ALL ABOUT OUR NEW DESIGNS!

Practical Wireless

3D

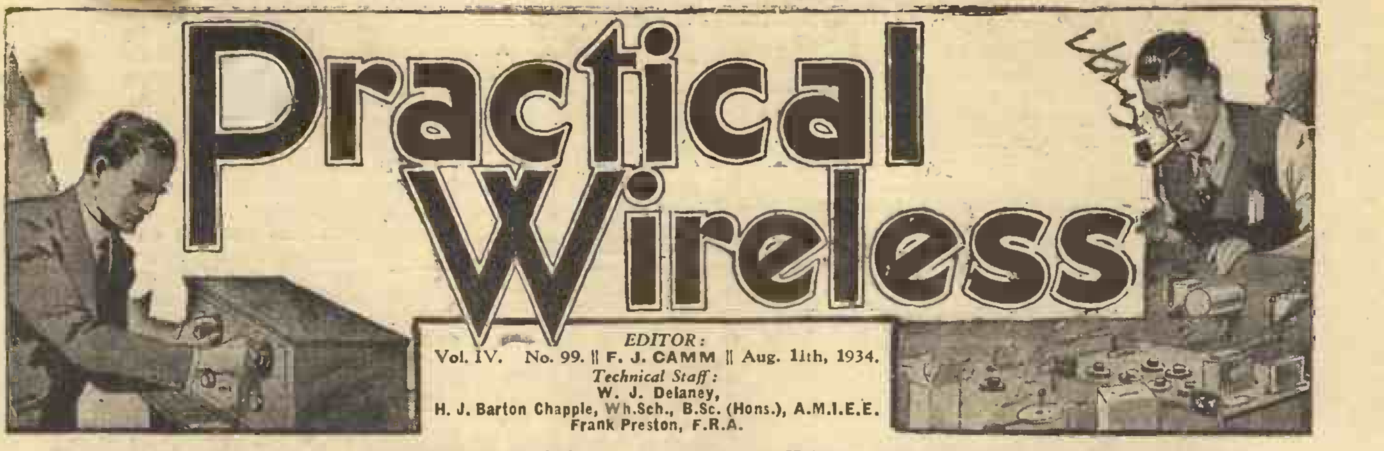
AND PRACTICAL TELEVISION

EDITED BY F.J.CAMM

Published every Wednesday by
GEORGE NEWNES LTD.
Vol. 4.——No. 99.
August 11th, 1934.
Registered at the G.P.O. as a Newspaper.

A NEW Course FOR THE Beginner

ORDER NEXT WEEK'S ENLARGED SHOW NUMBER NOW!



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Vol. IV. No. 99. || F. J. CAMM || Aug. 11th, 1934.
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"PRACTICAL WIRELESS" AND THE PRICE QUESTION.

Phenomenal Success of Our Campaign! Component Manufacturers to Supply Stripped Components! Valve Manufacturers Co-operate! By The Editor.

EVER since the publication of No. 1 of PRACTICAL WIRELESS my staff and I have resolutely been at work to provide the home constructor with designs for high-class receivers of guaranteed performance, and at a price which made it possible for a first-class receiver to be built at less than the cost of a commercial receiver. A well-built and well-designed home-constructed receiver is always better than an equivalent commercial receiver, for the simple reason that its builder is able to tune and adjust it, and to avail himself, through our Free Advice Bureau, of the services of the designer free of all charge.

He is also able at small cost to bring his receiver entirely up-to-date as new components are produced without having to go to the expense of buying an entirely new kit. It has been my earnest endeavour by means of our policy of specifying only those components used by the designer (no alternatives) and by our Free Advice Bureau, as well as by our guarantee, to give the home constructor as great a degree of confidence in building a receiver as obtains when he purchases one.

Our editorial policy has been resolutely pursued and we have sought to place in the readers' hands—by means of the Wireless Constructors' Encyclopaedia, the PRACTICAL WIRELESS Free Gift Data Sheets, the Encyclopaedia of Popular Mechanics, our Free Gift Spanners, and our Presentation Tool Kit—all of which have been supplied on Presentation terms—a complete library of technical information and really useful tools which cannot be bought elsewhere, so that they may enjoy radio at its best.

It is common knowledge among home constructors as well as among leading manufacturers, that PRACTICAL WIRELESS is the leading journal to which all discriminating readers regularly subscribe, in order to keep their knowledge entirely up-to-date.

But during the past twelve months the competition of the cheap commercial receiver has been so keen that in many cases it has been found cheaper to buy a receiver than to make one.

As all our regular readers know, I took early steps to safeguard the interests of the home constructor by embarking upon the design of our eminently successful Leader seri were designed down to a price without sacrifi this end I sought the co-operation of leading generously, and at once, designed and made so components at really competitive prices. T cheap commercial receivers made their answ producing even cheaper receivers, some of w efficient but appealed because of their low pri

MAKE A NOTE OF IT!

Olympia Radio Show

Thursday, Aug. 16th to Saturday, Aug. 25th, 11 a.m. to 10 p.m.
(OUR STAND No. 8, GROUND FLOOR)

Two Special Enlarged Numbers

I again got into touch with all the leading manufacturers of components to see what could be done about producing even cheaper components without sacrificing efficiency. As most of these manufacturers pointed out to me, whereas the set manufacturers could purchase stripped components of lower factor of safety at a low price, such components would lose their appeal if sold as separate units to home constructors. They also pointed out that valves represented quite a large proportion of the total cost of the receiver, and that if I could persuade valve manufacturers to reduce their prices, I should have performed yeoman service to home constructors. Accordingly, it is with extreme pleasure that I note that my recent letter to valve manufacturers has borne fruit in that members of the B.V.A. have now reduced the price of their valves as shown in the appended list.

	Old Price.		New Price.
Detector	7/-	now	5/6
Power	8/9	now	7/-
Screened Grid ..	15/6	now	12/6
Screened pentode	15/6	now	13/6
Output pentode	16/6	now	13/6

These prices apply to the following firms: A. C. Cossor, Ltd. (Cossor); Edison Swan Electric Co., Ltd. (Mazda); Ferranti, Ltd. (Ferranti); General Electric Co., Ltd. (Osram); Marconiphone Co., Ltd. (Marconi); Mullard Wireless Service Co., Ltd. (Mullard); Philips Lamps, Ltd. (Philips); Six-Sixty Radio Co., Ltd. (Six-Sixty); Standard Telephones and Cables, Ltd. (Micromesh).

These reduced prices mean a great deal to the home constructor. They enable him first of all to put new life into his old receiver. Combined with all of the other manufacturers who have responded to our request for their co-operation and have agreed to supply efficient stripped components at a low price, they mean that the home constructor can make an extremely fficient, selective, long range, and up-to-late receiver of any battery-operated type or a minimum of cost, at a price, in fact, which has never yet obtained in radio. here remains the hope that in the near uture mains valves will be similarly reduced. uite naturally, my staff and I are gratified hat our efforts to safeguard the interests or have been so successful. eivers, our readers should note, will con-vantageous lines the policy which led to ighly-successful Leader series. The next onstructors' year. In conclusion, I desire ousands of loyal readers who have con-success of PRACTICAL WIRELESS, and for r efforts. THE EDITOR.

ROUND the WORLD of WIRELESS (Continued)

B.B.C. Symphony Concerts, 1934-1935

ACCORDING to a recent announcement by the British Broadcasting Corporation, its season of twelve Symphony Concerts at Queen's Hall begins on Wednesday, October 24th, 1934, and will continue until Wednesday, April 10th, 1935, the intermediate dates being Wednesdays, October 31st, November 14th, November 28th, December 12th, January 23rd, February 6th, February 20th, March 6th, March 20th and March 27th.

Light Entertainment from Blackpool

ON August 10th, Blackpool contributes a forty-five minute entertainment to the North Regional programme, this period being equally divided between two concert parties—Tom Vernon's Royal Follies, from the Central Pier, and the Arcadian Follies, from the South Pier.

Band of H.M. 11th Hussars

BY permission of Lieut-Col. D. MacMurrough Kavanagh, the Band of H.M. 11th Hussars will be relayed for West Regional listeners from the Barry Horticultural and Horse Show at Romilly Park, Barry, on August 15th.

Variety from the Midland Regional

ON August 14th variety will be relayed to Midland Regional listeners from the Grand Theatre, Derby—the first outside broadcast from this theatre—and cabaret by Orlando and his Band, with guest artist from the Welcombe Hotel, Stratford-on-Avon, on August 18th. Billy Merrin and his Band will be at Derby.

Autumn Talks

IN the autumn talks this year India will have a series to herself and another series by prominent Americans will be relayed from the U.S.A.; the latter may be broadcast on Sunday evenings. Reminiscences, household talks, technical talks, discussions, short story and poetry readings will be included in the syllabus. Morning talks will start at the beginning of September, early evening talks will start in the third week in September and the rest of the general talks and discussion group talks will start in the first week in October. Announcements will be made from time to time as the arrangements for the various talks are completed.

Across the Channel

A PROGRAMME with the title "Across the Channel" will be broadcast to Northern Ireland listeners on August 9th. This will be a record in programme form of the impressions of an Irishman visiting England, Scotland and Wales.

"Picture People"

AT the end of May last a novel broadcast was given consisting of a complete variety programme taken from the sound-track of recent film successes and films in the making. It was entitled "Picture People" and included Gracie Fields, Eddie Cantor, Florrie Forde and many other foremost film artists. Clayton Hutton, who devised the programme, is now compiling a second edition for broadcasting on August 8th. Some of the artists to be included will be the following:—Mae West, who may be heard repeating her popular slogan; Paul Robeson; Florence Desmond; Norma Shearer; Bing Crosby; Sophie Tucker; Grace Moore; Elisabeth Bergner; Evelyn Laye and Wallace Beery. Leading film companies will again co-operate in the broadcast and, as on the previous occasion, the reproduction will be so perfect that it will be practically impossible to detect that the artists are not speaking direct into the broadcasting studio microphone.

INTERESTING and TOPICAL PARAGRAPHS

IN A MODERN RADIO FACTORY

Moving vanes for Cossor variable condensers being stamped out on a 40-ton power press.

SOLVE THIS!

"Arthur's Cave"

A PLAY for Welsh listeners, entitled "Ogof Arthur" ("Arthur's Cave"), by T. Rowland Hughes, will be given in the West Regional programme on August 15th. This play deals with the old tradition about Arthur's Cave. A group of people who are attending the National Eisteddfod wander up the mountainside and by accident discover the cave of Arthur and his knights. One of them summons enough courage to sound the huge bell which hangs from the roof and its deep boom breaks the long sleep of Arthur and his knights. The hero converses with the visitors and in the conversation an attempt is made to reveal his character. The complexities of modern civilization are bewildering to him and he returns to his sleep and to his dreams of Camelot.

Variety Entertainment from Belfast

A NON-STOP musical variety programme will be presented in the Belfast studio on August 10th. No less than thirteen acts have been booked to appear in the fifty minutes which the programme will occupy, ranging from a guitar team to a siffleuse. The whole show will be supported by David Curry and his Orchestra.

Two Plays from Midland Regional

TWO plays by H. C. G. Stevens will be acted by the Coventry Repertory Company on August 15th in the Midland Regional programme. A. Gardner Davies will produce plays, which will be relayed from the Opera House. The first, "Sir Herbert is Deeply Touched," concerns a famous actor-manager, and the second, "To Meet the King," is of the mystical type.

Droitwich Spa Orchestra

THE concerts by the Droitwich Spa Orchestra, composed of the Midland Regional Studio Nonet and some members of the City of Birmingham Orchestra, conducted by Victor Hely-Hutchinson, continue to be an attractive Sunday evening feature in the Midland programme. On August 12th the principal work is Schubert's Unfinished Symphony, written in 1822, never heard by the composer, and first played in 1865. George Gibbs, of Wolverhampton, is the baritone vocalist. He will sing the Sword Song, from Elgar's "Caractacus," and "The Song of the Soldiers" and "Adam lay i-bounden," by Hely-Hutchinson.

(Continued on page 569)

"PRACTICAL WIRELESS" at RADIOLYMPIA

AS our readers will by now be aware, next week will see the opening of the thirteenth Radio Exhibition at Olympia, the exact date being August 16th. This year will again see the vast crowds who every year make their way to the Great Hall in this famous London building in order to see the new developments in wireless receiver and component design. For months now the various manufacturers have been hard at work introducing new models and ideas which annually make their appearance at this time, and which pave the way for receiver modifications for the coming months when radio once again becomes of interest owing to the approach of the radio season.

Our Stand: No. 8, Ground Floor.

Radio should, of course, be an all-the-year-round hobby, but the warm days and long nights have a great influence in taking the listener away from his receiver. However, the majority of amateurs want to know what is new in radio and will accordingly make their way to Olympia. A cordial welcome is extended to all our readers, who will find us at the same spot as last year, our Stand also bearing the same number—namely Stand No. 8, on the ground floor. Here will be found copies of all the interesting books on radio which are published by the House of Newnes, including copies of our Encyclopædias, Data Sheets, and Blueprints, Tool Kits, etc. Those readers who have not already availed themselves of our Free Gift Schemes will thus be enabled to inspect the various items and obtain them for a cash payment. In addition, specimen receivers made up from the published details will also be on view, and will enable readers to check over any small point which they may find is causing them some difficulty.

