage.

This is shown very clearly in the accompanying diagram.

Here, then, is the seat of the trouble and the cause of the "hum feather."

An obscure form of interference which is often met with in the best-designed A.C. receivers is the slight "residual hum" that no amount of smoothing gear or installation checking will remove; the note in this case is a steady "purr" which persists whatever circuit adjustments are made—short of breaking the H.T. supply or the speaker leads.

"Residual Hum"

This type of hum has proved so difficult in the past that manufacturers have had to resort to a compromise in order to secure its elimination.

The causes of this "residual hum" are so varied and so many that it has sometimes been necessary to prevent it being made audible by "doctoring" the speaker.

One of the most effective methods is to set the loudspeaker slightly back from the baffle, thus leaving a space of about one inch between the edge of the cone and the baffle face.

This has the effect of slightly

The Best Way to Gang a Superhet

attenuating the very low notes and will, in most cases, completely prevent the audible reproduction of the "residual hum."

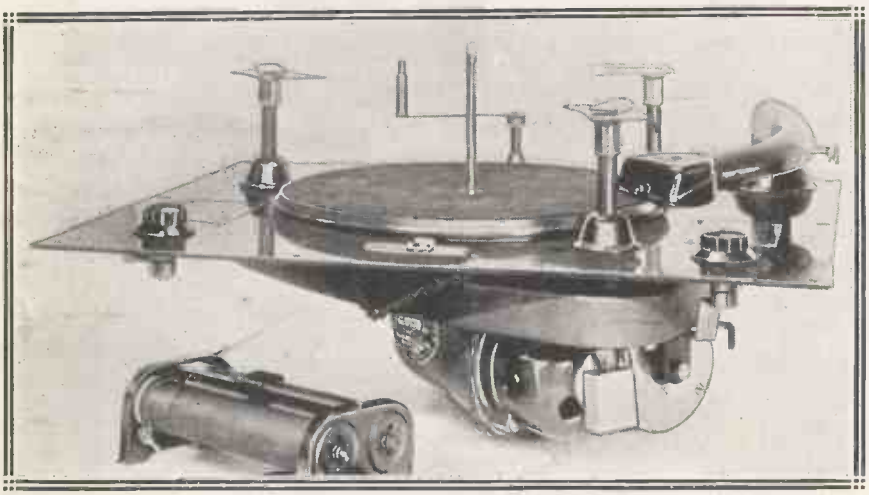
The ganging up of tuned circuits seldom bothers the home constructor to any serious extent nowadays; coil assemblies are very accurately matched by the manufacturers so that in almost every case it is only necessary to connect the coils to a suitable gang condenser to obtain perfect tuning on both wavebands.

Cases do occur, however, where a carefully found setting of the trimmers for the medium waveband is found to be very unsuitable on the long.

Trimming Discrepancies

Especially is this the case with superhets, where a very slight discrepancy will prevent the correct intermediate frequency being obtained, with the result that the set whilst working perfectly well on one waveband, is completely dumb on the other.

The best way of tackling this state of affairs is to find out in the first place whether the faulty coil is tuning too high or too low.



For this purpose it will be necessary to trim up the receiver very accurately on the medium waveband and to note carefully the position of the trimmers on this setting.

Now turn over to long waves and re-trim for this band.

You will find that it is only necessary to alter one trimmer in order to get the correct adjustment, for it is extremely improbable that more than one of the coils is inaccurate in its matching.

You must carefully note whether you have to increase or decrease the capacity of this trimmer.

If it is necessary to *increase* the capacity, it means that the inductance of the faulty coil is *less* than that of its fellows.

And vice versa.

If it is an easy matter to gain access to the coils the neatest and most satisfactory means of curing the fault is to add or remove a turn or two from the faulty coil; two turns one way or the other to the long-wave coil will almost certainly be sufficient, and although it is a rather ticklish job it is infinitely more satisfactory than loading the coil with exterior turns, or joining an extra trimming condenser across the dud coil.

Automatic record-changers appear to have come to stay. From the point of view of the gramophone enthusiast there can be no doubt that they are extraordinarily useful, and they have opened up a really new field in home entertainment.

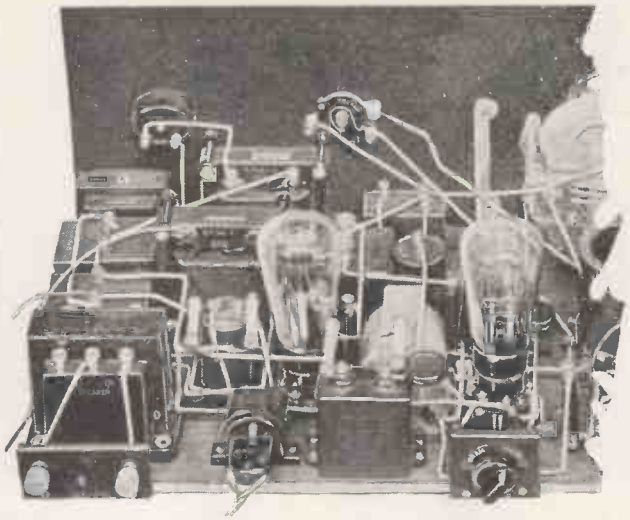
These sentiments are not shared, however, by service engineers whose job it is to investigate and correct their mechanical delinquencies.

In the early days of automatic changers, it took anything up to three hours to remove the mechanism from the cabinet, and a similar time was required to return it on the completion of repairs.

If you add to that fact, that not one service man in ten knew anything about the mechanism you will get some idea of the reasons for their unpopularity amongst technical folk.

D.C. MAINS

are often capable of providing surprising faults (as told in the accompanying article), and in a great number of cases the trouble is due to some outside cause. Our contributor also discusses automatic record-changers and warns the inexpert against making alterations or adjustments to this type of mechanism.



Difficult to Service

Incidentally, I remember attending a lecture on the functioning of record-changers which was supposed to be elucidating; all I remember about it is that the presiding "expert" gave us continually one piece of information—"this 'ere screw goes in this 'ere 'ole!"

So you will appreciate that we were all very much in darkness as to the whys and wherefores in those early days.

