THE A.C. £4 SUPERHET 4

Practical and Amateur Wireless

AND PRACTICAL TELEVISION

3d. EVERY WEDNESDAY

Edited by F. J. CAMM

A GEORGE NEWNES Publication

Vol. 7. No. 167. November 30th, 1935.

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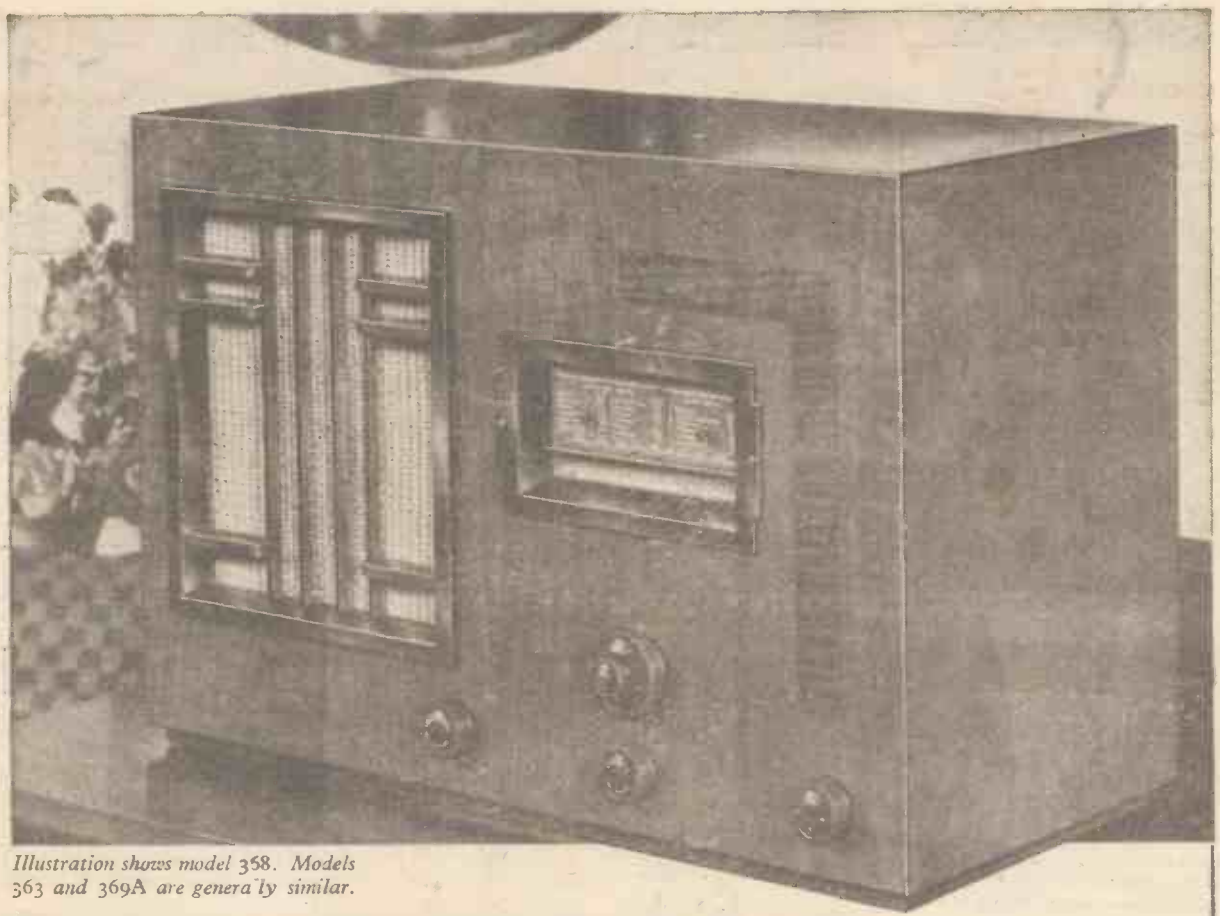

Illustration shows model 358. Models 363 and 369A are generally similar.

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Practical and Amateur Wireless

Edited by F. J. CAMM

Technical Staff:
W. J. Delaney, H. J Barton Chapple, Wh.Sch., B.Sc., A.M.I.E.E., Frank Preston.

VOL. VII. No. 167. November 30th, 1935.

ROUND *the* WORLD *of* WIRELESS

Next Week's Special Christmas Number

NEXT week's interesting big Christmas number captures and reflects the spirit of the festive season. It contains within its attractive three-colour cover a wealth of material of outstanding interest at this particular time of the year, including a special radio play which can be produced in any home; some interesting radio games; description of a special three-valve set; connecting an extra loud-speaker; how to connect a pick-up, and an abundance of other interesting matter fully and specially illustrated. Order your copy to-day!

Index and Binding Case for Volume VI

INDEXES for Volume VI of "Practical and Amateur Wireless" are now available at 7d. each by post from The Publisher, George Newnes, Ltd., 8-11, Southampton Street, Strand, W.C.2. Indexes, complete with title page and binding case, cost 3s. 6d. by post. We strongly advise all readers, whether they have their copies bound or not, to purchase an index, which will enable them to survey the contents of the past volume and to look up any particular subject without having to wade through a lot of back issues. These indexes are specially prepared for the benefit of our readers and as part of our service to them. Naturally, only a limited number are printed; make sure of your copy by ordering one to-day!

Mr. F. J. Camm's £4 Superhet 4

THERE can be no doubt that many hundreds of Mr. F. J. Camm's latest technical achievement—his £4 Superhet 4—are being built at the moment of going to press. The fact that he has at last provided readers living in swamp areas with a set which enables them to listen to alternative programmes and which gives them the selectivity to which others outside those areas are accustomed has contributed greatly to its success. Remember that it was tested beneath the aerials at Brookmans Park, and that anyone may build and adjust it. Bear in mind also that it only has three controls—tuning, volume, and wave change. Build yours now, and enjoy the best possible radio.

Reserve Transmitter for Vienna

THE authorities have installed a 5-kilowatt station at the Austrian War Office, in the capital, to act as a stand-by station in the event of a breakdown. The old 20-kilowatt Rosenhuegel transmitter has been transferred to Linz, where it is being re-erected.

Radio on the Danube

AUSTRIAN police launches on the Danube are equipped with wireless apparatus and machine-guns, in order to put a stop to the great smuggling trade which is being carried on with neighbouring states. The Central Police Station at Vienna can now, as with cars, give instructions by wireless to any motor patrol boat.

Loud-speakers Versus Bombs

ACCORDING to Paris papers the Italian Military Aviation Chiefs have decided to use loud-speakers in the near future, instead of bombs in Abyssinia. The scheme calls for the equipment of large aeroplanes with giant loud-speakers through which peaceful propaganda can be broadcast to the natives when flying over enemy territory.

Wireless Concerts in French Taxicabs

THE experiment carried out by the Paris taxicab proprietors in equipping the vehicles with radio receivers does not appear to have been very successful. Although, according to Police Authorities, this luxury has not resulted in an increased number of accidents, it would seem that the extra amenity offered has not appealed to the public.

How to Popularize Broadcasting

IN those districts of Turkey where radio is little known, the authorities are installing 40,000 receivers, which, for the period of one year, will permit the people to listen to broadcasts without paying any licence tax.

Does Away with Outside Aerials

CONSIDERING outside aerials unsightly, the City of Amsterdam has decreed that all masts or poles are to be dismantled: only those owned by amateur transmitters on short waves are to be allowed in future.

Combined Receiver and Headphones

ARPAD KISS, a Hungarian engineer, would appear to have solved this problem. Using his body as an earth, the metal frame of the headphones as aerial, the headphone cap as tuner, he listens to the local transmissions.

Sweden Cleans Up Her Network

DESIROUS of doing away with the thirty odd stations at present required for the distribution of radio programmes, the Stockholm broadcasting chiefs have submitted a plan by which adequate service could be provided by five high-power transmitters. As a start, the Hörby station is to be replaced by a 100-kilowatt station which is to be installed at Schonen (South Sweden).

Germany Adds One More

AS, notwithstanding the power of the new Munich 100-kilowatt station, certain parts of Bavaria can only secure a weak reception, a further 5-kilowatt relay station is to be built at some suitable spot towards the eastern districts; it will work on a common wavelength with Nurnberg.

Stand-by for P.T.T. Marseilles

IF, in the later hours of the evening, you tune in to 400.5 metres (749 kc/s) or between Katowice and Munich, you should hear tests being carried out by the new transmitter at Marseilles-Realtor. It will take over its duties officially at Christmas.

50 kilowatt Station at Buenos Aires

THE new high-power station, LR1, for Radio El Mundo, Buenos Aires (Argentine Republic), was formally opened on October 13th last. The transmitter now works daily from G.M.T. 23.00-04.00 on 280.4 metres (1,070 kc/s).

ROUND the WORLD of WIRELESS (Contd.)

Funbeams from Newcastle

THAT popular north-east concert party, the "Funbeams," which appears at Whitley Bay throughout the summer, is to broadcast again to Northern listeners from the Newcastle studios on November 29th.

Programmes from the Potteries

TWO programmes from the Potteries will be given on November 27th. The first is one of the series of "Midland Organs and Organists." Sydney H. Wéalé, City Organist of Stoke-on-Trent since 1919, will describe the four-manual concert organ of the Victoria Hall, Hanley, which embodies an improvement in pedal control of stops which he designed himself. Arthur Bliss, in his "Musical Pilgrimage" for *The Listener*, described the Victoria Hall as "an almost ideal place acoustically." The range and quality of the organ will be demonstrated in Mr. Wéalé's recital.

INTERESTING and TOPICAL PARAGRAPHS

MODERN RECORDING METHODS

The London Palladium Orchestra, under the direction of Richard Crean, making a record of the "Golden Valse" for "His Master's Voice" at their London Studios.

"A Microphone Poster"

ON November 27th James Ludovici, Midland Feature Programme Assistant, will produce "A Microphone Poster," which he has designed to reflect the life and genius of the Potteries.

Midland Orchestra's Concert

FOR the B.B.C. Midland Orchestra's concert representing the work of Midland composers, to be broadcast on November 28th, Reginald Burston, who conducts, will draw upon Leslie Heward (conductor of the City of Birmingham Orchestra); Joseph Engleman (of Birmingham); Julius Harrison—first broadcast of "Cornish Scene" (only second time performed)—and Dorothy Atkinson.

"Moonlight Masquerade"

"MOONLIGHT MASQUERADE" is a new musical romance of eighteenth-century Bath, by George Gordon. It is partly based on a play of the same name written by Henry McMullan. The B.B.C. Northern Ireland Orchestra, conducted by Peter Montgomery, takes part in this romance, and the production is by Edward Wilkinson.

A Potteries Band

KIDSGROVE Excelsior Band, from the Potteries, has its first broadcast in the Midland programme, James Thorpe conducting. It has won a number of awards at festivals in North Staffordshire and Cheshire, and was also in the prize list at Belle Vue last year. The vocalist is a Birmingham baritone, James Collier.

SOLVE THIS!

PROBLEM No. 167

Smith had a three-valve receiver operated from a small commercial mains unit. He read about the advantages of Class B amplification, and therefore decided to convert his receiver for this purpose. He built a separate Class B stage and connected this to his receiver, utilising the existing output valve as the driver. Although he checked the wiring and had the valves tested, and everything was apparently in order, the volume was less than previously, and distortion was much more noticeable. Why was this? Three books will be awarded for the first three correct solutions opened. Envelopes must be addressed to The Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 167 in the bottom left-hand corner and must be posted to reach this office not later than the first post Monday, December 2nd, 1935.

Solution to Problem No. 166

The I.F. circuits of Jackson's receiver obviously prevented any signals from passing except those of the intermediate-frequency, and therefore he should have cut out the I.F. stages in order to adopt his scheme. The following three readers successfully solved Problem No. 165, and books are accordingly being forwarded to them: A. G. Haken, Rossendale, Hyde Street, Winchester; H. Gibson, 47, Chestnut Avenue, Romford, Essex; R. Shearman, 32, York Road, New Southgate, N.11.

Bach Programme

THERE is a Bach programme for the concert by the Birmingham Festival Choral Society and the City of Birmingham Orchestra, which is relayed from the Town Hall. Leslie Heward conducts. Myra Hess is the pianist for the Concerto No. 1 in D minor.

"News of the Brass Band World"

PRECEDED by the first broadcast by the Dingle (Liverpool) Prize Band, Ernest E. Milner will give Northern listeners some "News of the Brass Band World" on November 27th. Mr. Milner, who is a Durham man, claims to be unique in that he has carried on the activities of brass-bandsman and journalist simultaneously for a considerable number of years. In his talk he will review recent developments in the brass band world, particularly with reference to the North, mentioning also such musical compositions as have been transcribed for brass bands lately.

"The Changing Village"

THE final talk in the series "The Changing Village," will take the form of a symposium to be broadcast on November 27th. The speakers will be Sir Francis Dyke Acland, G. C. Hayter-Hames, Derek Amory, and F. G. Thomas, of Exeter University College, who has been acting as editor of the series.

"Back to the Land"

THE fifth of S. L. Bensusan's talks, from the Midland Regional, on this series is also the last of the section which surveys farming conditions in the region especially from the angle of one who believes in an extension of land settlement. After Christmas a number of the points arising—e.g., marketing—will be the subject of discussions. In this talk Mr. Bensusan deals with Leicestershire, Nottinghamshire, and Northamptonshire. There have been two experiments in land settlement schemes in the first-named county—one near Leicester by Alderman Sherriff for the City Council, and another by the Catholic Land Settlement League near Market Bosworth.

My Friends the Foresters

THE second talk in the series, "My Friends the Foresters," by F. W. Harvey, will be given on November 30th. These talks are about the inhabitants of the Forest of Dean, and Mr. Harvey speaks from his intimate knowledge of them and their ways over a number of years.

Recital from Exeter Cathedral

THE first of a series of organ recitals, under the general heading "Some Organs of the West Country," will be given from Exeter Cathedral on November 29th. The recital will be given by Alfred W. Wilcock, organist and Master of the Choristers, who was formerly Professor in the Royal Manchester College of Music, as well as Lecturer at Manchester University.

"Farming in Bulgaria"

W. ARNOLD RILEY, who recently travelled right across Bulgaria and visited many farms, will discuss with A. W. Ling some of the things he has seen on Bulgarian farms in the feature "For Western Farmers in Particular," on November 28th. Mr. Riley will describe the primitive instruments used on many farms, and he will also tell of the part played by women and children in farm-work.

Designing Your Own Wireless Set

The Question of Obtaining Correct Tracking When Employing the Alternative Intermediate Frequencies is Discussed This Week

AS we have dealt in general terms with the important parts of a modern superhet we can now consider in greater detail the tuning circuits and intermediate-frequency stages. Unfortunately, it is scarcely possible to treat the tuning circuits quite as fully as might

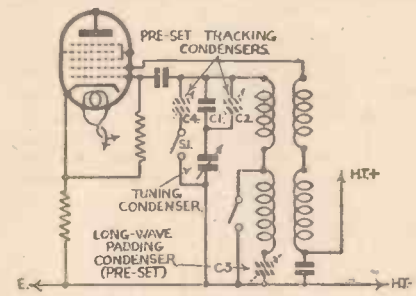


Fig. 1.—This skeleton circuit shows the complicated system of condensers required in the oscillator circuit when using certain types of coil in a 465 kc/s circuit.

be desirable due to the fact that there are so many types of coil by different makers that it would not be practicable to give circuits and particulars for using all of them. This being the case, we must confine our attention to dealing with the main types. By doing this the principal considerations will be made clear, and the reader will be in a better position to follow the connections supplied by the makers of the coils he eventually chooses.

The Choice Of Coils

Here again is a difficulty since we could not, for obvious reasons, recommend any particular make of coil—and there are so many that the final choice is not easily made. In most cases, however, the reader will have a preference for one make of coil and he will probably be able to obtain a suitable set in that make. The first matter which must be considered is in connection with the intermediate frequency which is to be employed. It was made clear in a previous article in this series that 465 kc/s possesses most advantages, but we must not overlook the alternative advantages of other frequencies.

One disadvantage with many of the 465 kc/s coils is that several padding condensers are required in conjunction with the oscillator coil in order to ensure correct ganging on both wavelength ranges. A typical example of the point in question is afforded by the circuit shown in Fig. 1, which shows the connections in the oscillator tuning circuit when using one make of 465 kc/s coils in conjunction with a standard superhet-type condenser also designed for 465 kc/s. In this case there are three pre-set condensers as well as one fixed condenser and the normal gang-condenser section. The condenser marked C.1 is in parallel with C.2, both being in series with the tuning condenser, on medium waves. On long waves the contacts of the wave-change switch are opened, and those of the switch marked S.1 are closed, so that the pre-set condenser C.3 is in series with the coil and that marked C.4 is in parallel with the tuned circuit. When this condenser network has once been correctly adjusted it functions perfectly well, but the difficulty of accurate trimming, especially when an oscillator is not available, can be imagined.

Simplified Tracking

It is possible to employ a much simpler arrangement, like that adopted for the £4 Superhet Four (described in this and last weeks' issues), but for this to prove fully effective it is necessary that the exact coils and condenser specified should be employed. While this circuit was being developed a variety of other components were tried, but none proved to be as satisfactory as those adopted without making the circuit more complicated. Actually, the tuning circuits of the set under discussion are as simple as those of a superhet working on 110 or 150 kc/s,

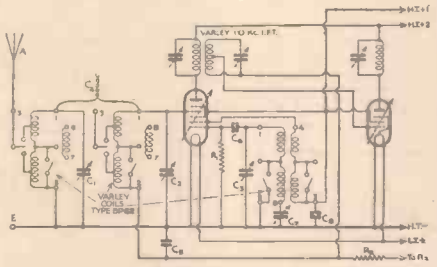


Fig. 3.—An inductive coupling arrangement using Varley coils.

but in general it is to be expected that the oscillator circuit for one of the lower frequencies will be simpler and less likely to present difficulty to the amateur set designer. All that is required for 110 kc/s with the majority of coils is a single pre-set condenser of about .002 mfd. (maximum) which can be switched into series with the oscillator tuning condenser on long waves. There are two slightly different methods of including the condenser in circuit according to the coils employed, but both are the same in principle, as will be seen from Fig. 2. In one case the condenser is in series with the oscillator coil (which is practically the same as being in series with the condenser), and one side of the wave-change switch is taken to earth, instead of to the lower end of the long-wave winding. In the other case the condenser is actually in series with the tuning condenser on long waves and is short-circuited by a separate switch section when medium-wave reception is required.

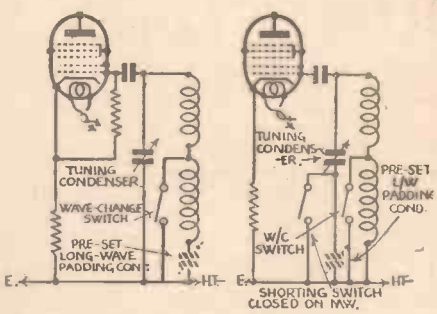


Fig. 2.—These circuits show alternative connections for the long-wave padding condenser.

Since the condenser is used on long waves only, and is independent of any other condensers, there is no difficulty in adjusting it correctly without the use of any equipment such as an oscillator or signal generator.

465 kc/s Preferred

In most cases the very same arrangements can be made when 150 kc/s is to be used as the I.F., but as this has never really been adopted as a standard, except for short-wave work, it is better to avoid it where possible unless there are some special circumstances which make it desirable.

While considering the relative advantages of the (comparatively) high and low intermediate frequencies it is worthy of mention that the degree of selectivity is slightly better when using 110 kc/s, assuming the use of I.F. transformers with fixed coupling; for most purposes, however, the difference is so slight that it need not be taken into consideration. And as this drawback is offset by the better amplification obtainable, and by the greater absence of second-channel interference, the scales are still weighted in favour of 465 kc/s.

In most instances oscillator coils which are designed for use with heptodes, octodes, or pentagrids can be used satisfactorily in conjunction with a triode-hexode, since the coupling is electronic and takes place within the valve. At the same time, however, before definitely buying the coils it is advisable to inquire of the makers whether or not they are suitable for use with the new triode-hexode. The position is somewhat different where the triode-pentode is concerned, since in this case the "mixing" takes place outside the valve, so that some suitable form of coupling circuit must be provided. Most manufacturers make coils which are intended for use with triode-hexodes, or which can be used with this type of valve by making minor modifications to the connections which are used for pentagrid "mixing." The latter statement does not, of course, apply to the battery-operated triode-hexode when "cathode coupling" is used, since in this case it is generally most satisfactory to include coupling windings in the filament leads to the valve. And it

(Continued overleaf)

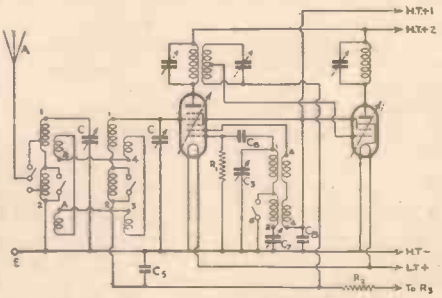


Fig. 4.—An inductive coupling arrangement with Ward and Goldstone coils.

(*Continued from previous page*)

is evident that these windings must be of low resistance and so placed in respect of the other windings that adequate coupling is obtained. There are actually few coils available which are designed expressly for use with a battery-operated triode-pentode, and for this reason it will generally be found more convenient to employ a pentagrid, heptode or octode in a battery set.

