The rocket-propelled vehicle has long been the dream of inventors and was first experimented with by Hero 130 B.C. This interesting article discusses the several successful designs which have since been produced and which are capable of extremely high speed. The principle has been applied to motor cars, trains, and aeroplanes.

The September issue of this interesting monthly contains a further attractive blending of fascinating scientific subjects treated in everyday language, and illustrated with dozens of interesting drawings and photographs. Feature articles include How Bridges are Built, The Pros and Cons of Rocket Propulsion, How Water is Raised from Deep Wells, How Pictures are Sent by Telephone, the Fourth Dimension, the New Television, Revolution Counters and Their Uses, and Colour Light Signalling, whilst the country dweller will be particularly interested in an article on House Lighting Plants.

Those of a scientific turn of mind will like the articles on Photo Cells, Liquefying Gases, and the Healing of Wounds in Metal, and those whose interests are in a practical direction will turn to the Special Articles, Fitting Electric Clock Chimes, Files and Filing, the Practical Mechanics Telegram, and Model Aeroplane Stability. Interesting articles on Historic Locomotives and old Waterloo Bridge and the reason for its collapse, round off an excellent issue.

On sale at all Newsagents and Bookstalls, or by post 2½d. from George Newnes, Ltd., 8-11, Southampton St., Strand, London, W.C.2

6d

Practical Mechanics
NEW BLUE SPOT SPEAKERS create sensation

The new Blue Spot Blue Star models have made a profound impression. Never before has loudspeaker reproduction been raised to such a pinnacle of perfection. Never before have broadcast programmes been reproduced with such vivid realism. The Star Loudspeakers now lead in quality reproduction. They are definitely the best. Hear one as soon as you can on your own set. Nothing you can do to your set will give such a striking improvement in output and quality.

BLUE SPOT "STAR" JUNIOR FEATURES:
- Wonderful Reproduction
- New Magnet Design
- Die Cast Chassis
- Transformer with Matching for any Set
- No Leakage of Magnetism

Price 35/- Cabinet Model in Oak and Chromium - 44/6


Prices: Chassis, 70/-. Cabinet in walnut and chromium, 98/–

BLUE SPOT REMOTE VOLUME CONTROL for use with the "Star" Speaker only. Provides full volume control of the loudspeaker from your armchair. Price 10/6

BLUE SPOT PICK-UP

Perfect reproduction of all frequencies without overloading. Screened leads. An earth connection provided. Special Volume Control giving silent and distortionless adjustment.

Price £1 7s. 6d., or without Volume Control, £1 1s. 6d.

OLD FRIENDS.

45 P.M. A moving coil speaker that has never yet failed to give satisfaction. Chassis 48/–. Cabinet walnut or mahogany, 67/6.

99 P.M. This speaker very rapidly made a name for itself—a name that stands as high today as ever it did. Chassis, 59/6. Cabinet in walnut, 81/6.

THE BRITISH BLUE SPOT COMPANY LTD.
Blue Spot House, 84/86 Roosman Street, Rosebery Avenue, London, E.C.1

Distributors for Northern England, Scotland and Wales: H. C. RAWSON (Sheffield and London), Ltd., Sheffield; 22, St. Mary's Parsonage, Manchester; 177, Westgate Road, Newcastle upon Tyne; 37, 38, 39, Clyde Place, Glasgow; 49, Springbank, Hull.

POLAR GANG CONDENSERS AND DRIVES

Send for NEW POLAR Catalogue

POLAR MIDGET GANG CONDENSERS
Steel Frame and cover. Ball bearing shaft. Small overall dimensions. Trimmers operated from top. Matched within 1% or 1 mmfd. whichever is the greater.

Two Gang (condenser only) 11/-
Three Gang (condenser only) 16/6
Three Gang Supreme (condenser only) 16/6

V.P. Horizontal Drive (as shown on condenser above) 6/6

Polar Vertical C.K. Drive
Slow motion drive. Horizontal pointers. Lampholders provided. Price 6/6


Polar "Arcuate" Drive

The three drives illustrated are all interchangeable for use with the "Midget," "Minor" and other Polar Condensers.

WINGROVE & ROGERS, LTD.
188/189, Strand, London, W.C.2

Phone: Temple Bar 2344 Works: OLD SWAN, LIVERPOOL
Music's Golden Tongue

No. 1

Testing an "His Master's Voice" Loudspeaker for accuracy of reproduction

Before a loudspeaker is fitted into an "His Master's Voice" instrument it is subjected to most rigorous tests—not only for defects but for its absolute truth of tone and accuracy of reproduction. These tests are made through the whole range of sound, musical and otherwise, from the highest to the lowest.

"His Master's Voice" have the advantage, here, in that they have been concerned with the science of sound reproduction since it first became a commercial possibility towards the end of the nineteenth century. The knowledge and experience accumulated during this time lie behind every instrument "His Master's Voice" make.

TESTING AN "HIS MASTER'S VOICE" LOUDSPEAKER
Every "His Master's Voice" Loudspeaker is tested acoustically against a "Master" speaker for the accuracy of its response to every musical sound. A succession of test passages are transmitted through both—a piano passage, a drum passage, a tenor passage, a soprano passage, the test for sibilants in speech, the orchestral test, the violin passage for harmonics, the heterodyne note for response to high and low frequencies, and so on. New speakers are tested for freedom from electrical or mechanical defects, and, finally, have to pass a "public performance" test in a sound-proof room. If, in any of these tests, the slightest inadequacy is evident, it is promptly rejected.