In addition, members of the Technical Staff will be in attendance daily, and will be prepared to answer any problem which our readers care to bring along, although we should like to take this opportunity of pointing out that at last year's exhibition many readers seemed to have an endless store of questions which could have occupied all day in answering. This hindered others from obtaining assistance, and prevented many visitors from seeing the various items which we had introduced for their inspection. Will readers kindly, therefore, prepare any questions which they require answered, and jot them down on a piece of paper before coming to the Stand? In this way they will be able to put their problem with the minimum of delay, and be able to pass on and so make way for others. An interesting and instructive part of our show programme is the Free Advice Bureau; last year our staff must have answered some thousands of questions. Remember there is no charge for this service, and that everyone is invited and welcomed at our Stand.

PRACTICAL WIRELESS is recognized throughout the country as the leading paper devoted to the interests of the home constructor, and during the past few months unceasing efforts have been made by us to bring down the prices of the components of wireless receivers. As a result of the great appeal which we have made, we are pleased to state that the majority of manufacturers have responded in a most ready manner, and in addition to genuine price reductions many cheaper parts have been introduced for the home constructor. In addition, the prices of battery valves have also been reduced, and the home constructor is thus placed in a more favourable position than ever before to experiment and test new ideas which are introduced in the reception of the broadcast programmes

Television will soon be here, and, as with all other developments, PRACTICAL WIRELESS will be the first to present for the home constructor details concerning the construction of suitable receiving apparatus. In addition, No. 1 of our new monthly, *Practical Television*, will be on sale at Olympia. A special announcement regarding it appears below.

"PRACTICAL TELEVISION"
OUR NEW SIXPENNY MONTHLY

THE science of television is on the eve of momentous achievement. Already it has been demonstrated that it has emerged from its development stage and has reached a point where it is commercially practicable, and has excellent entertainment value. Within a few weeks the Television Committee, appointed by the Postmaster-General to report to him as to the present position of television, will issue its findings. As with wireless, so with television, the home constructor will extract the greatest enjoyment from this fascinating yet simple new hobby. It behoves every reader of this journal to make himself *au fait* with this missing link of complete home radio entertainment.

PRACTICAL TELEVISION, our new 6d. monthly, will be published on August 16th, and copies of it will be on sale at Radiolympia at the popular price of 6d. per month.

No. 1 contains interesting articles on "Building a Home Visor," "Scanning Systems," "History of Television," "The Cathode Ray Oscillograph," "Telenews and Televiews," "Television—a Review of the Various Systems," "Coupling Your Set to a Visor," "Light Cells, their Principles and Uses," "Valves for Television," "Television Tips," etc., etc.

PRACTICAL TELEVISION will accurately present reviews and reports of the latest apparatus and television developments, and test reports of receivers and new apparatus will form regular features. Bring your knowledge of the new science right up to date and be prepared for the new hobby, by ordering a copy of PRACTICAL TELEVISION to be delivered to your door every month. Already the entire print of No. 1 has been taken up by the wholesale newsagents, and to secure your copy it is necessary to place an order now for this latest addition to our series of practical journals.

OUR RADIOLYMPIA RECEIVERS

THE "SUMMIT" AND THE "ARMADA"

Our New Battery and Mains Receivers. Preliminary Details of Two New Receivers which are designed in accordance with Our Recently-introduced Low-price Campaign. Full Constructional Details will be Given Next Week.

WITH the introduction of the Leader series of receivers we endeavoured to show that a receiver could be built at home at a price which was really comparable with that of a commercially-made set. This might not have been any very great achievement a few years ago, but in 1934 it is one of the greatest importance, since the production of factory-made receivers has been reduced to a very fine art and such sets can be produced at extremely low prices. The reason is not that the designers of these instruments are cleverer than those who design home-constructor sets, but that their facilities for obtaining components at extremely low prices are greater than those available to the amateur. Furthermore, in many cases the manufacturer of complete receivers also constructs his own components, and is thus relieved of the necessity of obtaining a greater profit owing to the fact that no distribution charges have to be added. There is also the point that no elaborate case or trimmings have to be added, and no terminals or other connecting devices need to be fitted. Our campaign also resulted in a great reduction in the prices of components offered to the home constructor, and as our readers will have seen, the price of battery valves has also been reduced. Our two new receivers have been designed to still further increase the popularity of home construction, and the prices of these receivers will be found fully to demonstrate that the home constructed receiver can vie with its commercially-produced prototype not only in price but in performance.

High Standard of Performance

Considered from the point of view of performance it might even be said that these receivers are capable of even better results than those of factory-produced articles. The reason for this is simple, and is that the constructor can himself in many ways "hot-up" and otherwise adjust the individual receiver so as to obtain the maximum from the parts which are employed. Such adjustments are not possible in the case of the ready-made set which must, in view of the low price at which it is offered, be made entirely by mass-production methods. These latter, of course, completely rob the receiver of that particular individuality which the home constructor and experimenter always values so highly.

In producing these receivers no attempt has been made to introduce what are generally referred to as stunt features, but instead the aim has been throughout to design sets of thoroughly proven type which are not only easy to make but have that nicety of adjustment and control which is peculiar to the instrument of so-called thoroughbred type. One of these receivers is designed for battery operation, and the other for mains operation, so that every reader may choose that particular model which in every way meets his individual requirements. The fundamental design of the battery set is such that radio reception is the prime consideration, although arrangements have been incorporated so that it may, when desired, be employed for the reproduction from gramophone records. On the other hand, the mains apparatus has been designed as a self-contained radio-gramophone, and it is arranged in a cabinet which contains, in addition to the loud-speaker and wireless apparatus, the gramophone turntable and pick-up. The cabinet is not one of the cumbrous and inelegant pieces of woodwork which have hitherto received the name of radio-gram. cabinets, but is neat and of such a size that it may conveniently be stood upon any table. In fact, it is very little larger than a consolette type of radio cabinet, and possesses a similarly attractive appearance. The modern small size radio component has played a large part in the reduction in the overall dimensions of this particular piece of apparatus, and the battery receiver has also been built to take full advantage of this tendency in modern design. When the finished receivers are compared with last year's models the great advantage of this size reduction will become apparent.

In both receivers the number of valves employed has been reduced to three—the minimum which will give good, consistent results in these days, and a combination which has been found to give all that is required for normal home entertainment. The latest type of high-frequency pentode is employed in the preliminary stage in order to ensure that adequate range of reception is secured and that the detector stage is fed with a sufficiently powerful signal from the desired station to enable good quality to be passed on to the output stage. The output stage similarly has been arranged to utilize one of the modern pentodes so that the loud-speaker may be operated at comfortable volume. Since the inauguration of the Lucerne Wavelength Plan we have received countless complaints and requests from readers regarding the reception of foreign stations, due to the difficulty of eliminating some of the interference caused by more powerful stations. Thus, although the Lucerne Plan was intended to simplify the reception of a greater number of stations, it appears from our large correspondence that, in many cases, greater difficulties have been introduced. All the letters which have been received have been very carefully considered by our technical staff, and the difficulties encountered have been tabulated and carefully considered from every angle. As a result of the investigations made in this way we feel sure that we have exactly gauged the requirements of the majority with regard to the degree of selectivity required. The tuning arrangements of both of the new receivers have been designed to incorporate those principles which have been found after considerable experience to fully satisfy the present-day needs so far as selectivity and signal strength are concerned. Because of this, readers will be able to rest assured that by building either of these receivers they will be able to take advantage of the experience and assistance which we have obtained from the analysis of the requirements of listeners in all parts of the country, and also from our own individual experiments, which have consistently been carried out during the past six months.

THE OCTODE FREQUENCY CHANGER

Some Interesting Details of the Latest Type of Multi-electrode Valve

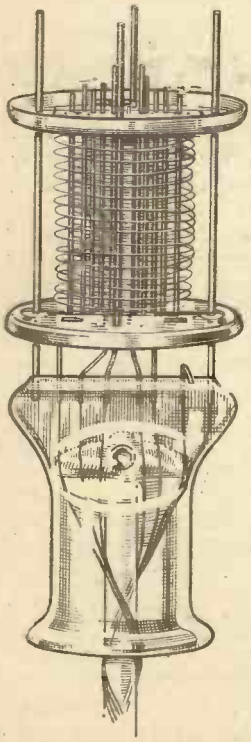
AS we have previously pointed out, the super-het. fell out of favour not so much on account of bad reproduction, but mainly because of troubles associated with the frequency-changing stage.

The whole process of frequency changing depends upon an oscillator and a "mixer," whether these be two separate valves, or whether both functions are performed by one valve, or by two sets of electrodes enclosed in a single bulb. In all previous systems the coupling between the oscillator and mixer elements has been obtained by coils inductively coupled.

In the "electron coupled" frequency changer, however, the heterodyne frequency is generated in one set of electrodes, and the coupling between the oscillator and mixer is obtained through the electron stream, thus avoiding the use of external coupling coils.

Six Separate Grids

Of the various types of electron-coupled frequency changer, the latest is the Mullard octode, which is made in two forms, Type F.C.4 for A.C. mains and Type F.C.13 for universal sets. As its name implies, the octode is an eight-electrode valve, having a cathode, six concentric grids, and an anode. The operation of the octode can be understood by reference to Fig. 1, which shows the electrode system in diagrammatic form, and Fig. 2, which gives the basic circuit arrangements.



This illustration shows the electrode assembly of the new valve.

The cathode and grids Nos. 1 and 2 form a triode oscillator, of which grid No. 2 is the anode. Grid No. 3 is a screen, carrying a high-tension voltage of some 85 volts. The potential on grid No. 3 accelerates the electrons emitted by the cathode, and a certain proportion of them pass through grid No. 3. Grid No. 4 is the control grid of the mixer portion, and is negatively biased due to the voltage drop across the resistance "R" in the cathode lead (Fig. 2). Due to this negative bias, the electrons passing grid No. 3 are retarded and a cloud of electrons, or "space charge," pulsating at heterodyne frequency, will occupy the region between grids Nos. 3 and 4, forming what is termed the "virtual cathode" of the mixer portion.

From this "virtual cathode" electrons will be drawn off, due to the high potentials on the auxiliary grid (grid No. 5) and on the anode, and this electron stream, already pulsating at heterodyne frequency, will be modulated by the receiver radio-frequency signal applied to the control grid No. 4. It will be understood, therefore, that the

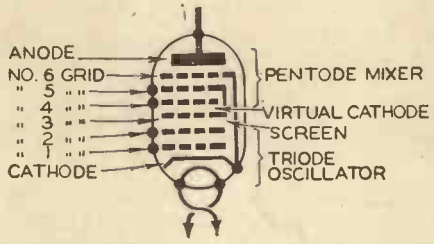


Fig. 1.—Diagram showing the electrode system of the octode frequency changer.

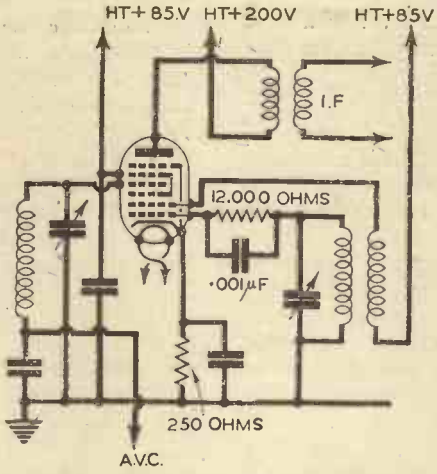
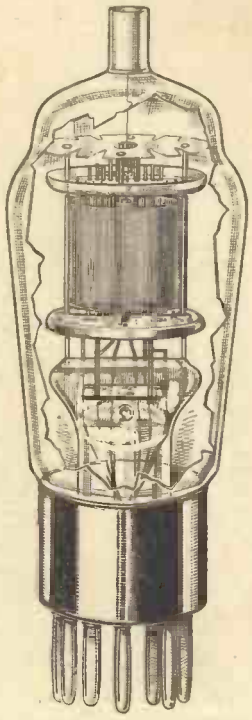


Fig. 2.—The basic circuit of the octode frequency changer.

electron stream now carries a double modulation—heterodyne frequency and signal frequency, and that the mixing of the two produces the required intermediate frequency.

The operation of the octode as so far described resembles that of other electron-coupled frequency changers, such as the hexode or pentagrid. In the octode, however, the sixth grid is introduced, and is connected back to the cathode. The mixer portion of the octode acts, therefore, as a pentode mixer instead of as a tetrode, as in the heptode, and thus possesses all the advantages by way of increased amplification combined with stability which characterize the high-frequency pentode as contrasted with the screen-grid valve.