The Aerial-Input Circuit

When we come to design the input-tuning circuits, the higher frequency again shows to advantage if simplicity and economy are important considerations. This is because there is only a very slight

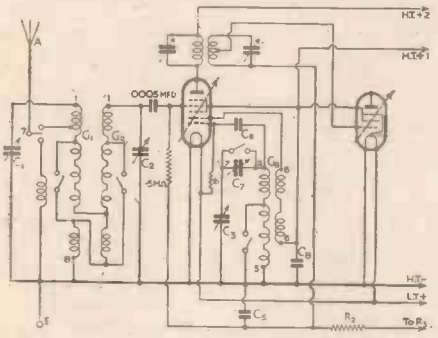


Fig. 5.—Circuit diagram showing the terminal connections for Colvern superhet coils.

amount of second-channel interference even when a single-tuning circuit is employed, whereas in the case of 110 kc/s a double circuit, either in the form of a band-pass filter or in conjunction with a signal-frequency H.F. stage is a practical essential if interference is to be reduced to reasonable proportions. The form of band-pass filter is not generally an important matter provided that a reliable make of modern superhet coils is used; these nearly always have either "top-capacity" or "mixed" (capacity and inductance) coupling, and three typical arrangements are shown in Figs. 3, 4 and 5.

Using an "Image Filter"

It cannot be denied that there is a slight amount of interference when using a single-circuit tuner in conjunction with 465 kc/s I.F., but what little there is is confined to a few slight "chirps" which are objectionable only when receiving one or two odd weak transmissions. The slight trace of interference can be prevented by using a simple type of "image filter" comprising an untuned coil coupled to the tuned-grid circuit of the first detector, as shown in Fig. 6. The filter circuit comprises a loading coil coupled to the grid coil by means of a "top-capacity" condenser and by the by-pass condenser normally used in conjunction with the decoupling resistance in the variable-G.B. or A.V.C. line. The loading coil is tapped for medium and long waves and is used in conjunction with a normal type of wave-change switch. At the same time, however, it is not variably tuned, but is designed to resonate at a frequency equivalent to the centre of the long- and medium-wave band respectively. In order to avoid too sharp a resonance peak it is usually desirable that a fixed non-inductive resistance of about 20,000 ohms should be connected between the aerial and earth terminals.

Band-pass on 465 Kc/s

It must not be imagined from the foregoing that there is any reason why band-pass coupling should not be used in a superhet designed for operation on 465 kc/s, for as a matter of fact a band-pass filter is the ideal input circuit for the higher frequency when economy and simplicity are not the most important considerations. When a band-pass filter is employed it is almost invariably found that there is a complete absence of second-channel interference, there not even being the few weak "chirps" which one generally associates with even a good superheterodyne. This is what one would really expect in view of the equivalent wavelength of about 650 metres to which the I.F. amplifier is tuned.

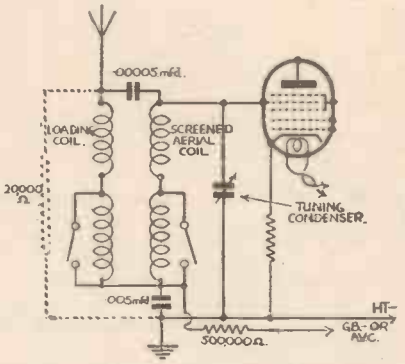


Fig. 6.—Showing the connections for an "image filter" suitable for use in conjunction with a single-circuit aerial tuner of a 465 kc/s superhet.

Random Jottings

Broadcasts for Italian Troops

ALTHOUGH it was originally intended to use the third Prato Smeraldo (Rome) short-wave station for a service of programmes to West and South Africa, the transmitter is being equipped with an aerial directional to Tripoli and Eritrea. In the course of a week or so the station will transmit daily news bulletins and musical entertainments of interest to Italian soldiers in the Colonial camps.

Educational Courses for Criminals

THE Governor of the City Prison at Louvain (Belgium) has installed a wireless receiver which permits prisoners in cells to hear, by means of headphones, lectures and musical programmes. The idea is not a new one, as a similar installation has existed for over a year at Geneva.

French War Bulletins from Abyssinia

A FRENCH newspaper, *Paris-Soir*, having despatched a war correspondent to Abyssinia, has now made arrangements to broadcast his reports every evening at G.M.T. 19.25 through Paris P.T.T. (431 metres), and the stations of the State Network.

A Novel Time Signal

INSTEAD of giving out the usual six pips at 11 p.m. Eastern Standard Time, or G.M.T. 04.00, the broadcasting stations in the Canadian Radio Commission Network transmit the four first notes of the National song "O Canada." The signal is sent first to the Ottawa station, CRCO, for distribution to the other Dominion transmitters.

Light Entertainment in Central Africa

TWO ladies called recently at the head office of McMichael Radio and introduced themselves as Mrs. Dabell and Miss E. F. Smith. On being interrogated they explained that they had just returned from driving across Central Africa and had with them all the time a McMichael short-wave receiver.

Selecting a particularly arduous route, they had set off from Tangiers on the N.W. coast, continued for several thousand miles across the Sahara Desert, through French Equatorial Africa and the Belgian Congo, and finished their journey of 8,000 miles at Tanganyika, British Mandate territory. During all this time their McMichael radio equipment acquitted itself admirably, despite the use of only a starting-handle earth, providing reliable and consistent reception of the Empire station, together with Rome and Zeesen.

Many interesting incidents transpired on their introduction of radio to the primitive peoples through which they passed. Their set was generally thought to be some kind of black and potent magic, and was treated with due respect; its fame spread well in advance of the party, particularly in the pigmy country, and audiences were always plentiful, while many of the few Europeans near their route made strenuous efforts to purchase the outfit, one man travelling fifty miles through rough country to make an offer! The receiver was actually sold for a very satisfactory figure at the end of the journey.

A group of natives in the Belgian Congo listening to a McMichael S.W. receiver.

Introducing the A.C. £4 Superhet 4

Preliminary Details of the First of the Mains Versions of Our Latest Four-valve Superhet Receiver

DETAILS have already been given for constructing and operating the battery model of the £4 Superhet, and also for two separate mains units with which this receiver may be used on the electric supply mains. There are, however, obvious advantages to be obtained by employing a receiver designed exclusively for use on a mains supply, as not only is the general design improved, but, owing to the improved characteristics of the valves which may then be employed, a much better performance may be expected. The theoretical diagram of the A.C. model is given on this page, and it will be seen that in general principle this follows the battery circuit, that is to say, the four valves are employed as frequency-changer, I.F. amplifier, detector, and output valve. The valves which are employed are, in their order, pentagrid, H.F. pentode, triode, and output pentode. For rectification of the mains supply a metal rectifier has been adopted in this model.

The Circuit

Analysing the circuit, from aerial to loud-speaker, we find that the aerial input circuits employs a band-pass tuner. It has been found that the added efficiency of the mains pentagrid is likely to introduce difficulty from whistles in certain parts of the country, but by ensuring a high degree of selectivity on the input side, this difficulty may be cut down very considerably, Fortunately there are available two simple methods of carrying out this arrangement—either by including an H.F. stage before the frequency-changer, or by utilising very sharply-tuned circuits. The latter is to be preferred on grounds of economy, and thus in the A.C. Superhet 4 we find a band-pass circuit, the two coils of which are tunedby two sections of a standard three-gang condenser. The third section of this condenser tunes the oscillator section in the usual way, and, again, this condenser must be of the type designed for use with 465 kc/s I.F. components. The ordinary 110 kc/s component will not be of the slightest use at this point, although a standard three-gang condensr could be adopted for use, with a number of fixed or pre-set condensers arranged to provide the correct frequency separation. It is obviously preferable to adopt a correctly-designed condenser rather than complicate adjustments by inserting a number of doubtful variables, and the full advantage of a single-knob control is thus obtained without loss.

Pick-up and Decoupling

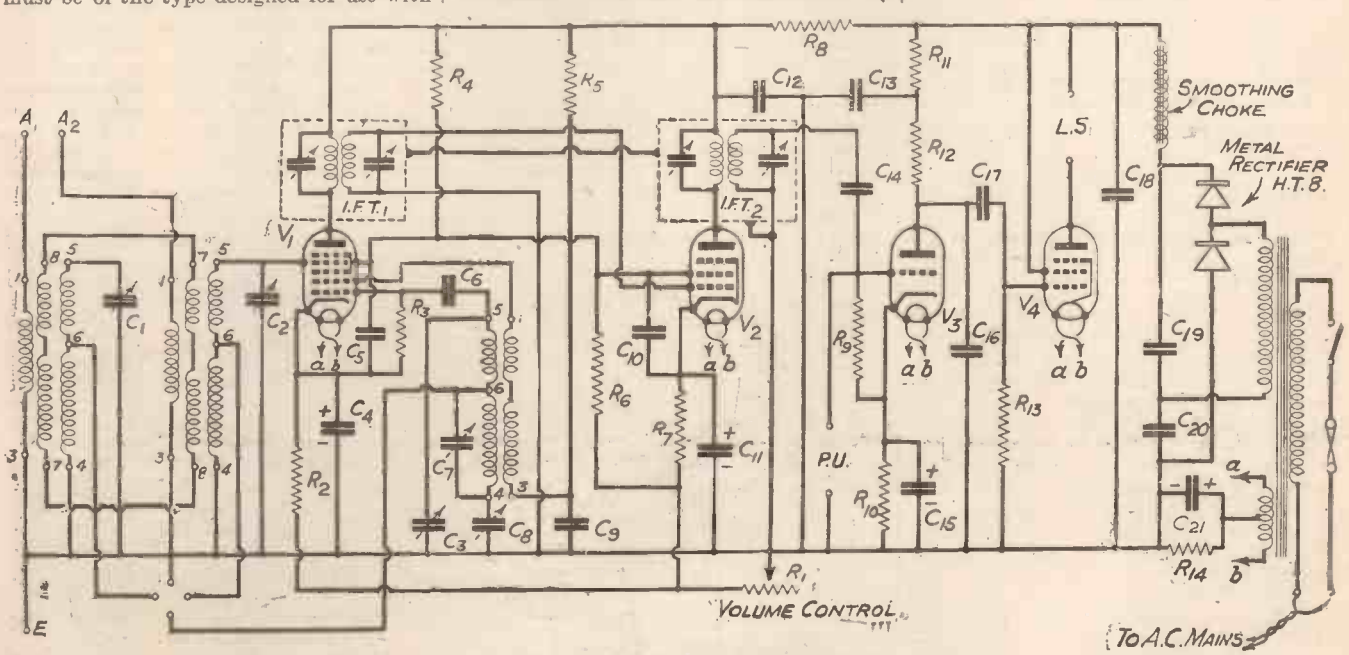
The pentagrid valve is provided with a biasing resistance in the cathode circuit, and the anode circuit is connected direct to the H.T. line. The screening grid is fed from a potential divider, and the decoupling is adequate for stability throughout the tuning range. The intermediate amplifying stage is similarly supplied, the screening grid being joined to the same point on the fixed potentiometer as the pentagrid valve. A small fixed minimum-bias resistance is again included in the cathode lead, and this is returned, together with the pentagrid cathode, to one side of the volume-control potentiometer. Large capacity decoupling condensers in the bias circuit ensure stable operation. The triode detector is wired in the standard manner, with the pick-up terminals arranged across the grid-earth circuit, a bias resistance being included in the cathode lead, and the grid leak returned direct to the cathode. A switch may be included at the option of the constructor, provided that the usual precautions regarding hum and instability are taken. Coupling between the detector and output valve is carried out by a resistance-capacity coupling, the size of coupling components having been chosen to ensure adequate low-note response and good stage gain.

Tone Control

The output valve is fed direct to the loud-speaker without the provision of a tone-control circuit. With the loud-speaker which is specified the tone should be quite satisfactory for all normal items. If, however, the high-note response is too great for the individual listener, the customary fixed condenser and resistance may be joined across the loud-speaker, or a variable resistance used for adjusting the degree of cut-off to suit different musical items. Smoothing is adequate in the mains section, and the choke which has been specified will be found quite up to its task of smoothing the H.T. supply to the four valves.

LIST OF COMPONENTS

Three coils: BP80, BP80, BP86 (Varley).
Three gang condenser: Midget 465 kc., with V.P. Horizontal Drive (Polar).
Two I.F. transformers: No. 674 (Eddystone).
Thirteen fixed resistances: Two 250 ohms, one 750 ohms, one 350 ohms, one 3,000 ohms, one 10,000 ohms, two 20,000 ohms, two 30,000 ohms, one 75,000 ohms, one 250,000 ohms, one 500,000 ohms (Dubilier).
One variable potentiometer: VS43, 2,000 ohms, with Q.M.B. switch (Bulgin).
Sixteen fixed condensers: Three .1 mfd. (type 4513), one .05 mfd. (type 4512), two .0001 mfd. (type 665), one .0003 mfd. (type 665), two 2 mfd. (type 9202), four 25 mfd. (type 3013), two 4 mfd. (type BE355 Block), one 8 mfd. (type 0281) (Dubilier).
Two pre-set condensers: .0001 mfd., .001 mfd. (Ward and Goldstone).
One L.F. choke, L.F.14 (Bulgin).
One H.T.8 rectifier (Westinghouse).
One W31 mains transformer (Heayberd).
Four valve-holders: one 7-pin, three 5-pin (Clix).
Two component brackets (Peto-Scott).
One four-point switch, S116 (Bulgin).
One fuse-holder with 500 m.a. fuse (Microfuse).
One Metaplex chassis (Peto-Scott).
Two-ft. screened lead (Ward and Goldstone).
Three terminal strips: A.E., P.U., L.S. (Clix).
Four valves: 41MPG, MVS-Pen., 41MHL, PT41 (Cossor).
One Speaker, Stentorian Senior (W.B.).



The theoretical circuit of the A.C. Superhet 4.

Points About Mains Units

How to get the Best from an H.T. Battery Eliminator; how to Modify Existing Units, and some Necessary Precautions

By W. J. DELANEY

THE user of a battery type receiver who obtains access to the electric supply mains often discards his high-tension battery for a mains supply, employing what has become familiarly known as an "eliminator." No matter whether this is a commercial article or a home-made accessory, the essential components will be identical, and if the unit is designed for use with D.C. mains it will consist simply of a smoothing circuit and voltage dropper, whilst if for A.C. mains there will be the addition of a rectifier. In Figs. 1 and 2 the essentials of the two parts are shown, and in the A.C. model a portion has been indicated in heavier lines, from which it will be seen that this is essentially the circuit of the D.C. model. From this, it is obvious that, should a listener possess either unit, and subsequently move to a district where the mains supply differs in character, it is not a difficult matter to convert either unit for use on the new source of supply. The only problem which exists concerns the voltage output, and it is here that the greatest difficulty is found.

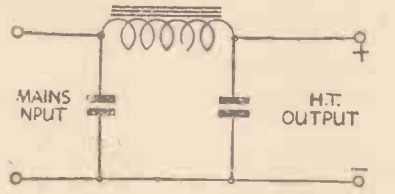


Fig. 1.—The essential circuit of the D.C. mains unit.

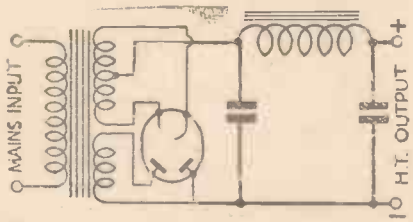


Fig. 2.—The essential parts of the A.C. unit.

The D.C. Supply

In the D.C. unit there are two essential points to be watched. Firstly, the negative mains lead is joined direct to the H.T. negative lead in the wireless receiver and, as in practically every circuit the H.T. negative lead is in turn connected to earth, this means that the negative mains lead is also earthed. In certain districts, however, the positive lead is earthed, or some other scheme is adopted, and thus, should the unit be used in the form indicated, without any precautions, the mains supply may be short-circuited. Furthermore, in the usual type of receiver employing an accumulator for the L.T. supply, there is also a risk that the short-circuiting of one of the L.T. leads to earth may introduce the complete mains voltage across the L.T. wiring and thus damage the valves. The first precaution with a D.C. unit is, therefore, to prevent the mains from being short-circuited, and this may conveniently be accomplished by connecting a reliable fixed condenser in the earth lead. It is usual to fit this in the mains unit, joining one side to the H.T. negative lead and the other side to earth, and then omitting the earth connection on the receiver. To avoid the risk of the above-mentioned L.T. short-circuit, it is recommended that this procedure be adopted, and that the unit is totally enclosed, whilst an insulated earth lead is employed. A further safeguard is to include a small fixed condenser in the aerial lead, placing this condenser inside the receiver cabinet and joining it to the aerial terminal, thus isolating the aerial lead-in wire. This condenser should be of the mica type, and it should, together with the previously-mentioned condenser, be of the type designed for use on voltages of 250 or more.

Voltage Dropping

To obtain the necessary reduced voltage from the D.C. supply a resistance may be inserted in the positive lead. This, however, will carry the full current of the receiver (that is, the total of all the valves in use), and thus it is necessary to guard carefully against overheating, and the wattage rating of the resistance must be carefully chosen. This value may be ascertained by adding together the total anode current of all of the valves, squaring this figure, and multiplying the resultant figure by the value of the resistance. Expressed mathematically, this in wattage equals $I^2 R$. To obtain various intermediate voltages, for the detector stage or the S.G. stage, a potentiometer device is to be preferred, as this may also be arranged to act as a decoupling circuit and thus prevent instability. In Fig. 3 a simple method of obtaining one intermediate voltage is shown, whilst in Fig. 4 the method to be adopted where more than one voltage is required is shown. From the latter diagram it is obvious that any number of tappings may be taken by adopting the same scheme, but the total current still passes through the resistance in the positive lead.

Hum Difficulties

The voltage-dropping schemes may, of course, be applied to either the D.C. or the A.C. units, and the points marked positive and negative apply to Fig. 1 or Fig. 2. Where a D.C. unit is being employed and hum is experienced, it is generally attributable to the fact that the smoothing is insufficient, and the remedy is to increase the inductance of the smoothing choke. In some cases also an increase in the capacity of the fixed condensers should be tried. If these steps are taken and hum is still experienced, it may be due to induction between the choke and the L.F. components in the actual receiver. The only effective remedy is to enclose the unit in an iron box, and this is a precaution which should always be taken in the interests of safety with any type of mains unit. The iron effectively screens the L.F. radiation (provided, of course, that it is effectively earthed), and it also prevents the risk of a short circuit or a shock.

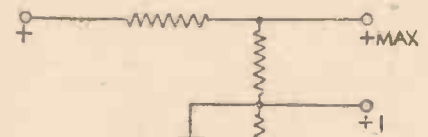


Fig. 3.—A simple method of obtaining a lower H.T. voltage.

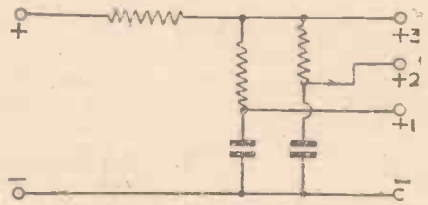


Fig. 4.—An elaboration of Fig. 3.

If hum is experienced after screening a D.C. unit in this manner, the difficulty may be traced to the actual receiver and the usual steps should be taken here. In the case of A.C. units the same steps may be taken, but the condenser mounted between the valve and the smoothing choke should not be increased in capacity above 4 mfds., as the output from the rectifier will be modified in such a case. A difficulty sometimes experienced with an A.C. unit is a type of hum which is actually acoustic, as distinct from electrical and is found to be due to the vibration of the laminations in the mains transformer or the smoothing choke. A remedy is sometimes effected by turning the unit on its side and thus permitting the weight of the component to pull on the holding-down bolts, and thus keep the laminations

(Continued on page 355)

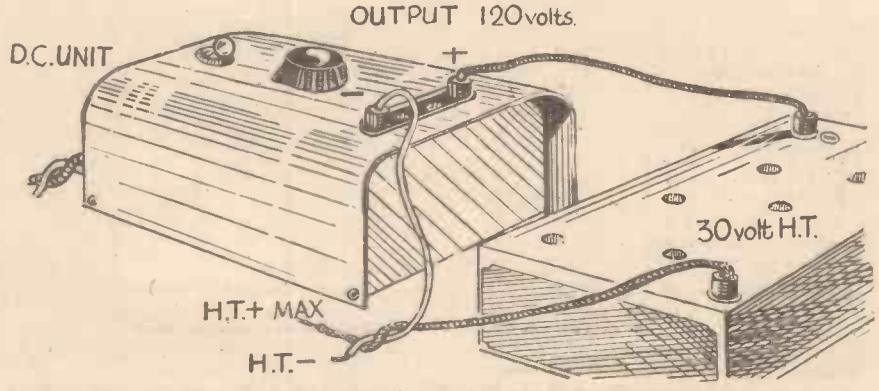


Fig. 5.—How the voltage output of a D.C. mains unit may be augmented.

A PAGE OF PRACTICAL HINTS

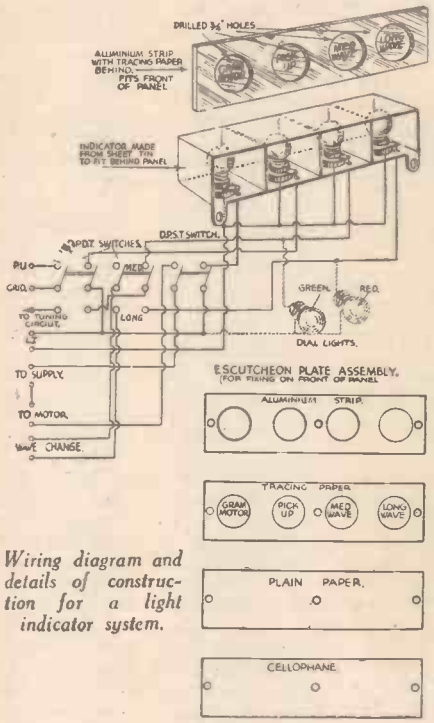
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

A Light Indicator Device

THE accompanying sketches show a light indicator system for pick-up, wave-change, etc. The box is made from sheet tin with the divisions soldered in, and lugs being provided for fixing. The escutcheon plate is a piece of aluminium strip with four ¾in. holes drilled in and also three 3/16in. holes for fixing. The wording



Wiring diagram and details of construction for a light indicator system.

is done on a piece of tracing paper or cloth, and in front of this there is a strip of thin white paper to prevent the wording showing through until either of the lights are switched on. In front of this is a piece of clear cellophane to keep the paper clean, and also to give a finish. I am using a switch of the telephone key type which has three positions, the centre being long wave, down for short or medium, and up for pick-up, but two D.P.D.T. switches will do. Dial lamps may be used, and they may be covered with red and green cellophane respectively.—H. E. GARBETT (West Bromwich).