"HIS MASTER'S VOICE"
THE GRAMOPHONE COMPANY, LTD., 98-108 CLERKENWELL ROAD, LONDON, E.C.1
HOW THE BLATTNERPHONE WORKS

PRACTICAL WIRELESS

October 1st, 1934

HOW THE BLATTNERPHONE WORKS

PRACTICAL WIRELESS

September 1st, 1934

Practical Wireless

EDITOR:
Technical Staff:

B. B. C.

The Blattnerphone was developed by R. J. Barton Chapple, Wh. Sch., B. Sc. (Hons.), A. M. I. E. E., and it is an example of a wireless receiver that utilizes a single crystal diode. The Blattnerphone is a simple yet effective design that has been widely used in home construction and amateur radio work.

The Blattnerphone was introduced in 1928 and quickly gained popularity due to its simplicity and affordability. It is a class-A receiver that uses a single crystal diode as its detector and audio amplifier. The Blattnerphone is capable of receiving AM radio broadcasts, but it is not designed for FM reception.

The Blattnerphone was a significant innovation in the field of wireless technology and helped to popularize home construction of radio receivers. It is a testament to the ingenuity and resourcefulness of early radio enthusiasts and continues to be a popular hobby for those interested in the history of radio technology.

The Blattnerphone was a hit with radio enthusiasts and quickly became a popular choice for home construction. The simplicity of the design made it accessible to a wide range of people, and the low cost made it affordable to many. The Blattnerphone was a significant milestone in the history of radio technology and continues to be a symbol of the ingenuity and resourcefulness of early radio enthusiasts.
 "In Town To-night"

THE B.B.C. have had so many requests from listeners to re-introduce the Saturday broadcasts entitled "In Town To-night," during the coming winter, that they have now arranged for a second series. Under the same title as before, namely "In Town To-night," these broadcasts will start on October 6th and will be continued on succeeding Saturdays. All that is brightest and best in London's week-end life will parade before the microphone. Listeners will again have the opportunity of hearing the most distinguished of Lon-

don's residents and visitors who have something interesting to tell. "In Town To-night" will cover all social grades and this season will introduce many novelties.

Well-Known Songs and Tunes

A PROGRAMME entitled "1880—An evening of select music in the drawing-room of Mr. and Mrs. Carruthers," which has been prepared by David Kean will be given for West Regional listeners on September 3rd. This programme deals in a gentle way with the old-fashioned musical evening, and contains many well-known songs and tunes beloved by our parents; listeners will get a fleeting memory of horsehair chairs, antimacassars, aspidistra, and the faintest suspicion of sentiment. All the dialogue is technically of an H.M.V. Superhet Portable Six.

Profitable Evenings

THE Chief Education Officer for Birmingham, Dr. P. D. Innes, is to give a short talk for the Midland Region on September 6th, on "Profitable Evenings"; the occasion being the forthcoming opening of the session for evening classes in Midland towns.

Light Music from Midland Regional

AN excellent programme of light music for Midland Regional listeners during the week will be given by Harry Engleman's Quintet, with Mary Pollock, on September 3rd; and Jack Wilson and his Versatile Five, with Edith James, on September 6th; while the late Saturday night enter-

SOLVE THIS!

Interesting and Topical Paragraphs

T

anentment is another cabaret show by Orlando and his Band, with Pat Hyde and guest artists, relayed from the Welcombe Hotel, Stratford-upon-Avon.

Gretta Keller's Return

This popular artiste's return to the microphone, which has been postponed since June, is now given definitely in the programmes. On August 30th she will broadcast a fifteen minutes' feature, on September 4th she will appear in Entertainment Hour, and on September 12th her third broadcast of this series will take place in the variety programme. Miss Keller, a Viennese singer, has built up a reputation in English-speaking countries on her performances for the B.B.C.

"Clean Cities"

DR. VEITCH CLARK, Medical Officer of Health for Manchester, will contribute to the "Schemes" series a North Regional talk about "Clean Cities" on September 7th. A keen advocate of smoke abatement, Dr. Clark will no doubt urge that by a greater use of smokeless fuels the national health could be improved and a check applied to much extravagance. It is argued that smoke, necessitating so much cleaning and replenishing of household furniture, costs the country approximately £80,000,000 a year—working out at an average of ten guineas a year for every household.

Light Music by "Heavy" Composers

The "20-20" programme, to be broadcast to the North Region on September 8th, will consist of two twenty-minute gramophone recitals, the first of which is called "Giants at Play: the Masters go gay." This will be a programme of light music by "heavy" composers, and will include, for example, a Bach gavotte played on the guitar, Haydn's "Toy Symphony," and "Giants and Fairies" by Elgar. The second half, entitled "Three Pianos," is to consist of piano recitals by three famous jazz pianists, Charlie Kunz, Ivor Moreton, and Dave Kaye.

Flute Recitals from North Regional

JOSEPH LINGARD, for many years principal flautist of the Hallé Orchestra, will give two flute recitals in the North Regional programme on September 9th. The first of these is during the Children's Hour, when he is to broadcast some Near-Eastern music in connection with a Rumanian programme (of talks and stories) arranged by Roma Lobel, a native of Rumania. In the evening he will broadcast Handel's Sonata No. 5 in F and the Rumanian programme (of talks and stories) arranged by Roma Lobel, a native of Rumania. In the evening he will broadcast Handel's Sonata No. 5 in F and the Sonata "La Flute de Pan" by Jules Mouquet.