Moreover, the Mullard octode is so designed that the mixer portion has variable-mu characteristics, so that the effectiveness of gain control, whether manual or automatic, is greatly enhanced. As an indication of the improvement effected in this direction, it may be stated that, with a grid bias variation of 20 volts, the control is from 1 to 10,000.



A general view of the new octode valve.

A further advantage attaching to the pentode characteristic of the mixer section of the octode is that the auxiliary grid voltage can be obtained by a simple voltage-dropping resistance, thus avoiding the use of an expensive potentiometer for regulating the auxiliary grid voltage.

On the score of re-radiation, the good screening between the oscillator and mixer provided by grid No. 3 prevents the heterodyne oscillation from being superimposed on the control grid, with the result that re-radiation to the aerial is negligible.

ROUND THE WORLD OF WIRELESS

(Continued from page 566)

Bridgwater Band Festival

THE Ynysybwl Workmen's Silver Prize Band, conducted by C. Hall, will be heard by West Regional listeners in a relay from the Bridgwater Band Festival on August 18th.

Concert by Band of H.M. Royal Marines

JACK COLLINGS (the fisherman bass) will be the vocalist in a concert for West Regional listeners by the Band of H.M. Royal Marines, Plymouth Division, on August 13th.

"Roundabouts and Swings"

THE Scottish Regional Saturday afternoon talk on August 18th will be given by John R. Allan, the well-known Scottish humorist. His subject is "Roundabouts and Swings." John has tasted the pleasures of every type of entertainment to be found in fairs, and the recital of his experiences should be amusing. He tells us that he takes up residence in Glendevon Castle in September, a castle, by the bye, which originally belonged to Archibald Bell the Cat. Naturally the castle is haunted, Glendevon's principal apparition being Green Jean, the daughter of the De'il of Kincardine.

(Continued on page 581)

Our Second Course for Beginners

INTRODUCING our new course in wireless transmission and reception, written in simple language for the newcomer as well as the old hand.

WE have, of course, previously dealt with the principles of wireless in these pages, and this new series of articles is intended to be a refresher and secondary course for the reader who has already acquired a knowledge of the various points involved, whilst it will also enable the newcomer to understand how it is that the speech and music at the broadcast station or the concert hall may be heard in our own homes situated miles away.

The Sciences Involved

Before it is possible to study the subject it is necessary to point out that for a complete understanding of wireless transmission and reception a knowledge of several subjects is required. Thus, in addition to the main item—electricity, it is also necessary to understand such things as magnetism, chemistry, meteorology, etc. It might seem, therefore, that the study of wireless means a lot of hard work, but actually for our purpose we can take a small portion of each of these and leave the complete study until later on. Perhaps, before going any further, it would be as well to point out where these extra items are introduced to our hobby in order to prevent any possible queries. Magnetism is, of course, the main prop of the loud-speaker and the headphone, whilst some types of microphone also employ a mechanism which relies for its function on a magnet. In our low-frequency transformers and smoothing chokes we also find the question of the magnetic property of iron and steel is introduced, and has some influence on the function of these components. Chemistry is introduced in the design of the valve, the insulation of various accessories, and of recent years it has also come into play in the design of various types of earth connection. In addition, the chemist has to be brought in to solve the problem of certain troubles and difficulties which arise in a wireless receiver due to inter-action between certain metals or other materials, and he has to order the employment of different substances in order to prevent noises which might be introduced through wires being eaten away or similar difficulties. In order to fully understand the problem of distant reception of low-powered transmitters and the vagaries of short-wave transmissions a knowledge of meteorology must be introduced.

What is Electricity?

Therefore the first subject to receive our attention is electricity, and whole pages would be required to give a thorough explanation of the principles and theories involved. To be brief, however, we may look upon electricity as the movement of particles in a certain direction. To-day everyone knows that all things are composed of atoms or small particles of matter, and these atoms are in themselves composed of smaller particles. These latter particles are of two kinds, known as "electrons" and "protons," and they are best likened to our present solar system. In this we have the sun around which the earth and other planets revolve, and in our atom we have a central nucleus (the sun) which is composed of "protons," and rotating round this nucleus we find what is known as "electrons." An attractive force exists between electrons and protons, and therefore the atom, no matter how many electrons and protons it contains, is held bound together, and in a normal state contains an equal proportion of both electrons and protons, and is therefore in a neutral or uncharged condition. Under certain conditions one or more of the electrons may leave the assembly, and when this happens the atom is left in a "positive" condition owing to the excess of protons which exists. The atom is now in a condition known as "charged," and it will endeavour to attract a negative particle in order to make up its deficiency. Consequently a movement will take place and an attractive force will exist between this positively charged atom and any other normal atom near it, until it is able to restore its original condition.

Our new series is intended to deal with these and similar aspects of radio, and the new reader should carefully study the course as it develops in our pages.

STATIC OR DYNAMIC?

An Interesting Chat About Valve Curves

By H. J. BARTON CHAPPLE, Wh.Sch., B.Sc. (Hons.), A.M.I.E.E.

IF you examine any page of a valve manufacturer's catalogue you will observe a table giving the "characteristics" of the valve; that is, anode impedance, amplification factor, and mutual conductance. This table will be prefaced by a statement that these are the published characteristics of the valve, taken under some special operating conditions—usually anode volts 100, and grid volts zero. Further, there will be "characteristic curves"—usually one or two showing the relation between anode current and grid voltage for various values of anode voltage.

It is generally understood that these characteristics and curves are what is known as "static" characteristics, that is to say, they are derived from test figures taken in the laboratory, and not as a result of measurements made while the valve is operated under reception conditions with a signal applied to the grid and a "load" connected in the anode circuit. On the other hand, it is not commonly known that, under practical working conditions, the values of the characteristics are not so high as the "static" figures.

Why not Dynamic?

The reader may, therefore, quite reasonably ask why "static" characteristics and curves are published by valve makers instead of the more practical "dynamic" characteristics. There are two very good reasons. In the first place, the static characteristics are published merely as an indication of the qualities of various valves, and since all the valve makers publish characteristics taken under the same voltage conditions, these figures serve perfectly well as a standard of comparison between various types and makes of valves.

The second reason requires a rather extended explanation. It is that the "dynamic" characteristics are not constant, but depend upon the actual operating conditions, and more particularly upon the nature and impedance of the "load," that is the type of apparatus connected in the anode circuit of the valve.

An Example

This will be made clear by taking a typical example. Fig. 1 shows the published (static) grid volts/anode current characteristic curves of a typical 2-volt general-purpose valve—the type of valve used as a detector or first low-frequency amplifier. Separate curves are given for anode voltages of 75, 100, 125, and 150 volts. Taking the 125-volt curve—the top curve but one, it shows that, if a pressure of 125 volts was applied to the anode of this valve, and the voltage applied to the grid was varied from zero to 7 volts negative, the anode current would vary from about 7.4 milliamps down to zero, the corresponding values of grid voltage and anode current being represented by points on the curve. It is necessary to realize, however, that *this curve pre-supposes that the anode voltage remains constant at* 125 *volts all the time.*

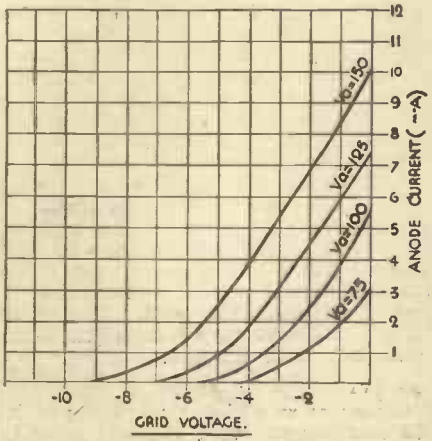


Fig. 1.—Static characteristics of a typical general purpose battery valve.

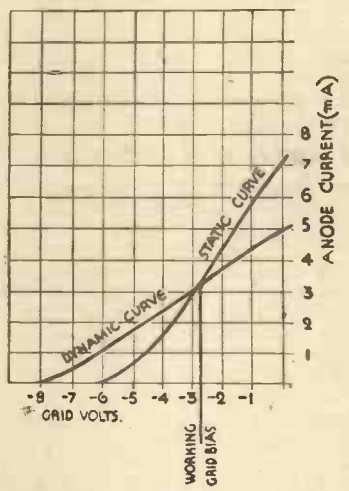


Fig. 2.—Static and dynamic curve forms.

In Practice

Now see what happens in actual practice. To begin with, some piece of apparatus, such as a resistance or a transformer, will be connected in the anode circuit, and if the valve is being employed as a low-frequency amplifier, a negative bias voltage will be applied to the grid. Suppose this negative bias is 3 volts, and that with no signal applied to the grid the actual voltage on the anode is 125. When a signal is applied to the grid, the grid voltage varies above and below the bias value of 3 volts negative. When the grid voltage increases (that is, becomes less negative) the anode current will rise, and when the grid voltage becomes more negative the anode current will decrease.

But when the anode current rises, the voltage drop in the anode load will increase and the actual voltage at the anode will be less than 125. Similarly, during negative half-cycles when the anode current decreases, the voltage drop in the anode load will also decrease, and the actual voltage at the anode will be greater than the nominal figure. Thus, the *true* values of anode current during positive half-cycles will not be those indicated by the static curve, but will be lower; and the true values of anode current during negative half-cycles will be greater than those found from the curve.

Practical Effects

In other words, the "dynamic" curve of the valve will be "flatter" than the static curve, as though it has been moved round bodily with the point corresponding to the working grid-bias as the pivot, as indicated in Fig. 2. It is easy to understand from this graph, which shows that the dynamic curve has a less steep slope than the static curve, that the practical effect of using a valve under reception conditions results in a reduction of its mutual conductance below the "static" figure.

Another, and still more interesting way of showing the difference between static and dynamic conditions is to derive a dynamic curve from the anode volts/anode current curves of the valve. This method will appeal to those listeners who like to study radio from the theoretical angle, and should also interest those who, so far, have not come across anode volts/anode current curves.

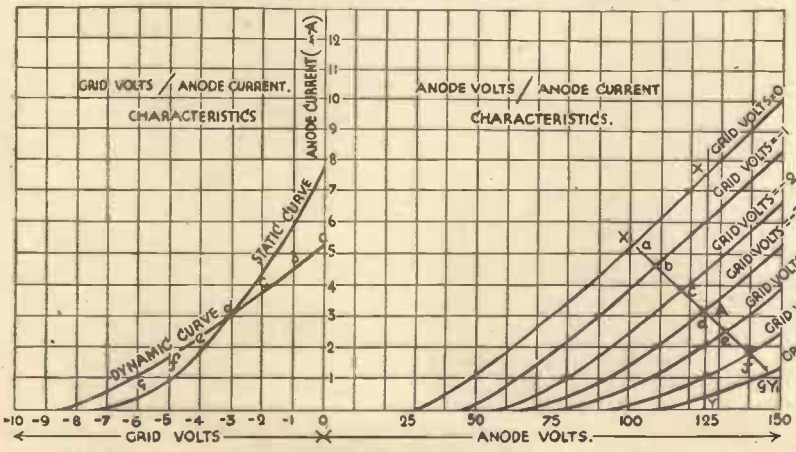


Fig. 3.—Anode volts/anode current curves and derived dynamic curves.

Deriving Other Curves

Referring again to Fig. 1, we can take readings from the curve, showing the anode currents for various grid voltages, as for example 0,—1,—2, —3, and so on. The following table has been compiled from the curves in Fig. 1.

(*Continued overleaf*)

STATIC OR DYNAMIC ?

(*Continued from previous page*)

Negative Grid Volts.	Anode Current.			
	75 Volts.	100 Volts.	125 Volts.	150 Volts.
0	3.1	5.25	7.4	10.0
1	1.8	3.9	5.9	8.4
2	0.95	2.4	4.3	6.7
3	0.4	1.4	3.0	5.2
4	0.1	0.65	1.85	3.8
5	0	0.25	1.0	2.4
6		0.05	0.4	1.35
7		0	0.15	0.7
8			0	0.35
9				0.1
10				0

Now take a sheet of graph paper and plot the different values of anode current at zero grid volts against the corresponding anode voltages. You will then obtain a curve similar to that shown at the top in the right-hand half of Fig. 3. Similarly, by plotting the various anode currents for —1 grid volts (second horizontal line of the table) against the respective anode voltages, a second anode volts/anode current curve for grid volts —1 can be plotted. To complete the work a whole "family" of such curves must be drawn.

Now we have considered in our example that at —3 volts grid bias the anode voltage is 125. If the anode voltage remains constant (which, of course, it does not for reasons already explained) a 3-volt (peak) signal on the grid would cause the anode current to vary between the points X and Y, for the grid voltage would vary by 3 volts above and below the bias of—3 volts. Thus, the instantaneous grid voltage will range from zero to—6 volts.

The Effect of Impedance

These conditions would only exist, however, if the "load" in the anode circuit of the valve had no impedance and therefore produced no voltage drop. But the anode load does possess impedance—must, in fact, possess impedance in order that an amplified reflection of the grid input signal shall be developed across it. And because the load possesses impedance, and produces a voltage drop which depends upon the current flowing through it at any instant, the fluctuations in anode current will not be so great as those indicated by the intersections of the line XY with the various anode volts/anode current curves.