Most of the gloom has now been dispelled, but the time required for even minor adjustments is still very high.

This is largely due to the inaccessibility of various parts, which, in turn, is due to the necessity of cramping all the working parts into the smallest possible space.

(*Continued on page* 276.)

TIME FOR A CHANGE!

In spite of such drastic modern innovations as the metal chassis method of assembling sets, most home constructors feel a sneaking preference for the panel-and-baseboard receiver. There is, though, in our contributor's opinion, need for fresh developments not so far met by recent changes of fashion, and you will find he has a refreshing outlook on the neglected matter of receiver layout.

By P. WOODWARD.

IN the very early days of radio we used to build our sets on large ebonite panels which we subsequently mounted horizontally like the lid of a box on top of something which, in the innocence of our hearts, we called a cabinet. Just occasionally we varied things by mounting the panel in a sloping fashion, but for the most part we put up with the inconvenience of the horizontal position and cultivated flexible backs in order to be able to lean well over and see the tuning dials.

Advance America

For years we did these things, and then there came a development from across the Atlantic which seemed to inaugurate a new era of vastly better layout and more efficient wiring. We called this new system the American method of construction, and the reader has probably guessed by now that it was none other than the vertical panel and the horizontal baseboard plan which has kept the amateur under its iron rule ever since.

It was certainly a great advance on the crude system which it supplanted, for, by arranging our components in two planes like this, we were enabled to get much better electrical grouping and much shorter and more direct wiring. It cannot be denied that our sets became more efficient as a result, though this is a point which is apt to be lost to sight in the welter of circuit and valve development which began at about the same time.

Truth About Layout

Although a deal of nonsense has been talked about the influence of layout on the performance of a receiver, it must be admitted that there is a good deal of truth in the contention that it has a great bearing on the efficiency of, at any rate, all sets using H.F. amplification. We must therefore give the "American" method of construction credit for giving us a definite lift-up in the performance of at least our more elaborate sets.

A BETTER WAY

The inclusion of the complete receiving equipment in one cabinet is a method of set construction which immediately secured many enthusiastic adherents on its comparatively recent introduction to home constructors

The idea was good, too, in that it also made set building very much easier by permitting the majority of the components to be mounted on soft and kindly wood instead of the hard and splintery ebonite which embittered our souls in those far-off days. Who that ever experienced it will forget the miseries of the struggle to attach the components with screws and nuts passed through holes which never *would* get themselves correctly placed in those wretched panels!

Step Forward Now Due

The so-called American system certainly earned our gratitude in giving us emancipation from those trials of patience, and making our sets more efficient, but is that a valid excuse for the slavish way we have clung to it ever since? I submit that it is not, and that the time has come to try to free our minds of ingrained habits of thought and see if we cannot take another step forward.

The panel and baseboard system has now been in almost universal use for a matter of eight years or more, which is no doubt a fine testimonial to its merits. All the same, it seems to me obvious that no one idea should hold sway for so long a time in such a rapidly progressive science as radio.

It is true that various attempts have been made to depart from the system, but they have met with very little real success, and the reason is not far to seek. It is simply that the alternative schemes proposed have not really been suited to amateur needs and so have not caught on with those whom they were meant to please.

The Metal Chassis

For example, well-meaning people have tried to get the home constructor to use the chassis system of assembly which is so universally employed in commercial work. It was argued that what was admittedly good for the highly developed commercial receiver of to-day must also be an improvement for the home-built set; but it was forgotten that there is a tremendous difference between the mass

The Ideal Layout Closely Follows the Circuit Diagram

EARLY PRINCIPLES

The first home constructors mounted all their components on an ebonite panel which formed the lid of a box dignified by the name of "cabinet."

production of thousands of sets to the same rigid design and the building at home of a single instrument under conditions which make it essential to be able to work in as many as possible of a varied stock of accumulated parts.

Those Old Components

Under these conditions the complete inflexibility of the metal chassis method is often a heavy handicap. Any departure from the exact makes and types of components for which the chassis was originally intended will inevitably involve the unlucky constructor in all sorts of makeshifts and extra chassis drillings, and he will quite likely find at the end of his labours that he has been driven into such drastic alterations of the designer's layout that he feels very doubtful of the efficiency of the resulting instrument.

I do not want to give the impression that the metal chassis method has no legitimate place in home construction, for it undoubtedly has certain limited applications. What I do maintain, however, is that it does not hold out much hope of providing us with a universal system to replace the panel and baseboard method of assembly.

In Different Planes

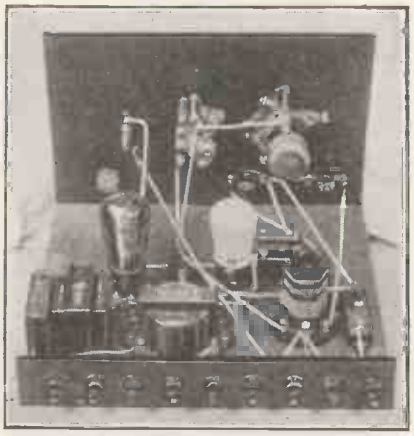
A more hopeful scheme would appear to be the raised wooden baseboard sometimes seen, which has the obvious merit of providing us with two surfaces for the mounting of our components. This extension of the principle of increasing the number of planes on which we can arrange the parts of a set is obviously sound, but I suggest that it does not go nearly far enough to meet the need for a really far-reaching development.

I believe that the time is ripe for a determined effort to be made to extend the principle still further, and devise a system which will enable us to build our sets still more closely in accordance with the ideal layout of a circuit diagram. We have stagnated too long, and we shall not get much farther in the direction of the ideal set until we tackle the question of construction from an entirely new angle.

Extend the Idea

This is a problem we can all help to solve, for the man most likely to hit upon the better method we all want is the experienced constructor who has always formed the backbone of the amateur movement.

A STEP FORWARD



A great advance in amateur construction technique was signalised by the advent, some eight years ago, of the "American type" panel and baseboard layout, which has held sway ever since.