"At the Shore"

THE second programme in the series "At the Shore" is to be heard by Northern Ireland listeners on August 29th. The first programme dealt with the Coast Road, but this one goes in the opposite direction from the city of Belfast and is concerned principally with the Mourne Mountains and Mourne coast. This beautiful country abounds in picturesque legend and history.

Talks on Walking

LAURENCE MILLS, a Kidderminster manufacturer, is to give the next of the series of talks for Midland Regional listeners on Walking. On September 6th he will tell of the delights of footpaths. The subject is one to which he has given many years of pleasurable study. As secretary of the Footpaths Committee of the Midlands Federation of Ramblers, he has had to deal with several cases of attempted interference with rights of way.

Across North Africa

AN adventurous motor journey across North Africa is the subject of a Midland Regional talk to be given on September 11th, by Geoffrey Bunn, a student of Birmingham University. With two friends, he decided, when in Cairo, to motor overland to Tangiers, crossing the Libyan desert, and then through Spain and France after crossing to Gibraltar. Their car had to be equipped with special reserve tanks for water and petrol for this journey.
A Review of the Principal Exhibits and Some Afterthoughts of Olympia

Illustrations Drawn at Olympia by Our Artists

Those sceptics who are continually claiming that radio has reached "saturation point" must have had a shock, on visiting the 1934 Radiolympia to find that the display was not only the best yet, but that interest in every branch of wireless was keener than in any previous year. It must be admitted that a considerable amount of space was devoted to complete ready-made receivers, but it is equally true to say that the variety and quality of components and accessories offered to the home constructor were very much in evidence, despite the enormous price reductions which manufacturers have been able to effect. So great was the interest in home construction that it is agreed that the coming season is going to be a "bumper" one for the amateur and experimenter, who can pursue his hobby more inexpenisively than at any time since radio became Britain's National hobby.

Home-constructor Interest

Ample evidence of home-constructor interest was afforded Practical Wireless Technical Staff, who were in attendance to answer any readers' queries free of charge. We were inundated by inquiries of every kind, from those concerning the reason for a particular fault regarding the theory of components and accessories the octode, pentagrid, etc., and so on. Our only regret is that we were unable to spend quite so much time with some readers as we should have liked, due to the fact that there was always a long "waiting list." We were, however, very pleased to make the acquaintance of hundreds of new readers and to meet again a large number of those who called upon us last year. All spoke in high praise of our low-price-with-efficiency campaign, and expressed their appreciation of the "Leader" series of receivers.

New Designs of Loud-speakers

In going the rounds of the exhibition one could not fail to be impressed by the variety of novel and interesting loud-speakers which were to be seen on a number of stands. It was very apparent that makers have been carrying out a large amount of experimental work, with a view to improving the quality of reproduction—and that success has attended their efforts.

A few manufacturers have tackled the problem of quality reproduction by designing a special and additional speaker which gives maximum response to the higher musical frequencies. This is used in conjunction with the normal instrument, which gives maximum response to the lower and middle frequencies, with a result that a uniform response is obtained at all frequencies between about 50 and 10,000 cycles.

One new unit for handling the upper frequencies is the Celestion High-Note Speaker, type T.3, which consists of a special moving-coil movement attached to an unusually shaped metal horn. This instrument is of the energized pattern, and is intended for use in conjunction with a cone-diaphragm moving-coil, such as the Celestion E.10. It is priced at £3 3s., and a special input transformer for separating the high and low frequencies was offered.

For valve testing this Avo-Daptor will be found invaluable. The test engineer and the keen experimenter will find this Avo-Oscillator a valuable piece of apparatus.

Two new Blue Spot speakers which possess some novel points. A few manufacturers have tackled the problem of quality reproduction by designing a special and additional speaker which gives maximum response to the higher musical frequencies. This is used in conjunction with the normal instrument, which gives maximum response to the lower and middle frequencies, with a result that a uniform response is obtained at all frequencies between about 50 and 10,000 cycles.

One new unit for handling the upper frequencies is the Celestion High-Note Speaker, type T.3, which consists of a special moving-coil movement attached to an unusually shaped metal horn. This instrument is of the energized pattern, and is intended for use in conjunction with a cone-diaphragm moving-coil, such as the Celestion E.10. It is priced at £3 3s., and a special input transformer for separating the high and low frequencies was offered.
Another new speaker for providing equal response to the complete mystical spectrum is the Blue Spot "Super Dual," which combines two separate cone-diaphragm moving-coil units, these being mounted concentrically. The large cone is of normal type and deals with all except the very low frequencies, whilst the small one comes into operation on frequencies above about 1,500 cycles. To lighten the smaller movement, thereby ensuring the minimum of inertia, the speech coil is wound with aluminium wire, whilst the cone is of special material. An input transformer and the necessary filters are fitted to the instrument so that no extra fittings are required. Another loud-speaker development of importance which was revealed at Olympia was the introduction by Messrs. W.B. of the new "Stentorian" range of units. These are of especial interest to the owner of a small receiver, who has hitherto been obliged to stick to the old moving-iron speaker because of the comparative insensitivity of the average moving coil; the "Stentorians" certainly give a greater output for a given input than do any other moving coils we have tested. A new feature of interest on the W.B. stand is the neat tone control which can be fitted to almost any speaker in order to vary the pitch of reproduction as required.