Operating Conditions

The operating conditions of the valve will still slide from one curve to another, but along another line, such as X_1 Y_1, which represents a load of just over 10,000 ohms, being given by "resistance equals volts divided by amps." The greater the impedance of the load, the less steep will be the slope of X_1 Y_1. For the present we will assume that the line so marked in Fig. 3 represents the actual working conditions.

The Dynamic Curve

The working values of anode current at various instantaneous values of grid voltage will therefore be shown by the points at which the line X_1 Y_1 cuts the various anode volts/anode current curves, and are marked a, b, c, d, etc., on X_1 Y_1 (Fig. 3).

From these values we can new construct a dynamic characteristic curve, as shown at the left-hand side of Fig. 3. In this way the true variations taking place in the valve under actual working conditions can be studied with accuracy.

THE WIRE IN "WIRELESS"

Some Interesting Facts Regarding the Manufacture of Fine Instrument Wires

MANY humorous things have been said about the use of the word "Wireless" to describe that set of phenomena which is now almost universally termed Radio. It is quite true that the actual signals travel from the transmitting aerial to the receiver without conveying wires, but wire plays a most important part in the complete process. For example, on a ship's transmitting apparatus there are about 300 miles of wire in the transformer. Even in our receiving sets the amount of wire employed is considerable.

Few realize the art which is employed in the manufacture of wire. Copper plays, perhaps, the most important part in wire manufacture, but, of course, there are other materials used in the manufacture of special or resistance wires. Copper is shipped to this country in large quantities, principally from America.

Copper

Copper, as we all know, plays its part in the currency, and with gold and silver is recognized as one of the universal equivalents in our exchange system. The price of copper may vary from day to day and for this reason a constant watch has to be kept by the wire manufacturers and electrical firms on this aspect of the case. When the copper bars are to be made into wire, or copper strips as employed in commutator segments, etc., they are placed in a container and put into a crucible and melted at a temperature which makes the copper liquid glow at a white heat.

All round these furnaces are large tubs of water into which the workmen can jump if, as often happens, their overalls catch on fire owing to the heat from the ingots. The latter are about 5ft. in length and 9in. thick, they are grabbed by the operators with long pincers and propelled along the steel floors, thence to be placed between rollers, which shape and flatten the metal to a workable size. If it is to be strip, the whitened metal will be run backwards and forwards until, like a snake from the nether regions, it is 60ft. to 70ft. in length, sliding over the polished steel floor, sending sparks hither and thither during its progress, a most awe-inspiring sight.

When round wire is required the metal is run through different shaped rollers and, owing to the enormous length it reaches, is turned back on itself through adjacent rollers, so that it actually travels through several rollers at a time, with many loops all over the floor. It is during the latter process that men have had their legs trapped in the loops of white-hot metal, with disastrous results. Having obtained a length of copper sufficiently reduced in diameter the next job is to draw it cold, down to the size of wire required, and this is done in easy stages.

Wire Drawing

The first stage sees the copper, the size of a man's wrist, being drawn by a chain, the links of which would do justice to a steam-roller transmission system, through a tapered reducer. When the wire is drawn down to really fine sizes, such as those used for making radio tuning coils or transformers, etc., it is taken through numerous diamond dies, each successive die having a smaller diameter hole than its predecessor. During the latter process the wire passes through cooling baths. Having reduced the conductor to the requisite size, it now remains to cover it with suitable insulation.

We may have cotton covering, silk, rubber, cellulose compound, in fact there is a galaxy of insulations at our disposal. In radio the commonest forms of insulation are enamel, silk, cotton, cotton and cellulose, cotton and wax, and, of course, oiled cotton sleeving (*i.e.*, systoflex), and V.I.R. (vulcanized india-rubber). To enamel the wire it has to be run through several baths of the insulating material and baked after each bath. The general temperature plays a very important part in this process, as does local climatic conditions.

It is interesting to note that one well-known transformer concern insists on an enamel insulation which will have a "breaking point" beyond that of the wire conductor. This means that when the wire is stretched it will actually break before the enamel surface. One can appreciate the reason for this precaution owing to the number of bends in a length of wire employed in the secondary winding of a transformer and the enormous pressure existing in the internal turns.

Covering the Wire

In cotton covering the wire travels horizontally, and reels of cotton are arranged radially around the conductor. There has to be a correct relationship between the velocity of the wire and the revolutions per minute of the cotton reels which spin round and round in a big circle, lapping the core with the right amount of cotton. D.C.C., or double cotton covered wire, necessitates two sets of reels revolving in opposite directions. In order to impart a braided covering the reels move around a vertically travelling wire. Actually the reels take an eccentric course similar to children playing "in and out the windows."

The famous Litzendraht wire, or Litz as it is known, is composed of three sets of three wires, each set of three being twisted and then the three lots twisted together; this ensures that each conductor shall come to the surface alternately, and since H.F. currents travel on or "near" the surface of conductors, Litz reduces the H.F. resistance as compared with ordinary wire. It is important to note that genuine Litz has each conductor separately insulated either by silk covering or enamel.

Preventing Electrolysis

It very often happens that when a coil is employed in a humid atmosphere a green spot appears on the wire which finally eats it away and causes a breakdown; this is known as electrolysis, and is due to the passage of a steady current through a conductor in a damp environment. Especially did this "green spot" occur in the early "spaghetti" resistances. A cure has been found by winding the wire on a non-absorbing core, sealing the ends and last, but not least, by the employment of a wire free of iron content.

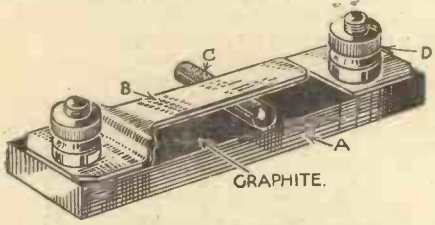
Such is the care exercised in modern wire production that it was found in one factory that breakdowns were due to the peculiar moisture on the skin of the hands of two sisters employed in handling the wire.

READERS' WRINKLES

THE HALF-GUINEA PAGE

A Pre-Set Resistance

A NEAT and handy variable resistance, such as may be used to decouple the screen of an S.G. valve is illustrated in the accompanying sketch. A piece of ebonite (A)

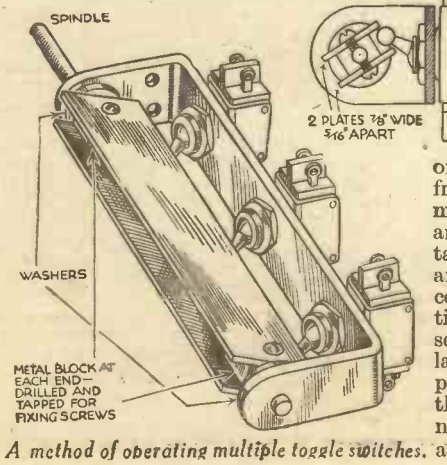


An easily-made variable resistance.

about 1½in. by ½in. is drilled at each end. One terminal holds a narrow piece of springy brass, such as taken from a flash-lamp battery (B). The surface of the ebonite from terminal to terminal is thickly coated with graphite by means of a soft pencil, and the second terminal holds a square brass plate firmly on this (D) so as to ensure good contact. A fairly thick piece of pencil lead such as used in a draughtsman's compass (C) is inserted under the brass strip, so that by sliding it along the resistance may be varied, while the pressure of the spring keeps it in place. When a suitable value has been found either the whole thing may be immersed in wax to prevent variation, or a spaghetti may be matched to it by means of the well-known meter bridge.—J. H. ROWE (Dublin).

Operating Multiple Toggle Switches

HAVING found it necessary to devise a scheme to operate two or more toggle switches from the panel of my radio set, I hit upon the following idea. Two flat bars, ⅞in. width, were secured to a couple of metal blocks which were placed upon a common spindle. These blocks were $\frac{5}{16}$in. thick to allow the knobs of the toggle switches to just ride easily inside them in course of their operation. The principle of their coupling may be easily gathered



A method of operating multiple toggle switches.

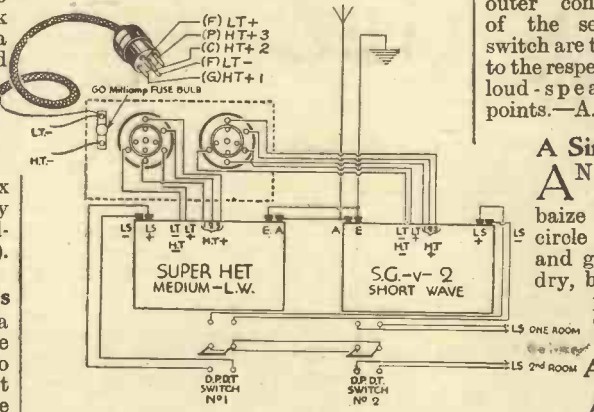
THAT DODGE OF YOURS!

Every Reader of "PRACTICAL 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 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.

from the accompanying sketches, and it will be found that the "snap action" is definitely transmitted to the main control knob.—W. H. ARTHUR (Liverpool).

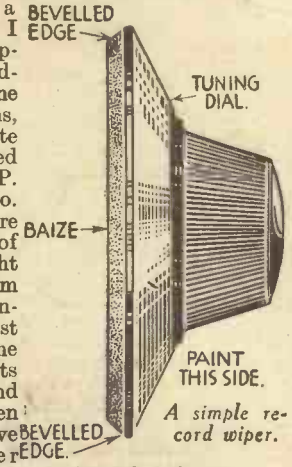
Novel Change-over Switching

I HAVE two receivers in use, one for medium/long-wave reception, and the other for short-wave work. Each has three



A novel change-over switching arrangement.

H.T. tappings, and I got rather tired of changing over from one set to another each time I wanted to listen. There were L.T.+ and —, H.T.—, H.T.+1, 2 and 3, A. and E., and loud-speaker to be connected. Eventually I placed the receivers side by side, the aerial and earth permanently joined. (Fortunately, one receiver is built right to left and the other from left to right). Behind the receivers two five-pin valve-holders are mounted on a piece of ⅜in. ply wood. The L.T. wiring from one set is taken to the filament points of one valve-holder and the three H.T. tappings are taken to end, centre pin, and anode pins. The H.T. negative is connected in the set to L.T. negative, and similarly with the second set and valve-holder. The accumulator is connected to the filament pins of a Bulgin five-pin plug, and the H.T. tappings from my eliminator are taken to the end, anode, and centre pins of the plug. The H.T. negative from the eliminator is taken through a 60-milliamp fuse bulb to the L.T. negative pin of the plug. It is then a simple matter to plug the power on to either set as required. The loud-speaker terminal leads of the two sets are brought out and taken to the end contacts of a D.P.D.T. switch (No. 1). The centre contacts of this switch are led off to a loud-speaker. I desired to operate a loud-speaker in one of two rooms, and to facilitate this I interposed a second D.P.D.T. switch (No. 2), to the centre contacts of which I brought the leads from the centre contacts of the first switch. The outer contacts of the second switch are taken to the respective loud-speaker points.—A. C. LAMB (Dewsbury).



A simple record wiper.

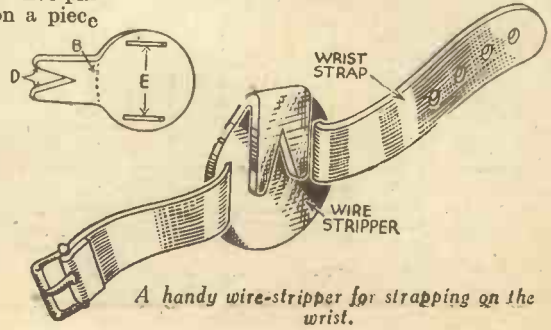
A Simple Record Wiper

AN efficient dust remover for records may be made from a piece of baize and an old tuning dial. Cut a circle of baize the same size as dial, and glue it to the back of it. When dry, bevel the edge of the baize with a pair of scissors.—P. BINGLEY (Esher).

A Novel Wire-stripper

A PIECE of steel cut from an old saw blade, shaped as shown, and attached to a wrist band, makes an excellent wire-stripper for the home constructor.

Two slots (E) are cut in each side of the blade, for the strap. The round part of this stripper is about 2½in. across, and the whole is 4in. long. A V-shaped notch (B) is cut in the metal and the edges sharpened, as at (D). The steel piece is then bent back on itself, after heating.—J. CROWSHAW (Bolton).



A handy wire-stripper for strapping on the wrist.

THE FOU
SUPER-M

A New Two-Valver for the

By "ELE

Fig. 4.—A rear view of the finished receiver.

THE building of a receiver for ultra-short waves has always been considered as a job quite apart from the construction of a standard broadcast receiver. So much so that experimenters who required a set for S.W. work, have almost invariably found it necessary to employ a separate set for the purpose whilst keeping another for broadcast reception. A number of constructors have tried to combine the two functions in a single instrument, but in very few cases have the results been really satisfactory. The writer has been a short-wave enthusiast for several years, and has experimented constantly with a view to simplifying the apparatus required for both reception and transmission, but his efforts have only recently met with unqualified success. Even now the success is due as much to improvements in manufacturers' components as to improvements in actual design.