Just what direction is the most promising in which to try to proceed it is a little difficult to say, but it seems to me that we should concentrate on the idea of an increase in the number of planes available for the accommodation of the components. If the step from one plane to two was so beneficial, why not try three or four? This, of course, is just what the commercial designer often does with his relatively complicated chassis, with its various surfaces for the placing of the parts, but what we home constructors want is something which will give us these same advantages in a form suited to our conditions.

That it would be worth while no one can doubt who has ever seen a complete set of connecting wires for a well-designed commercial receiver laid out for inspection. It is no exaggeration to say that the total length of wire involved in the case of, say, a three-valve set is no greater than the amount needed for many amateur single-valve receivers.

A Shelf Suggestion

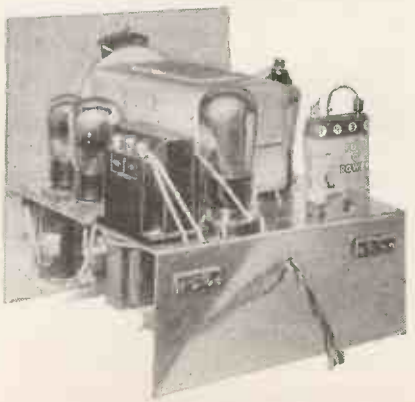
My own suggestion, given with some diffidence, is that we should consider the possibilities of a system of construction using a series of superimposed shelves, each housing, perhaps, just one valve and its associated components. The shelves would be quite small, and presumably of wood.

We might perhaps even go so far as to develop a semi-standardised series of shelves, one for an H.F. stage, another for an intermediate L.F. stage, a third for a triode output stage, a fourth for a pentode output stage, and so on, so that we could assemble complete receivers of various types merely by different combinations of standard shelves. Thus, a new set might consist largely of shelves taken from the old instrument, with just one or two new ones required for the special features of the new design.

Can You Beat It?

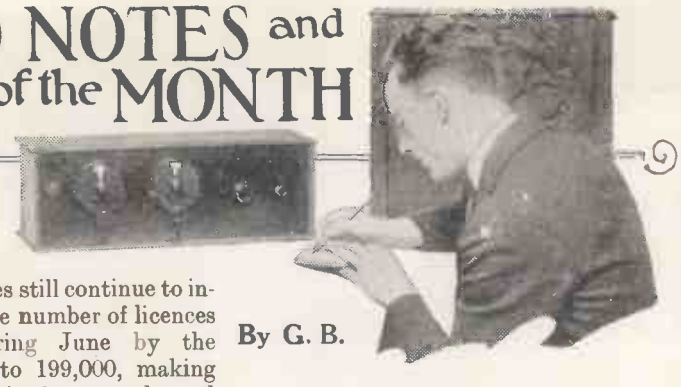
Whether such a system would appeal to the constructor as much in practice as it does to me in theory I do not know, but it would certainly make the building of a new set a much easier, quicker and cheaper process. The idea as I have outlined it is probably crude, but it seems to me sufficiently promising to be worth a trial. Will anyone help, or perhaps suggest something better?

MODERN PRACTICE



The modern tendency is for home-built sets to imitate commercial methods by employing metal chassis assemblies. Is it really suited to the amateur's requirements?

RADIO NOTES and NEWS of the MONTH



By G. B.

LICENCE figures still continue to increase. The number of licences issued during June by the G.P.O. amounts to 199,000, making the total number in force at the end of the month 5,598,000.

To Visit Sweden

I hear that Val Gielgud, the B.B.C. Director of Dramatic Productions, and brother of John Gielgud, the famous actor, is going to Sweden in September to make an intensive study of radio play production methods in that country.

In Search of Ideas

Henry Hall is another B.B.C. departmental chief who is going abroad to get fresh ideas. Henry sails for America on August 26th, and when he lands he intends to give American broadcast dance music the "once over."

Henry will also be pretty busy during the Radio Exhibition at Olympia. He and his band will appear for the first time in public at the variety performances in the big concert hall. There will be plenty of stars to see at these performances, including Norman Long, the Houston Sisters, Flotsam and Jetsam, Clapham and Dwyer, Julian Rose, etc., etc.

Our Stand is No. 11!

By the way, you will be reading this copy, I hope, on the opening day of the Exhibition. Don't forget to pay it a visit, and also don't forget to pay us a visit at our Stand, No. 11. The Exhibition will close on August 24th.

Reduced Royalty Fees

An agreement of considerable importance to the wireless trade and the general listener has been concluded by the British Licensing Pool (which consists of the British Thomson-Houston Co., Ltd., Electric and Musical Industries, Ltd., Marconi's Wireless Telegraph Co., Ltd., Standard Telephones and Cables, Ltd., and Western Electric Co., Ltd.) and the Radio Manufacturers Association.

A new form of agreement is to be offered by the Pool to certain manufacturers and, briefly, it means that royalty charges on patents held by the Pool will be reduced. The standard royalty will be 2s. 6d. per valve on sets and 1s. 3d. per valve on kits with a rebate arrangement.

This should mean that set manufacturers will find it more economical to produce multi-valve sets during the forthcoming season, for until quite recently the valve royalty on commercial sets was 5s. per valve. Purchasers will certainly get better value in the way of improved circuits and extra refinements, and the new arrangement should also do a great deal to enhance the possibility of all forms of multi-valve sets, especially the super-heterodyne.

(*Continued on page* 267)

RADIO NOTES AND NEWS OF THE MONTH

—*continued from page 266*

Increased Power

Eight German stations are to have their power increased as the result of the new Lucerne Plan. Königs Wusterhausen is to have its power raised to 150 kilowatts, and Munich, Langenberg, Berlin (Witzleben), Hamburg, Stuttgart, Breslau, and Heilsberg are all to be increased to 100 kilowatts.

In fact, a plan of reconstruction will begin in Germany in December this year. The present power of Munich, Stuttgart, Breslau and Hamburg is 60, 60, 60, and 1·5 kilowatts respectively; but in December these stations will go up to 100 kilowatts each.

Droitwich Also?

When the new British National long-wave station at Droitwich was planned, the power of the station was fixed at 100 kilowatts, but I hear it is quite likely that the power will be increased to 150 kilowatts.