Still dealing with speakers, mention should be made of the bowl-type instruments made by Kingsway Radio, Ltd. These are very attractively made and are finished in a modern style, as can be seen by examining one of the accompanying illustrations. Another novel speaker is the "Mastersinger," which is combined with an electric light shade. Due to the position of the speaker, near to the ceiling, and to the fact that the electric shade gives a "diffusion" effect, it is claimed particularly good reproduction can be secured.

High-grade Measuring Instruments

It was very interesting to find that a number of manufacturers were now catering more than ever for the real experimenter who wishes to take accurate measurements. The Automatic Coil Winder Co., Ltd., which is so well known as manufacturers of the "Avometer," "Avominor" and "Avo-adapter," have added to their range of instruments the "Avo-Oscillator," which is extremely useful for making a variety of tests on receivers and components. It provides a modulated signal, the frequency of which is variable over the complete long- and medium-wave bands; the frequency of which is adjustable can readily be determined by use of the graphs which are shown on the front of the unit. The price of this high-grade accessory, complete with valves, dry cell, and 20-volt H.T. battery, is £5 10s.

A variety of other useful test instruments were to be seen on the Bulgin stand. There were here meters of almost every type required by the experimenter, and at remarkably attractive prices. Other meters shown were for use as visual tuning indicators, and these also were in various types and shapes, so that they are suitable for use in conjunction with any type of tuning dial or component arrangement. Among the low-priced, though accurate, testing instruments and meters were the "Pifco" units made by Provincial and Incandescent Fittings Co., Ltd. The A.C./D.C. "Radiometer" and the "Rotameter" are items in question, and both of them attracted much well-merited attention.

Tuning Units

Tuning coils and condensors were to be seen in a variety of interest types, and one could not fail to be impressed by the many important changes which have been brought into effect since last year. There were several midget gang condensors, which must have warmed the hearts of those constructors who are in favour of buying components of high mechanical efficiency and who are also interested in the development of the compact receiver. The midget screened gang condensors on the stands of Wingrove and Rogers ("Polar") and of Jackson Bros. Ltd., proved to be very popular indeed; these were shown in both "plain" and superhet types.

Among the many types of coil which were to be seen, the new Colvem "Ferrocart" units, employing a new form of construction, were to the fore. Other coils of novel type were to be seen on the Bulgin, Wright and Weaire ("Wearite") and Telsen stands, whilst something quite new was shown on the Varley stand. This was a new ganged permeability tuner which, it is claimed, gives constant selectivity and amplification over the whole of both wave-bands. In order to demonstrate the efficiency of the new tuner two cathode-ray outfits were set up on the stand.
GRIDS for all types of valves — weldless — made with laboratory precision

**ACCURACY**

Throughout the Cossor Valve Factories, laboratory standards of accuracy are stringently enforced — the result is absolute uniformity of characteristics in any given type of valve. One thousandth of an inch is the degree of accuracy insisted on in all vital parts. Strict adherence to these exacting standards at every stage of manufacture is just one of the reasons why Cossor Class 'B' Valves, in common with all Cossor Valves, are as per published specification.

**COSSOR CLASS 'B' VALVES**

**COSSOR 240 B.**
- Filament volts 2.0;
- Filament amps 0.4;
- Anode volts 150 max.;
- Anode Current Swing 50 mA.;
- Max. Peak Applied Signal (Grid to Grid) 40 volts;
- Static Anode Current at $V_a = 100$,
  $V_g = 0$ (each half) 1.5 mA.

**Price** 14/-

**COSSOR 220 B.**
- Filament volts 2.0;
- Filament amps 0.2;
- Normal Anode volts 120;
- Max. Anode Current Swing 35 mA.;
- Max. Peak Applied Signal (Grid to Grid) 40 volts;
- Static Anode Current at $V_a = 100$,
  $V_g = 0$ (each half) 1.25 mA.

**Price** 14/-

**FREE!**

**72 PAGE WIRELESS BOOK** — a book packed with useful and interesting information — latest circuits — technical terms — hints on 'super' tanks etc. Send now — please use coupon.

To A. C. COSSOR LTD.,
Melody Dept.,
Highbury Grove, London, N.5

Name
Address

Please send me free of charge, a copy of Book B 21 giving full particulars of 'Class B' Amplification and also include a copy of the Cossor 72 page Wireless Book.

To A. C. COSSOR LTD.,
Melody Dept.,
Highbury Grove, London, N.5

Name
Address

PRACTICAL WIRELESS
HOW THE BLATTNERPHONE WORKS

A Description of a Method of Making Sound Recordings on Steel Tape

Fig. 1.—This photograph shows the Blattnerphone installed in the B.B.C's premises at Savoy Hill in 1931. The amplifier and control panel can be seen in the background.

Fig. 2.—Showing how a "record" is made on a specially prepared steel tape.

M ANY readers have no doubt often wondered how the B.B.C. manage to reproduce a talk or other item during the evening programme which was actually given earlier in the day; or how it is possible to give a selection of important items in the past year's broadcasts made on New Year's Eve. Similarly, it has probably often puzzled listeners to know how "trailers" of forthcoming plays are given without having the caste in the studio. All these questions can be answered very simply and by means of one word—Blattnerphone. This is a marvellously efficient recording apparatus, which is in many ways far superior to ordinary wax recording such as is employed for gramophone reproduction, and it is so good that the British Broadcasting Corporation have found it worth while to install at least three expensive Blattnerphone outfits at Broadcasting House.