General Considerations

It is well known that any loss in efficiency is much more pronounced on short waves, and, therefore, in designing a set for this purpose the aim must always be to eliminate any possible source of loss. This is not difficult when making a set for laboratory or experimental use, but when the set has to be installed in a drawing-room things are rather different. In working out the design of the "Four-Range Super-Mag Two," the first consideration was to make a S.W. receiver which was sufficiently compact and neat whilst being as good as the best experimental model. When this had been done, gradual modifications were introduced so that the same set could be used successfully for reception on the longer wavelengths. Without enumerating all the difficulties encountered it can be said that this idea was eventually reached without detracting in any way from the efficiency on S.W. Perhaps the greatest difficulty was in obtaining a satisfactory system of switching from one waveband to another without incurring capacity losses in the wiring. This was solved by employing coils with self-contained switches, with a result that the only other switch required was a simple 3-point one, and the additional wiring almost negligible.

As the name implies, the "Four-Range Super-Mag Two" is a two-valver designed to cover four different tuning ranges and giving a high degree of amplification. The ranges covered, by the way, are from 18 to 35 metres, 30 to 65 metres, 220 to 550 metres, and 900 to 2,200 metres. Efficiency and the degree of magnification are equally high on all four wavebands, and in this respect the set stands out as being somewhat unique.

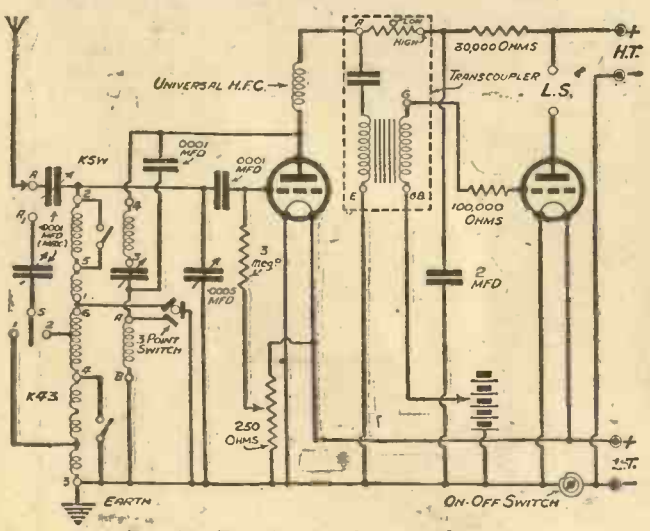


Fig. 3.—The theoretical circuit diagram.

Selectivity and Range

As a broadcast receiver pure and simple, it is better than most two-valvers both as regards selectivity and range of reception. It will bring in at least fifteen stations on the loud-speaker, even when used within twenty miles of a pair of Regional Transmitters, and at such a range the tuning of each of the latter stations does not extend over more than 10 degrees or so. On the short wavebands it is sufficiently sensitive to bring in a number of Continental and American stations at loud-speaker strength, whilst when using phones the expression "distance no object" is most apt. Under all conditions tuning is remarkably easy, and reaction control beautifully smooth. The final appearance of the set is very "clean" and symmetrical, but as mentioned above it has passed through many experimental stages, so intending constructors are specially requested not to try to "improve" it by using different components or by altering the lay-out to suit some convenient cabinet. All the parts have been chosen after careful experiment, and their best positions have been determined by patient trial and as the result of a long experience.

Fig. 1.—A three-quarter rear view of the set, showing the neat layout.

Coil Assembly

The coil assembly is the most important item, and has been specially made up for this set by Messrs. Colvern at the writer's request. It consists of two separate screened coils, each fitted with a self-contained wave-change switch and with both switches operated by a single ganged drive. One coil is a special S.W. one and the other is a

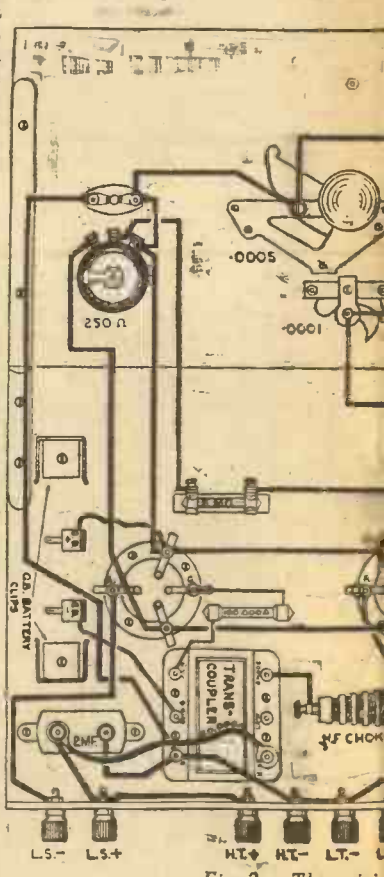


Fig. 2.—The wiri

R-RANGE AG TWO

Experimenter and His Family.

ECTRIX"

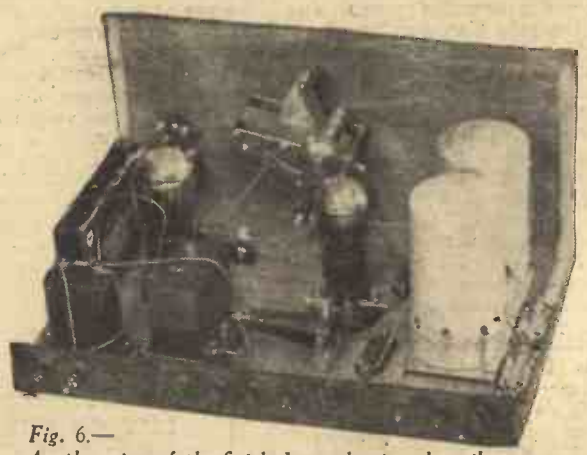
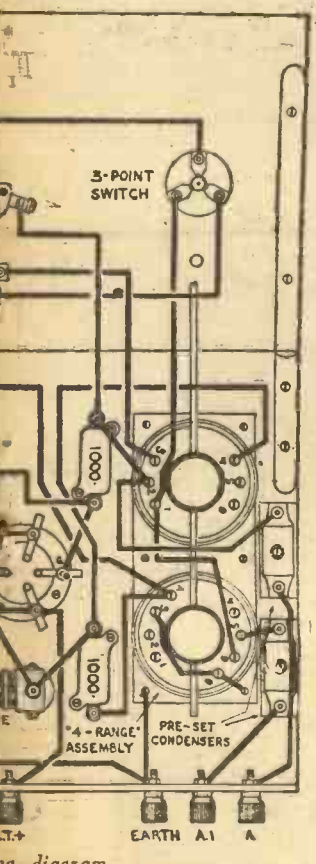


Fig. 6.—Another view of the finished set, showing the coil screens.



ng diagram.

broadcast coil with two aerial tappings; another switch contained in the base of the latter coil automatically connects the aerial to an appropriate tapping for medium or long-wave reception. When the set is required for operation on the two higher wavebands both windings (grid and reaction) of the two coils are in series, but when listening on short waves the windings of the broadcast coil are short circuited by a 3-point switch. Tuning is by a single knob which operates a .0005 mfd. condenser having a 35 to 1 reduction drive, thus making accurate tuning easy of accomplishment even on the highest frequencies.

Both coils have reaction windings, which are used in conjunction with a variable condenser. A .0001 mfd. reaction condenser is sufficient for S.W. reception, but for the broadcast bands approximately twice that capacity is necessary. In order to satisfy both these conditions in the most satisfactory manner a .0001 mfd. variable reaction condenser is used and functions independently on S.W. When the 3-point switch is pushed "in," however, a fixed condenser of similar capacity is put in parallel with it. With this very simple arrangement reaction control is delightfully easy on every waveband.

Other Components

Two aerial terminals are provided, one for S.W. work and the other for Broadcast reception. Each is connected to the appropriate coil through a separate preset condenser so that the optimum setting can be found and retained for long and short waves. The detector valve (a new one of high amplification) operates on the usual leaky grid system although the values of grid condenser and leak are rather unconventional; values were chosen which proved to be equally satisfactory for each waveband. The grid leak is taken to the slider of a 250 ohm. potentiometer, wired across the filament supply, so that exactly the correct grid voltage can be applied under all conditions. The potentiometer can be left in almost any position for more or less local reception, but it is extremely valuable when carrying out long distance or S.W. reception. The H.F. choke has to deal with all wavelengths, and that chosen is specially designed for this purpose.

Instead of the usual L.F. transformer, a neat "Transcoupler" is employed which combines a high efficiency transformer with a parallel resistance-capacity anode feed circuit. The arrangement makes for "straight line" amplification of all frequencies, besides giving a greater degree of amplification due to the absence of D.C. current in the primary windings. A decoupling resistance and condenser are used to feed the transcoupler, so preventing motor-boating and L.F. feed-back. A 100,000 ohm. non-inductive resistance (actually a metallized one), is inserted in the grid leak of the power valve to prevent the passage of any stray H.F. currents into the amplifier. The power valve chosen is one of the newer high-efficiency types, which gives a very high degree of magnification on a small anode current.

Practical Details

A plywood panel is specified in the list of components, but an ebonite one may be used in its place if desired. The plywood is, of course, cheaper, and is one of the writer's pet fads because it can be finished in such a variety of ways to match cabinets or furniture, and it does not discolour with exposure to sun and bright light. The positions and diameters of the panel holes is given in Fig. 5. Details of the construction and wiring are most easily obtained from the photographs Figs. 1, 3 and 4, and the wiring plan, Fig. 2. All wiring is in "Glazite" insulated wire, which can be attached to the terminals after baring the ends by looping and fitting it under the nuts. It might not be quite clear from the wiring plan that two connections are made to the aluminium baseplate of the coil assembly. These are made by looping the wires round the holding-down screws before tightly screwing down the latter. These two connections simplify slightly the wiring and, of course, serve to "earth"

(Continued overleaf)

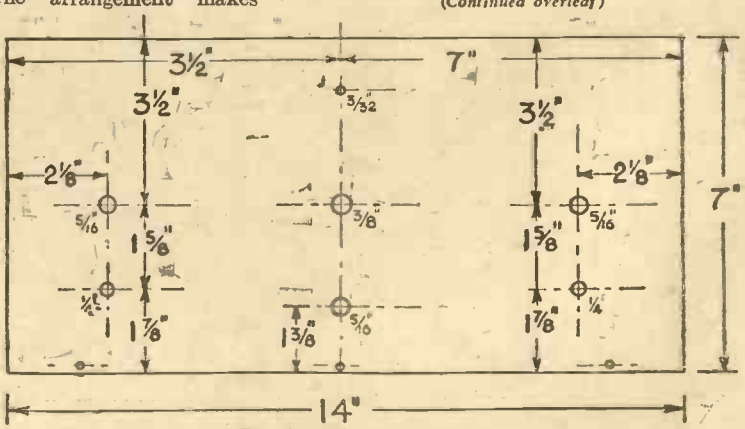


Fig. 5.—The panel layout.

(*Continued from previous page*)

the entire screening system. The two leads to the grid bias wander plugs are made with flex, so that they can be moved more easily. The spaghetti resistance itself is used to connect the "High" terminal of the transcoupler to the 2 mfd. by-pass condenser. Little need be said of the other wiring, since this is perfectly straightforward. The containing cabinet specified and employed by the writer is made up from a set of "Byldurone" components. Its internal dimensions are 14in. wide by 7in. high by 14in. deep, so it is sufficiently large to accommodate both accumulator and high-tension battery.

Working the Set

It is best to employ a high-tension battery of no less than 100 volts, and with a voltage of about that figure the appropriate grid bias voltage will be 3. With these voltages the total anode current consumption is between 5 and 6 milliamps, so a battery of the smallest capacity is adequate and will give satisfactory service for several months.

When batteries, aerial, earth, and speaker, have been connected, first try the set on broadcasting; this is done by connecting the aerial to terminal A.1 and pushing in the 3-point switch. Set the reaction condenser to its minimum position (anti-clockwise), and pull out the battery switch. Rotate the tuning dial until a station is heard, and then bring it up to required strength by increasing reaction. When searching for weaker or more distant stations, the reaction knob should be set to a position just short of the oscillation point while the tuning dial is rotated. In some cases it might be desirable to manipulate both tuning and reaction knobs simultaneously, but with the original receiver it was found that once the reaction was set to its best position for one station little alteration was required whilst "searching" was carried out. This applies to both the 200 to 550 metre and 900 to 2,200 metre bands, the former of which is obtained by turning the coil switch to the left and the latter by turning it to the right.