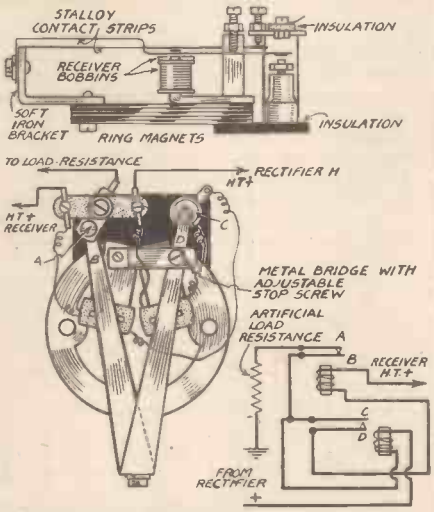
An H.T. Delay Action Relay

THE chief parts for making the relay shown in the diagrams consist of an ordinary 60-watt telephone earpiece, the bobbins of which proved satisfactory without any necessity for rewinding. The bobbins are mounted at an angle on top of the magnet rings, on one side of same, to form one pole only. To the opposite side of the rings is attached a soft iron bracket for supporting the stalloy contact strips, these, of course, being in opposite polarity to that of coil pole pieces. The stalloy strips are

THAT DODGE OF YOURS!

Every Reader of "PRACTICAL AND AMATEUR WIRELESS" must have originated some little dodge which would interest other readers. Why not pass it on to us? We pay £1-10-0 for the best wrinkle submitted, and for every other item published on this page we will pay half-a-guinea. Turn that idea of yours to account by sending it in to us addressed to the Editor, "PRACTICAL AND AMATEUR WIRELESS," George Newnes, Ltd., 8-11, Southampton Street, Strand, W.C.2. Put your name and address on every item. Please note that every notion sent in must be *original*. Mark envelopes "Radio Wrinkles." Do NOT enclose Queries with your Wrinkle.

set so as to give upward normal tension, and small brass pins are riveted in the centre of these immediately over the coil pole pieces, to prevent the stalloy sticking and not returning to normal when current is switched off. One stalloy strip was given a small set at about half-way of its length, this being necessary to give the required movement without risk of either strip fouling the other. The contact arrangement is self-explanatory, and may clearly be seen from the diagram. The contacts may be made with pieces of silver or any good contact metal alloys removed from old disused springs. The operation of relay is as follows: Firstly, all valve heaters are switched on, including the rectifier heater. It will be seen from the circuit diagram that the H.T. from rectifier has a path through one of the relay bobbins *via* A, B contacts, and an artificial-load resistance to earth. This load resistance must pass maximum current taken by the set, which, in my own case, was 60 m/A. It takes approximately fifteen to twenty seconds before the anode current in rectifier-valve reaches its maxi-

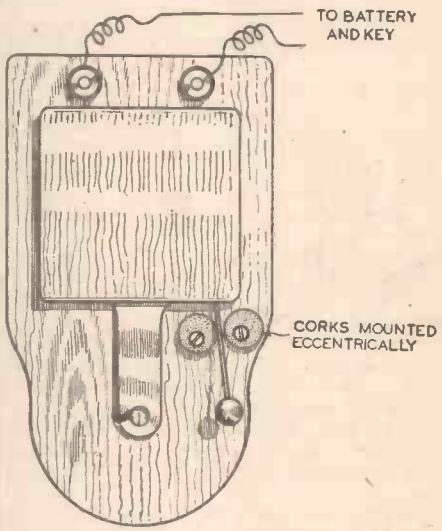


A telephone earpiece is used for making this delay action relay.

mum, and the relay is adjusted so that the contact strip will not make before this time has lapsed. At this period, however, C and D contacts make, thereby switching H.T. through to the receiver *via* the other relay bobbin, which, in turn, becomes energised, thus breaking contacts A and B which connect the artificial load to negative and earth. Both stalloy strips are now attracted by coil pole pieces, A and B, contacts broken, while C and D are made and set is receiving its full H.T. The relay is at present working in a receiver and gives perfect results. The advantage over the thermal delay strips being that its action is much more reliable and snappy.—V. D. BROOKER (Chelmsford).

A High-note Buzzer

AN old bell can be converted into a good high-note buzzer, for morse practice or for a wave-meter, by using two rubber corks. The rubber corks are mounted eccentrically on screws driven into the baseboard of the bell, near the hammer rod, as shown in the sketch. The corks are



A high-note buzzer made from an old bell.

adjusted by turning them round the screws, the one on the bell side of the hammer should be just clear of the rod whilst the other should just touch it.—PETER G. REDGMENT (Norwich).

TESTS OF COMMERCIAL RECEIVERS ON OUR AERIAL

REVIEW OF LATEST RECEIVERS

The Cossor A.C. Superhet (Model 365)

THE new Cossor Model 365 A.C. Superhet de Luxe is a set which has been designed with the object of obtaining all worth-while European stations at the highest possible quality level, and to meet the demand of those who desire a luxurious instrument.

The compensated anti-fading superhet circuit successfully overcomes variations in volume due to fading, while the presence of delay in the A.V.C. circuit permits of the weaker stations being received if desired.

The circuit is a fairly orthodox arrangement on the superheterodyne principle, although it has one or two innovations of considerable importance. The first stage employs a Cossor 41MPG pentagrid frequency changer designed to give the highest possible gain consistent with retaining a high degree of selectivity. It is interesting to note that the Cossor 41MPG is so designed that modulator harmonics are absent, and, in addition, this type of valve allows almost constant efficiency over the whole of each waveband.

The Cossor MVS/PEN Variable-mu H.F. pentode is used in the intermediate-frequency amplifier, where it develops very high gain with the aid of highly efficient iron-cored coils. Both this valve and the pentagrid have variable-mu characteristics, and both are controlled by the A.V.C. system which actuates from the Cossor D.D.T.

The third valve, Cossor D.D.T., is a double-diode-triode. One diode acts as signal detector, while the other diode is arranged for delayed A.V.C. working on the first two stages, as already mentioned. The triode portion of the D.D.T. acts as a low-frequency amplifier, and loads up the Cossor 4XP, which is a large directly-heated output valve providing the speaker with about three watts undistorted output. The output of the signal diode is fed to the triode portion of the D.D.T. through the variable volume control arranged to control volume on both radio and gramophone.

The power pack is very generously designed with large electrolytic condensers, and makes use of Cossor 442BU, a double-wave rectifier. So efficient is this section of the receiver that there is a complete absence of mains hum under the most adverse conditions.

Simplicity of Control

The tuning dial is particularly interesting and deserves special mention. A generously proportioned horizontal panel, on which the wavelengths are engraved, carries a dual pointer, and an arrangement, operated by the combined on-off gramophone and wave-change switch, illuminates the waveband in operation. A very large tuning knob operates the pointer enabling very fine control, and a detachable station name-plate fitted above the waveband scale simplifies station identification.

Visual Tuning

On either side of the station scale are small windows and contained in the left-hand one is the Cossor visual tuning indicator. The vertical tube shows instantly when any station is correctly tuned in, by a red light which rises and falls as the tuning knob is rotated. The third knob, which is of course the volume control, also actuates a small pointer which moves over a graduated scale housed in the right-hand window. It is therefore always possible to see what proportion of the maximum volume the set is giving.

This illustration shows the smart appearance of the new Cossor A.C. Superhet, Model 365, with the three control knobs, visual tuning, and waveband scale.

Terminals for the aerial and earth are provided, and there is provision for connecting an extension loud-speaker with an ingenious switch enabling either or both of the speakers to be operated at will. Connections for pick-up are also provided at the back.

On test the receiver reveals a very high standard of performance. Selectivity and sensitivity are both of a very high order, and with a moderate aerial it is possible to bring in between forty and fifty stations in an evening. Tuning is naturally very simple, partly due to the fact that only two controls are used, volume and tuning, and partly due to the neon tuning indicator, which makes accurate tuning practically instantaneous. This indicator is particularly valuable when tuning a programme during an interval, as accurate tuning is as easy of accomplishment as it would be on a full orchestral item.

The automatic volume control held all the principal stations level at a volume too great for ordinary domestic purposes, but allowing a generous margin that is undeniably useful at Christmas parties, dances, and on similar occasions. Maximum volume is instantly controlled by the volume control, but is, however, very comfortably handled by the highly efficient ten-inch concert grand energised moving-coil loud-speaker which, together with the careful and ingenious design of the set, brings about an exceptionally high standard of reproduction. It is not possible to over-stress the quality of reproduction available from this receiver, which is an achievement in a superheterodyne having such a high standard of selectivity.

Two points are worth an independent mention. (1) The several squeaks, owing to oscillator and detector harmonics, that appear on almost every superheterodyne, are absent in this receiver, due to an extremely ingenious circuit arrangement, and (2), when the volume control is used to reduce volume to a low level, the bass and treble notes do not disappear but are retained, giving good quality at any setting of the volume control—a most unusual feature. The twenty-inches-high cabinet is a beautifully finished piece of furniture, made with two shadings of walnut, with the speaker fret, escutcheon, and controls in old gold, with pale coffee colour tuning dial. The cabinet is tastefully set off by the top moulding and plinth being also in old gold.

The instrument is moderately priced at 14 guineas, or it may be obtained on hire purchase terms for 25s. deposit and twelve monthly payments of 25s.

SPECIFICATION

CIRCUIT: Superhet, with one I.F. stage; power output A.V.C., full-wave valve rectifier.

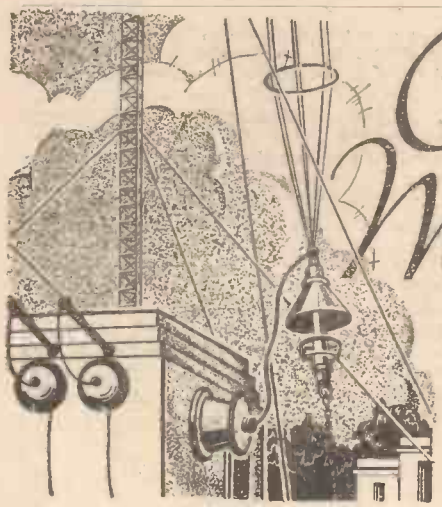
VALVE COMBINATION: Pentagrid frequency-changer; H.F. pentode; double-diode-triode; super power; full-wave rectifier.

CONTROLS: Three only. One for tuning, one combined wave-change and on-off switch, and one manual volume control.

REMARKS: The circuit incorporates an improved A.V.C. device, and to render the action visible and to ensure accurate tuning a neon tuning indicator is fitted. The tuning dial is calibrated in wavelengths (with removable portion to allow for changes), and the volume control produces an indication of its setting on one side of the dial.

PRICE: £14 14s.

MAKERS: A. C. Cossor, Ltd., Cossor House, Highbury Grove, London, N.5.



On Your Wavelength

By Thermion

The Language Problem

JUST as I thought! Once again I have drawn fire! As the mark of the successful journalist is that he must demonstrate to his Editor that people take note of what he writes I must be a successful journalist! Even a professional entertainer finds it necessary occasionally to ask a member of the audience to give him any number between 1 and 20 just to ascertain that they are still awake and paying attention to him. When I wrote my paragraph about Maurice Healy's broadcast on Nov. 4th I *hoped*, I *knew*, that Scottish readers would swoop down upon me. There are now two organised hates against Thermion—the crooners and the Scots. Having destroyed all the rude letters, I have at last come to one which seems to sum up the Scottish point of view. I gladly publish it. It was written by K. J. C. of Dewsbury, and it runs as follows:—

"I read with interest and amusement your remarks concerning Maurice Healy's

Cinema organs remind me of roundabouts.

broadcast on Nov. 4th in which he made the statement that Englishmen spoke English carelessly, and that English at its best was spoken by the Scots.

"If my memory doesn't deceive me, you once made a similar criticism of a similar event in a previous number. You give several instances of Scottish mispronunciation to support your opinion, which I will endeavour to pull to pieces in an effort to show that Maurice Healy was not so far wrong.

"First of all, you hate the re-rutilated R. Perhaps you do, but if you probe into the annals of the English language you will find that in no instance is the R a silent consonant, neither does it acquire any of the various and vulgar supposedly R sounds that emanate from the English seats of learning; no nevah! (*How about Wurrrruld!*—THERMION.)

Secondly, you mention the use of nacht and nicht for night. This immediately shows that you, in common with the average Englishman, are unaware that there are two vastly different languages in Scotland—English and Scotch (no, not Scots, that is the English version), the latter being derived from Gaelic, French and German, with a little English thrown in.

"Of course, the Englishman bases his knowledge of the Scottish tongue on what he hears on the wireless or reads in books. The fact that he understands it on the wireless merely goes to prove that he isn't listening to pure Scotch, but only a compromise on the part of the B.B.C. who seldom go farther afield than lowland Scotch, which is nothing but English with a Scotch accent or Scotch with an English accent, whichever way you look at it.

"The pure English of the Scotch is spoken in the north with a musical beauty which no Englishman can ever hope to achieve. It is very seldom heard by anyone who has not actually travelled in these parts and is hard to credit, but is nevertheless a fact.

"To go back to a previous paragraph, the word nacht is correctly pronounced Scotch direct from the German and not, as you indicate, badly-spoken English.

"With this I leave you, but I do hope you will slate me in return. Eh! bah goom, boot that waur a naisty wun!"

Well, well, well!!!

Jazz Notes

I CONTINUE to receive letters from readers in support of crooning, and I have asked the printer to set this paragraph in a type worthy of the importance of this modern subject. Apparently he is of the same opinion as myself, since to read this proof I have to use a magnifying glass. The printer assures me that such a hoary old subject is not worthy of larger type or more space. He seems to be on my side.

"Shear" Annoyance

A READER tells me of an amusing incident, amusing now that he has solved the trouble, but deuced annoying whilst he was discovering it. He had noticed a considerable falling off in the quality of the reception and the number of stations he could receive. Thinking that some of the components had got tired, he bought new valves and spent weeks rebuilding it. Results, however, were not improved, and he then did what he should have done in the first place, namely, inspected the aerial and earth system. His annoyance can be imagined when he discovered that the gardener had cut his lead-in when trimming the creeper round the house. The lead-in being long acted sufficiently as an aerial and thus did not obliterate reception altogether. Oak trees from little acorns grow, and big troubles usually have small origin. This is an example of it.

Cinema Organs

THERE is one thing that the jazz controversy has brought to light, and that is, that some of my readers hate cinema organs almost as much. Most of them seem agreed that the mighty throat of the modern cinema organ sounds like the hurdy-gurdy or the queer noise which emanates from roundabouts. I am not taking sides in this argument, thank you, but pass the opinion along for what it is worth.

Let the B.B.C. Help

I SHOULD like to expand upon my notes of last week that the B.B.C. during the Children's Hour should include a homework period and thus save paterfamilias from harassing questions about Euclid and relative motion and split infinitives when he arrives home after a tiring day at the office. They could include a few problems touching on the school curriculum and also give the answers. As the Children's Hour would be over before father reaches home many of the problems he is expected to tackle would be solved, particularly those inane problems which ask how long it would take a man to lay nine bricks, if it takes three men four days to lay six. I believe that is the output of the average bricklayer.

Parties and Music-Halls

I LIKE the festive spirit at some of the parties and the Music-Halls broadcast by the B.B.C. Even so a lot of the gags appear to be private jokes among the guests and the artists, and thus are unappreciated by the listener. There is far too much noise about some of the Music-Halls, and it is impossible to sort out the background from the broadcast. Although there is an air of abandon and extempore humour about some of these bright patches in our programmes they bear the unmistakable mark of having been very carefully rehearsed. I suppose that is inevitable. Personally, I should like to hear Leslie Henson about twice a week. When television arrives let us hope that we shall be able to see him as well as hear him. Ralph Lynn and Tom Walls are two others who should be heard more often.

Cuts his lead-in while trimming the creeper.

The Price of Service

I SEE that a progressive firm of radio service engineers has recently prepared a schedule of suggested standard charges for minor repairs to commercial receivers.

(*Continued overleaf*)

(*Continued from previous page*)

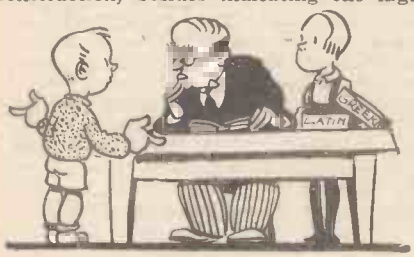
The idea appears very sound, for it would enable those who work to the schedule to give an accurate estimate for necessary repairs, and if generally adopted, it would prevent price-cutting by local dealers and might, eventually, ensure that repairs would be carried out by competent people who could receive a fair rate of payment.

I do not propose to repeat full details of the schedule, but a few sample charges will give some impression of the scheme. Before quoting these, let me say that I consider them quite fair, although to some of my readers they may seem unduly high. It must be remembered, however, that service stations have overhead expenses, have to be equipped with modern test gear, and *should* employ thoroughly competent and well-experienced engineers.

As an example of the charges, the cost of testing valves is 1s. 6d., the same charge being made for fitting new ones. This charge applies when the set is taken to the station, but the charge of fitting the valves when the set has to be collected and delivered, or when the work is carried out on the customer's premises, is 5s. In the former case no charge is made if new valves are fitted. A few other charges are as follows: cleaning and overhauling the set, 7s. 6d. or 10s.; removing short-circuit or repairing open circuit, 5s. and 7s. 6d.; replacing a volume control, tone control, filter choke, or valve socket, 5s. and 7s. 6d. It is expressly stated that these charges are for labour only, and that new components required are charged for in addition.

This means that in the case of a grid-bias by-pass condenser short-circuiting, causing the valve to be damaged by the excessive anode current, and causing the output choke to be burnt out, a charge of 10s. would be made if the work were carried out at the service station. This is, perhaps, an unlikely event, but it will be seen that it would turn out rather costly. The constructor would probably be able to correct a fault of this nature in a few minutes, and would thus consider the charge excessive. It might be so in this hypothetical case, but the old saw about swings and roundabouts must be applied.

Anyhow, the scheme outlined provides a very strong argument in favour of home construction, besides indicating the high



Homework problems.

financial value of the PRACTICAL AND AMATEUR WIRELESS Guarantee of Free Service for sets built according to our published designs.

Aerial Effects

I WAS recently asked a most interesting question regarding the function of an aerial wire. It was appreciated by my questioner that the aerial of the single wire type has a directional effect, but the problem was: What happens when a wire is run round three or four sides of a room or loft? Does it pick up more due to the different directions in which it runs? Does one station cancel another due to the flow of currents in different directions? Or does it act altogether as a mere capacity pick-up, without directional effects? This is rather a problem, and I should be glad to receive some really sound technical data on the question. From my point of view I take it that there is no directional effect (or at least such a small effect as to be ignored) and that the general efficiency of the aerial is lowered due to the changes of direction. That is, if the same amount of wire were run in a straight line it would be more effective. I think it acts generally as a capacity pick-up, but, as I mentioned above, I should be glad to hear from any readers who have compiled data on the subject, and could provide some interesting information.

Notes from the Test Bench

Induction Hum

HUM is certainly one of the bugbears of mains-operated receivers, and although it sometimes happens that a receiver that has been built quite haphazardly is entirely free from this annoying trouble, it is advisable to pay great attention to the layout of the components in the first place in order to avoid disappointment after the constructional work has been completed. The necessity for careful layout was forcibly brought home to me the other day when trying to cure the hum in a friend's set. He had already tried all the well-known remedies, such as the connection of hum-dingers across the heater windings of the mains transformer, and the screening of all grid leads and valves. He had forgotten, however, that hum can be due to interaction between inductance components in the set and its mains unit. Interaction between the L.F. transformer and mains transformer was suspected in this particular case, as the hum disappeared when the L.F. transformer primary was short-circuited but recurred when the detector grid leak was shorted. The leads of the transformer were therefore disconnected and flexible leads fitted. The transformer was then rotated slowly on its axis until a position was found where the hum disappeared completely—the minimum setting was uncannily critical. Should readers experience the same type of hum, this procedure is certainly worth trying.

Heater Leads

IN another receiver tested recently excessive hum was found to be due to radiation by the heater leads. The leads joining the valve heater terminals were twisted together, but the constructor had omitted to twist the leads joining the valves to the mains transformer. When these two leads were kept about 1in. apart very pronounced hum was experienced, but as soon as they were brought near each other the hum disappeared. The alternating current passing through the heater leads produces a field, which induces a current into the valve grid leads. If the two heater wires are brought near each other, however, the two fields negative each other and no induction occurs.

Output Couplings

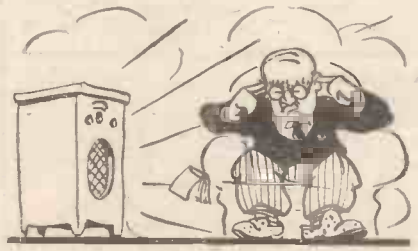
IT is necessary to accurately match the output valve and the speaker if best results are to be obtained. If the output transformer attached to the speaker is not of the correct ratio, an output choke or an output transformer of suitable ratio should be interposed between the speaker and the output valve. This method of coupling is also very desirable if the speaker transformer has not been designed to carry the current passed by the output valve, and it is pointed out that saturation of the core of the speaker transformer can cause distortion. The required transformer ratio is calculated by dividing the optimum load of the output valve by the impedance of the speaker speech coil (or transformer if this is already fitted) and taking the square root of the result.

A New Variety

ONE problem which is exercising the minds of those interested in variety is how to bring about a very close relationship between the real artist on the stage, television, cinematography, and radio. The advent of television with its suggested ramifications has undoubtedly brought this to a head, and in one quarter it was stated quite emphatically that living artistry, in music-hall or theatre, is becoming increasingly incapable of stemming the tide of mechanism owing to a lack of faith in its destiny. There seems little doubt that a new order of things is being brought about gradually as far as entertainment is concerned, and scientific development as exemplified in aural radio and television, coupled with talking films, has contributed the biggest quota to this.