The Woman Announcer

Why all the fuss in the newspapers about the appointment of a woman announcer? The B.B.C. maintains that it dislikes publicity of a personal character, and yet everything seems to have been done to enhance public interest, and to arouse Fleet Street curiosity in the appointment of Mrs. Charles Borrett.

Although the lady refused to give interviews when Press men tracked her down, it wasn't long before all relevant details were available to the Press.

One journalist in an evening newspaper described her as young, tall, and slender, dark haired, elegant in manner, and friendly. This, maintains the reporter, gives the average reader a good idea of what the new Queen of the Air looks like.

Anyway, it was certainly a good move on the part of the B.B.C., because, however good the announcers may be, there are times when one feels like switching over to Rome to hear the voice of the lady announcer there who seems to get more humanity into her broadcast announcements than any other announcer on the air to-day.

On What Authority?

According to the Sunday Express, 14,000 people are using television sets against hardly any six years ago. I should like to know where these figures have been obtained from, for, as readers of MODERN WIRELESS know, we have been trying to persuade the Baird Company or the G.P.O. to reveal these figures for years past.

IN PASSING

—*continued from page 248*

out. Mr. Dunstan found a note on his table, reading:

"You will die at ten, this night." It was signed, "Peter Uniter."

Mr. Dunstan, under the influence of drink, thought this a huge joke and imparted the fun to his pals, who roared with glee. Quite like a bit of Edgar Wallace, they said.

"Ha! Have a drink," said Mr. Dunstan. "Have some bu-bottled beer."

"Whisky for me," laughed Bill Newham.

"Got a drop of bubbly?" asked Graham.

"Bottled beer! I hate it!" said Revenga. "Water, please."

"Well, boys," said Mr. Dunstan, "here's how! I die at ten. It's five to. Drink up."

"Why not die to music?" said Revenga, lifting his glass.

"Goo' idee! Lemme out on radio," said Mr. Dunstan, and he lurched into his sitting-room.

"Gentlemen," said Revenga, "let us drink to the dear departed."

Mr. Dunstan seemed to tarry. As his friends waited and listened, there was a thud as of a falling body.

"Let me go," said Revenga, and went to see.

Mr. Dunstan was dead. Revenga called the others and became busy.

"Look," he said. "He has died of poison gas. The clenched teeth, the purple froth! Let us investigate. Ah! Look! The wireless receiver! There is a ten-volt battery for two-volt valves. One of these 'valves' exploded when he switched on the set. It released a gas called *murine*—deadly, instantaneous."

"But why didn't *we* breathe it?" gasped Newham.

"Because I released a syringe full of a neutralising gas."

"But why—how did you know?"

"I did it all. I put the valve there, In fact, I killed him as he killed my father. I am Peter Uniter."

And before they could act, Peter Uniter had vanished.

E.B.

AT THE RADIO SHOW IN THE GRAND HALL

—*continued from page* 187.

lators and rectifiers covering all requirements from those of amateurs to those of large broadcasting equipments.

Stand 55

MULTITONE ELECTRIC CO., LTD.

The Multitone firm, famous already for transformers of all kinds, have taken advantage of Q.P.P. and " Class B " to provide a new range of components with the most modern characteristics.

The " Class B " driver transformers are especially interesting in that they have been specially prepared for various makes of output valve, while the " Puchoke " is ideal for matching any loudspeaker to " Class B " output.

Also on this stand will be found the Multitone " Class B " converter, which is a plug-in unit suitable for almost any battery receiver.

Despite this concentration on " Class B," the Multitone tone control transformer has not been neglected and will have a prominent place on the stand.

Stand 107

NEW LONDON ELECTRON WORKS, LTD.

A firm which specialises in one branch of radio activity has a good chance, provided its products are good, of becoming famous.

At the same time, it might be thought difficult, perhaps, to become famous for specialising in nothing but aerials and earths! The New London Electron stand will show you how this has been done.

The already popular " Superial " and full-copper aerials will be on show in all convenient lengths, together with copper earth wire.

In addition, the screen aerials and the fire screen aerials will be worth looking at, while most attention will probably be centred on an entirely new line introduced for the first time at Olympia—the " Varial," Electron's variable aerial. We will not tell you what this is, for you will enjoy finding out for yourself!

Stand 123

OLDHAM & SON, LTD.

The Lively " O " has made its mark among set owners as a reliable and efficient source of L.T. or H.T. power, and its appearance at the Radio Show is always greeted with interest. This year a number of improvements in Oldham batteries have been made, and these are specially apparent in the realm of H.T. accumulators.

The glass jars of this type of battery, whilst retaining their advantageous 2-volt assembly features, have been rendered as rigid as monobloc construction, while not losing the advantages of the 2-volt assembly and the air-spacing. In addition the filling plugs and end terminals have been redesigned, the plugs being of the screwed cap variety and the terminals of screw-on pattern.

A new insured life scheme covering all the radio accumulators is of particular interest, for it covers the users for periods of two or two and a half years, dependent on the type of battery in use.

Stand 99

THE ORMOND ENGINEERING CO., LTD.

So many new lines have been introduced recently and at the Exhibition to the Ormond catalogue that it is with the greatest difficulty that we can pick out examples without leaving unsaid many things we would like to say. The variety among the

(*Continued on page* 269)

AT THE RADIO SHOW IN THE GRAND HALL

—continued from page 268

variable condensers is, perhaps, naturally most striking, for we have choice here of anything from a single slow-motion condenser to the latest screened gang type; but in the ranks of the loudspeakers we have almost equal variety, for we can choose plenty of models between a moving-iron loudspeaker unit and the very attractive cabinet moving-coil speaker which is sold for something under £3.

The number of different loudspeakers that are offered will surprise visitors to Olympia, or those unfortunately unable to attend who write to the makers for a complete catalogue. We believe there are something like twenty-five various types and models from which to choose, so that the loudspeaker section is well catered for.

Stand 92

OSRAM VALVES

Catkin valves, as one might expect, make a goodly show on this stand, and a most interesting exhibit it is with its detailed illustrations, dissected valves, and the large numbers of the various types of the all-metal valve that are now available.