Advantages of the Blattnerphone System

The Blattnerphones are used extensively for making records of programme rehearsals so that the artists can hear their own performances within a few minutes of completion. This would be impossible if ordinary wax recording were used, since a considerably greater time is required in order to "bake" the original matrix, prepare the record from it, and so on. From this it might be imagined that, since the Blattnerphone is so good, it should replace the gramophone. But when it is explained that the simplest type of apparatus costs hundreds of pounds, whilst the "record" itself is valued at several pounds for a "playing time" of a few minutes, it will be realized that the Blattnerphone is by no means a rival to the gramophone. Those readers who have compared the reproduction given by the Blattner-Stille system (the name is after the inventors) with the original must have been struck by the amazing fidelity, and yet it can be stated definitely that the B.B.C. are still experimenting with a view to obtaining even better results. It is because of this that the photograph shown in Fig. 1 was taken in the old Savoy Hill Studio, before the B.B.C. moved into their Portland Place premises. I was recently advised by B.B.C. officials that they will not give photographs to be made of the present apparatus owing to its experimental nature.

Lack of High-Frequency Response

As a matter of fact, however, the only real fault with the existing apparatus is that it will not give perfect response to the higher musical frequencies, although it is wellnigh perfect on speech. The Blattnerphone at present in use is so good that it can be used perfectly well, not only for "re-broadcasting," but also for the making of wax records from the sounds recorded by it.

Variable Magnetization

The principles underlying the functioning of the Blattnerphone are quite simple and easily understood, even though the practical details present no little difficulty. The operation of the apparatus depends upon the variable magnetization of a specially-prepared steel strip or tape as it passes between two magnets which carry windings into which sound frequencies are fed. This will be more easily understood by referring to Fig. 2 which is a diagrammatic representation of the input or "recording" section of the Blattnerphone. It can be seen that the ordinary broad- casting microphone is connected to an amplifier which feeds into the coils surrounding the recording magnets. It will be understood that the fluctuating signal currents constituting the output from the amplifier will vary the strength of magnetization of the magnets. Thus, as the steel tape passes between the poles of the magnets, its degree of magnetization is varied along the complete length of the tape. The effect can be compared with a similar system in which pencil lines on a strip of paper vary the light intensity of a beam directed on to a photo-electric cell. In the latter cases, however, it was shown that sounds were produced by varying the area of blackness on the "sound track" of a film or strip of paper, whilst in the present case, the sound is recorded by varying the intensity of magnetization. The effect is shown graphically in Fig. 3, where the magnetic strength of the tape is represented by a graph which corresponds to sound waves such as are produced when a person speaks.

The steel tape is run between the magnets at a definite speed in one direction, and then, after the required "record" has been made the tape is wound back (much more quickly this time) in readiness for reproduction. At this juncture it might be mentioned that in order to compensate for the deficiencies of the Blattnerphone at high audio frequencies the amplifier which feeds it is specially designed to give high-note emphasis. This largely compensates for the failings of the recording system, but it is impossible for it to do so completely at the present stage of
PROFESSIONAL WIRELESS

September 1st, 1934

developments, since if too much emphasis is given, a form of "hiss," which is similar in effect to the needle scratch experienced with wax records, becomes evident due to the "grain" in the steel. It should also be explained that the normal microphone, besides supplying the Blattnerphone, may also be connected to the standard amplifiers and broadcast transmitter in the usual way, so that any or every broadcast transmission can be "Blattnerphoned" for further use.

Reproducing The Steel "Record"

The method of "reproducing" the Blattnerphone record is just the opposite of the recording system, and consists of passing the tape, at the same speed as was used in recording, between the poles of a second magnet, which might be likened to the "works" of an ordinary gramophone pick-up. The magnet has a double coil which is connected, just like a pick-up, to the input terminals of a standard amplifier feeding into a loud-speaker (see Fig. 4). Variations in magnetization of the tape thus cause corresponding varying currents to flow through the windings. These currents are (almost) exactly the same as those passing through the first or recording magnet coils, and therefore reproducing the sounds as they were picked up by the microphone in the first place, so completing the cycle of operations.

Wiping-Out the Recording

It was mentioned above that the special Blattnerphone sales tape is very expensive. This is actually true in regard to its first cost only, since a single tape can be used time after time by "erasing" or wiping out one set of "magnetic impressions" and applying another recording. The method of "erasure" is simple enough in theory and consists of passing the tape between the poles of yet another magnet.

amplifier. The first item is looked after by controlling the amplification produced by the amplifier, for which reason an H.F. voltmeter is included in the output circuit so that the control engineer can ascertain that the audio frequencies supplied to the recording head do not exceed a certain pre-determined figure. In practice it is generally found better to design the reproducing amplifier so that it tends to emphasize the higher frequencies. Thus, double tone compensation should be provided in the amplifier. The Blattnerphone has powerful and are energized by means of a uniform direct current, with a result that the tape becomes magnetically saturated so that all traces of the variable magnetism are entirely removed. Because of this it will be appreciated that the recording process consists of a partial de-magnetization of the tape, in addition to the variable magnetization produced by the audio-frequency currents fed to the magnets from the amplifier.

The complete Blattnerphone instrument consists of three distinct parts which functions have been briefly described above; these are referred to as the "recording head," the "reproducing head," and the "wipe-out head," for reasons which will now be apparent.