A High-definition Television Demonstration

A FEW days ago a demonstration of high-definition television, using an ultra-short-wave radio link and simulating the conditions of the proposed new service, was staged between the Crystal Palace and the Press Club, Fleet Street. A large company, including Sir Stephen Tallents, B.B.C. Public Relations Officer, and Mr. Gerald Cock, who has charge of the B.B.C. television department, witnessed the demonstration. First of all, the President of the Club addressed the assembly as a head and shoulder image, the scanning unit employed



Some of those "parties" and "music-halls" are only so much noise.

being the intermediate film process. He was seen on two television receivers no larger than an ordinary radiogram. Incorporated in the Baird sets were cathode-ray tubes mounted vertically so that the pictures, black and white in colour and having a size 12ins. by 9ins., were viewed in an inclined mirror located in the cabinet.

Langenberg Back on 100 Kilowatts

BY means of a temporary aerial, the Cologne concerts are again broadcast at full power, but, as will have been noticed, are subject to considerable fading. The new and permanent aerial will not be installed before next spring as the mast must be entirely rebuilt.

Practical Television

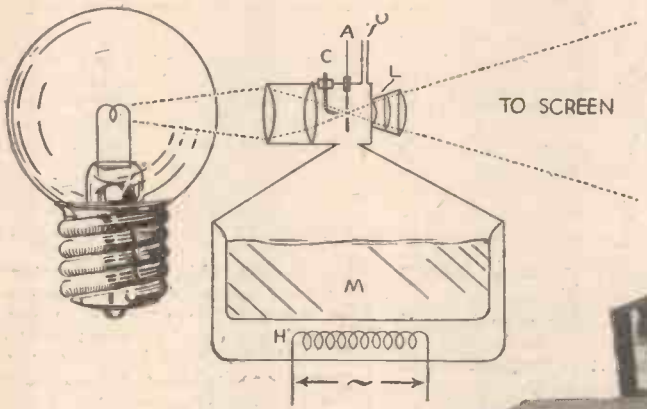
A SUGGESTED COLOUR SOUND-VISION RECEIVER

Further Details of the Proposed Charlton Television Apparatus

WE recently mentioned that a new type of television receiver had been designed, and the accompanying illustration, Fig. 1, shows a receiver which has been built to receive sound and vision, in natural colour, on the same wavelength.

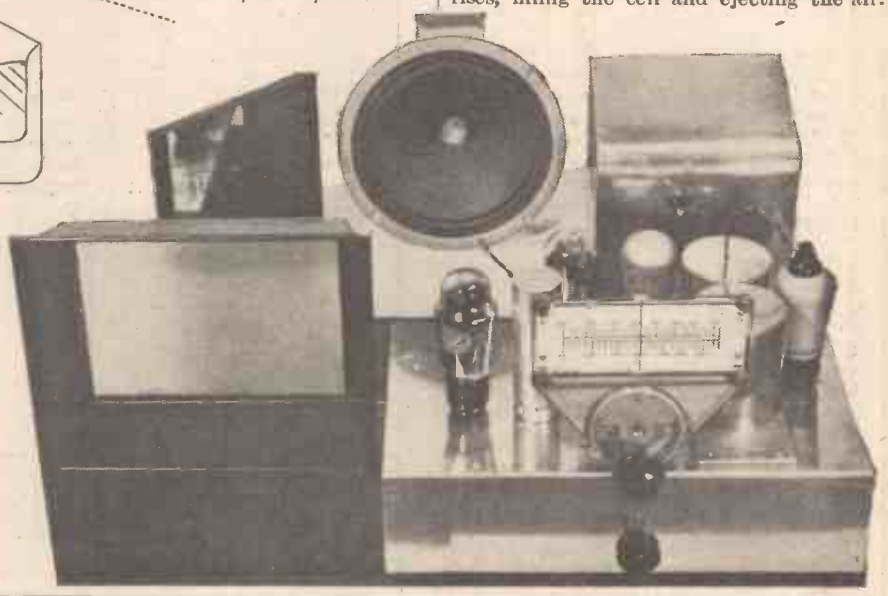
The vision apparatus shown in the diagram, Fig. 2, is enclosed within the case shown at the rear right-hand side of the illustration, Fig. 1. The vision will be projected on to the mirror at the left-hand side, and then reflected to the screen at the front.

The equivalent of a complete picture in electron vibrations will be carried on every alternate half wave; sound vibrations will be carried on the other half.



A is the ring anode; C, the pointed cathode; M, the mixture container; L, the micro-objective lenses; O, the outlet; and H, the heating resistance.

The illustration, Fig. 1, below shows the complete dual apparatus, and the diagram on the left, Fig. 2, shows the theoretical arrangement of the picture producer.



Frequency Bands

Wavelength, and, of course, frequency of wavelength, need not be altered, but in order to add the very high negative vibrations of vision to the carrier wave, it is necessary to make the high-frequency oscillation much higher than it is at present. The H.F. will be made to oscillate at a mauve frequency, or similar colour to that of the eye register. Frequency of wavelength must not be confused with frequency of oscillation.

Sound and vision will be separated by the coupling in the receiver, sound modulations going to the detector, and vision modulations going to the pointed cathode (C), thence changed into vision when being pulled through the vapour to within the ring anode. At the same time it is projected by the light beam on to the screen.

The complete picture, in natural colour, will appear within the ring anode (A) which is in focus with the micro-objective lenses.

The pointed cathode (C) is placed within the beam in such a way that it does not appear on the screen. The vapour is produced by heating a mixture (M) which rises, filling the cell and ejecting the air.

Before Christmas?

IT has been stated quite authoritatively that before Christmas a complete television broadcast will be staged and shown on a full-sized cinema screen in London. It is not known yet which cinema has been chosen for this purpose, although the Dominion in Tottenham Court Road has been mentioned in some quarters as the most likely venue for this most ambitious television experiment. The concentrated effort made towards achieving the B.B.C. high-definition television service early next year has rather put other television applications in the background, but big-screen working has been improving steadily, and will open up possibilities of extreme importance. If the experiment proves successful, then the public can look forward to all important outdoor events next year being televised for reception not only in the home *via* the B.B.C. service, but in the cinemas, and the delay between the event occurring and its portrayal on the screen will be only a matter of seconds.

No doubt the high-powered radio transmitter installed at the Crystal Palace will be used for the cinema broadcast, and as the first trial will be only in the nature of an experiment, special permission from the Postmaster General should not be necessary.

TELENEWS

At the present stage no attempt will be made to compete with standard cinema film reproduction, but rather to indicate how television is adapted admirably for the almost instantaneous portrayal of topical events, either indoor or outdoor.

In the U.S.A.

CONSIDERABLE difficulties appear to have arisen in the U.S.A. as far as television is concerned, owing to a difference of opinion between the Federal Communications Commission and the American Telegraph and Telephone Company. The Commission decided that the company's patent coaxial cable must be made available to all legitimate television experimenters. This the company refused to do as they felt it would give an undue advantage to their rivals. Since the use of a coaxial cable seems essential for television signal distribution, there is a state of impasse at the moment, unless another company produces a similar cable capable of accommodating frequencies of at least a million.

At Birkenhead

THE new proprietor of the Roxy Cinema, Birkenhead, is already making very ambitious plans for the New Year. The biggest scheme is his proposal to present a televised representation of next year's Cup Final. At the moment, however, no details have been disclosed as to how this is to be carried into effect.

A New C.R. Tube

IT is often stated that the television images produced on the fluorescent screens of standard cathode-ray tubes suffer from lack of sharpness and so give a fluffy misfocused image. To overcome this a patent has been taken out in Germany whereby the electrode system is added to by a concentrating field produced between the last pair of electrostatic deflecting plates and the screen through the medium of a funnel shaped concentrator. To this is applied a small negative potential with reference to the last electrode of the system. By this method it is claimed that equal picture sharpness is secured over the whole rectangular picture mask area.

A neat home-made screened coil described in our issue dated December 9th, 1933.

FINDING A

THE BES

A Description of a Few Simple Experiments C
made Coil to Determine the Most Suitable Char

By FRANK

DESPITE the large number of excellent and inexpensive coils of all types which are on the market it is not always possible for the constructor of a simple type of receiver to obtain one which is most suitable for his own particular circumstances. The reason is that the constants of the "ideal" coil vary to a certain extent according to the circuit employed and the aerial-earth system in use. When the receiver is a fairly ambitious one, probably employing a superhet circuit, the difference in results provided by two slightly different coils is not noticeable. On the other hand, however, when a "straight" circuit is used and there is no high-frequency amplifier, quite a small alteration to the aerial coil can produce a surprising difference in the reception obtained. The difference is still more pronounced when using a crystal receiver—and it is interesting to many to find that the simple crystal set is regaining a good deal of its former popularity.

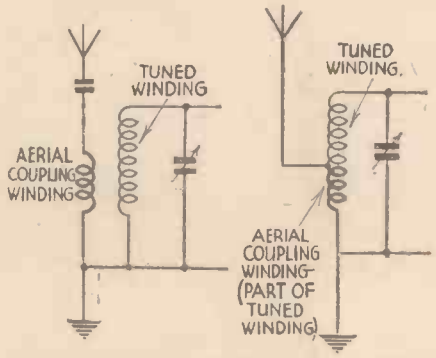
Proper Matching

It is not intended in this article to go into technical details regarding aerial and valve-input impedances, but it will simply be stated that for maximum efficiency these must be balanced, just as are the anode and grid impedances of L.F. valves when connected in cascade. The point which is of importance here is that the aerial-earth impedance is low compared with the grid-filament impedance of the first valve. In order to obtain correct matching, therefore, the impedance of the coil windings used in the two circuits must be similarly low and high respectively. This is the principal reason why loose-coupled and tapped aerial coils nearly always provide greater selectivity and better reception.

Actually, the relevant conditions are just the same whether the aerial is joined to a separate winding coupled to the tuned grid winding, as in Fig. 1, or to a tapping on the grid coil, as shown in Fig. 2. It is clear from these two diagrams that the number of turns joined between the aerial and earth leads is appreciably smaller than the number across the tuning condenser in both cases. From this it would appear that results should be practically the same whether a double-wound or single-wound tapped coil were employed; and in practice this is fully confirmed.

Combining Efficiency and Sharp Tuning

In designing and making a tuning coil for a receiver in which the degree of H.F. amplification is small it is important that



Figs. 1 and 2 (left and right).—These circuits show the similarity between a loose-coupled and tapped aerial coil.

the coil shall combine the maximum degree of sensitivity and selectivity, and these conditions can be fulfilled only by using either a loose-coupled aerial winding or connecting the aerial lead to a tapping. A few simple experiments will generally reveal that when the aerial is connected to a tapping near the top (grid end) of the coil sensitivity is good and selectivity poor. As the tapping point is lowered, sensitivity generally falls off and selectivity increases. This is true only up to a certain point, for careful measurement has shown that with the aerial attached to a certain (fairly critical) tapping the necessary degree of selectivity is obtained without any loss of sensitivity.

Knowing this, the constructor can spend a good deal of time most interestingly by observing the effect of using different tappings or (and this amounts to the same thing) by experimenting with aerial-coupling windings of various sizes, arranged in different positions in respect of the tuned winding. The tapping method is generally less complicated and is therefore recommended as a basis for the preliminary experiments. The most suitable tapping points must be found for both long and medium waves, and the two wave-bands are best treated separately.

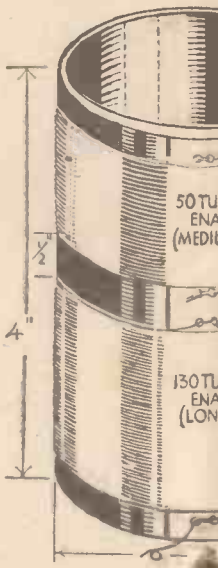


Fig. 3.—Here you ... tails of the experiment ... some cases it might b... the medium-wave ...

Making the Coil

A start should be made by obtaining a length of paxolin or shellaced cardboard tube 3in. in diameter by about 4in. long. Near one end make two holes and anchor the end of a 2oz. reel of 24-gauge enamelled wire. Keeping the wire perfectly taut, wind on 10 turns, make a twisted loop in the wire (see Fig. 3), wind on another 10 turns, make another twisted loop, next another 5 turns, make a loop, and complete by making 50 turns in all and making tappings after the 30th and 40th turns, and anchoring the end of the wire. That will form the medium-wave winding.

Leave a space of ½in. and make another pair of holes, into which should be anchored the end of some 32-gauge enamelled wire from a 2oz. reel. There should be 130 turns in all of this wire, wound in the same direction as the medium-wave winding, and loop tappings should be taken after the 30th, 50th, 65th and 80th turns, the end of the wire being anchored in the same

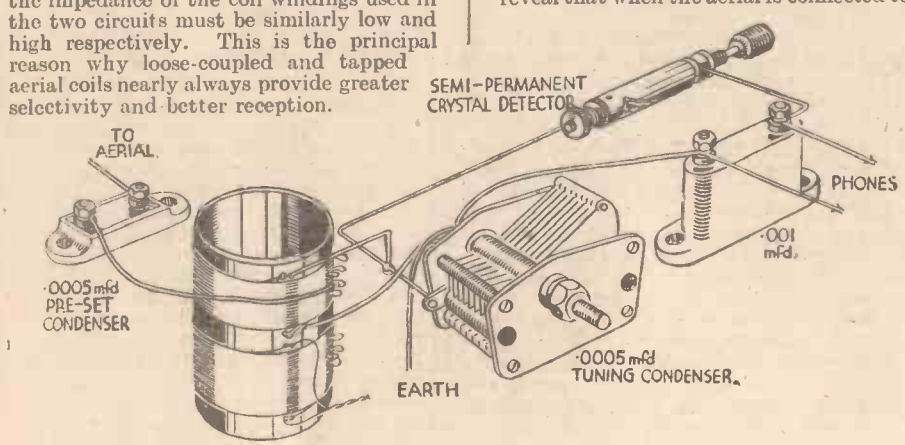


Fig. 4.—This shows the method of using the coil in a modern crystal-set circuit.

AND MAKING ST COIL

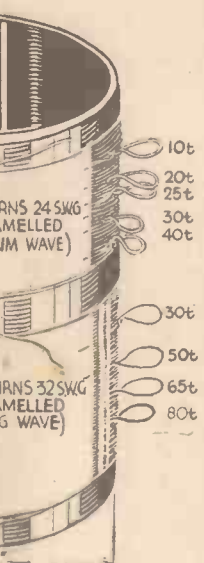
hich can Easily be Carried Out with a Home-
acteristics for any Det.-L.F. or Crystal Receiver

PRESTON

manner as was the beginning. This is the long-wave winding.

The Connections

A reaction winding will be added later, but this is best ignored until the first and most important tests have been made. The coil can now be connected to a .0005-mfd. tuning condenser, crystal detector and 'phones, as shown in Fig. 4, or to the grid condenser and L.T.— H.T.— lead of the detector valve of a det.-L.F. set. First short-circuit the long-wave winding by connecting together the two ends, after baring the wire. Scrape away a little of the insulation from each of the loop tappings, and join the aerial lead, through a .0005-mfd. pre-set condenser and crocodile clip to the uppermost tapping. Tune to a station which can only just be heard, and then observe the effect of transferring the aerial lead to different tappings. When the first tapping is used it will probably be found that the local station cannot be cut out, or even that the two local stations can be heard at the same time. A little experiment, however, should make it possible to eliminate the locals without reducing signal strength to any great extent.



*e constructional de-
l coil described. In
desirable to reduce
nding to 45 turns.*

After finding the most suitable tapping in this manner, note the effect of altering the capacity of the pre-set condenser and of again using different tappings. Incidentally, it should be mentioned that each alteration of the tapping or to the pre-set condenser will necessitate a slight alteration in tuning to keep the signal at its greatest strength.

Wave-change Switching

Having determined the best conditions for medium-wave reception the long waves should be tackled by connecting together the lower end of the smaller winding and the upper end of the larger one. Repeat the previous experiments and make a note of the tapping which proves most satisfactory. It remains only to fit a wave-change switch, and one of the double-pole-double-throw Q.M.B. type is required, and should be connected as shown in Fig. 5; when this is in one position the long-wave winding is short-circuited and the aerial joined to a medium-wave tapping, and when in the other position both windings are in series and the aerial is connected to a tapping on the long-wave section.

The coil can be put into permanent use without further ado if reaction is not required, or if a crystal set is being made, although it will be worth while to unwind and re-make it, this time providing only the tappings required, and making these rather longer so that they can be attached to terminals mounted round the top of the tube or on a small ebonite terminal strip attached across the top of the tube by means of two small metal angle brackets. It might be mentioned in passing, for the benefit of a number of recent querists, that the coil described is excellent for use in a modern crystal set, and that a detector of the semi-permanent or perikon type is to be preferred.

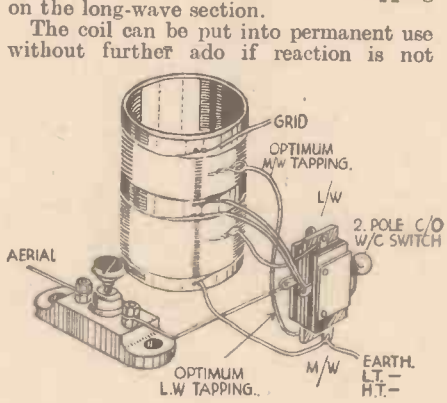


Fig. 5.—Connections for a wave-change switch.

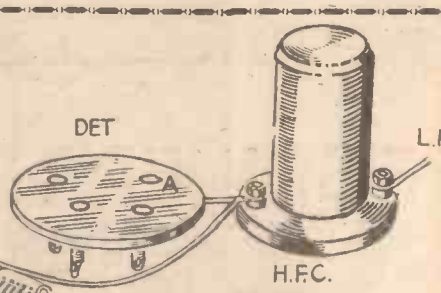
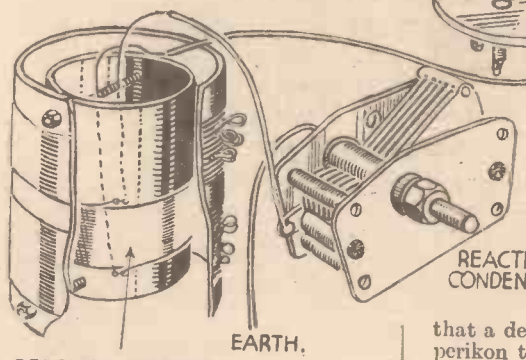


Fig. 6.—The connections for a reaction winding are shown here.



Adding Reaction

When the coil is for use in a valve set a reaction winding is well worth while, for the application of reaction builds up signals to a considerable extent. A reaction winding can be made by winding eighty turns of 32-gauge enamelled wire on a 2¼in. diameter tube which can be placed concentrically inside the larger one. In most cases it will be found that most satisfactory results are obtained when the upper end of the reaction winding is in line with the lower end of the medium-wave winding, but the effect should be noted of altering the height by standing the inner tube on small blocks of wood of different thicknesses. When the best position has been found the winding can be arranged in the appropriate place so that the ends of the inner and outer tubes are in line. The tubes can then be fastened together by means of two lengths of 4 B.A. screwed rod and nuts, the rods being passed through the tubes at the top and bottom.

One end of the reaction coil should be joined to the anode of the detector valve, and the other to the fixed vanes of the reaction condenser, of which the moving vanes are earth connected, as shown in Fig. 6. It is, however, important that the two connections be in the correct order; thus, if the reaction winding is in the same direction as the tuned windings the upper end should be joined to the reaction condenser, and the lower one to the detector anode. If the leads are wrong way round reaction will not be obtained, and this will indicate that the leads should be reversed.

The parts required for the screened coil shown in the heading.

TRACING THE SOURCE OF INTERFERENCE

BEGINNER'S SUPPLEMENT

An Explanation of a Few Simple Methods of Tracking Down the Cause of Man-made Static.

A GOOD deal has been written concerning the remedies to apply in order to overcome electrical interference, but the first difficulty encountered by the amateur is almost invariably that of finding the cause and source of the trouble. It would be useless to fit choke-condenser filters in the mains leads if the so-called man-made static were caused by a flashing sign outside the house, just as it would be a waste of time to fit an interference-free aerial system if the crackles were being conveyed to the receiver through the mains-supply leads. The first step should thus be to decide the reason for the impaired reception, and although the Post Office engineers are always very helpful in this respect when their services are requested, the average enthusiast would prefer to carry out a little "detective" work on his own before asking for outside assistance.

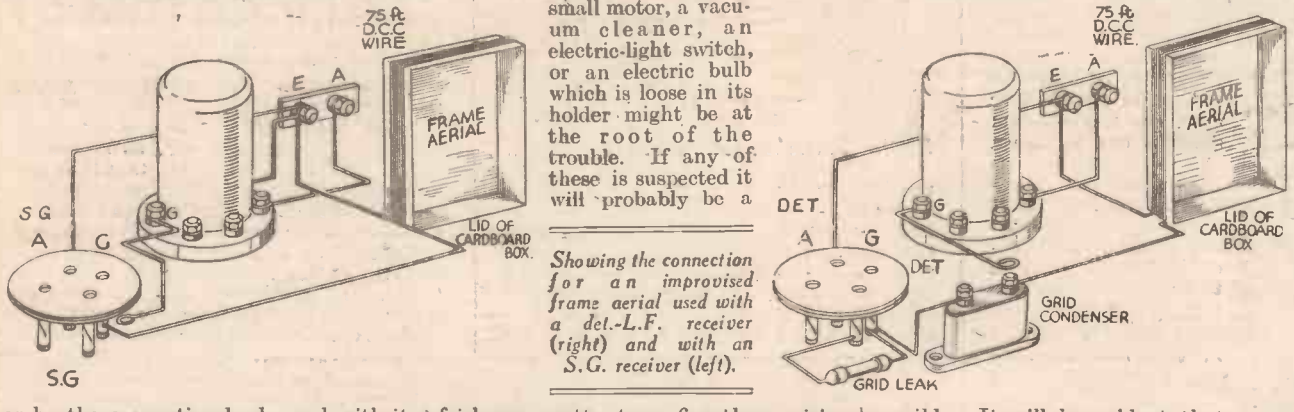
Pick-up or Wire-conveyed

In the first place, it is evident that if the set is battery operated the interference must be picked up by the aerial or by the connecting leads used with it. For this reason it is a good plan where a mains-operated set is used to arrange with a fellow amateur to compare the results obtained with his set with those provided by the mains receiver in the location in which the trouble is observed. This will generally give an immediate clue to the type of interference—mains-borne, or direct pick-up. When the interference is fed into the receiver by means of the mains leads it is evident that a choke-condenser filter of the type described recently in the article entitled, "Trouble Tracking" is required. A certain amount of experiment may be required in order to determine the most suitable values of condensers and chokes, but the procedure will be comparatively straightforward.