The ordinary glass envelope valve is not neglected, however, for there are still large quantities of these on the market, and in many types the Catkin has not yet arrived to take their place. We thus have a full range of battery valves of the glass types, with a large percentage of the mains types of heavy wattage valves, and rectifiers in the same types of containers. But we can safely say that the all-metal Catkins will be the ones that attract the crowd.

What is the latest development? We are not going to let the cat out of the bag here, for it is a very late arrival indeed and will arouse considerable interest among all set users. The valve designers keep on surprising us, and the last few months have seen some wonderful advances in valve technique.

Stand 73

PYE RADIO, LTD.

Among many of the manufacturers of complete sets the coming season is to be a superhet one, and Pye are making a bold bid for big sales in this

(Continued on page 270)

AT THE RADIO SHOW IN THE GRAND HALL

—continued from page 269

direction. At Olympia they are showing a full range of supers, for A.C. and D.C. as well as battery drive, the sets covering every possible need.

There is the " Q " series of transportable sets, the Pye radiogram for battery operation, using Q.P.P., the three 3-valvers which are available for A.C., D.C., or battery operation, and the Pye " MM " receiver, with its complete transportability and purity of reproduction. Also, we should like to draw attention to the special set for school use, and finally to the big pieces of the year, the " S " superhet and the four Pye radiogramophones, which operate on mains, and are in addition to the battery model already mentioned. A full list, my masters!

Stand 79

RADIO GRAMOPHONE DEVELOPMENT CO., LTD.

High-class complete radiogramophones have for several years maintained R.G.D. in a place of high renown in the radio industry. All their sets are carefully designed from the point of view of performance, not price, and the public is rapidly realising that from every aspect, electrical, mechanical, and artistic, R.G.D. have certainly got it.

Automatic record-changers are incorporated in many of the designs, while superhet radio reception is utilised throughout. The " hottest " radiogram of them all is the type 901, which contains nine valves with delayed A.V.C., and a push-pull output stage capable of giving an undistorted output of 6 watts.

Stand 41

RADIO INSTRUMENTS, LTD.

The main features of the coming season's Radio Instruments apparatus are the new " Madrigal " receivers and radiogramophones. For instance, there is the " Madrigal " superhet radiogramophone, which incorporates amplified automatic volume control and a control of tone which will be welcomed by its purchasers. The gramophone side includes a high-class electric motor with automatic stop, and a specially chosen pick-up.

A smaller mains set is the three-valve " Madrigal," which is a table model using iron-cored inductances which have been developed during the last few months specially for this set, and the battery receiver which accompanies it. This latter is a four-valver employing " Class B " amplification.

The energy that the famous transformer makers have put into the complete receivers has not taken their attention away from the components for which they are so justly popular. R.I. transformers have always been in the forefront of radio design, and a wonderful range of types is to be seen at Olympia. The latest addition to the R.I. transformer family is the " Auto Parafeed," which is as striking in appearance as it is in price.

New designs for Westinghouse rectifiers have been produced, and these, too, are to be seen on the stand. Smoothing chokes have also received a great deal of attention, and a notable example is the re-designed and improved " Audirad " which is reduced in D.C. resistance and carries several important modifications.

Stand 44

REPRODUCERS & AMPLIFIERS, LTD.

A very useful range of moving-iron and moving-coil loudspeakers is listed by R. & A. at prices from 21s. to round the 70s. mark. The former is the moving-iron type, which is remarkable in its possibilities, the armature being of the four-pole type. It is notable for its low note response.

The next in the range is the " Bantam," a moving-coil P.M. speaker at 27s. 6d.; while a step higher we come to the famous " Challenger," which retails at 35s., and is, an excellent speaker produced in five different models. These cover every requirement from universal to Q.P.P. and " Class B."

The fourth of the series is the large " Victor," which costs 70s., and is, as the others, of the permanent-magnet type. It is particularly strongly constructed with a metal shield over the diaphragm which protects it and strengthens the whole structure at the same time.

Stand 32

SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD.

An imposing array of batteries is being shown on Stand 32, where the main feature is naturally the range of " Full O'Power " radio batteries. These batteries are of unusual design, and require special manufacturing plant, the normal machinery used for making batteries being unsuitable, so that they are by no means ordinary in their conception!

There are four types of " Full O' Power " batteries, the " Cadet " type, which is designed to provide 6–7 milliamps.; the " Standard," giving 10; and the " Power," for 10 to 20 milliamps. Finally we have the " Super Radio " battery, capable of providing 20 to 30 milliamps.

With " Class B " so firmly fixed in the public eye it will perhaps save a great deal of questioning if we state here that for " Class B " sets the " Power " type battery is recommended by the makers, and is also capable of giving steady economical power for amplifiers of the push-push type.

Stand 101

SOVEREIGN PRODUCTS, LTD.

Among the new lines just introduced by Sovereign Products is a remarkably low-priced " Class B " transformer and accompanying output choke. The transformer can be obtained in two types: " C " for use with a specific valve, and " Multi ratio " which is suitable for several makes of " B " valve. The prices are 7s. and 9s. respectively.

The output choke is of the universal type and costs but 7s. It has output ratios of 1, 1·5, and 2 to 1.

A complete range of new mains units is to be obtained from the same firm, including a D.C. unit for 15 to 25 milliamp. output, and A.C. models covering 14, 20, and 30 milliamps. All can be bought for cash or on hire purchase agreements.

Finally we must mention the mains transformer which is being introduced. It is designed for " A " type rectifying valves, and caters for a rectified output of 60 milliamps. at 250 volts.

Stand 98

TELEGRAPH CONDENSER CO., LTD.

One of the most interesting devices to be seen here is the new anti-interference unit designed to eliminate mains noises. It consists of condensers and fuses, the former being specially constructed for mains working, and the latter conveniently arranged for replacement, should that be necessary.

Other exhibits include a full range of small condensers, mica and paper constructed condensers, and a variety of dry and wet electrolytics. Among these visitors should look out for the small tubular dry electrolytic which is intended for use in mains set grid-bias circuits.

Examples of high voltage transmitting condensers up to 80,000-volts test can be seen, so that the whole stand is packed with interest to every home constructor.

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AT THE RADIO SHOW IN THE GRAND HALL

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An interesting and valuable feature concerning T.C.C. condensers that is little known is the fact that a twelve-months' guarantee of dependable service is given with every one. This is an expression of faith in the components that should be recognised by all constructors.