Ensuring Good "Quality"

In using the Blattnerphone there are several important points to watch. One of these is that the output from the amplifier is not sufficiently great to "over-load" the tape by allowing it to become magnetically saturated at certain points, and another is that high-note tone compensation should be provided in the amplifier.

Recording Long-Distance Broadcast

In addition to its use as a means of quickly making excellent records of "original" sounds, the Blattnerphone has proved to be extremely useful for recording items actually broadcast from a distant station or transmitted over a land line. A recent example of such a use being made of the Blattnerphone was the broadcasting on the evening of Easter Monday by the B.B.C. of a portion of the ceremony of the closing of the Holy Door by the Pope in Rome at noon on the same day. Other examples may be quoted by the score, whilst mention might also be made of the re-broadcasting on numerous occasions of "eye-witness" accounts of important events during the evening programmes.

Tone Correction

It will be appreciated that in many instances it is necessary to employ special tone-correcting devices in conjunction with the Blattnerphone amplifier equipment to compensate for deficiencies of the microphone, land-line, wireless transmission, etc., as the case may be. This presents very little difficulty at the present time, however, when it is common practice to include correction or tone-control devices in the circuits of most types of "quality" amplifiers.
AFTER the receiver has been completed and the preliminary adjustments have been made in the manner described last week, the chassis can be fitted into the cabinet. This will present no difficulty if the dimensioned front view given in the first constructional article is followed. The positions of the various holes should, of course, be marked on the inside of the cabinet, after which small pilot holes can be made by means of a small bradawl or 1/16in. drill. It will then only be necessary to bore the holes through from the front. Six holes are required in all, of which those for the reaction condenser, on-off switch, potentiometer and wave-change switch should be 3/8in. diameter, that for the spindle of the tuning condenser being 3/4in. diameter, and that for the condenser escutcheon being 11/2in. diameter.

The next step is to mount the speaker unit, screwing it both to the front and the base of the cabinet with 1/2in. screws; in fitting the screws to the front, however, care must be taken to ensure that they do not go right through the wood. If there is any doubt concerning the latter point it will be advisable to slip a washer under the head of each screw.

Matching the Speaker

Before finally covering in the cabinet by passing through a hole in the top of the chassis and going to the grid-bias battery.

Pick-up Connections

It will have been noticed, by studying the circuit diagram and wiring plans, that no provision has been made for the connection of a gramophone pick-up. This is because it has been found that most constructors do not wish to use a pick-up, but there is no difficulty whatever in connecting one when it is desired. The simplest method of connecting a pick-up is to join one lead to the grid terminal of the detector valve-holder and the other to a wander plug.

List of Components

<table>
<thead>
<tr>
<th>Component Description</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two dual-range coils, types A.D. and T.G. (Weares)</td>
<td></td>
</tr>
<tr>
<td>One two-ganged condenser (B.R. &quot;Uniline&quot;)</td>
<td></td>
</tr>
<tr>
<td>One 0.003 mfd. differential reaction condenser</td>
<td>(Graham Farish)</td>
</tr>
<tr>
<td>Five 34000 ohm potentials (Ferranti)</td>
<td></td>
</tr>
<tr>
<td>Five resistances : 10,000 ohms, 30,000 ohms,</td>
<td></td>
</tr>
<tr>
<td>40,000 ohms, 20,000 ohms, 1 megohm (Dobhill, 1 watt)</td>
<td></td>
</tr>
<tr>
<td>Three 51/2 in. fixed tubular condensers (Graham Farish)</td>
<td></td>
</tr>
<tr>
<td>Two 0.005 mfd. fixed condenser (T.M.C.)</td>
<td></td>
</tr>
<tr>
<td>One 1 mfd. fixed condenser (T.M.C.)</td>
<td></td>
</tr>
<tr>
<td>One 5/8 in. on-off switch (Snap Switches)</td>
<td></td>
</tr>
<tr>
<td>One 5.1 Niclet L.F. transformer (Varley)</td>
<td></td>
</tr>
<tr>
<td>Three valve-holders : Two 4-pin and one 5-pin</td>
<td>(Clix)</td>
</tr>
<tr>
<td>One &quot;L.M.S.&quot; screened H.F. choke (Graham Farish)</td>
<td></td>
</tr>
<tr>
<td>One &quot;Snap&quot; H.F. choke (Graham Farish)</td>
<td></td>
</tr>
<tr>
<td>One 100 m.a. fuse and holder (Bulgin type F.S.)</td>
<td></td>
</tr>
<tr>
<td>Three wander plugs, GB-2, GB-2; (Belling Lee)</td>
<td></td>
</tr>
<tr>
<td>Two component brackets (B.R.G.)</td>
<td></td>
</tr>
<tr>
<td>One &quot;Summit&quot; cabinet (Peto-Scott)</td>
<td></td>
</tr>
<tr>
<td>One Metaplex chassis, 12in. x 10in. x 3in. (Peto-Scott)</td>
<td></td>
</tr>
<tr>
<td>One four-way battery cord (Belling Lee)</td>
<td></td>
</tr>
<tr>
<td>Two terminal socket strips</td>
<td>One A and E and one L.S. (Belling Lee)</td>
</tr>
<tr>
<td>One G.B. battery clip (Bulgin No. 1)</td>
<td>One cell connecting wire, screws, etc.</td>
</tr>
<tr>
<td>One &quot;Stentorian&quot; Standard M.C. speaker unit (W.B.)</td>
<td>(B.R.G.)</td>
</tr>
<tr>
<td>One 120-volt H.T. battery</td>
<td></td>
</tr>
<tr>
<td>One 9-volt G.B. battery</td>
<td></td>
</tr>
<tr>
<td>Three valves : One W.P.210; one H.L.210; and one H.P.T.220</td>
<td>(Cossor)</td>
</tr>
</tbody>
</table>