For Short-wave Work

To use the two lowest wavebands connect the aerial to terminal "A," pull out the knob of the 3-point switch and turn the coil switch to left or right for the 18 to 35 metre or 30 to 65 metre band respectively. Searching is done in a manner similar to that just described, but as tuning is much more delicate it must be carried out by using the slow-motion knob only. Reaction also is more critical and the last fine adjustments are most easily made on the potentiometer. Stations can be received all round the dial, but it is best to use the first half, that is up to 90 or 100 degrees.

So far no mention has been made of the method of setting the two pre-set condensers. There is no difficulty in this; first tune in a station, and then adjust the pre-set condenser associated with the particular waveband in use until the signal is brought to maximum intensity. In doing this the tuning must be adjusted each time the capacity of the pre-set condenser is changed. The most suitable capacity for the pre-set condenser connected to Terminal "A" (S.W.) will depend principally upon the aerial.

LIST OF COMPONENTS FOR THE FOUR-RANGE SUPER-MAG TWO

1 Plywood Panel, 14in. by 7in.
1 Baseboard, 14in. by 9in. by ½in.
1 Pair Panel Angle Brackets (Bulgin).
1 Ebonite Terminal Strip, 14in by 1½in. by $\frac{3}{16}$in. (Becol).
9 Terminals; marked "A," "A.1," "Earth," "L.T.+" "L.T.—," "H.T.—" "H.T.+," "L.S.+," "L.S.—." (Belling Lee type "R").
1 .0005 mfd. Variable Condenser with Slow Motion Drive (Jackson Bros. type "D").
1 Dial Indicator (Bulgin).
1 .0001 mfd. Reaction Condenser (Jackson Bros. "Midget").
1 2-spring Battery Switch (Bulgin "Junior").
1 3-spring Wavechange Switch (Bulgin).
1. 250 ohm Potentiometer (Colvern type "M.T.").
1 set "Four-Range" Coils; supplied complete with Ganged Aligned switches and Base-plate (Colvern "Four-Range").
2 .0001 mfd. (max.) Pre-Set Condensers (Colvern).
1 .0002 mfd. Fixed Condenser (Dubilier type "670").
1 3 megohm Grid Leak (Dubilier).
1 Grid Leak Holder (Bulgin).
1 .0001 mfd. Fixed Condenser (Dubilier type "670").
2 Low-Loss Valve Holders ("Eddystone").
1 Universal H.F. Choke ("Eddystone").
1 L.F. Transcoupler (Bulgin).
1 30,000 ohm. Spaghetti Resistance (Bulgin).
1 2 mfd. Fixed Condenser (Dubilier type "BB.").
1 100,000 ohm. Metallized Resistance (Dubilier, 1 watt).
1 pair G.B. Battery Clips (Bulgin No. 1).
2 Wander Plugs; marked "G.B.+" and "G.B.—" (Belling Lee).
2 Coils Glazite, odd lengths flex, ½in. Screws.

Approximate Cost, £4 0 0.

Accessories:
2 Valves: 1 Mullard P.M.1.H.L (new type) and 1 Mullard P.M.2 A.
1 Cabinet (J. J. Eastick and Sons, "Byldurone").

RADIO in the NEXT WAR

Will a Gramophone Record Replace a Thousand Bandsmen?

By RICHARD ARBIB

WHILST the authorities fully appreciate how the latest developments in the design of portable radio transmitters and receivers will be of assistance to armies in the field in future wars, the question of amplified speech or music for use with armies on the march appears to have been strangely neglected. A considerable sum of money is spent in the training and maintenance of bandsmen whose efforts are spectacular and heart-stirring when playing in front of their regiments on the parade ground, but are of little use when regiments are on the march in war-time.

The function of regimental bands, when examined from a practical viewpoint, would appear to be to keep up the spirits of the troops whilst on the march. But only a small proportion of the soldiers are able to hear the efforts of their musical colleagues.

Orders to columns of infantry on the march are passed down the line by the sergeant-majors or sergeants shouting the directions from one to another, so that by the time an order has reached the last sergeant many minutes may have elapsed. When it is necessary to bring a regiment immediately to the halt this time factor may have serious consequences.

Power Amplifiers

The adoption by the War Office of high-power amplifying equipment would promote greater efficiency and at the same time effect considerable economies.

We can visualise the British armies on the march in future wars, which we sincerely hope will never take place, being preceded by a large van somewhat similar in appearance to the B.B.C. detector vans. It will be painted in khaki or covered with foliage to camouflage it from enemy aircraft. When used on the parade ground or at regimental reviews it may be decorated in the colours of the regiment it precedes.

Mounted on its roof will be two or more high-power loud-speakers. Inside will be a double turntable gramophone unit, suspended in rubber slings, whilst mounted in rubber against the walls will be powerful amplifiers. The troops will be able to march in perfect rhythm to the music reproduced from gramophone records which have been made by an ideal military band.

Transmitting Apparatus

The range of a loud-speaker van would probably be limited to a quarter of a mile, in order that the volume of sound would not be distressing to the troops immediately following it. The monitor van would, however, be linked up by a small power short-wave transmitting apparatus to other vans at quarter-mile intervals. These would be installed with similar amplifying and loud-speaker apparatus, and thus the whole column of troops would march to the same music.

More powerful loud-speakers, having a greater range, could be used, but this would be inadvisable owing to the time lag of sound which might prevent the soldiers equally distant from two vans hearing the music satisfactorily.

Perhaps the greatest asset in employing these mobile amplifying equipments will be the immediate reception by troops of verbal orders. Instead of the sergeant-majors passing the orders to one another in stentorian voices, the commanding officer will be able to murmur his directions in front of a microphone connected to the monitor van, and his voice will be at once audible over a radius of several miles.

At the Aldershot Tattoo each year the commands to the troops whilst they were in the arena could only just be heard by the audience in the Grand Stand, but when, at the end of the performance, the epilogue, spoken by a well-known actor, is reproduced through the loud-speakers, as are the details of the items, every member of the audience of many thousands present can hear each word distinctly.

SUPPLEMENT TO PRACTICAL WIRELESS

Practical Television

AUGUST 11th, 1934. Vol. 1. No. 32.

TELEVISION RECEIVING CIRCUITS

By H. J. Barton Chapple, Wh. Sch., B.Sc., A.M.I.E.E.

MANY and varied are the number of radio receiving circuits which can be employed in conjunction with television apparatus in order to obtain images which are visually satisfactory. No hard and fast rules can be laid down in this connection owing to the varying distance of constructors from the London National Station which radiates the signals, coupled with questions of local environment which have a marked bearing on the degree of amplification necessary to produce an output signal of adequate strength reasonably free from interference.

Bearing these individual factors in mind, however, it is possible to furnish details of types of circuits which from actual practical experience have given good results. Contrary to popular belief quite a simple "straight" set can be built up which will modulate successfully an ordinary disc television receiver, especially if this machine incorporates a beehive or "letter" neon lamp in lieu of one of the flat plate variety. A well-tried circuit of this nature is shown in Fig. 1 together with component values, and this is satisfactory within approximately thirty miles of the London National station. It is a three-valve battery-operated set with a variable-mu high-frequency pentode stage (this may be replaced with a screen-grid valve of the variable mu or "straight" class if preferred) together with anode bend detector stage coupled to a pentode output valve. For simplicity a straightforward tapped aerial coil is shown, but this can be modified to suit individual tastes provided the circuit is not made too selective. For a simple home-made coil L_1 can consist of 60 turns of No. 24 gauge D.S.C. wire wound tightly on a 3-inch diameter former, a tap being made at the fifteenth turn from the earth end.

The variable-mu feed to V_1 is quite standard practice, but in the anode circuit coils L_2 and L_3 constitute an H.F. transformer arrangement, L_2 consisting of 60 turns of 36-gauge D.S.C. wire wound on a 3-inch diameter former, while L_3 has 60 turns of 24-gauge D.S.C. wire on the same former, the windings being kept close together to give a tight magnetic coupling. If the constructor has some old type two pin plug-in coils available, these can even be used. L_1 then becomes a No. 60 tapped coil, L_2 a No. 40 or 60 coil, and L_3 a No. 60 coil, coils L_2 and L_3 being mounted close together to give the required degree of magnetic coupling.

The detector stage is quite normal, the appropriate negative bias to the grid of V_2 for anode bend rectification being furnished by GB—2. Resistance capacity coupling links V_2 and V_3 and, in order to reduce the total high tension voltage required, the neon lamp (and synchronising coils if included in the receiver) are coupled to the output of V_3 *via* a 1/1 output transformer.

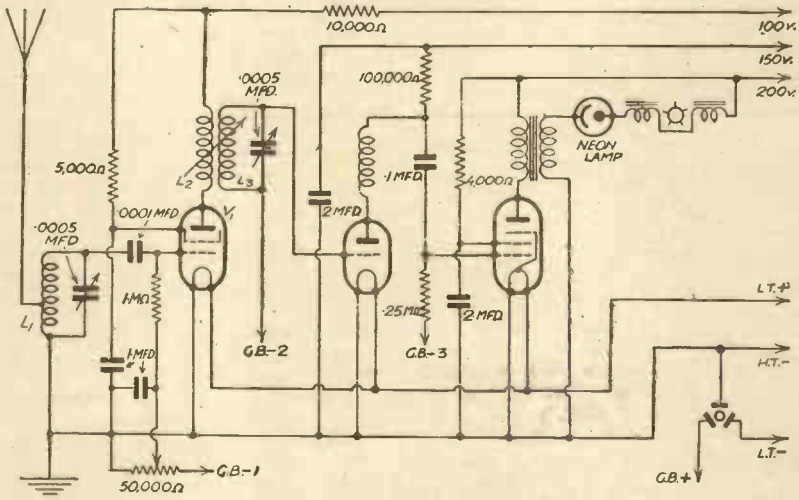


Fig. 1.—A simple three-valve battery circuit suitable for receiving television signals.

Standard valves are quite satisfactory for this set, V_1 being of the V.P.2 or 220 VS type, V_2 of the PMILF or L210 type, while V_3 can be either a PM22 or a 220PT. It will be noticed that the coils specified are only for the medium waveband, it being assumed that the set is to be used only for television. If desired, however, dual range coils may be included, in which case the receiver, in addition to being available for television reception, can serve as a stand-by battery set for home use.

A Mains Receiver

Fig. 2 shows a mains-driven three-valve receiver following on very similar lines to that of Fig. 1. The same valve combination and methods of coupling are used, while a grid bias battery is employed for the anode bend detector stage, it being proved by test that this gives slightly better results than when automatic bias is used. The eliminator side is quite standard and for the valves a choice can be made from AC/SG, MSG/LA, S4VB for V_1; MH4, 41 MFH, AC/HL for V_2; PM26, 615PT, PT625 for V_3; and 460BU, DW4, U14 for V_4. In the case of the mains rectifying valve it must be arranged that the transformer windings give only a 400-volt feed after rectification as the component values have been calculated on this basis.

A circuit of somewhat greater range and power for disc-type receivers is indicated in Fig. 3. The climinator side has been omitted here, as this can follow standard lines, while battery bias is shown for simplicity. This latter can be converted to automatic bias if desired. Briefly, the circuit shown consists of a band-pass filter with condenser coupling to give a wide peak separation. V_1 is a standard S.G. valve, but a variable-mu H.F. pentode or S.G. valve can be used if desired. This valve has a choke-grid feed to a power grid-detector valve, followed by an R.C. coupling to the first L.F. valve with two power valves arranged in push-pull in the output stage. No reaction is included in the detector stage, while the neon lamp of the disc television receiver is linked to the extremities of a centre-tapped output choke *via* two 2 mfd. condensers.

(*Continued overleaf*)

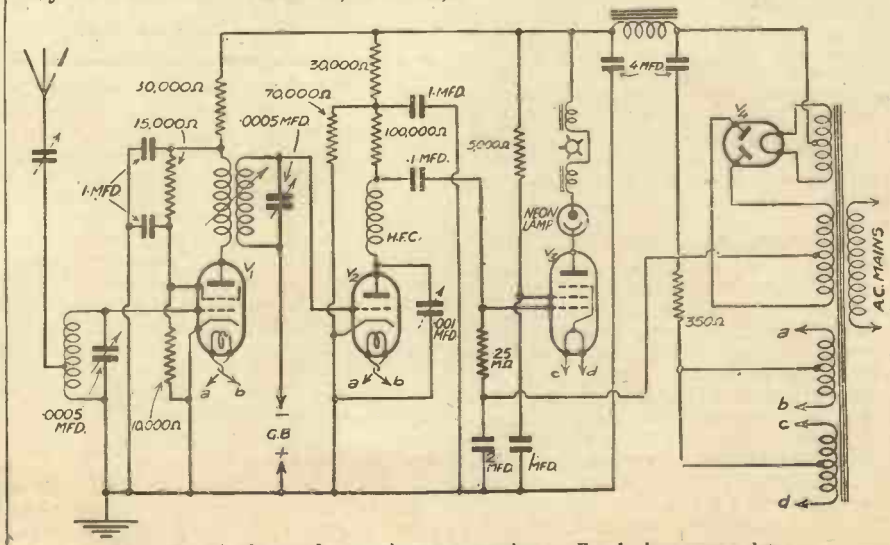


Fig. 2.—A three-valve combination similar to Fig 1, but mains driven.