If it is definitely determined that the trouble is due to pick-up, the next step should be to remove the aerial lead-in at the point where it enters the house and note whether this makes any difference. If it does, a screened down-lead might prove effective and should certainly be tried. Should this make very little difference, however, the effect of altering the position of the leads to the speaker (where it is external to the set) should be tried, whilst it should be observed whether an alteration in position of the batteries and their leads makes any difference. These points are raised because it is frequently found that some of the leads run near to a wall through which an electric conduit is taken, and if the wires are parallel to this they make ideal "interference aerials."

Bad Contacts

If none of these changes has any pronounced effect, it will often be indicated that the interference is due to a bad or intermittent contact to some piece of electrical apparatus in the house. A small motor, a vacuum cleaner, an electric-light switch, or an electric bulb which is loose in its holder might be at the root of the trouble. If any of these is suspected it will probably be a fairly easy matter to confirm the suspicion by switching off the particular item. In this respect it should be mentioned that a switch having contacts which are worn, and across which sparking or arcing takes place, can be the cause of a mysterious form of trouble which is intermittent in character. In the same manner a loose electric lamp bulb can produce interference due to slight arcing between the bulb "pips" and the spring-loaded contacts in the holder. Other cases have been observed where the trouble was due to a bad contact between one of the wire coils in an electric fire and the terminal post to which it is attached.



Showing the connection for an improvised frame aerial used with a det.-L.F. receiver (right) and with an S.G. receiver (left).

Direction Finding

Should it be found impossible to locate the source of trouble by trial-and-error methods it is often possible to arrange a direct system of location by the use of a frame aerial in conjunction with a battery set. A portable receiver is most convenient for the purpose, but where this is not available a simple frame aerial consisting of about 75ft. of 26-gauge cotton-covered or enamelled wire wound round the lid of a cardboard box and connected to a battery set (preferably one having a "straight" circuit), may be used almost equally well. In the latter case the grid lead from the aerial coil should be disconnected and the frame wired in its place, the other end being earth connected, as shown in the illustrations on this page. It does not matter very much whether the tuning condenser is left in circuit or not, because the interference is very rarely confined to any particular wavelength, but is completely untuned.

When the frame aerial has been connected it should be found that the interference is most pronounced with the edge of the frame pointing in one particular direction (really there are two opposite directions because the frame responds equally to signals from the front and rear edges).

The frame aerial should thus be rotated until the strength of the interference attains a maximum, after which the volume control, where fitted, should be turned down until the crackles are only just audible in a pair of 'phones connected to the speaker terminals. The next step is to move the set and frame first in one, and then in the other direction of the frame, carefully observing whether the interference increases or diminishes. It is almost sure to become more pronounced when the outfit is moved in one direction, and the frame should therfore be moved as far as possible in that direction, the frame occasionally being rotated slightly so as to keep the interference as loud as possible. It will be evident that every time the sound increases the frame has been moved nearer to the source of trouble.

When the Interference is External

If the interference is due to some piece of apparatus inside the house it should eventually be located by progressing along the lines described. On the other hand, if it is established that the source is outside the house it will generally be necessary to call in the assistance of the Post Office Engineering Department. To do this, it is necessary to obtain an appropriate form from the local Post Office, fill in the details asked for, and send it to the address given on it. In most cases an experienced engineer will call in a few days (without charge) and continue the search.

Choosing and Using a Short-wave Converter

In this Article Consideration is Given to Some of the Points which arise in Connection with the Installation of Apparatus for Converting a Broadcast Receiver to one working on the Short Waves

By H. J. BARTON CHAPPLE, B.Sc., A.M.I.E.E.

FOR many years the short waves have held a particular attraction for the more or less expert experimenter. In the first place, the field was largely unexplored, and short-wave working presented certain technical difficulties which it was fun to solve. Only more recently, however, has the general listener and the average constructor become interested in this sphere, his conversion being due largely to the increasing use of the 14 to 50 metre waveband for real programme broadcasts from Europe and from still more distant countries, together with the very good transmissions from advanced amateurs. There are now on the market many very satisfactory all-wave receivers, special short-wave receivers, and converter units, so that there is no difficulty in obtaining suitable apparatus for short-wave listening, while many designs for each

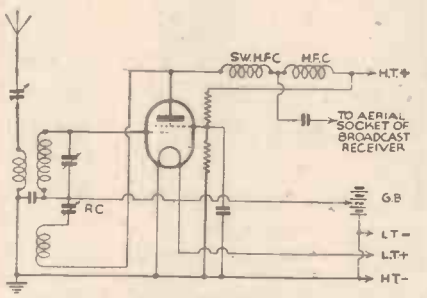


Fig. 1.—A simple S.W. converter in which an S.G. valve operates as an anode-bend first detector and frequency changer.

type of equipment to be built at home have been published in PRACTICAL AND AMATEUR WIRELESS from time to time.

A Summary

Summing up briefly the advantages and disadvantages of the different forms of short-wave listening apparatus, it may be said that for the listener who wishes to make a start on short-wave listening mainly from the pure programme point of view, a complete all-wave set, receiving on long, medium, and short-wave bands, has much to commend it. But the listener may already have a really good standard broadcast receiver and may not be ready, for the moment, to build another complete set; or he may be a new-comer to radio construction and not have sufficient confidence in his ability to build an all-waver just yet. He then has two alternatives; either to build a separate complete short-wave receiver, or to construct some form of unit which can be connected temporarily to his existing broadcast set to permit short-wave listening as occasion demands.

The complete short-waver has the advantage that the fan can install it in his own den, and listen away to his heart's content while the family enjoy the medium-and long-wave programmes. A very simple short-waver, however, is a little tricky to operate, and a more elaborate apparatus, while perhaps more satisfactory in operation, can be quite as expensive to build as a standard-wave model.

Two Kinds

Suitable units are of two kinds—what is termed an "adaptor" and the so-called "converter." The first is, in effect, a simple short-wave receiver comprising a detector stage only, or possibly one high-frequency stage and detector—but with no low-frequency amplifying equipment. It is intended to be used by the mere expedient of plugging the output of the detector valve into the pick-up sockets of the broadcast receiver, thus making use of the L.F. side of the existing set. Although simple in design and capable of giving quite good results, instruction, and entertainment, it is necessary to keep the detector valve always on the verge of oscillation, which means quite a critical adjustment of the reaction control with each re-tuning operation.

The converter, however, is rather a different proposition. It consists, in essence, of a frequency changing stage, sometimes with a high-frequency pre-amplifying stage, and it is intended that the output of the unit should be passed to the broadcast receiver in such a way that the complete combination forms an efficient short-wave superhet receiver.

It is important to remember that a converter can only be used in connection with a receiver which has at least one high-frequency amplifier, if it is a straight set, or at least one intermediate-frequency amplifier in the case of a superhet. Then, in the case of the straight set, the H.F. amplifier will serve, during short-wave working, as the I.F. stage of the converted superhet; while in the case of the superhet the converter output is usually connected to the input of the first intermediate amplifier of the broadcast set.

Simple Schemes

It is not intended in this article to give complete working circuits for constructional converters, as suitable designs have appeared in these pages quite recently, but some of the arrangements commonly used will be described briefly and their particular advantages suggested. Theoretically, any of the many well-known types of frequency-changing circuit, from the simple autodyne upwards, may be, and often have been, employed. The very simple forms, however, are to-day considered rather too crude and difficult to handle.

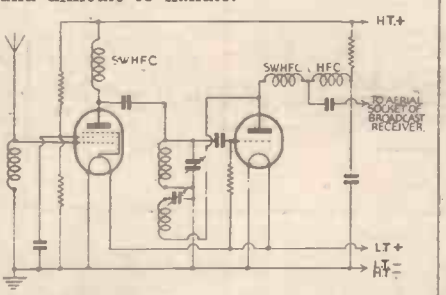


Fig. 2.—A superhet S.W. converter using simple autodyne circuit with an untuned H.F. amplifier to reduce re-radiation.

For the sake of completeness, and because many amateurs may wish to utilise valves and components already in their possession, two of the more simple circuits are shown. The single-valve autodyne arrangement is represented in Fig. 1, in which a screen-grid valve operates as a self-oscillating anode bend first detector. Its disadvantage is, of course, that the single valve is in a continual state of oscillation, and re-radiation is therefore apt to be serious. This can be overcome by the use of a screened-grid or screened pentode pre-amplifier, and in Fig. 2 such an arrangement is shown, the amplifying valve being used with an untuned aerial circuit and the self-oscillating detector in this case being a triode.

Improving Selectivity

It will be observed that in both these arrangements there is only one tuned circuit, and selectivity is therefore not of a very high order. If, however, one of the

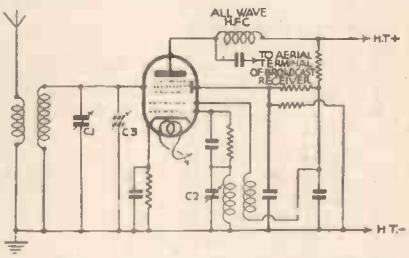


Fig. 3.—A mains-operated S.W. superhet converter using heptode frequency changer. C1 and C2 are ganged, and C3 is a variable trimmer.

more modern frequency-changers is used, such as a heptode or octode electron-coupled valve, two tuned circuits are employed with a corresponding improvement in both amplification and selectivity. When valves of this type were first introduced, a measure of difficulty was experienced in using them on the short waves because, at the very high frequencies corresponding to these wavelengths, capacitative couplings assumed serious proportions between the two tuned systems, with the result that the signal and heterodyne frequencies tended to become equal, so that the intermediate frequency was not maintained at a constant value. The valves have, however, been greatly improved with respect to inter-electrode capacities, and the "pulling" effect is not so often experienced.

The newer triode-hexode combination, consisting of a triode oscillator and hexode mixer in one bulb, with electron coupling between the two sections, is claimed to be still better in this respect. However, our present purpose will be served by the theoretical circuit shown in Fig. 3—namely a converter employing a heptode frequency-changer. In this arrangement the two condensers C1 and C2 may be ganged, and a balance maintained by means of the hand-operated variable trimmer condenser C3 in parallel with C1.

Battery or Mains?

There are a few points concerning the design, particularly in connection with the high- and low-tension supplies, which deserve special consideration. One of the first points concerning which the listener must

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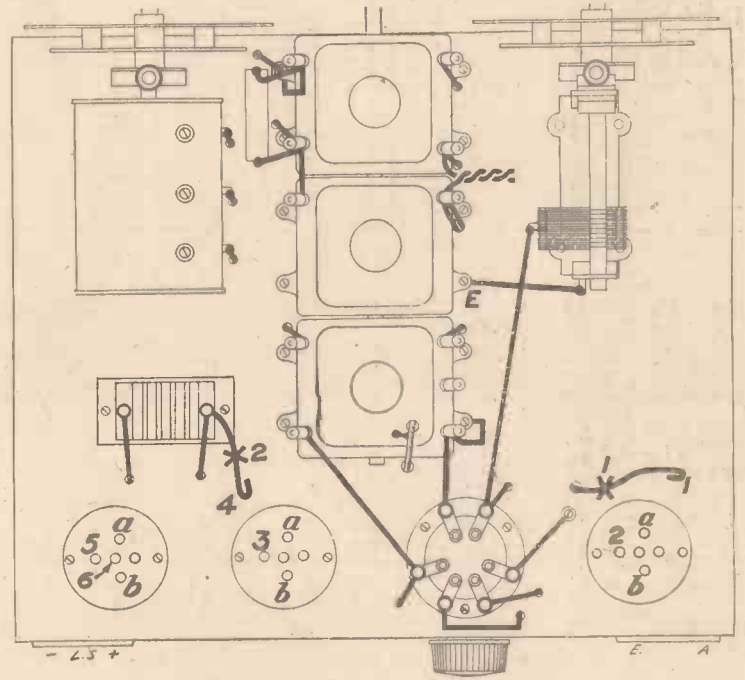
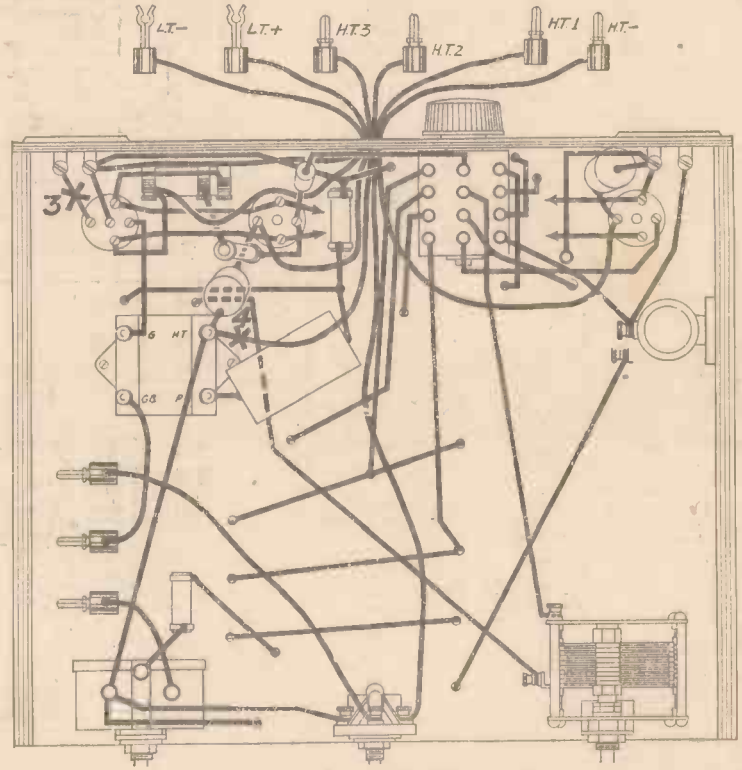
Practical and Amateur Wireless SERVICE DATA SHEET No. 11 FOR THE BATTERY SILVER SOUVENIR



Top of Chassis View



Underside of Chassis

Approximate Voltage Readings

Voltmeter —to E

„ +to 1=120 volts.
„ +to 2= 60 volts.
„ +to 3= 24-36 volts.
„ +to 4= 90 volts.
„ +to 5=115 volts.
„ +to 6=120 volts.
„ across a-b=2 volts.

Approximate Current Readings

Milliammeter connected at × 1= 2½ m.A.
„ „ „ × 2= 1 m.A.
„ „ „ × 3=12 m.A.
„ „ „ × 4=18 m.A.

Approximate Resistance Readings

Coils

Ohmmeter connected across A and E=1 ohm (med. wave)
„ „ „ A and E=3½ohms (long wave)
Ohmmeter connected across VC and E=1.2 ohms (med. wave)
„ „ „ VC and E=14 ohms (long wave)
„ „ „ HT and Cap Lead=2.2 ohms (med. wave)
„ „ „ HT and Cap Lead=8 ohms (long wave)
„ „ „ R and E=4 ohms.

L.F. Transformer

Ohmmeter connected across P and HT=750 ohms
„ „ „ G and GB=4,000 ohms

CHOOSING AND USING A S.W. CONVERTER

(*Continued from page 341*)

make a decision is whether to build a battery- or mains-operated converter. From the point of view of efficiency, the mains-operated type is certainly preferable, and with reasonable care concerning layout no trouble with hum should be experienced. But if no mains are available, a battery-operated apparatus is the only choice. Even if mains are available, when the actual receiver is of the battery-operated type, it may prove cheaper to build a battery type converter, as it seems rather extravagant to construct a complete mains supply unit for one valve only.

Where the converter is to be of the battery type, low-tension terminals or leads can be fitted and both supplies taken from the existing batteries. With regard to the high-tension voltage, this is sometimes rather critical, and if no point in the existing set giving just the voltage required can be found, it will be necessary to take the H.T. supply from the highest tapping and to include in the converter a variable voltage-dropping resistance with, of course, the usual non-inductive bypass condenser. This remark, by the way, applies equally to mains-operated equipment.

The listener who owns a mains-operated broadcast set will prefer a mains-operated converter also. If his set is an A.C. set, fitted with mains valves with 4-volt heaters, he may at once decide on a converter using a mains frequency-changer of the A.C. type with 4-volt heater also. He will have little or no difficulty in tapping the H.T. supply, and it may also be easy to run the heater of the frequency-changer from the main set. If tapping the L.T. circuit is difficult, however, or if the added L.T. load on the transformer results in excessively low voltage in the heater circuit, it will be best to install a separate filament transformer for the converter.

"Universal"

There are many listeners with A.C. mains who, for one reason or another, have built or bought a "universal" set, using A.C./D.C. valves with their heaters wired in series. Usually it is not possible to tap into the heater circuit of such a set because it would mean a readjustment of the heater regulating resistance, and in these circumstances it is best to build the converter around an A.C. (4-volt) frequency-changer, and to install a separate 4-volt heater transformer, but the H.T. voltage can be obtained from the main set.

For the listener on D.C. mains, a mains-operated converter is almost out of the question, as the only mains frequency-changer he could use would be one in the universal range, and this would have to be run with its heater direct off the mains through a separate regulating resistance, which would be wasteful, because the total L.T. consumption of the set, already in the region of 40 watts, would be thereby doubled. The D.C. user, therefore, would be well advised to construct a battery-operated converter, or a complete universal mains all-wave or short-wave set.

SHORT WAVE SECTION

SHORT-WAVE PHRASEOLOGY

Interesting Details of the Call-signs, Verifications, Codes, etc., Which are Met With in Short-wave Work.

THE steady increase in international communication makes it necessary to solve an important problem—the possibility of all peoples understanding each other, in spite of the great variety of languages. This problem cropped up even in the Middle Ages, when the physical sciences had to be communicated to professional colleagues in the various countries; the Esperanto of that time was the Latin language known among intellectuals.

Even nowadays we have professional groups which, besides their mother languages of civilised people, have to know a third internationally recognised language to make themselves understood in every part of our globe. It is peculiar that up to now no living or synthetic language composed of several languages, as, for instance, Esperanto, has been able to get a firm hold, but that this international understanding is based more on agreed signs and signals.

There exists an international book of flags, traffic signals are the same in almost all the countries, there is an international hotel code, the morse alphabet is recognised everywhere, and many other examples of such generally applicable means of understanding could be enumerated. In all places where powerful communication interests of the inhabitants of all countries meet, such an international language originates compulsorily, and it is a proof of how radio has become an international means of communication that for wireless communications as well an international language has been developed.

This already begins with the indication of the individual stations. In the same way that every motor-car in foreign countries bears an indication plate of the country of which it belongs, every radio transmitting station in the world has an internationally recognised identification sign.

Identification of Call Signs

The name of the station, the identification sign of the country and of the province of the country in which it is situated, are here grouped in a collective identification sign. From the first or the first two letters of what is known as the "call-sign" one can discover the country of the station, whilst the numerals and letters following indicate the province of the country and the station in question. For indicating the country and the station eighty-one groups of letters have been internationally agreed upon. Holland, for instance, has been allotted the group PA, PB, PC—up to PI.

If, therefore, in some part of the world one hears the announcement "Here is PCJ," it is unnecessary to understand the further announcement to know that it is a station in the Netherlands, because the call-letters begin with PC. The next letter J indicates that it is the experimental transmitter in Eindhoven which is regularly transmitting experimental broadcasts on a short wavelength of 19.71 metres. If the first letter is a W then it is an American station. a G indicates an English station, a VE stands for Canada, etc.

After the call-letters for the country comes more information about the station. If the G is followed by an S this means that it is an English short-wave station in Daventry, and GSD then indicates the short-wave transmitter in Daventry working on a wavelength of 25.56 metres. Or W3XL are the identification letters of the American station Bound Brook, on a wavelength of 17.33 metres.

To simplify understanding, an international spelling-key was also agreed upon, with which announcers very often spell the call-signal of their station. These identification words are usually geographical identifications, and if one should hear, for instance: Hanover—Jerusalem, 5, Amsterdam—Baltimore—Denmark, one need not think that such geographical confusion is due to an April joke, for it is the spelling of the call-signal for the short-wave station CALI in Columbia, which reads as follows: H J 5 A B D.

A collection of QSL cards is the ambition of all short-wave enthusiasts.

It is with the call-signal for the stations that the vocabulary of short-wave phraseology begins. Nowadays everybody knows the signal "S O S," the emergency call of ships in danger and comprising, in morse code, three dots, three dashes, and three dots. Arranged in a similar way are the calling-up and termination signals, the signals for urgent communications, for announcements with regard to safety at sea and in the air. Besides this there are internationally recognised abbreviations with which it is possible to arrange a long talk between radio stations.

The "Q" Code

All these words start with a Q, which is an indication that the next group of letters has been taken from the radio code. If somebody wishes to inquire the exact time he need only signal "QTR"; he will be understood and receive the correct answer. If one desires to know the name of a station one inquires "QRA," which is as much as saying "Who are you?" If a radio-telegraphic connection has to be broken, then one signals "QRN," and the partner in the talk knows that this means "I cannot receive any longer. I am closing down because a thunderstorm is interfering."