Results to Expect

No particular mention has yet been made of the capabilities of the "Summit," but it can be said without hesitation that it will give excellent reception from a number of British and Continental stations. After dark it is by no means difficult to bring in twenty odd stations at real programme strength, whilst very many others can be received at lower volume levels. In daylight one can be certain of tuning in four or five stations at good strength in any part of the British Isles, provided that the aerial is reasonably good.

Using an Eliminator

Those readers who wish to operate the "Summit" from the mains can do so without making any alteration whatever, since the set is perfectly suitable for direct connection to almost any type of eliminator, either A.C. or D.C. If a new mains unit is to be made or bought it should have an output of approximately 120 volts at 20 milliamperes, for although so much current is not required it is always better to have a little "reserve" than to work at the extreme limit. There being only two high-tension leads, there cannot be any confusion regarding their method of connection, and if the unit is fitted with a third (screening grid) terminal, this can simply be ignored so far as this receiver is concerned. On the other hand, there is no objection whatever to slightly modifying the receiver to make use of the screening grid H.T. feed. The modification involves only the removal of the two fixed resistances, which together form a fixed screening-grid potentiometer, and the connection of the screening-grid terminals on the first valve-holder to the eliminator terminal provided.

Fitting a Radiogram Switch

A still better method is to fit a single-pole change-over switch, for then it will not be necessary to disconnect the pick-up from the set when radio reception is required. The switch may be of any convenient type and it will have three terminals. Of these, the centre one should be joined to the grid terminal on the detector valve-holder, the other two being connected to one pick-up terminal and to the detector grid condenser respectively. When that is done the lead from the grid condenser to the grid must be removed.
REFLEX CIRCUITS
FOR THE EXPERIMENTER

It is Some Years Since Reflex Circuits were Widely Used, but the Writer Shows that they are Still of Interest to the Experimenter and, After Explaining the Principles, Describes a Reflex Circuit of Modern Design. 

By FRANK PRESTON.

REFLEX circuits are rarely used at the present time, although they were extremely popular between 1922 and 1924. Despite this, however, there are doubtless many readers whose interest in wireless does not date back so long a period as ten years, and who would like to experiment with some of the arrangements which were in favour two or three years ago. It is no exaggeration to say that reflex circuits, if carefully designed, can even now be used with commendable success, and that they are worthy of consideration quite apart from their rather historic associations.

One Valve As Two

Before going on to describe one or two reflex arrangements, it might be as well, for the benefit of newer experimenters and constructors, to explain exactly what a reflex circuit is. The name is fairly explanatory, for it is defined in the dictionary as "bent or turned back; directed backwards." Thus, a reflex circuit is one in which the signal voltages are "turned back." In other words, after the signals have been rectified by their passage through the detector, they are passed back to the grid of the valve, from there to the (tuned) anode circuit, to the crystal detector, back to the grid-dilament circuit of the valve by way of an L.F. transformer and, finally, to the phones or speaker. The arrangement is simple enough and the principle perfectly obvious. As to the practical details, it should be observed that the secondary winding of the L.F. transformer is at the earth end of the aerial circuit, and also that it is by-passed by a variable-mfd. fixed condenser. One point to observe is that reaction results can be obtained with a more modern arrangement, because the same valve (this component was always used with the earlier types of bright-emitter valve) and a small value of grid bias is applied to the valve.

Quality of Reproduction

The principal fault with the reflex circuit was that reproduction was not so good as with the "straight" arrangement, because the same valve could not function efficiently at both high- and low-frequencies. In spite of this difficulty, however, results were frequently obtained, and the actual arrangement shown can be tried out with modern components. This arrangement, because the same valve is used for both high- and low-frequencies.

One Valve As Two

Thus, a reflex circuit is one in which the signal voltages are "turned back." In other words, after the signals have been rectified by their passage through the detector, they are passed back to the grid of the valve, from there to the (tuned) anode circuit, to the crystal detector, back to the grid-dilament circuit of the valve by way of an L.F. transformer and, finally, to the phones or speaker. The arrangement is simple enough and the principle perfectly obvious. As to the practical details, it should be observed that the secondary winding of the L.F. transformer is at the earth end of the aerial circuit, and also that it is by-passed by a variable-mfd. fixed condenser. One point to observe is that reaction results can be obtained with a more modern arrangement, because the same valve (this component was always used with the earlier types of bright-emitter valve) and a small value of grid bias is applied to the valve.

Quality of Reproduction

The principal fault with the reflex circuit was that reproduction was not so good as with the "straight" arrangement, because the same valve could not function efficiently at both high- and low-frequencies. In spite of this difficulty, however, results were frequently obtained, and the actual arrangement shown can be tried out with modern components. This arrangement, because the same valve is used for both high- and low-frequencies.