(Continued from previous page)

As a representative valve choice for a scheme of this character, the following can be taken as a guide: V_1 AC/SG or MSG/LA; V_2 and V_3 AC/HL or 41MFH; V_4 and V_5 P625A or 610XP.

More Powerful Circuits

The next circuit to be illustrated is for use in conjunction with a Kerr or grid cell light modulating device. A four-valve combination is shown, and a set made up in this manner is suitable only for those situations where a strong aerial signal is available, that is to say, within reasonable distance of the London National station. As before, only simple tuning arrangements are shown, but these can be adapted readily to suit personal requirements without in any way upsetting the efficiency of the scheme.

The first valve, V_1, is a modern variable-mu high-frequency pentode having a resistance network voltage feed calculated to give the correct anode, grid and variable bias voltages. A choke-fed tuned-grid coupling links this valve to the next stage, where V_2 is working as a power grid-detector valve. A stage of resistance-capacity coupling links valves V_2 and V_3, a directly-heated super-power valve being included in the V_3 position. In the anode circuit of this valve is wired the cogged-wheel automatic-synchronizing apparatus, a potentiometer acting as a volume control to adjust the synchronizing signal strength to the correct value.

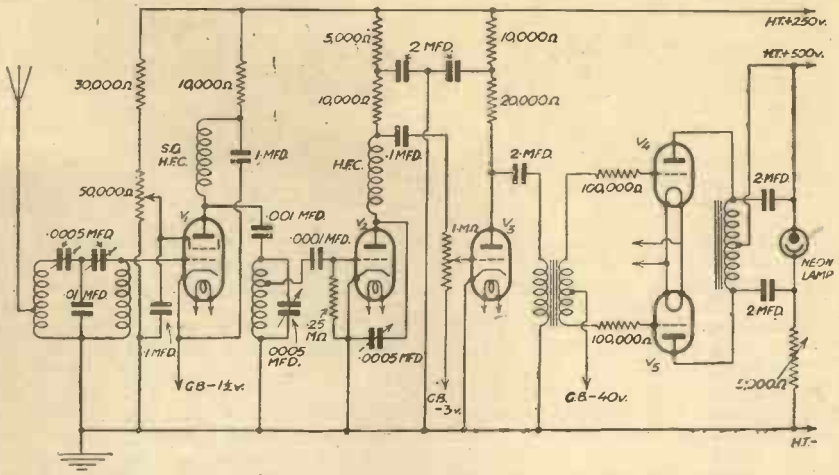


Fig. 3.—A television receiver suitable for long-distance reception.

Finally we have V_4, another directly-heated super-power valve also resistance-capacity coupled to the detector valve and acting as a separate feed to the grid or Kerr cell. The two fixed resistances and potentiometer wired in series and joined across the 500-volt H.T. feed serves the purpose of applying the correct polarizing potential to the cell for optimum working. The source of high tension can be any standard high-powered eliminator, but for simplicity this is not shown.

It will be noticed that adequate decoupling is included throughout, and the circuit is one which can be very confidently recommended.

On the subject of valve choice, the following selection will be found satisfactory: V_1 VP4 or VMP4; V_2 AC2/HL or 41MH; V_3 and V_4 PP5/400 or DO.24.

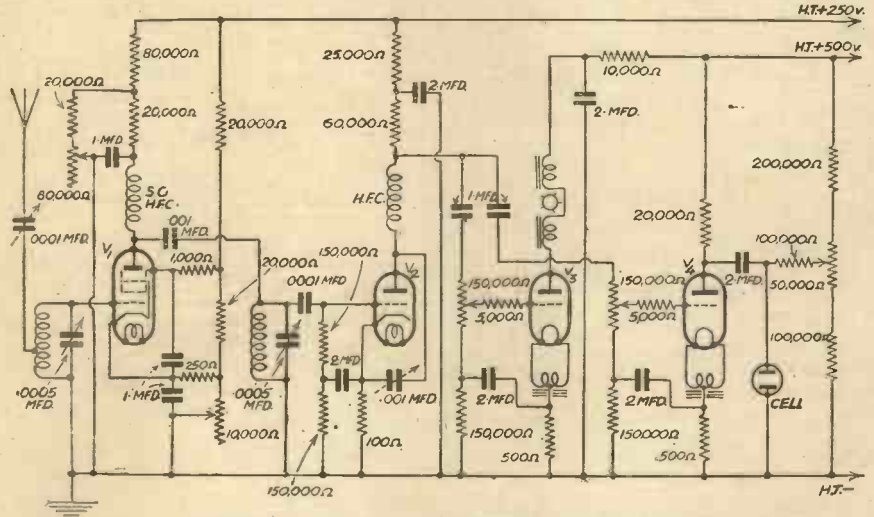


Fig. 4.—An efficient arrangement to employ when using a Kerr or Grid cell.

THE DETECTOR VALVE AND THE GRAMOPHONE PICK-UP

How Overloading is Often the Cause of Failure. By PERCY RAY

IT is customary in a modern receiver for the detector valve to serve the double function of a first low-frequency stage when a gramophone pick-up is used, and many listeners are somewhat surprised to find that the results on gramophone do not attain the same standard as the radio section.

When results on gramophone are poor the entire receiver is usually held to be above suspicion if it gives good reception on ordinary broadcast, and the gramophone pick-up and volume control travels between the service departments of the bewildered manufacturer and the disappointed purchaser.

The trouble is usually to be found in the detector valve, which is called upon to perform such widely different functions that it is not surprising when it fails. In a well-designed receiver the output valve should overload just before the detector valve, but when the gramophone pick-up is plugged in and bias applied, the impedance of the valve rises considerably, and also, instead of being able to work far into the positive its grid swing is now restricted between the curve of the characteristic and the point where grid current begins. The grid swing being thus restricted, the valve overloads too easily, and is often so overloaded that it becomes unbearable before sufficient voltage is developed to load up the output valve by 50 per cent. When this state of affairs prevails the volume on gramophone without noticeable distortion will be only half of that obtainable on radio.

The most obvious cure will be to use a detector valve of very much lower impedance so that it will have the necessary grid swing to accommodate sufficient input from the gramophone pick-up; but, unfortunately, this course is not always desirable, as it may lower the efficiency of the receiver when working on radio and may rob the reaction condenser of proper control on the long wavelength.

Separate L.F. Valve

The ideal arrangement is undoubtedly a separate low-frequency valve for the pick-up, working straight into the output valve, and a separate detector valve also working direct into the output valve; both valves will, of course, be chosen for their suitability to carry out the work allotted to them.

This suggestion, however desirable, may often be impracticable, and some sort of compromise has to be effected, and means must be found to make a single valve perform both functions in a reasonably satisfactory manner. A valve should be chosen having a moderate impedance, say about 15,000 ohms, and arrangements should be made so that the anode voltage applied is the maximum available when working on gramophone record reproduction, although it may be necessary to reduce it to the conventional 60-90 on radio. This can very easily be achieved by having a suitable dropping resistance in the anode circuit, which can be shorted either by a switch or by the use of a single circuit-make jack to receive the pick-up plug instead of the usual single circuit jack without the additional limb.

Finally, when working on the gramophone side do not adhere too closely to the grid bias recommended by the makers in this particular instance, as in some cases the valve recommended may refer to the valve when used as an H.F. amplifier.

PRACTICAL 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).

Five-valve Superhet Wanted

SIR,—Superheterodynes are becoming very popular with the manufacturers, and I believe they have come to stay. I appreciated the article by Frank Preston in PRACTICAL WIRELESS, June 23rd, 1934, entitled "Some Superhet Pointers."

Personally speaking, I want to see more articles about superhets, and what I would like to see more than anything else is a good five-valve superhet for the home-constructor, with either class B or pentode output A.V.C. and single-knob tuning. Can we look forward to such a set in the very near future?—W. R. GIRVAN (Monaghan, I.F.S.).

[*We have Mr. Girvan's suggestion under consideration and hope to publish in due course particulars of a set on the lines of that mentioned above.*—ED.]

A South African Reader's Thanks

SIR,—I have received my copy of "Everyman's Wireless Book," for which many thanks. It certainly is a very instructive and helpful book, and has helped me considerably in clearing up many of the "snags" connected with wireless. I have taken PRACTICAL WIRELESS since July last, but this is the first gift offer I have taken advantage of, and I must congratulate you on the production of so helpful a book.—J. E. KAY (East London, South Africa).

Steam-Roller Radio

SIR,—Yet again Dr. Hackenoff speaks! As he has already stated, certain secret seeds were sown—planted among men at the Institution—some time ago, in hope that "wireless for steam-rollers" might crop-up and stay up—and now, we gather, from Hack's own hamper here, that all his hush-hush husbandry—cum-careful cultivation—has frothed fruit enough to crown him "High Hat in the Canned-Goods Game!" Some will say: "Hack's a hop-head, and this is the aftermath of a session with the Pipe." Others will tell you it's all a trick, done with concealed wires—but we ourselves would rather say: "Well, Hack's at the 'Inst.', ain't it?"

"I got this idea," he tells, rather than informs us, "from watching a steam-roller climb the mast at Rugby, and from playing 'Old Man River' on my 'Radio-Chaffcutter' with a set of magnetic hay-forks." And, strangely enough, we find ourselves believing him! "Don't erect any new sets or statues in my honour until you've destroyed the others," he adds, with the same delightful touch that put him where he is to-day. "And be sure to tell the kiddies their old Uncle Gas. will be playing his 'Lattice-Lezzoletto'—with the Lynchem Rope Quartet—as per usual, despite the time taken up by gloating over his latest lawless lay-out."

"Tum on, den," we say, in our Bowery-Ghetto guttural. "Show dese guys dat 'Steam-Roller Reddio' is out of de Wood at last! Chute de woyks!" And here's what Hack. shot at us, folks—the "works" with both barrels:—

SIR,—Realizing steam-rollonauts—despite their disarming appearance—have, when roused, a nasty habit of taking those who upset them for a "ride"—which either ends up at the top of a tree, in custody, or in the unfortunate victim being "bumped off" and rolled-out—I knew my promise of "Radio for Rollonauts" (June 22nd) would have to be made good or else—well, even inventors like living (although they're not really supposed to!). Fearing the worst, I decided to do my best—to give to steam-rollonauts the set of their lives, and something they really wanted. After luring two of the dusky dare-devils to the Institution, and observing their reactions to certain treatment, I soon discovered the style of set they were set-on, and sent for my constructors.

Receiving certain whispered instructions from myself, and being handed certain mysterious crates, cartons, crockery and sundry divers equipment, those gallant and eager young yeomen—"The Constructors"—were each given a puff at my mighty "Inspirator" and locked away—in our "D.X-perimental Pent-house"—with my thoughts and theirs for the best. . . . Whatever really happened inside, I know not—but, as a result of what must have happened, the apparatus was wired and waiting when I lifted the latch of the pent-house door. (Washed-out though they were, the boys were able to exclaim: "There tish, Doc.—we done it on Shell!"). And so—almost overnight—was born "Steam-Roller Radio"—our greatest gesture; our super-salute—our superb salaam to safety—to pre-Victorian uniformity! With rollonauts appeased, my cup was full; my face, red. . . .

The wonderful apparatus was designed by our own draughtsman, Dr. Hooey (who is, alas! only a poor man). From his daringly-drawn draughtwork—on the Hooey 1500-line system— any owner of a PRACTICAL WIRELESS "Discovisor" (or my own "Televisitor") will be able to construct a similar apparatus for himself; but, for those who have not this apparatus handy, I will give an old man's description:

In the top left-hand corner of the set is a sturdily-built Malster-Hopwood "Storage-ginerator"—Maltese-cross model, roller-top fixing; from this to the set runs the X main lead. In the centre of the set is the input socket and hold-up; middle, ciderial time and gravity-indicators; top, co-crystal combinator—with getutite-hilite rare earths, and the cuddlesome Barmann-Pullem controls; right, high-frequency "quencher" coils, output platform and canning apparatus.

But, as Dr. Hooey has now consented to take all the credit, and draw all the necessary plans, I think it only right to add his words: "Allt der kredit mit this give me—'Dampf-Rollen Rundfunk' ist *wunderbar*!" . . . (More later.)—DR. GASPARD HACKENOFF (Institution for Eccentrical Engineers, Univ. of Timbuctu).

CUT THIS OUT EACH WEEK

Do you know

—THAT the latest valve has no less than five separate grids in addition to an anode, cathode and heaters.

—THAT some novel cabinet designs will be seen at the forthcoming radio exhibition.

—THAT a valve will also be seen in which two separate valves are included in a single glass bulb—the two sections comprising an H.F. pentode and a triode.

—THAT a severe shock can often be obtained simply by touching a control knob on a mains-operated receiver, due to the grub screw projecting from the control knob.

—THAT a dab of sealing wax or Chatterton's Compound will prevent the above trouble.