Stand 88

TELSEN ELECTRIC CO., LTD.

A very large range of new Telsen components is being introduced to the public for the first time at Olympia. They cover practically every requirement of the set builder from mains units and chargers to transformers, coils and valveholders.

There are at least two different mains unit designs, one for D.C. and one for A.C., the latter incorporating a trickle charger.

High voltage electrolytic condensers are a new venture for Telsen, and they are now available in two working voltages, 275 and 500, and in 4-, 6- and 8-mfd. capacities. A very useful feature of these condensers is the special bracket that allows them to be mounted on any baseboard or chassis.

A range of resistors with wire ends mark another new departure, and very wide ranges of resistances can be obtained in either ·5, 1 or 2-watt ratings. Starting at 250 ohms, the resistances go up to 500,000 ohms in the cases of the first two mentioned wattages, and to 100,000 in the 2-watt types.

Iron-cored screened coils are also to be seen on this stand, and they are available in single, dual or triple matched units. They are versatile in their uses, and follow closely the universal character that was obtained by the air-core Telsen canned inductances.

"Class B" has not been forgotten, and driver and output chokes for "Class B" amplification are among the amazingly comprehensive component list Telsen have just issued.

Stand 85

VARLEY (OLIVER PELL CONTROL), LTD.

Only a few years ago Varley set the world of radio talking about their Square Peak band-pass coils. Now they will be again in the limelight with the Nicore tuning coils, iron-cored coils employing a dust alloy that has been perfected by Varley.

Permeability tuning, too, has been carefully investigated by this energetic firm, and readers of MODERN WIRELESS may have seen the striking article in "Popular Wireless" a few weeks ago, where the construction of the first set to employ permeability tuning was described.

A new radio gramophone with automatic volume control is among the complete sets that are being exhibited, while new components are to be found in all branches of radio reception. Coils, transformers, chokes, superhet parts, all number newcomers among their ranks, so it will be seen that Varley have been far from idle during the past twelve months.

Stand 105

VINCE'S DRY BATTERIES, LTD.

A good name to give the batteries made by this London firm: "LION." It indicates well the power and punch behind the firm, and beneath the label on their products.

But if the aims of Vince's Dry Batteries, Ltd., are high, their prices are remarkably low, and dry H.T. batteries of 60 volts can be obtained for the remarkably low figure of 4s. 6d.,

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AT THE RADIO SHOW IN THE GRAND HALL

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while the special 108-volter costs but 8s., and the 120-volt battery, the largest available, is priced at one shilling more.

Grid-bias batteries, torch cells, and a variety of other sources of power are similarly listed.

Stand 32

THE WESTINGHOUSE BRAKE & SAXBY SIGNAL CO., LTD.

Naturally, the principal items on the Westinghouse Stand are H.T. and L.T. rectifying units and the recently introduced "cold valve," the Westector. The new H.T. units H.T.12 and H.T.13, are on view for the first time, the former superseding the old H.T.6 and H.T.7 and giving an output of 30 milliamps at 200 volts.

The H.T. 13 is a special unit for high-tension supplies for Q.P.P. and "Class B" receivers. It has uncommonly good voltage regulation and provides ample power.

Battery and mains superhet receivers designed by Westinghouse are on view to show the practical applications of the famous Westector rectifier. An interesting feature in these designs is the fact that the last intermediate frequency amplifying valve is used as the first L.F. valve when the set is switched over for the reproduction of gramophone music.

The battery version, moreover, uses two Westectors, the second acting as a battery economiser. With a maximum undistorted output of 1,100 milliwatts the standing current of this set's output stage is only 2 milliamps., while the mean operating current is round about 12.

Stands 128 and 129

WHITELEY ELECTRICAL RADIO CO., LTD.

For many years famous for reliability, whether in the design of small apparatus like valve holders or the manufacture of more imposing pieces of gear like loudspeakers, W.B. have again a number of surprises to be launched at the Radio Exhibition.

This time they come in the "Class B" components and the new designs of loudspeakers. All the W.B. permanent magnet loudspeakers (moving-coil types, of course) include an entirely new feature, which at the time of writing we are not able to disclose owing to the patent situation. But we can say that all the W.B. speakers at the show which incorporate the new feature will be designated as W.B. "Microlode" speakers, and readers who go to Olympia will be able to pick out for themselves the special feature that is the secret of their success.

Going from the large to the small, we must mention the new change-over switch which can be obtained in one, two, or three-way type. Nickel-silver contacts are used in its construction, while the structural design is particularly ingenious, though quite unconventional.

Stand 20

WILKINS & WRIGHT, LTD.

"Utility" is the trade name of this firm, and if ever a name were founded on fact this one is. All the parts made by them are reliable and well constructed, and much ingenuity has been exercised in their design.

One of the most useful component ideas that has made its appearance for some time is the combined reaction condenser and volume control, and a well-made example of this is to be found among the new Utility arrivals.

A new version of the famous straight-line condenser scale is to be seen, and a new slow-motion drive, known as the Micro-Disc Dial, is worth close inspection. It offers a very smooth reduction gear drive of a ratio round about 50/1, and absolutely no backlash is among its claims.

Stand 93

WINGROVE & ROGERS

A new range of Polar variable condensers marked the arrival of August, and the types it includes are to be seen at the Radio Show. The range is an additional one to the famous Polar Star condensers, and is known as the "Star Minor." It covers all the various types of ganged condensers that are likely to be required, and in addition there are a number of different drives available either with the new condensers or separately.

Three full-vision drives are now available, as well as a moving-scale drive which should be very popular. The full-vision drives are well arranged to give both wavelength and degree readings, and they are obtainable in semi-circular, or horizontal shapes, or as an arc.

The popular Polar designs of the Compax, Differential, Aperture and Preset condensers are being continued, and the new ranges are additions instead of being replacements, so that the choice offered to the constructor among Polar components is indeed vast.

AT THE RADIO SHOW IN THE GRAND HALL

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Stand 1

WRIGHT & WEAIRE, LTD.