This rather peculiar but very practical language is not only an idiom for those who need it in their line of business. Just as one meets on the road "professional" motor-car drivers and owner-drivers, there are on the air, besides the "professionals," radio telegraphists, sporting and scientific "drivers." They also make use of this abbreviated manner of speaking, the "Q" language as we might call it.

There are more than 70,000 short-wave amateurs, distributed over 120 countries, who make themselves understood in this language. Most industriously they have spun a narrow network across the whole earth and there are probably no two towns on our planet which have not been brought into contact with each other by amateur short-wave stations.

For the listener whose receiver has a short-wave section, it is most thrilling to follow up the transmissions of amateur stations, next to the regular broadcast programme. One always comes across the "Q" language and will hear many things that at first will appear rather comical. For instance, amateur transmitters always end their transmission with "Dadidadida," which is nothing else than a phonetic translation of the closing-down signal of the "Q" language in morse code.

QSL Cards

The special pride of all short-wave amateurs are the cards with which listeners in all parts of the world inform the amateur transmitter how his broadcasts have been received. These QSL cards are of a prescribed uniform model, and all technical information is written on them also in definite signs. Volume of sound is indicated by an R and a number between 1 and 9. Volume of sound "1" means that the

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transmission could just be heard, whilst "9" indicates powerful loud-speaker strength. An "F" stands for slight fading, double "F" for more pronounced fading, and "FFF" for total fading, whilst reception without any fading is indicated by an "N." Atmospheric interferences are indicated in various degrees by 1-3 "X." Finally, the kind of receiver used is indicated by a corresponding letter.

Equipped with a knowledge of short-wave phraseology and an all-wave receiver one can safely start on the world journey. It is quicker, cheaper, and more comfortable in this way than with any other means of transport. Do not forget that instead of the picture postcards you used to send to your friends you now send QSL cards to the transmitters you heard; they will be pleased with such news, perhaps even more so than the people to whom the picture postcards are addressed.

The enjoyment of the latter was perhaps mingled with a little jealousy about your travelling pleasures, whereas with the former you can reckon on the enjoyment being fully shared, and, in the true sense of the word, enjoyment shared counts for double enjoyment.

Leaves from a Short-wave Log

ALTHOUGH on several occasions I have tried to tune in VK2ME, Sydney, I find that it is between G.M.T. 15.00 and 16.30 only that I can secure reliable reception. Bear in mind that the station only works on Sundays. In its immediate neighbourhood you will find Daventry GSB, Oslo (Norway), and DJN, Zeesen, but careful tuning should separate VK2ME, of which the signal is usually very clear. The announcements are fairly frequent with reference to *The Voice of Australia*, and towards the latter part of the transmission "variety" is a strong feature. Before closing down the announcer gives us the future times of broadcasts, and this is followed by the laugh of the kookaburra and the playing of *God Save the King*. "The time" we are told "is 4 p.m. Greenwich Mean Time, or 2 a.m. (Monday) at Sydney. Good morning to everybody, wherever you may be." Details for your log: 31.28 metres (9,590 kc/s), 16 kilowatts, and distance from London, roughly 10,540 miles.

ZCK, Hong Kong, on 34.29 metres (8,750 kc/s), was another recent catch. The times of transmission are G.M.T. 04.30-06.15, and again from 09.00-15.00. The station was tuned in at 13.50, and held for roughly twenty minutes. The call heard was: *This is station ZCK at Hong Kong, relaying a programme from ZBW*, which is the medium-wave transmitter. Should you log a broadcast, reports are highly prized and must be addressed to The Secretary, Broadcasting Committee, ZBW, P.O. Box 200, Hong Kong, China.

Another search gave me on a later date what I took to be ZTJ, Johannesburg, on 49.2 metres. I cannot swear to its identity as the signals were poor and only held for a few minutes, but I am certain that I picked up a few words of a Dutch dialect, which would tally with Taal or Afrikaans. It has encouraged me to try again on some other occasion. The dial reading is one in close proximity to that of W3XAL, Boundbrook, which is so well heard after G.M.T. 21.00.

New Station at Rocky Point

Here is good news for listeners to the U.S.A. transmissions. The R.C.A., of which the full title is The Radio Corporation of America, Inc., is building at Rocky Point (Long Island), a 200 kilowatt short-wave station to replace WEF, which hitherto, in addition to working traffic with Europe, has often broadcast the New York radio programmes on 28.25 metres (10,620 kc/s). The new station, experimentally, will carry out a series of transmissions destined to Great Britain and the European mainland. The difference in power, namely, 200 and 40 kilowatts, it is considered will ensure excellent reception even under the most unfavourable atmospheric conditions.

And writing of the U.S.A. reminds me that the popular Saturday afternoon B.B.C. feature *Five Hours Back*, in the National programmes, is relayed by the Tatsfield listening post from Radio City, New York, mainly *via* W2XAD, Schenectady (New York), 19.56 metres (15,330 kc/s), and W3XAL, Boundbrook (New Jersey), 16.87 metres (17,780 kc/s). I have frequently succeeded in taking it direct through the latter channel.

Finally, a few items for your log. HJ2ABD, at Bucaramanga (Colombia) on 50.17 metres (5,980 kc/s) has been heard in London between G.M.T. 02.00-03.00; the programme being radiated at the time consisted of gramophone records with Spanish announcements.

A new Venezuelan station—it was only opened in July last—on 51.02 metres (5,880 kc/s), has been captured by a listener. It is YV8RB, Barquisimeto, which in its call styles itself *La Voz de Lara*. It is said to be on the air from G.M.T. 22.30 until 02.30 daily. The power is 400 watts.

Facts & Figures

COMPONENTS TESTED IN OUR LABORATORY

Goltone Screened Aerial

MESSRS. WARD AND GOLDSTONE have recently received repeat contracts for "Goltone" Multi-shell Air-spaced Metal-screened Flexible Conductor from British and Dominion Government Departments. Multi-shell was originally evolved for low-loss screened aerial downleads to overcome electrical radiated disturbances and for use under severe climatic conditions. The strong mechanical construction, combined with flexibility and low H.F. losses (the impedance of the standard $\frac{5}{8}$in. diameter type is 175 ohms), allows this screened conductor, however, to be employed for short-wave and other transmitting purposes.

Long lengths are used as matched impedance lines between control panels and for similar purposes. A special $\frac{3}{4}$in. type with an impedance of 120 ohms is also supplied, though this is not available for use as a screened downlead.

Full details are given on page 26A in the new Radio List, R134, free on request to all interested readers of this journal.

A New H.M.V Speaker

"HIS Master's Voice" are releasing a new permanent-magnet extension loud-speaker which can be used with all "His Master's Voice" models with the exception of the two High Fidelity instruments, Models 580 and 800. The new loud-speaker will retail at the very attractive price of three guineas and will be known as Model 172. It incorporates an inbuilt volume control, so that, when using it as an extra speaker, the volume can be varied without the necessity of going from one room to another. Furthermore, the volume control does not affect the volume of the "parent" loud-speaker.

Another feature of this Model is that it will, owing to the multi-ratio input transformer, match up to pentode, triode or push-pull output stages. This loud-speaker can also be used satisfactorily where a low-impedance speaker is necessary. The loud-speaker is of the new nickel aluminium alloy permanent magnet type and is capable of handling up to $2\frac{1}{2}$ watts output (undistorted). The cabinet is of a modern but restrained design and is finished in figured walnut marquetry. Model 172 is available on very attractive hire purchase terms, when purchased with a "His Master's Voice" radio instrument, amounting to only a few shillings a month.

Heayberd Charger

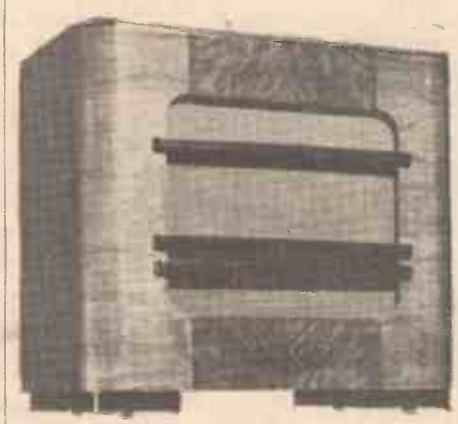
A USEFUL charger is obtainable from Messrs. Heayberd, and at this time of the year will form an ideal Christmas gift either for a radio enthusiast or for the car owner. It is the model A.O.3, designed for use on A.C. mains and will charge 2, 6 or 12 volt accumulators at 1 amp. In addition to its use as a simple charger it is possible to employ it for operating model railways, operating cinema projectors, etc. The price is 50s. in either a portable or non-portable form.

Ferranti 2-watt Resistances

A NEW range of carbon resistances has been added to the Ferranti components and these are similar to the types G5 and G1, but are designed for higher rating. These resistances are made from a special refractory material upon which carbon is deposited, and in a special machine some of the carbon is removed whilst the resistance is included in a special circuit. A meter shows the total value of the resistance, and it is thus possible to obtain a very high degree of accuracy in each resistance as the carbon deposit is removed until an exact value is obtained. Due to this method of manufacture there is little likelihood of the value changing during use and perfect silence of operation is obtained. The new model is known as G.2 and the rating is 2 watts. The price is 1s. 6d. each and the standard colour code is adopted for identification purposes. All values from 140 ohms to $\frac{1}{2}$ megohm are obtainable. Standard wire ends are fitted for connection purposes.

New Osram Half-wave Rectifier

A NEW rectifying valve is announced by the G.E.C. Known as the U16, this is intended for use with cathode-ray tubes and is standard in appearance, although the 4-pin base has connections taken to only two of the pins. The anode connection is taken out to a cap on top of the valve. The filament rating is .25 amps at 2 volts and the valve is rated to withstand a maximum anode voltage of 5,000 R.M.S., the maximum rectified D.C. being 2 mA. A new design of photocell amplifier is also announced. A valve of the L2 type is incorporated and the amplifier may be used on A.C. or D.C. supplies indiscriminately.



The new 3-guinea H.M.V. loud-speaker.

RADIO CLUBS AND SOCIETIES

Club Reports should not exceed 200 words in length and should be received First Post each Monday morning for publication in the following week's issue

ANGLO-AMERICAN RADIO AND TELEVISION SOCIETY

THIS Society held a very successful dance in Uxbridge on November 9th. Among the attractions were electric instruments, the first appearance of the A.-A.R. & T.S. Novelty Orchestra, and greetings broadcast to those present over Radio-Normandie. No charges are made for attending these dances and full particulars may be obtained from Leslie W. Orton at "Kingsthorpe," Willowbank, Uxbridge. On New Year's Eve a Masked Dance is being held by the Society in Uxbridge. The Ladies' Section of the Society announce, through their representative, Miss Eileen Harris, that they are now represented in Great Britain, Irish Free State, U.S.A., Cuba, Hungary, South Africa, New Zealand, and Australia. W2XAF will shortly broadcast special Anglo-American Radio and Television Society concerts.

THE RADIO, PHYSICAL AND TELEVISION SOCIETY

AT the last meeting of this Society, held on Friday, November 15th, lectures were given on Short-wave Reception and Photo-electric cells, the lecturers being Mr. J. Gilbert Hobbs (G2QG) and Dr. C. G. Lemon. Mr. Hobbs outlined the difference between medium- and short-wave reception, particularly from the mathematical point of view, and he explained the decibel system as used by commercial stations for checking signal to noise ratio. At the conclusion of the lecture several points of interest were raised by members.

Dr. Lemon, in his lecture, dealt with various types of photo-electric cells, both from the theoretical and constructional viewpoints. The next meeting of this Society will be held on Friday, November 29th, when Mr. J. Goldwin Smith will give a lecture entitled "X-Rays and the Structure of Matter." A "refresher" course in theory and fundamentals of wireless for beginners and old hands alike is about to commence, while a morse instruction class is shortly to be instituted. Readers of PRACTICAL AND AMATEUR WIRELESS are cordially invited to any of our meetings, which are held at 72A, North End Road (off Talgarth Road), West Kensington. Further details of our activities may be obtained from the Hon. Sec., M. E. Arnold, 12, Nassau Road, Barnes, S.W.13.

SHORT-WAVE RADIO AND TELEVISION SOCIETY (THORNTON HEATH)

THE weekly meeting of the Short-wave Radio and Television Society of Thornton Heath was held at St. Paul's Hall, Norfolk Road, on Tuesday, November 12th, under the Chairmanship of Mr. R. E. Copp. The evening was devoted to a discussion on automatic tuning which was opened by Mr. O. L. Crossley. Automatic tuning was one of the latest developments, he said, and had been introduced by Murphy Radio, Ltd. The model demonstrated was the A28C. The receiver was tested on numbers of stations, and found to be very effective.

LEAMINGTON AND WARWICK SHORT-WAVE CLUB

THIS club has been founded for the convenience of short-wave experimenters in Leamington, Warwick, and district. It is hoped that all interested enthusiasts in the locality will join and help to make the club a real success. Particulars may be obtained from the President, A. W. Field, 89, Wathen Road, Warwick, or the Hon. Sec., 2BWG, 40, Clarendon Square, Leamington Spa.

THE CROYDON RADIO SOCIETY

THE Croydon Radio Society's assistant technical adviser, Mr. J. A. Delves-Broughton, lectured to his fellow members in St. Peter's Hall, Ledbury Road, S. Croydon, on Tuesday, November 12th. His topic, "Researches which have led to my New Loud-speaker" had been keenly anticipated, and a number of PRACTICAL AND AMATEUR WIRELESS readers were attracted by the event. Early researches on this speaker proved how hard is the path of the inventor, and it was not until Mr. Delves-Broughton joined the Society and received hints and tips from helpful members that his speaker was created. Its most remarkable feature was the entire absence of spider, or centering device for the cone. Only held as it was by special surround material at the front, the cone could move with almost complete absence of friction. Such a feature was invaluable, and was responsible for great efficiency and really marvellous bass reproduction. The cone itself was unusual, being of a unique re-entrant design, only evolved after some years of trial and error experiments. The moving-coil when constructed had no former, so resulting in economy of weight. All other constructional details were carefully discussed, and in the demonstration the audience were amazed at its purity of reproduction. The speaker will be on show at the Society's loud-speaker night on Tuesday, December 3rd, and visitors are invited to hear how Mr. Delves-Broughton's instrument compares with a dozen other models. Hon. Pub. Sec.: E. L. Cumbers, Maycourt, Campden Road, S. Croydon.

LETTERS FROM READERS

The Editor does not necessarily agree with opinions expressed by his correspondents.

All letters must be accompanied by the name and address of the sender (not necessarily for publication).

Transmitting Data

SIR,—With reference to the comments of Mr. Vickers (G6GV, Prestwich) in the November 9th issue *re* my letter published under "Jamming on the 40-metre Band," I wish to inform your correspondent that it is my practice to speak and write from personal experience or from the experience of others well qualified to express their opinions. I am familiar with all past and present R.S.G.B. publications, and in giving my views do so after comparing them and others of home and foreign origin, and with the articles which have appeared in this journal. In addition, personal contact and correspondence with readers of this journal helps to strengthen the opinions expressed. One telling fact is that readers, including G6GV, are in favour of more transmitting articles, which, to my mind, denotes that they meet readers' requirements, and place before them 100 per cent. information on transmitters free from padding, which is a different thing from a treatise on short-wave radio in text book form. G6GV considers my criticism of the R.S.G.B. subscription as unfair, and details the benefits. I appreciate the comprehensiveness of benefits, but do not regard the matter from a value for money standpoint. The outstanding fact is that one member's support is as good as that of another. All can benefit from the facilities offered, but unless they can pay the greater subscription must forfeit certain benefits. There are many schoolboys, youths and men, whose apparatus is the result of self-sacrifice, and I consider that a more reasonable fee and one only would so increase membership and finances that curtailment of benefits would be unnecessary. The R.S.G.B. have always been conservative, and had they recognised and catered for the short-wave broadcast listener years ago would now be the strongest society in the world, and a strong lever at wavelength allocation conferences, etc. Instead, various other organisations came into existence. All members share a common interest, DX listening, experimenting, etc. Equal benefits, including first-class magazines, are available to all at a very moderate fee, proof that it can be done.

I would draw attention to the fact that R.S.G.B. members, in the first place, introduced the society into this correspondence, and inferred in a veiled sort of way that transmitting data was, or should be, their monopoly as true experimenters and not potential law-breakers. Experimenters exist outside of organisations as well as inside. I regard such tactics as boost and maintain that the majority deride such issues, as transmitting data comes under general radio knowledge, and we know the law. I hope this is clear to Mr. Vickers, who regards my complaints as groundless, yet states that the R.S.G.B. are aware of swamping complaints. Rather contradictory and, as stated by a high-power user, unconvincing. Local co-operation as outlined helps locally, but does not prevent a distant low-power station being jammed out of existence. The looker-on sees most of the game. The listener hears all and from unbiased evidence draws his own conclusions.—A. W. Mann (Middlesbrough).

Conditions in South Africa

DEAR THERMION,—In the article "On Your Wavelength" in the PRACTICAL AND AMATEUR WIRELESS of September 14th you quoted an instance of long distance on the ultra-short waves and I thought the following cutting might be of interest:—

LOW-POWER RADIO

Mr. S. E. Poole, an amateur radio experimenter of Bellville, has just established a two-way communication on a wavelength of 10 metres with amateurs in England and France. Mr. Poole's transmitter, ZU1C, has an output of only 9½ watts, and he believes his communication with G2YL in England and F8VS in France constitutes a world's record for 10 metres.

Another amateur, Mr. G. Shoyer, of Rondebosch, spoke to a South American station this week. This is believed to be the first time that a South African amateur has had two-way communication with an amateur in South America. Mr. Shoyer's transmitter has an output of 50 watts.—(*Cape Argus*).

I always read your news and views in PRACTICAL AND AMATEUR WIRELESS, and I think your opinion regarding crooners is about on a par with that of the majority of listeners out here. Time, I think, is the only remedy plus education.

This country is full of American all-wave sets, many of them quite good, and this type of receiver has been steadily gaining ground for the past seven or eight years. It fills the demand, as there are only three or four broadcast programmes to listen to. Overseas broadcast is only good when atmospherics are absent, which is rare. The powerful short-wave transmissions from Daventry, America, and the Continent are received here as good as the South Africa broadcasts, hence the popularity of the American sets which sell at £24 10s., Table model consoles £35 to £37, and gram-radios round about £45. The hire purchase system is responsible for the majority of sales which keep importers busy. It seems as if we are at the peak period now, but it has been stated in the daily papers that there is likely to be a slump soon. Nearly every kind of tradesman and shopkeeper sells wireless sets. Auctioneers are importing and selling them by auction, which is significant of the profits made. In Johannesburg the business is a huge one. I still use my three-valve Reinartz, which I built ten years ago and from which I have had many hours, early and late, of enjoyment, and I am still satisfied, although I use "plug-in" coils and 6-volt valves, with Ferranti AF3 and AF5 for amplification. I find the 16-metre band the best for daylight. It seems to be more consistent than the 19-metres band, but for evening reception the 25- to 49-metres band is good.—T. TENNYSON (Sea Point, Cape Town, S. Africa).

A Good Log from Coventry

SIR,—As a regular reader of your excellent paper, I have noticed many short-wave logs published recently in your columns. As I have not yet noticed one from Coventry, I am sending a few extracts from the two logs compiled by my friend and myself since August last. All stations have been received on o-v-1, battery-driven receivers with short indoor antennæ. We have not troubled to list all the commoner G 'phones and Continentals which pour in any Sunday morning on 7 m/c, nor the numerous W 'phones which could be received with ease up till a month ago on the 14 m/c band. The following are some of our more interesting captures:—

On 7 m/c band: HB9T, HB9J, HB9AY, LX1AI, LX1AS, LX1GG, OE1UE, LU4BC, SU1GP, EI8G, EI7G, GI6WG, GI5MZ, GI5FZ, FM8CF, ZL5F (C.W.), OK1CS (C.W.), OK2PR, HAF8G, I2IT and SP1GT. The last four were on C.W.

On 14 m/c band: VO1I, TI2AV, TI2IP, TI2RC (Costa Rica), VP9R, VP9O (Bermuda), VP6MR, VP6YB (Barbados), LU8DR, LU9GA (Argentine), PY1GK, PY2BA, PY2AA (Brazil), HC1FG, HH2W, HP1A, HI7G, K4DDH, X1D, as well as numerous Cubans. Europeans on 14 m/c include SM5WK, SM5SX, LA1G, LY1AG. The following commercial stations were also received: HAS2*, DHE*, JNO*, JNJ*, JVH, FZR*, RKI*, WQP, WON, CGA3, CGA4, SUZ, WNC, JNB*. Those marked with an asterisk were on C.W. We should be very pleased to correspond with anyone interested in S.W. reception, particularly regarding reception of amateur DX.—A. NOAKES, 41, Aldermoor Lane, Coventry.

A Beginner's S.W. Log

SIR,—The accompanying log of short-wave stations which I have received might be of interest to beginners like myself.

On 25-metre band: W1XAL (Boston), Radio-Centre (Moscow), Rome, DJD (Germany), FYA (Paris).

On 31-metre band: W2XAF (Schenectady), DJA (Germany). On 30 metres: EAQ (Madrid) and G5GB, and many English stations on 40 metres.

The set used was a one-valver as described in your September 14th issue. All stations were received on an indoor aerial. W1XAL, W2XAF, and Moscow came in at good strength on earphones.—HUBERT BROOK (Huddersfield).

CUT THIS OUT EACH WEEK.

Do you know

—THAT an A.C. receiver or mains unit may be used on mains with a higher frequency than that for which it is designed.

—THAT if the mains frequency is lower than the rating of the unit it should not be connected to the mains.

—THAT when mounting a moving-coil loudspeaker the bass response may be reduced by mounting the speaker slightly clear of the baffle.

—THAT the efficiency of the earth connection may generally be improved by using an insulated cable.