—THAT if an A.C. mains receiver is connected to a D.C. mains supply it will probably be damaged owing to the mains transformer burning out.

—THAT care should be exercised when choosing a "block" condenser for use in a receiver employing a metal rectifier in a voltage doubler circuit.

The Editor will be pleased to consider articles of a practical nature suitable for publication in PRACTICAL 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 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.

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.

SLADE RADIO

"Electrical ignition equipment" was the title of a lantern lecture given by Mr. J. E. Miller at a recent meeting of this society. Commencing with a slide showing the ignition system in use at the beginning of the century, a brief description was given of the progress which has been made up to the present time. Full details were then given of the systems now in use, and special details given of coils, flux density, condensers, magnetic fields and special magnets of various materials. Slides were also shown depicting the winding of condensers, testing of magdynos, and high tension testing of mouldings.

A demonstration was given with a specially constructed running board with a complete ignition system, and the effect of various engine speeds was shown. The lecture proved one of considerable interest, and at the conclusion a large number of questions were raised.—Hon. Sec., 110, Hillaries Road, Gravelly Hill, Birmingham.

SHORT-WAVE CLUB FOR PLYMOUTH

It is proposed to form a chapter of the International Short-Wave Club in Plymouth, and readers of PRACTICAL WIRELESS who are interested in short-wave work are invited to write to Mr. F. Ward, 37, Embankment Road, Plymouth, for further particulars.

INTERNATIONAL SHORT-WAVE CLUB (LONDON)

There was a very large attendance at the meeting of the London Chapter, held on Friday, July 20th, which indicates the increasing interest in short-wave reception. At this meeting a member, who is an authority on short-wave propagation, gave an illustrated lecture on frequency changers, and described and demonstrated a new A.C. short-wave superhet which members agreed to be one of the most efficient receivers ever demonstrated at the Chapter. Full details of this receiver will be sent to anyone enclosing return postage. At the meeting of this Chapter held on Friday, July 27th, Mr. G. Hayes, one of the Chapter's technical advisers, described and demonstrated an autodyne short-wave convertor of his own design and construction. This convertor, which is operated from A.C. mains, was used in front of a Ferranti superhet, Gloria model. It had several special features, and very good reception was obtained from W2XAD, 19.56 metres, W8XK, 19.72 metres, and W8XK, 25.27 metres. Membership of the club costs 4s. 6d. per year, which includes a handy little monthly magazine, the official organ of the society.—A. E. Bear, Secretary, 10, St. Mary's Place, Rotherhithe, London, S.E.16.

AMONGST the August Decca releases an excellent standard has been attained. The following selected records in the Polydor and Brunswick category should certainly be heard.

Decca

It is a long time since we heard a record from Greta Keller, the charming Viennese singer, who made so many friends with her broadcasts from the B.B.C. a few years ago—apart from her records. In "Easy come, Easy go," and "Don't let It Happen Again" (F5078) she gives us her best. Since then she has been in America, sometimes singing and broadcasting alone, and sometimes with that well-known pair, Ross and Sargent. (In private life she is Mrs. Joe Sargent.)

The issue of this new record is, therefore, of especial interest since Greta Keller will be paying us a flying visit in September, when she will be heard once more from the B.B.C.

The recording was done, of course, in the Brunswick Studios in New York.

A Successor to De Groot

The Alfredo Campoli Grand Orchestra (K734): "Operantics," and (F5075): "Evergreen" Selection. I wonder if everyone fully realizes the amazing versatility of Campoli. The above orchestra is his fifth recording unit selling on records to-day. Campoli as a violinist; his Salon Orchestra; his Novelty Orchestra; his Trio; and now his Grand Orchestra. With these activities he combines regular broadcasting, concerts, cinema stage appearances on the big circuits, and accompanying work on recording sessions.

For a long time now he has been acclaimed as the worthy successor to De Groot. His two records issued this month are particularly interesting for their arrangements and orchestrations. I think that the "Evergreen" Selection will be found especially acceptable.

Billy Reid and his London Piano-Accordion Band (F5116): "Madonna Mine" and "Grinzing" (In Grinzing back with you).

Billy Reid's Accordion Band have a long time been one of the big sellers on records.

You will be invited to listen to many recorded versions of "Madonna Mine," but I venture to think that Billy Reid's performance on Decca F5116 is one of the finest that will come into your possession.

Oskar Joost Dance Orchestra (F5091): "Souvenir Tango" and "Talk to Me of Love, Mariu." The above name will be new to you—for a short time. It is a German orchestra, newly formed, and it already ranks as "The Jack Hylton Dance Band of Germany." No vocal refrains will appear on any of these records, and they will be individual in that the Continental style predominates, as the American and English styles predominate in American and English recordings. In Germany they are a phenomenal success, and their records in England will appear exclusively on Decca.

Don Barreto and his Cuban Orchestra (F5084): "Jungle Drums." I have written many times of this beautiful Cuban Orchestra now playing in Paris. Their playing is to me a joy, and I personally am delighted to find a new record from them in the August List.

Roy Fox and his Band (F5081): "Over My Shoulder." The first thing that always strikes me about anything Roy Fox does is his efficiency. Even the smallest detail is handled with meticulous care.

I was present at the recording of the above, and I was much struck by the care Fox took, and the experiments he made in order to get a true balance and a vitality of performance. He appears to be trying to get every ounce of personality into his records, and he has been specially rewarded in his version of "Over My Shoulder."

Brunswick

Connie Boswell (01816): "All I Do is Dream of You." What a perfect artist Connie Boswell is! She always manages to find a different interpretation to a song, after hearing which others sound commonplace. At least, that is how I feel. Whenever a new "hit" is born I at once make enquiries as to whether Connie Boswell is going to record it. One only has to look through a Brunswick catalogue to find such classics as "Time on My Hands," "I Cover the Waterfront," "It's the Talk of the Town," "Dinner at Eight," "Emperor Jones," "Where, I Wonder Where," etc., etc., to find that her recording of these numbers is superb. They stand alone. She is, to me, the perfect "Blues" singer—an expression I don't care for, but it seems to be the accepted term.

Again she has surpassed herself in "All I do is Dream of You," although I do not, frankly, care for the other side, "Little Man, You've Had a Busy Day." I understand, however, that such touches are popular in America.

But in spite of this first fall from grace, the other side more than makes amends for it. Please hear it.

A Calloway Concatenation

Cab Calloway and his Orchestra (01792): "Sweet Georgia Brown." Another record for the hot fans, played in characteristic Calloway style.

Casa Loma Orchestra (01793): "Love Me." "Love Me" is a sweet number written by that prolific writer, Victor Young, who is, incidentally, the musical director of Brunswick Company. The Casa Loma Orchestra, apart from the beauty of its playing, is quickly identified by the vocal refrains of Kenny Sargent, who is rather like Jack Teagarden in style. They both have that "sleepy" style of the negro singers, which is ideally suited to vocal refrains. The band is acknowledged to be one of the greatest in the world, and is composed of ex-college boys, working on a co-operative basis. They are, at the moment, playing at Glen Island Casino, on Long Island, one of the smartest country clubs for the rich New Yorkers.

Decca-Polydor

The Decca-Polydor List does not contain anything that is particularly exciting for the thoroughly initiated music-lover. A popular list has been drawn up in order to attempt to cater for those less experienced in standard music—those who like good music for entertainment rather than for intellectual exercise.

Erna Berger (Soprano) (PO5100): "My Dear Marquis" and "I'll Play the Innocent Country Maid." I would draw attention to the exquisite record of Erna Berger of two songs from the Johann Strauss opera, "The Bat."

Alexander Brailowsky (Pianist) (DE7029): "Polonaise in A Flat Major, Op. 53" (Chopin). Brailowsky, one of the greatest pianists of our time, has not appeared lately in our lists, and his return will be cordially welcomed. He plays the very famous "Polonaise in A Flat Major." This is also a record to which I venture to draw your attention.

The Glorious "Fifth"

—*Symphony*, that is, by Beethoven. It would be, I think, safe to wager that if a hundred musically cultured folk were told they could take only one piece to the postulated desert island—this would be chosen by the majority.

Now there is one factor which militates against universal popularity of many of the great symphonies and sonatas—one which our more astute modern composers would be wise to avoid whenever possible. This factor is the unfortunate titling of this or that symphony as No. 2 in A flat Major (Opus 99). If only this feast prepared for us by Beethoven could have been first given a title which envisaged the "plot" behind the music (for Beethoven drew his ideas from the most natural and commonplace sources) we may safely say that tens of thousands would revel in, say, "Life," where "Symphony No. 5 in C Minor" remains unheard. It should be pointed out that it was written during an ardent love affair, and we are told that a commentator sees in it a portrait of the composer and his fiancée. Hear it for yourself and you will find that perhaps you yourself are just as strongly drawn. There are four records in this new recording—Columbia DX516-519—and the very beautiful interpretation is by the London Philharmonic Orchestra under Weingartner. I mentioned above the omnipresence of a vital message in this symphony. What is it? This can be interpreted only by the listener, but once a concept has been formed, nothing will shake a belief in what will have become one of the eternal verities to that listener. At any rate, here is beauty of the rare, stirring, simple kind, which everyone may dress as he chooses to his lasting spiritual benefit. Hear, then, Beethoven's "Fifth," and re-title it for yourself.

LET OUR TECHNICAL STAFF SOLVE YOUR PROBLEMS

REPLIES TO QUERIES and ENQUIRIES by Our Technical Staff

The coupon on Page iii of cover must be attached to every query

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 WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton St., 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.

Please note also that all sketches and drawings which are sent to us should bear the name and address of the sender.

Voltage Dropping Resistances

"I have built a three-valve set using 2-volt valves and wish to operate this from a D.C. eliminator giving 60-80 for screen; 60 volts for detector and 120-150 volts at 19 mA. I should be obliged if you could let me know what type and value of resistances I should have to use to give me the correct H.T. at the anodes of the valves, and whether the resistances could be incorporated in the set to act as decoupling resistances at the same time."—A. H. B. (Coatbridge).

Theoretically there should be no necessity to use voltage dropping resistances with this combination, as the outputs from the various terminals will suit the receiver. Thus the 60-80 tapping should be joined to the screening grid, the 60-volt to the detector anode, and the 120-150 volt tapping to the anodes of the H.F. and output valves. In the event, however, of any instability arising and decoupling being necessary, a value of 5,000 ohms for the H.F. anode should be found quite satisfactory, and it may be found better to use a 50,000-ohm resistance in the anode circuit of the detector valve and join this to the maximum tapping instead of to the 60-volt tapping. The customary fixed condensers must also be used in conjunction with the resistances.

Increasing D.C. Mains Output

"I have a small battery set operated from a D.C. mains eliminator. This gives an output of 120 volts, but I wish to use mains valves, taking 150 to 200 volts. I have arranged for the heater supply, but am not certain how to increase the H.T. output. Could I connect an H.T. battery in series with the eliminator to step up the H.T. only?"—R. F. G. (Staines).

The idea is quite workable, but as the valves to be used are mains valves they will presumably operate with 200 volts H.T., and if your mains are higher than this you only require a small resistance to reduce the voltage to 200. You could then use a simple smoothing circuit, and do away with the eliminator. However, if you wish to retain this, an 80-volt battery connected in series with the positive lead to the eliminator will be quite satisfactory.

The A.C. Selectone

"Will you please tell me whether you can supply me with a copy of 'Practical Wireless' dated April 29th, 1933, No. 32, Vol. 2. I understand a wiring diagram was given in that issue of a two-valver. Could you also tell me whether arrangements were made in that circuit for biasing the detector valve when used for gramophone-record reproduction."—L. G. R. (Rugby).

A copy of the back number in question may be obtained from our Back Number Department, price 4d. post free. The detector valve was so designed that when switched over to gramophone reproduction the necessary biasing resistance was included in the cathode circuit. The output valve of this receiver was a Mazda AC/P, the output of which is rated at 650 milliwatts.

An All-Power Eliminator

"Please let me know whether you can supply a plan for an eliminator which provides H.T., G.B., and L.F. I want to do away with the batteries for good and plug into the A.C. mains."—G. G. A. C. (Southampton).

In PRACTICAL WIRELESS No. 5 we published a detailed constructional article of an all-power mains unit which should meet your requirements. This did not provide grid-bias voltages, as these are generally obtained by inserting a suitable resistance in the cathode of the valve which requires negative bias. Various articles have been published by us showing how to ascertain the value of the required resistance, and you should find no difficulty in converting your receiver.

Miscellaneous Advertisements

Advertisements are accepted for these columns at the rate of 3d. per word prepaid — minimum charge 3/- per paragraph—and must reach this office not later than Tuesday for the following week's issue. Radio Components advertised at below list price do not carry manufacturers' guarantee. All communications should be addressed to the Advertisement Manager, "Practical Wireless," 8, Southampton Street, Strand, London.

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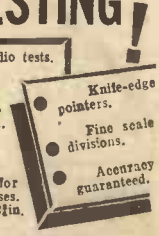

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(Continued from foot of column one)

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