Very original design characterises the Wearite new Nucleon iron-cored coils which are being introduced at the Radio Exhibition. They are well made and contained in attractive screens, with the terminals placed conveniently along the sides.

New models of the disc type power transformers, too, are to be found, covering an extensive range of output requirements. Nowadays it is no easy matter to cover the possible needs of the home-constructor in regard to power output of transformers, for beside the many valve types of rectifiers one has to cater for the dry rectifier, with its special demands on the transformer designer. But Wearite have covered the ground excellently, as those who study the stand at Olympia will no doubt agree.

Stand 1 is well worth a prolonged visit, for on it are scores of most interesting components, and the home constructor inevitably feels that here indeed is a veritable radio Utopia.

Stand 68

DUBILIER CONDENSER CO., LTD.

Condensers and resistances naturally form the mainstay of the Dubilier Condenser Co.'s display. Although no new condensers of mica-dielectric types are shown, there are several new introductions in the paper type.

A completely new range in cylindrical form has been introduced, and these are provided with a patented fixing device.

Improvements have been made in the Electrolytic Condensers, and there is a new range of low-voltage electrolytic condensers on show.

So far as resistances are concerned little change is shown externally, but we understand improvements have been made internally which make Dubilier resistances even more desirable.

An interesting exhibit is provided by the sets of resistances that are sold for preventing ignition interference when radio is employed on a motor-car.

SHOWING ON THE GALLERY

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Stand 213

SOUND SALES LTD.,

Among the first with Q.P.P. and "Class B" components Messrs. Sound Sales, Ltd. are still in the forefront of design. They are invariably hot on the track of new things, and this is well exemplified by the special transformer that they have designed for the operation of cathode ray television receivers from the mains.

As a matter of fact a television outfit with the Sound Sales transformer is to be seen at Olympia, following closely the arrangement described by our contemporary "Popular Wireless" a few weeks ago, and to be seen on our stand.

Another up to the minute idea is the Pentone combined oscillator and detector unit to provide immediate conversion of an ordinary receiver to an up-to-date superhet. In addition, a full range of "Class B" components is to be seen, and a very fine range it is.

Stand 228

C. A. VANDERVELL, LTD.

The power supply to a battery-operated receiver is one of the most important factors in the success or failure of the set. This is fully recognised by C.A.V., the well-known manufacturers of L.T. and H.T. accumulators, and their stand is thick with ideas for supplying reliable energy to sets of all sizes and types.

From the tiniest two-valver to the large receiver requiring large anode current C.A.V. have batteries that will suit the task perfectly. H.T. cells capable of being built up in 10-volt units and having capacities of up to 5,000 milliamp. hours readily solve the problems of H.T. supply for the largest of battery driven multi-valvers.

But wet cells are not the only products of this firm that will interest callers at the stand. There is also a goodly array of dry H.T. batteries and of jelly electrolyte L.T. accumulators.

We have not the space to give but the briefest details of the exhibits, but what we have written will give a good indication of the vast scope covered, and a visit to their stand at Radiolympia, or a post-card to the firm, will result in the fullest possible details being provided to all who require them.

FREQUENCY FAKING

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exact location of this upper cut-off point has been the cause of much argument among the pundits, but it seems to be more or less accepted now that it should be somewhere in the neighbourhood of 5,000 cycles.

It is not argued that *perfect* reproduction can be got with a cut-off fixed as low as this, but that the best compromise available under present conditions is thereby obtained. This really means that the very slight gain in quality which would result from a higher cut-off would be much more than off-set by the increase in heterodyne and other types of interference which accompany it in the case of a long-distance receiver.

Adjustable Cut-Off

My own personal preference is for a cut-off adjusted to begin at about 7,000 cycles, because it so happens that my ear is sensitive to the presence or absence of the upper harmonic range. To me it is worth while to put up with a little extra noise in order to get a better rendering of these higher frequencies, but I know that many people will not agree with me.

It is very much a matter of the characteristics of the individual ear, and it would seem that an adjustable cut-off point would be a desirable refinement in long-distance sets. One could then set the control to suit not merely one's own ear, but also the presence or absence of interference on any given station, and so make the very best of every transmission. A dream, perhaps, but a little nearer to realisation than many people imagine, I fancy.

The circuit commonly used to obtain correction of the type we have been considering is shown in Fig. 4. It is really very similar to the simple composite arrangement of the previous case, the difference being that instead of a simple inductance in series with the resistance we have an inductance shunted by a condenser which tunes it to a frequency of perhaps 4,000 cycles.

The impedance of the tuned circuit thus formed is quite high for a considerable range of frequencies on either side of the actual resonant point. Consequently, the total impedance of the coupling circuit rises to a higher value over just that range of frequencies which we desire to boost up, and drops back to a comparatively low figure again for the higher frequencies which we do not want, hence the upper cut-off effect which has been mentioned. Actually the fall in the impedance is a good deal sharper above the resonant point than it is below, so that we get the desired effect of a gradual rise in amplification up to the point of tune and then a fairly sharp cut off.

H.F. Choke Used

For the inductance the very high wavelength type of H.F. choke is commonly used. Those who desire to try the method will find that the makers of many such chokes can tell them what capacity of tuning condenser to employ to cause the choke to resonate at any desired frequency.

We have now dealt with the partial suppression of bass and of the higher frequencies, and the boosting of those same upper frequencies, and it only remains to explain how the bass can be in its turn boosted in case of need. This is not often required nowadays, but occasion does sometimes arise, so it is as well to be prepared for it.

There are two principal methods, of which the first is by far the most effective, in that it can be made to give a very big boost indeed. This consists in the use of a resistance-fed transformer with the capacity of the coupling condenser so adjusted that it takes the primary to a point in the range of bass frequencies which we desire to emphasise. To do this we must use a condenser of perhaps only ·1 mfd., instead of the usual 1 mfd. Here again the exact value will depend upon the particular transformer, but a little trial and error work will quickly settle the matter. Many transformer manufacturers can supply data for their particular instrument on application.

For R.C. Stages

The second method is for use in resistance coupled stages, and resembles the methods of emphasising the upper range, except that we now arrange a composite coupling circuit which has a comparatively low impedance for all high and medium frequencies, and a higher impedance at the bass end. As before, we use capacity and resistance to achieve our end, these being arranged as in Fig. 5.