—THAT when it is difficult to erect a good outdoor aerial the capacity aerial may be found to prove efficient.

—THAT an ordinary milliammeter cannot be used in a Class B or Q.P.P. stage to detect distortion.

—THAT ordinary H.F. chokes must not be connected in the mains leads for preventing interference, as they will not carry the high current.

The Editor will be pleased to consider articles of a practical nature suitable for publication in PRACTICAL AND AMATEUR WIRELESS. *Such articles should be written on one side of the paper only, and should contain the name and address of the sender. Whilst the Editor does not hold himself responsible for manuscripts, every effort will be made to return them if a stamped and addressed envelope is enclosed. All correspondence intended for the Editor should be addressed: The Editor,* PRACTICAL AND AMATEUR WIRELESS, *Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, W.C.2.*

Owing to the rapid progress in the design of wireless apparatus and to our efforts to keep our readers in touch with the latest developments, we give no warranty that apparatus described in our columns is not the subject of letters patent.

REPLIES IN BRIEF

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

C. McC. (Cockstown). The circuit is quite in order and the only suggestion we should make would be to insert decoupling components in the anode circuits. This may not prove necessary with your present supply, but may prove advisable when the battery becomes partially discharged.

A. McI. (Edinburgh). You cannot use the arrangement depicted in your letter as the valves take different currents. It is necessary to limit the filament circuit so that the current flowing is sufficient for each valve, but, as shown, you would either overrun the first two valves or underrun the output valve.

R. G. P. (Ufficulme). The arrangement you desire to employ is quite in order, and would reduce the H.T. consumption. You would not, of course, obtain the same volume as in the original receiver.

F. N. (Thornton Heath). You do not state whether you wish to fit the control to the speaker or the receiver. The latter is desirable if the speaker is used with the receiver, although if you are employing the speaker as an extension model special arrangements would be necessary. Further details are therefore necessary before we can answer your query.

D. O'N. (Kings County). Regret cannot make any definite recommendation. Would suggest that you communicate with the various big firms in this country with a view to the course you mention.

C. G. (Billericay). There are several valves suitable for the purpose you mention. Suggest you obtain the various valve manufacturers' catalogues and make a selection.

A. D. D. (Walthamstow). So far as we are aware the blueprint is no longer obtainable. Messrs. Mullard may be able to assist you.

W. N. F. (Flint). The effect is always noticed when touching the aerial. You can screen the condenser, or improve the earth connection. Losses and a high capacity between the condenser and earth must be avoided.

J. O'R. (Dublin). Regret there is no blueprint of this particular adaptor.

G. H. C. (Brighton). If the fault has developed since the receiver was installed it is obviously due to the failure of a valve or component. We therefore suggest that you check the circuit stage by stage.

D. M. (Netley Abbey). It would appear that your earth is ineffective. Try a different earth connection, and check carefully all the earth leads in the actual circuit.

J. S. (Dumfries). Faulty grid circuits can produce the effect. Try eliminating one stage at a time until you locate the faulty one.

J. T. (St. Bees). The arrangement is not advisable for short-wave work. It is preferable to use the .0005 mfd. condenser as a "tank" tuning condenser and connect a very small condenser in parallel for band-spreading.

C. G. C. (Granton). We cannot suggest a blueprint for your particular case, but would recommend that you dispose of the Cossor receiver and build one of our short-wave sets. Alternatively, you could build a short-wave adaptor or converter to use in conjunction with the Cossor receiver.

L. O'L. (Oldham). No damage will result and either half may be used, or the total winding may be employed and the tap ignored.

R. S. (Abbotskerswell). The extension sockets should be quite suitable for the purpose you mention. Unfortunately we do not know the circuit employed in this particular receiver and cannot therefore give defluite information. The makers will be able to settle the point definitely.

C. F. W. (Aintree). The condenser was simply joined across the H.T. supply and thus proves that the battery was in a poor condition. A condenser of this type is generally specified for use across the battery to avoid difficulties of the nature mentioned.

W. C. (Angus). The Encyclopaedia is quite suitable for your needs. The aerial connection is quite in order.

J. C. (Partick). As the component is not now on the market, any ordinary pre-set condenser with a maximum capacity of .0003 mfd. will do.

C. W. M. (Carlisle). We would not advise you to try making your own batteries in view of your remarks. It would be preferable to obtain the super type of battery which should give good service. You are probably obtaining small batteries which will not stand up to the load.

W. McG. (Glasgow). It would appear that the mains are being connected across the control, but without knowledge of the circuit employed we cannot suggest the reason. We presume that you have fixed condensers between earth and the H.T. negative terminal of the receiver.

W. M. (Aberdeen). Any standard amplifier should be suitable, but further details are required before giving definite information. Must the amplifier be distortionless? That is, would distortion affect your measurements? Perhaps you could give fuller information of the measurements.

C. C. (Ilford). The circuits are obviously out of gang. This may be due to your circuit arrangement or the trimming. Have you the correct type of gang condenser?

G. D. (Barnard Castle). The arrangement you suggest is quite in order, but care must be taken not to short-circuit the H.T. supply. We have no details of the H.M.V. circuit and cannot therefore advise the combination until you can check the pick-up connections. A filter output to your short-wave set might prove advisable.

A. A. J. (Coleford). The component you refer to has been withdrawn from sale due to manufacturing difficulties.

J. W. S. (Wallsend). We regret that we cannot supply the information you ask for. We have no details of the valve and have not published a circuit in which such a valve is included.

E. C. (Barnsley). We have no four-valve blueprint using the coils in question. We cannot give the connections to the condenser. Usually red is used to indicate positive, and it would thus appear that the condenser is a double unit, incorporating two condensers.

H. M. M. (Burton-on-Trent). It is possible to use the two-gang condensers with various fixed (or pre-set) tracking condensers. No details can be given as no coil data is available. The makers may be able to assist you.

E. G. B. (Edinburgh). We do not think the valve would be fully loaded at your address with the circuit you mention. We cannot recommend the alteration of the mains unit.

J. A. W. (Irlams). The circuit is certainly superseded, but there is no modern circuit in which the parts could be used. The cost of valves would be considerably reduced by using a modern circuit, and the same degree of efficiency with some improvement in performance would be obtained by a moderu circuit. We recommend the £4 Superhet Four.

J. L. P. (Birmingham). Until the television transmissions recommence it would not be advisable to proceed with your ideas. The circuit in question is out of date and will be useless with the high-definition transmissions.

F. H. (Sheffield). The circuit in question could be modernised, but it would be preferable to rebuild it entirely. Some of the components are obsolete, and a more efficient receiver could be made up with the same number of valves.

POINTS ABOUT MAINS UNITS

(Continued from page 334)

together. If the bolts cannot be further tightened, a certain cure is to be found in the simple device of pouring molten Chatterton's Compound over the core, after finding the offending component by gripping the choke and transformer core tightly with the fingers. The usual precautions against a shock due to touching two points of different potential should be taken.

Varying Periodicity

The standard mains transformer is designed for use on A.C. mains having a periodicity of 50 cycles. Thus, unless a mains unit has been purchased especially, it must be used on mains rated at 50 cycles. There is no objection to using it on mains having a periodicity higher than this figure (up to 100 cycles), but on no account should it be connected to mains below 50 cycles. If a transformer is used on low-period mains, when it has not been designed especially for it, it will speedily break down and hum will be almost impossible to eradicate.

Switching

A combination switch is desirable with a D.C. unit, so as to avoid the risk of leaving the L.T. battery in circuit. Where the unit incorporates a trickle charger this is unimportant, as the switch is generally operated to put the battery on charge when the receiver is switched off. If, however, no such scheme is incorporated, the L.T. supply should be switched on first and the H.T. last. When switching off, the reverse takes place—namely, the H.T. is switched off first and the L.T. last.

Increasing Output

If a D.C. unit of commercial make is being employed, and the output is between 100 and 120 volts, the extra voltage necessary to apply a full 150 volts to the output stage may be obtained by including an ordinary small H.T. battery in series with the mains unit.

IMPRESSIONS ON THE WAX

By **T. Onearm**

TWO records of considerable interest are issued by Columbia this month. One is a selection of Richard Tauber's new film, "Heart's Desire," presenting half a dozen items from the picture, including "Vienna, City of my Dreams," and "My World is Gold," on *Columbia* 1595, and the other is a selection of Grace Moore's "On Wings of Song," including the theme song and the classic numbers which the opera star sings in the film, on *Columbia* 1596. The vocals are provided by Anne Lenner, and both selections are played by the Cine Studio Orchestra.

Gipsy-style Music

IN a record which introduced them for the first time to the gramophone public, the Roaming Tziganes demonstrated last month a new gipsy style of music that was exceedingly good. The logical sequel is another disc in the latest Columbia list—*Columbia FB*1148. The titles of this record are "Lonely Villa by the Sea," and "Let's Fall in Love for the Last Time." A novel feature of these items is the electronde, the instrument which extracts music from the air by a waving of the hands.

"Drinks All Round"

CONVIVIALITY is the keynote of a "vocal gems" record just issued by Columbia, bearing the above title. It is another of the "Drinks All Round" series, embracing some ten or so famous drinking songs, old and new, and presented in jolly, vocal form. Among the items are such favourites as "Tavern in the Town," "Little Brown Jug," "Drink to me Only," winding up appropriately with "Here's a Health unto His Majesty." The whole thing goes with a swing and sparkle, and the Columbia Vocal Gem Company—well known for their fine work in this direction—infuse an atmosphere of spontaneous cheeriness that is irresistible. The number of this record is *Columbia DX*708.

Hawaiian Novelties

HAWAIIAN music never loses its fascination, especially when played by such an authentic group of musicians as Andy Iona and His Islanders. This little band of native players are featured in a pair of Hawaiian novelties on *Columbia FB*1129. The titles are "Hawaiian Paradise" and "Sweet Hawaiian Maid."

Open-air Recordings

THE three Northern Command Tattoo records which Columbia issued in September invoked a good deal of excitement, representing as they did one of the most thrilling and enjoyable tattoos in miniature the gramophone has offered. Now comes another of the discs which were recorded on the spot—actually at Wollaton Park, Nottingham—offering two marches by the Massed Bands, "Old Comrades" and "Blaze Away," and these make a welcome addition to those splendid open-air band recordings already issued. The number of this disc is *Columbia DB*1584.

Columbia 1s. 6d. "Variety" Records

WHEN Columbia decided last month to test the gramophone market by issuing a series of popular variety artists' records at 1s. 6d., it was done as an experiment. The inclusion of such names as Jack Buchanan, Flanagan and Allen, and the B.B.C. "Hill-Billy" discovery, the Rocky Mountaineers, promptly settled the point beyond all dispute.

Owing to their tremendous success they include this month such stars as Elsie and Doris Waters, Clapham and Dwyer, Turner Layton, Billy Mayerl, Ruby Duncan (the pianist-auntie of the Glasgow station), John Mills, star of "Car of Dreams," and Norman Long. With such artists in this popular-price series, Columbia need have little doubt of a lack of appreciation of this new enterprise.

A Fine Tenor Record

TENORS rarely figure well when singing simple songs without orchestral accompaniment. Those who have not had the pleasure of hearing Borgioli during the past two months with the Covent Garden Opera Company will soon realise his mastery on hearing him in two popular Italian airs, "O del mio amato ben" and "Piscatore 'e pusilleco." It is undoubtedly a very fine record, the number being *Columbia LX*422.

"Mr. Jetsam"

MALCOLM McEACHERN, more familiarly known to the public as "Mr. Jetsam," of Flotsam and Jetsam, has made a very fine record this month on *Columbia DB*1582. The titles on this record, "The Song of the Horn" and "O Ruddier than the Cherry," are ideally suited to his basso profundo voice, particularly the second, written by Handel for his masque, "Acis and Galatea," about 1720. This record is definitely a triumph of bass singing.

Decca Records

THE Decca repertory of "permanent music" is extending rapidly, and almost every month new artists appear. Now, Sir Hamilton Harty and the London Symphony Orchestra make their Decca début on the following records: "King Lear Overture" (Parts 1 and 2) on *Decca K*792, "King Lear Overture" (Part 3) and "Marche Troyenne," on *Decca K*793, "Introduction: (a) Rigaudon, (b) Polonaise," on *Decca K*794, and "Arietta" and "Passacaglia" on *Decca K*795.

The five Handel pieces have been selected and transcribed for a large symphony orchestra by Sir Hamilton Harty, and many music lovers will find specially attractive the quietly impressive "Introduction" and the spacious "Passacaglia."

Steffani and his Silver Songsters present us with a typical Christmassy record—namely, "Christmas Carols," on *Decca K*794, which introduces a number of carols with which we are all familiar.

All the latest dance tunes played by a number of popular dance bands are also included in the Decca list for this month.

If a postal reply is desired, a stamped addressed envelope must be enclosed. Every query and drawing which is sent must bear the name and address of the sender. Send your queries to the Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2.

SPECIAL NOTE

We wish to draw the reader's attention to the fact that the Queries Service is intended only for the solution of problems or difficulties arising from the construction of receivers described in our pages, from articles appearing in our pages, or on general wireless matters. We regret that we cannot, for obvious reasons—

(1) Supply circuit diagrams of complete multi-valve receivers.
(2) Suggest alterations or modifications of receivers described in our contemporaries.
(3) Suggest alterations or modifications to commercial receivers.
(4) Answer queries over the telephone.
(5) Grant interviews to querists.

Please note also, that queries must be limited to two per reader, and all sketches and drawings which are sent to us should bear the name and address of the sender.

Reactance of a Condenser

"I am working out some details for which it is necessary to know the reactance of a condenser. The condenser in question (I have not yet decided on the exact value) will be about .0001 to .001 mfd., and I should be glad if you could give me a formula for working out the reactance in microfarads."—G. U. P. (Bristol).

WE presume you wish to calculate the reactance in ohms, but employing the condenser value in microfarads. In this case the formula will be as follows:—

$$\text{Reactance (ohms)} = \frac{1{,}000{,}000}{6.28 \times f \times C}$$

where "f" is the frequency at which you are working or at which the apparatus will be used, and "C" is the capacity of the condenser in microfarads.

L.F. Coupling

"I am making up a set in which I intend to use either an H.F. pentode or an S.G. valve as a detector. I shall use the normal anode connection for output, but wish to experiment with the screening grid as a reaction circuit. Is this quite in order? Are there any snags? And can you state whether there will be any improvement over an ordinary triode?"—G. O. (Surbiton).

THE arrangement will generally result in greater sensitivity than is obtainable with a triode valve. The simplest method of using the S.G. valve is to connect the reaction circuit in the normal way to the anode and to connect the screening grid to an H.T. potentiometer. The only snag is to be found in the method of L.F. coupling. Owing to the high impedance of the type of valve mentioned it is necessary to maintain a high impedance in the anode circuit, and therefore a resistance-fed transformer coupling must be used, or one of the special high-inductance L.F. chokes should be employed for coupling purposes.

Increasing Eliminator Output

"I have an eliminator of the 150-volt 30 m/A type and should like to increase the output from this. Can you tell me the best way to do so without doing any damage to the parts?"—G. Y. (Salford).

YOU do not state the type of eliminator, and this is, of course, a vital factor. If the unit is for D.C. use there will be a choke and resistance in circuit and these will have been so chosen as to limit the voltage to 150 volts when a current of 30 m/A is passed. Thus, to increase the output (in volts) the resistances must be modified. A greater current load may be taken (according to the apparatus to which it is connected), and this will result in a drop in the voltage output, and probably also to damage to the resistances or choke due to the passage of the greater current. If the unit is for A.C. purposes, the only modification is to reduce the resistance of the choke so as to deliver a greater voltage, but again if a larger current load is imposed the voltage given by the unit will fall off.

Using Superhet Coils

"I have an old set of superhet coils, the types of which are unknown. As I should like to use these, I have considered using a straight ganged condenser with fixed padding condensers to give the correct variation between oscillator and ordinary tuned circuits. I shall use a modern pentagrid and should like to know how to calculate the capacities for the condensers."—H. M. A. (Coleford).

WE note that the coils are "old" and that you intend to use a pentagrid valve. It is possible that the reaction winding on the oscillator coil will be ineffective when used with a modern pentagrid valve. The use of fixed condensers cannot be recommended in view of the doubt which exists concerning the coil data. It would be preferable to employ a separate oscillator-tuning condenser, but the difficulty of double tuning points must be borne in mind.

Using Two Receivers

"I have an A.C. four-valve set which is fitted with pick-up terminals, and also a two-valve battery short-wave set. Would it be possible to connect the output from the short-wave set to the pick-up terminals on the A.C. set so as to get loud-speaker results from the short-wave stations?"—G. W. E. (N. Harrow).

IF the output terminals on the short-wave set are joined direct in the anode circuit the scheme should not be adopted. If, however, you fit a 1/1 output transformer to the short-wave set, and then connect the secondary terminals of the transformer to the pick-up sockets the combination should function satisfactorily.

Aerial Series Condensers

"What is the best form of selectivity device to place in the aerial circuit to sharpen tuning on the medium waves? I have tried several schemes, but without much success, and should be glad of some further information on the subject."—L. A. S. (Brighton).

THE only selectivity-improver which can be used in the aerial lead without modification of the tuned circuits is a capacity device. Thus, it may take the form of a fixed condenser, a variable condenser, or some form of semi-variable condenser. There are several proprietary devices on the market for the purpose, but they all consist in effect of variable or adjustable condensers. If, therefore, you have found that the various schemes have brought no success it indicates either that the capacities which you have tried were not of a suitable value or range, or that the aerial is so large that you are receiving a very strong signal. Even in the latter case a value of condenser should be found which will considerably modify the selectivity.

Band-pass Ganging

"I have just incorporated in a receiver a band-pass tuning unit of unknown make, and find on changing to the long waves that a considerable adjustment is necessary to the trimmer of the centre section of the three-gang condenser. This section controls the second band-pass coil and this has four terminals, the outer two of which I use and the inner two are connected to a separate winding. It would be appreciated if you would explain what this separate winding is for and whether its inclusion in the circuit would cure the trouble I experience when changing wavelengths. I enclose a diagram of the coil and connections."—C. L. W. (Southsea).

THE extra winding which you indicate on the second band-pass coil is intended for use as a reaction winding when the band-pass coils are included in the grid circuit of a simple detector stage. There should be no ill effects obtained if the winding is left unconnected. The fact that you cannot maintain ganging throughout the tuning range may be due to the fact that the first band-pass coil is unmatched, due to the aerial load, or that the wrong form of coupling (or wrong capacity if capacity coupling is adopted) is being employed. The aerial load may be modified by means of a semi-variable condenser, and different types of coupling should be tried. If you are using capacity coupling a variable condenser might prove useful as you have no data on the coils.

The coupon on cover iii must be attached to every query.

Practical and Amateur Wireless
BLUEPRINT SERVICE

These blueprints are full size. Copies of appropriate issues containing descriptions of these sets can in most cases be obtained as follows:—"Practical Wireless" at 4d., "Amateur Wireless" at 4d., "Practical Mechanics" at 7½d., and "Wireless Magazine" at 1/3, post paid. Index letters "P.W." refer to "Practical Wireless" sets, "P.M." to "Practical Mechanics" sets, "A.W." refer to "Amateur Wireless" sets, and "W.M." to "Wireless Magazine" sets. Send, preferably, a postal order (stamps over sixpence unacceptable) to "Practical and Amateur Wireless" Blueprint Dept., Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, W.C.2.

PRACTICAL WIRELESS.

STRAIGHT SETS. Battery Operated.

	Date of Issue	No. of Blueprint
One-valve : Blueprints, 1s. each.		
All-Wave Unipen (pentode)	14.10.33	PW31A
Two-valve : Blueprints, 1s. each.		
All-Wave Two (D, Pen)	—	PW28
Four-range Super Mag. Two (D, Pen)	11.8.34	PW36B
Three-valve : Blueprints, 1s. each.		
Bijou Three (SG. D, Pen)	29.10.32	PW5
Argus Three (SG, D (pen), Pen)	12.11.32	PW6
Solo Knob Three (D, 2 L.F. (trans.))	10.12.32	PW8
Selectone Battery Three (D, 2 L.F. (trans.))	—	PW10
Alpha Q.P.P. Three (D, Q.P.P.)	25.3.33	PW14
Ferrocart Q.P.P. Hi-Mag Three (SG, D, Q.P.P.)	25.3.33	PW15
Three-Star Nicore (SG, D (SG), Pen)	24.6.33	PW24
Auto-B Three (D, LF, Cl. B)	—	PW27
F.J.C. 3-valve A.V.C. (Transfer Print) (SG, D, Pow.)	—	PW32
Sixty-Shilling Three (D, 2 L.F. (R.C. & trans))	2.12.33	PW34A
Leader Three (SG, D, Pow.)	3.3.34	PW35
Summit Three (HF Pen, D, Pen)	18.8.34	PW37
All-Pentode Three (HF Pen, D (pen), Pen)	22.9.34	PW39
Hall-Mark Three (SG, D, Pow).	—	PW41
Hall-Mark "Cadet (D, LF, Pen (R.C.))	23.3.35	PW48
F. J. Camm's Silver Souvenir (HF Pen, D (pen), Pen) (All-wave Three)	13.4.35	PW49
Genet Midget (D, 2 L.F. (trans))	*June* '35	PM1
Cameo Midget Three (D, 2 LF (trans))	8.6.35	PW51
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector Pen)	17.8.35	PW53
Battery All-wave Three (D, 2 LF (R.C.))	31.8.35	PW55
Four-valve : Blueprints, 1s. each.		
Fury Four (2 SG, D, Pen)	—	PW11
Beta Universal Four (SG, D, LF Cl. B)	15.4.33	PW17
Radiopax Class B Four (SG, D, LF, Cl. B)	27.5.33	PW21
Nucleon Class B Four (SG, D (SG), LF, Cl. B)	6.1.34	PW34B
Fury Four Super (SG, SG, D, Pen)	—	PW34C
Battery Hall-Mark 4 (HF Pen, D, Push Pull)	2.2.35	PW46
Five-valve : Blueprints, 1s. each.		
Superset (SG, SG. D, LF, Cl. B)	—	PW26

Mains Operated

Two-valve : Blueprints, 1s. each.		
A.C. Twin (D (pen), Pen)	22.4.33	PW18
A.C.-D.C. Two (SG, Power)	7.10.33	PW31
Selectone A.C. Radiogram Two (D, Pow.)	29.4.33	PW19
Three-valve : Blueprints, 1s. each.		
Mains Express Three (SG, D, Pen)	8.10.32	PW3
Double-Diode-Triode Three (HF Pen, D.D.T., Pen)	10.6.33	PW23
D.C. Ace (SG, D, Pen)	15.7.33	PW25
A.C. Three (SG, D, Pen)	16.9.33	PW29
A.C. Leader (HF Pen, D, Power)	7.4.34	PW35C
D.C. Premier (HF, Pen, D, Pen)	31.3.34	PW35B
Ibique (HF Pen, D (Pen), Pen)	28.7.34	PW36A
Armada Mains Three (HF Pen, D, Pen)	18.8.34	PW38
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen)	11.5.35	PW50
"Allwave" A.C. Three (D, 2 LF (R.C.))	17.8.35	PW54
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen)	31.8.35	PW56
Four-valve : Blueprints, 1s. each.		
A.C. Quadpack (SG, SG. D, Pen)	2.12.33	PW34
A.C. Fury Four (SG, SG, D, Pen)	25.2.33	PW20
A.C. Fury Four Super (SG, SG, D, Pen)	10.2.34	PW34D
A.C. Hall-Mark (HF Pen, D, Push-Pull)	—	PW45
Universal Hall-Mark (HF Pen, D, Push-Pull)	9.2.35	PW47

SUPERHETS.