Here the coupling effect on all medium and high frequencies is provided by R_1, which is roughly equal to the valve impedance. R_2 has but little effect, because it is heavily by-passed by the condenser C. When the capacity of this is

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FREQUENCY FAKING

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suitable, its by-passing effect will tend to disappear on low frequencies, and so we get our rise in total circuit impedance and an increase in amplification as we go down into the bass.

In most cases a quite substantial increase in bass can be got if a condenser of ·02 mfd. is used here, but more marked effects can be had with smaller capacities, such as ·01 mfd. If only a slight bass rise is wanted, of course, a somewhat larger capacity may be used, whereupon only the very lowest frequencies will be boosted. Alternatively, if it is desired to emphasise the same range of bass notes as before, but to a lesser extent, keep to one of the smaller capacities but reduce the resistance of R_2, which should otherwise be made twice the value of R_1.

As in all tone-faking procedure, the best thing to do is always to try out some roughly suitable values and then modify by ear. It is easy enough if you take the trouble to master the simple rules I have given, so that you know what change to make to produce any particular effect. A very interesting subject you will find it, too, if I know my fellow-experimenter.

"M.W.'s" RECORD REVIEW

—*continued from page* 194

Tauber's monthly offering is exceptionally good. He sings Richard Strauss's famous *Standchen* and his *Dream in the Twilight* (Parlophone RO20222). Quite the best Tauber for some time and they happen to be two songs that one must have one day.

This company apparently specialises in tenors, for Josef Schmidt has a good record in *Mattinata* and *Santa Lucia* (R1550). Two pleasant numbers (although the second is a bit worn now), easily and capably sung in German.

Instrumental

There are two records in this section which are well worth attention. The first is a most delightful performance by the Cedric Sharpe Sextet of Elgar's *Serenade* and *Adieu* on H.M.V. B4392. Here are two of his most tuneful compositions which can be heard again and again with ever increasing pleasure.

The second is a very remarkable violin solo by Wolfi. This boy plays *Perpetuum Mobile* (Ries) and *Serenade* (d'Ambrosio). As the name of the first implies, motion is vividly suggested, and this young violinist goes through it surely and brilliantly.

The second has more of sedateness, naturally, but he is equally at home with it. The record is Columbia DX477.

And Last

The Overture to *Rienzi* by the Band of the Grenadier Guards has been re-recorded by them. It suits them splendidly; they bring to it any amount of colour; it is a fine example of the skill of our Army bandsmen, which are pretty good reasons why you should hear Columbia DX476.

ACOUSTICS AND THE LISTENER

(*Continued on page* 246)

air vibrate, and so the loudness of this frequency is reduced.

This will not be serious in small rooms, since the natural period of the air will be too high to be noticeable, but it is interesting to notice that when loud sustained notes are being reproduced, as during an organ recital, a small article, such as a vase, may vibrate so violently at one particular frequency as to cause it to rattle.

Another curious effect is the production of standing waves which occur when a continuous note, such as a "tuning-in" signal, is heard. The continuous streams of waves are reflected backwards and forwards between the walls and interfere with one another so that a definite pattern of stationary waves is produced throughout the room.

Neutralised Waves

In some places the waves neutralise one another, and the signal is very faint, but in other places the waves assist one another and the note is much louder. Hence when listening to notes which persist for some seconds the sound will depend upon the position of the listener in the room, and, in fact, the sound heard by one ear will be different from that heard by the other.

This can be usefully employed when an annoying heterodyne whistle is being experienced, for by moving the head a position can usually be found in which the whistle sounds very faint.

FAULTS I HAVE FOUND

—continued from page 262

If you are ever tempted to make any adjustments to your own record-changing mechanism, my advice is to "gang warily!"

Some of the operations and functions are more or less obvious to anyone with a mechanical turn of mind and can be tackled quite safely, but the simplest form of "meddling" can very easily be disastrous.

"Let Well Alone"

As far as these mechanisms are concerned, the best policy is "let well alone!" and, in the event of a breakdown, for heaven's sake, don't ask the local garage to try to repair it.

Even "old hands" at the fault-finding game are astonished at times by the disastrous effects that can be brought about by the lack of simple precaution when testing.

To illustrate this, I give one instance that I came across recently when I was caught "napping" rather badly.

I was attending to an all D.C. mains receiver of somewhat unconventional design that used ordinary battery valves in series, the necessary voltage drop for their filaments being obtained across a large resistance, more popularly known as a "cooker."

Electrolytic Condensers

Across each of the two H.F. valve filaments was a 60-mfd. electrolytic condenser having a maximum working voltage of 12 volts D.C.

The fault in this case was simple, and I did not have to remove the set from the cabinet.

I had taken the usual precaution of removing all the valves before making the required adjustments.

On completing the job I connected up the set and switched on; there was no result and a glance showed that I had omitted to replace the valves.

I suppose everybody has made the same error at some time or another, and I was not unduly distressed by such a slight lapse.

I immediately rectified the error and switched on again.

A continued absence of any programme was the reward of my temerity, and I looked round for the cause of the trouble.

Three guesses on the part of the reader are indicated at this point!

Well, it's simple enough to guess the trouble afterwards.

When I switched on the power with the valves out of their holders, I applied the full mains voltage across the 12-volt electrolytic condensers, for there was no current passing through the circuit to drop the voltage across the "cooker."

The condensers broke down and failed to re-seal, thus placing a short across the filaments of the two H.F. valves. Hence the complete silence at the second time of switching on!

MAKING A 5-METRE RECEIVER

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rushing sound is just obtained. This is the final adjustment, and the coils should be stuck in position. It will now be found that the rushing or quenching sound is controllable by means of the reaction resistance, increasing in intensity as the resistance is controlled towards the right, and decreasing as it is turned to the left, ceasing altogether just before the "minimum" reaction position.

With a station being received it will be found that the rushing is quenched by the carrier, so that although it might be imagined from preliminary tests that the noise would be too great for telephony reception to be accomplished, the background is conveniently reduced, or even removed, when a carrier is tuned in, and the modulation is left clear of interference.

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