Battery Sets : Blueprints, 1s. each.		
Supersonic Six (Six valve)	—	PW16
Premier Super (Five valve)	23.9.33	PW30
£5 Superhet (Three valve)	—	PW40
F. J. Camm's 2-valve superhet (two valve)	13.7.35	PW52
Mains Sets : Blueprints, 1s. each.		
Luxus A.C. Superhet (four valve)	14.10.33	PW33
A.C. £5 Superhet (three valve)	—	PW43
D.C. £5 Superhet (three valve)	1.12.34	PW42
Universal £5 Superhet (three valve)	15.12.34	PW44

SHORT-WAVE SETS.

Two-valve : Blueprints, 1s. each.		
Midget Short-wave Two (D, Pen)	15.9.34	PW38A
Three-valve : Blueprints, 1s. each.		
Empire Short-wave Three (D, 2 LF (R.C. and Trans))	—	PW7
Experimenter's Short-wave Three (SG, D, Power)	23.9.33	PW30A

PORTABLES.

Three-valve : Blueprints, 1s. each.		
Atom Lightweight Portable (SG, D, Pen)	2.6.34	PW36
Four-valve : Blueprints, 1s. each.		
Featherweight Portable Four (SG, D, LF, Cl. B)	6.5.33	PW12

MISCELLANEOUS.

S.W. Converter-Adapter (1 valve)	23.2.35	PW48A

AMATEUR WIRELESS AND WIRELESS MAGAZINE.

CRYSTAL SETS.

Blueprints, 6d. each.		
Four-station Crystal Set	—	AW427
1934 Crystal Set	4.8.34	AW444
150-mile Crystal Set	—	AW450

STRAIGHT SETS. Battery Operated.

One-valve : Blueprints, 1s. each.		
B.B.C. One-valver	—	AW344
B.B.C. Special One-valver	—	AW387
Twenty-station Loud-speaker One-valver (Class B)	—	AW449
Two-valve : Blueprints, 1s. each.		
Melody Ranger Two (D, Trans)	—	AW388
Full-volume Two (SG, Det, Pen)	17.6.33	AW392
Iron-core Two (D, Trans)	—	AW395
Iron-Core Two (D, Q.P.P.)	12.8.33	AW396
B.B.C. National Two with Lucerne Coil (D, Trans)	—	AW377A
Big-power Melody Two with Lucerne Coil (SG, Trans)	—	AW338A
Lucerne Minor (D, Pen)	—	AW426
Family Two (D, Trans)	—	WM278
Three-valve : Blueprints, 1s. each.		
8 Radiogram (D, RC, Trans)		W343
F.T.P. Three (Pentode-Triode-Pentode)	*June* '35	WM389
Class-B Three (D, Trans, Class B)	22.4.33	AW386
New Britain's Favourite Three (D, Trans, Class B)	15.7.33	AW394
Home-Built Coil Three (SG, D, Trans)	14.10.33	AW404
Fan and Family Three (D, Trans, Class B)	25.11.33	AW410
£5 5s. S.G.3 (SG, D, Trans)	2.12.33	AW412
1934 Ether Searcher: Baseboard Model (SG, D, Pen)	20.1.34	AW417
1934 Ether Searcher, Chassis Model (SG, D, Pen)	3.2.34	AW419
Lucerne Ranger (SG, D, Trans)	—	AW422
Cossor Melody Maker with Lucerne Coils	—	AW423
P.W.H. Mascot with Lucerne Coils (D, RC, Trans)	17.3.34	AW337A
Mullard Master Three with Lucerne Coils	—	AW424
Pentaquester (HF Pen, D, Pen)	14.4.34	AW431
£5 5s. Three: De Luxe Version (SG, D, Trans)	19.5.34	AW435
Lucerne Straight Three (D, RC, Trans)	—	AW437
All Britain Three (HF Pen, D, Pen)	—	AW448
"Wireless League" Three (HF Pen, D, Pen)	3.1.34	AW451
Transportable Three (SG, D, Pen)	—	WM271
Multi-Mag Three (D, 2 Trans)	—	WM288
Percy Harris Radiogram (HF, D, Trans)	—	WM294
£6 6s. Radiogram (D, RC, Trans)	*Apr.* '33	WM318
Simple-tune Three (SG, D, Pen)	*June*, '33	WM327
Tyers Iron-core Three (SG, D, Pen)	*July* '33	WM330
C.B. Three (D, LF, Class B)	—	WM333
Economy-pentode Three (SG, D, Pen)	*Oct.* '33	WM337
All-wave Three (D, 2LF)	*Jan.* '34	WM348
"W.M." 1934 Standard Three (SG, D, Pen)	—	WM351
£3 3s. Three (SG, D, Trans)	*Mar.* '34	WM354
Iron-core Band-pass Three (SG, D, QP21)	*June* '34	WM362
1935 £6 6s. Battery Three (SG, D, Pen)	*Oct.* '34	WM371
Graduating to a Low-frequency Stage (D, 2LF)	*Jan.* '35	WM378
Four-valve : Blueprints, 1s. 6d. each.		
65/- Four (SG, D, RC, Trans)	—	AW370
"A.W." Ideal Four (2SG, D, Pen)	16.9.33	AW402
2 H.F. Four (2SG, D, Pen)	—	AW421
Crusaders' A.V.C. 4 (2 HF, D, QP21)	18.8.34	AW445
Pentode and Class-B Outputs for above: blueprints 6d. each)	25.8.34	AW445A
Quadradyne (2SG, D, Pen)	—	WM273
Calibrator (SG, D, RC, Trans)	*Oct.* '32	WM300
Table Quad (SG, D, RC, Trans)	—	WM303
Calibrator de Luxe (S.G, D, RC, Trans)	*Apr.* '33	WM316
Self-contained Four (SG, D, LF, Class-B)	*Aug.* '33	WM331
Lucerne-Straight Four (SG, D, LF, Trans)	—	WM350
£5 5s. Battery Four (HF, D, 2LF)	*Feb.* '35	WM381
The H.K. Four	*Mar.* '35	WM384
Five-valve : Blueprints, 1s. 6d. each.		
Super-quality Five (2HF, D, RC, Trans)	*May* '33	WM320
New Class-B Five (2SG, D, LF, Class-B)	*Nov.* '33	WM340
Class-B Quadradyne (2SG, D, LF, Class-B)	*Dec.* '33	WM344
1935 Super Five (Battery Superhet)	*Jan.* '35	WM379

Mains operated.

Two-valve : Blueprints, 1s. each.		
Consolectric Two (D, Pen) A.C.	23.9.33	AW403
Economy A.C. Two (D, Trans) A.C.	—	WM286
Three-valve : Blueprints, 1s. each.		
Home-lover's New All-electric Three (SG, D, Trans) A.C.	—	AW383
S.G. Three (SG, D, Pen) A.C.	3.6.33	AW380
A.C. Triodyne (SG, D, Pen) A.C.	19.8.33	AW399
A.C. Pentaquester (HF, Pen, D, Pen) A.C.	23.6.34	AW439
D.C. Calibrator (SG, D, Push-pull Pen) D.C.	*July* '33	WM328
Simplicity A.C. Radiogram (SG, D, Pen) A.C.	*Oct.* '33	WM338
Six-guinea A.C./D.C. Three (HF Pen, D, Trans) A.C./D.C.	*July* '34	WM364
Mantovani A.C. Three (HF Pen, D, Pen) A.C.	*Nov.* '34	WM374
Four-valve : Blueprints, 1s. 6d. each.		
A.C. Melody Ranger (SG, DC, RC, Trans) A.C.	—	AW380
A.C./D.C. Straight A.V.C.4 (2 HF, D, Pen) A.C./D.C.	8.9.34	AW446
A.C. Quadradyne (2 SG, D, Trans) A.C.	—	WM370
All Metal Four (2 SG, D, Pen)	*July* '33	WM329
"W.M." A.C./D.C. Super Four	*Feb.* '35	WM382
Harris Jubilee Radiogram	*May* '35	WM386

SUPERHETS.

Battery Sets. Blueprints, 1s. 6d. each.		
1934 Century Super	9.12.33	AW413
Super Senior	—	WM256
1932 Super 60	—	WM269
Q.P.P. Super 60	—	WM319
"W.M." Stenode	*Oct.* '34	WM373
Modern Super Senior	*Nov.* '34	WM375
Mains Sets : Blueprints, 1s. 6d. each.		
1934 A.C. Century Super, A.C.	10.3.34	AW425
1932 A.C. Super 60 A.C.	—	WM272
Seventy-seven Super A.C.	—	WM305
"W.M." D.C. Super, D.C.	*May* '33	WM321
Merrymaker Super, A.C.	*Dec.* '33	WM345
Heptode Super Three, A.C.	*May* '34	WM359
"W.M." Radiogram Super, A.C.	*July* '34	WM366
"W.M." Stenode, A.C.	*Sep.* '34	WM370
1935 A.C. Stenode	*Apl.* '35	WM385

PORTABLES.

Four-valve : Blueprints, 1s. 6d. each.		
General-purpose Portable (SG, D, RC, Trans)	—	AW351
Midget Class-B Portable (SG, D, LF, Class B)	20.5.33	AW389
Holiday Portable (SG, D, LF, Class B)	1.7.33	AW393
Family Portable (HF, D, RC, Trans)	22.9.34	AW447
Town and Country Four (SG, D, RC, Trans)	—	WM282
Two H.F. Portable (2 SG, D, QP21)	*June* '34	WM363
Tyers Portable (SG, D, 2 Trans)	*Aug.* '34	WM367

SHORT-WAVERS.. Battery Operated.

One-valve : Blueprints, 1s. each.		
S.W. One-valve converter (price 6d.)	—	AW329
S.W. One-valve for America	—	AW429
Roma Short-Waver	10.11.34	AW452
Two-valve : Blueprints, 1s. each.		
Home-made Coil Two (D, Pen)	14.7.34	AW440
Three-valve : Blueprints, 1s. each.		
World-ranger Short-wave 3 (D, RC, Trans)	—	AW355
Experimenters' 5-metre Set (D, Trans, Super-regen)	30.6.34	AW438
Experimenter's Short-waver	*Jan.* 19,' 35	AW463
Short-wave Adapter	*Dec.* 1, '34	AW456
Superhet, Converter	*Dec.* 1, '34	AW457
The Carrier Short-waver	*July*' 35	WM390

Miscellaneous Advertisements

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RECEIVERS, COMPONENTS AND ACCESSORIES

Surplus, Clearance or Secondhand, etc.

PREMIER SUPPLY STORES

OFFER the Following Manufacturers' Brand New Surplus Goods at a Fraction of the Original Cost. All goods guaranteed perfect. Carriage paid over 5/-; under 5/- postage 6d. extra; I.F.S. and abroad carriage extra; orders under 5/- cannot be sent c.o.d.

PLEASE Send 3d. Stamp for Large New Illustrated Catalogue, also November Bargain Supplement.

WORLD Famous Continental Valves, mains type, 4/6 each H.L., L.; screen grid; variable mu screen grid; 1, 3 and 4 watt A.C. output directly heated pentodes; 250-volt 60 m.a. full wave rectifiers, V.M.H.P., D.D.T., diode tetrodes; A.C., D.C. types, 20 volts, 0.18 amp., filaments; screen grid; variable mu screen grid; H., H.L., power and pentodes.

THE Following Types, 5/6 each: 350v. 120 m.a., full wave rectifiers, 500v. 120 m.a. full wave rectifiers, 2½ watt indirectly heated pentodes.

2-VOLT H.F., L.F., 2/3; power, low consumption power, super power, 2/9; screen grid, variable mu screened grid 5- or 4-pin pentodes, V.M.H.P., H.F.P., Class B, 5/-.

THE Following American Types, 4/6: 250, 210, 245, 47, 46, 24, 35, 51, 57, 58, 55, 37, 80, 6A7, 2A7, 27, 77, 78, 2A5, 281; all other American types, 6/6 each.

RELIABLE Soldering Irons, 200-250 volts, 2/6, consumes 0.2 amps.; super type, 3/9.

PREMIER Short-wave Tuning Condensers (S.L.F.), complete, ceramic insulation, silver sprayed, brass vanes, noiseless pigtail, 0.00015, 0.00016, 0.0001, 2/9; double spread 0.00005, 0.000015, 0.000025, 3/- each.

BRASS Reaction Condensers (S.L.C.), with integral slow-motion, 2/9; mica condensers, 0.00002, 0.00005, 6d.

PREMIER Short-wave Coils, with circuit, 4- and 6-pin type, set of 4, 13-170 metres, 7/-; for either type; Lowloss formers, 4- and 6-pin ribbed, 1¼in. diameter, 1/-; short-wave valve holders, 4- 5- and 7-pin chassis type, 6d.

B.T.H. Moving Coil Speakers, matched pairs, 8in., 1,500 ohms, 7,500 ohms (1,500 speaker as choke, 7,500 speaker in parallel with H.T. supply), with output transformer for pentode, 15/6 per pair; A.C. kit for pair, 12/6.

MAGNAVOX Moving Coil Speakers, 6 volt fields, handles 5 watts, 12/6. State transformer required.

M.C. Multi-ratio Output Transformers, 2/6; 2-1 or 1-1 output transformers, 2/6; microphone transformers, 50 and 100-1, 2/6; 3 henry chokes, 2/6; 100 henry chokes, 2/6.

LARGE Selection of Pedestal, table and radiogram cabinets at a fraction of original cost.

BLUE SPOT 29 P.M. Moving Coil, multi-ratio transformer, 15/-; handles 4 watts; Sonochorde ditto, ideal for battery sets, 10/6.

ELIMINATOR Kits.—120v. 20 m.a., 20/-; trickle charger, 8/- extra; 150v. 30 m.a., with 4 v. 2-4 amp. C.T., L.T., 25/-, trickle charger 6/6 extra; 250v. 60 m.a., with 4v. 3.5 amps. C.T., L.T., 30/-; 300v. 60 m.a., with 4v. 3-5 amps., 37/6; 200v. 50 m.a., with 4v. 3-5 amps., L.T., 27/6.

PREMIER L.T. Charger Kits, input 200-250v. A.C., output 8v. ½ amp., 14/6; 8v. 1 amp., 17/6; 6v. 2 amp., 27/6; 30v. 1 amp., 37/6; 2v. ½ amp., 11/-.

B.T.H. Truspeed Induction Type. A.C. only, gramophone motor, 100-250v., 30/-; ditto D.C., 42/6.

COLLARO Gramophone Unit, consisting of A.C. motor, 100-250v., high quality pick-up and volume control, 45/-; motor only, 30/-.

EDISON Bell Double Spring Gramophone Motors, including turntable and all fittings, 15/-.

WIRE-WOUND Resistances, 4 watts, any value up to 50,000 ohms, 1/-.

MAGNAVOX Speakers.—144 Magna, 25/-; 152 Magna, 37/6; 154, 12/6; 152, 17/6; all 2,500 ohms. Energising kits, 10/-; permanent magnet, 9in. cone, 16/6; permanent magnet, 7in. cone, 16/6; state transformer required; all other types in stock.

AMERICAN type, 250 valves, 9 watts, in push-pull; matched pairs, 9/-.

12-2,000 metres, without coil changing. Lissen All-band 2-gang screened coils, for screened grid H.F. stage (tuned), screened grid detector type receiver, circuit supplied, giving complete details, 12/6.

BRITISH-MADE Meters, moving iron flush mounting, 0-10, 0-15, 0-50, 0-100, 0-250 milliamps, 0-1, 0-5 amps., all at 6/-; read A.C. and D.C.

1,000 Ohm 150 milliamp., semi-variable resistance, 2/-; 1,000 ohm 250 milliamp., tapped for any number 0-18 valves, 3/6; 800 ohms 350 m.a., tapped, 2/-.

(Continued at top of column three)

Easy Terms

Send us your enquiries for everything Radio — SETS, SPEAKERS, ELIMINATORS, and ACCESSORIES. We can supply anything on the Easiest of EASY TERMS. Send for Quotation.

1936 SPEAKERS 1936

W.B. STENTORIAN JUNIOR MODEL 36J. (illustrated). Suitable for any output and incorporating improved Microlode device. Cash or C.O.D. Carriage Paid. £1/12/6. Or yours for 2/6 down, balance in 11 monthly payments of 3/-.

W.B. STENTORIAN BABY MODEL 36B. £1/3/6, or 2/6 down and 10 monthly payments of 2/6.

W.B. STENTORIAN SENIOR MODEL 36S, £2/2/0, or 2/6 down and 11 monthly payments of 4/-. Fitted with W.B. Non-Resonant Cabinet. £3/3/0, or 5/- deposit and 11 monthly payments of 5/9.

2/6 DOWN

W.B. STENTORIAN DUPLEX MODEL £4 4/0, or 7/6 down and 11 monthly payments of 7/9.

BLUE SPOT SENIOR P.M. £1/9/6, or deposit 2/6 and 10 monthly payments of 3/-.

EPOCH 20C P.M. £1/15/0, or deposit 2/6 and 9 monthly payments of 4/-.

CELESTION SENIOR 9. £2/15/0, or 5/- down and 11 monthly payments of 5/-.

ANY OTHER MODELS ON SIMILARLY EASY TERMS.

LISSEN BAND SPREAD SHORT-WAVE 3 KIT, complete with Valves. Covers 13-55 metres. Band Spread Tuning. Cash or C.O.D. Carriage Paid. £3/9/6. Balance in 11 monthly payments of 6/6. With **5/-** Order

RADIO FOR THE MILLION, "NEW MASTER THREE." 3 valver. Complete Kit of components with Mullard valves. Cash or C.O.D. Carriage Paid, £1/17/3. Balance in 10 monthly payments of 4/-. With **2/6** Order

AVOMINOR D.C. and BATTERY TEST METER

TEN TESTING INSTRUMENTS IN ONE!

2/6 DOWN

Ten Ranges, measures 0-3 megohms. Send only 2/6; balance in 10 monthly payments of 4/3. Cash or C.O.D. Carriage Paid, £2/0/0.

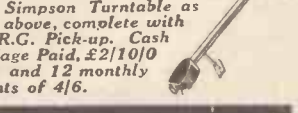
UNIVERSAL A.C./D.C. AVOMINOR, 22 ranges. Cash or C.O.D. Carr. Paid. £5/0/0 or 9/- down and 11 monthly payments of 9/3.

PIFCO ROTAMETER, 9 testing ranges on mains or battery receivers. Cash or C.O.D. Carriage Paid, £1/9/6 or 2/6 deposit and balance in 10 monthly payments of 3/-.

SIMPSON'S 1936 ELECTRIC TURNTABLE

THE PERFECT GRAMOPHONE MOTOR AT LAST! Low consumption, **CONSTANT SPEED. 1-HOLE FIXING.** Darwin's Magnets. A.C. Mains only. 110/150 or 200/250 volts, 50 cycles, 12-in. turntable. Send only 2/6, balance in 11 monthly payments of 4/-. Cash or C.O.D. Carriage Paid, £2/2/0. (Complete with Automatic Mains Stop and Brake 3/6 extra.)

2/6 DOWN



Simpson Turntable as above, complete with Guaranteed B.R.G. Pick-up. Cash or C.O.D. Carriage Paid, £2/10/0 or 2/6 Deposit and 12 monthly payments of 4/6.

New Times Sales Co

56, (Pr.W.5), LUDGATE HILL, LONDON, E.C.4.

Please send me illustrated Catalogue of Radio Sets from 5/- down; Xmas Bumper Bargain Lists, etc., etc.

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Name .....

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.....*Pr.W.5*

(Continued from foot of column one)

COSMOCORD Pick-ups, with arm and volume control, wonderful value, 10/6; super type, 12/6.

THE following lines 6d. each or 5/- per dozen: 4-, 5- or 7-pin baseboard or 4-, 5- or 7-pin chassis mounting valve holders, American valve holders, 1-watt resistances, wire end, every value; tubular wire end condensers, 1,500 volt, every value up to 0.5, 3 amp., 2- or 3-point switches, Cyldon double trimmers, 6 yds. Systoflex, 1, 1.5, 2 or 2.5 mm., 1 yd. 7-way cable, 9ft. resin cored solder, 6 yds. push-back connecting wire, 2in. knob.

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