A More Modern Circuit

It is not anticipated that there will be many readers who will wish to go to the trouble of rigging up the circuit shown in Fig. 1, since better results can be obtained with a more up-to-date arrangement using modern components and a valve (instead of the crystal) as rectifier, with reaction. A suitable circuit for such an arrangement is shown in Fig. 2, where the first valve is a variable-mu H.F. pentode, and the second a normal type of three-electrode rectifier.
PRACTICAL WIRELESS
September 1st, 1934

THE “ARMADA” MAINS THREE

How to Obtain the Best on Radio and Gramophone Records with this Novel Radiogram

If the receiver has been constructed exactly in accordance with the details which have already been given, it should not be found difficult to tune in any desired station or to play a record. However, for the benefit of those who are making their acquaintance with home-constructed apparatus for the first time, it would perhaps be as well to give the various points careful explanation so that no trouble can arise, and in order that the best may be obtained from the apparatus.

Firstly, when tuning in to a broadcast station, the right-hand control knob should be turned to the desired waveband. When this has been done, the valves will commence to heat up, and whilst attaining maximum temperature the extreme left-hand knob should be set to a position about half-way between maximum and minimum, the knob next to it should be turned as far as it will go in an anti-clockwise direction, and the tuning control should be adjusted so that the pointer is set to the required wavelength. After a few seconds the valves will commence to function and the signal should be heard.

The extreme left-hand control—the volume control—should then be used in order to obtain the required degree of volume. If, even when this is at its maximum setting, volume is not sufficient, then the knob next to it—the reaction control—should be employed to build up the signal, but when this is adjusted it will be found advisable to employ both hands, one hand being used for the reaction control and one for the tuning control, and as the reaction knob is turned slowly the tuning control should at the same time be given a slight adjustment. The reason for this to be found in the fact that the application of reaction will slightly affect the detector grid coil, and to maintain the circuits in tune a slight readjustment of the tuning condenser becomes necessary. Although only a slight movement is called for, it will be found necessary, if the maximum volume is required, to employ this “two-handed” control. It should, of course, be remembered that the use of reaction results in the cutting of the higher frequencies, and that therefore stations with a high frequency range is so weak that it becomes necessary to employ so much reaction that distortion becomes evident, it is obvious that it is undesirable to listen to that station, and therefore the range of reception should be limited to that which may be comfortably covered by the receiver.

Gramophone Records

For best results on gramophone records the choice of the needle is a vital point. There are many different types of needle on the market, and although many may prefer to employ what is known as a permanent needle—that is, one which may be used for a number of records before it is discarded, it will generally be found preferable to use a needle once only. If, however, a permanent type of needle is used, then it must on no account be removed from the pick-up arm until it is discarded, or the records will be damaged. The Talie needle will be found as good as any, both from the point of view of volume and tone, and this type of needle has a fine point which will not damage the record provided it is used once only. Set the switch to the gramophone position and adjust the volume control on the pick-up carrier to a midway position before inserting the needle. If the volume control is left at its maximum position, the incorrect position of the needle will produce very distressing noises from the loud-speaker, and the placing of the needle on the record will also prove objectionable. When the needle is in position the pick-up arm should be swung outwards, when the turntable will commence to rotate. Place the needle carefully on the edge of the record and gently push it inwards until it commences to run in the spiral groove. Then turn up the volume control until the surface noise becomes apparent from the speaker. As soon as the music commences a final adjustment of volume may be made and the lid closed down to remove the extraneous noise of pick-up scratch, etc. When the needle comes to the end of the record the turntable will automatically be stopped and the record cannot be damaged.

Adjusting the Speaker

At the bottom of the loud-speaker chassis will be found a knob with a circular scale, and each constructor should adjust this knob to produce the balance of tone which appeals to his individual ear. There is obviously an optimum position dependent upon the impedance of the output valve, but with many listeners it may be found that a deeper or a more brilliant tone is desirable, and the matching control may thus be utilized in order to produce this degree of control, although for maximum volume and best results the correct setting should be used.

LIST OF COMPONENTS FOR THE “ARMADA” MAINS THREE.

One 50 mid. electrolytic type 521 (C13) (T.C.C.).
Three 4 mid. type 80 (C14, C15 and C16) (T.C.C.).
Two 5 mid. valveholders (Clix).
One 5 mid. tubular condenser (C10) (T.M.C.).
One 5 mid. electrolytic type 501 (C9) (T.C.C.).
Three 4 mid. type 250 condenser (C7) (T.C.C.).
Two 5 mid. type 300 ohm 1 watt resistance (R4) (Ferranti).
Two 5 mid. type 80 do. (C8 and C9) (T.C.C.).
One 5 mid. tubular condenser (C10) (T.M.C.).
One 5 mid. tubular condenser (C10) (T.M.C.).
Two 5 mid. electrolytic type 501 (C9) (T.C.C.).
One set Ferrocart coils, types G1, G2 and G3, with mains on/off switch (Colvyn).
Three-gang Midget condenser (C1, C2 and C3) Polar.
One Acoustic slow-motion drive (Polar).
One 0.0015 mid. differential condenser (C7) (Polar).
One 30,000 ohm 1 watt resistance (R8) (Ferranti).
One 20,000 ohm 1 watt resistance (R12) (Ferranti).
One 15,000 ohm 1 watt resistance (R11) (Ferranti).
Three 50 mid. watt resistances (R7, R8 and R11) (Ferranti).
One 100 ohm 1 watt resistance (R4) (Ferranti).
One megohm grid leak (R6) (Ferranti).
One 25 mid. tubular condenser (C7) (T.M.C.).
One 50 mid. tubular condenser (C10) (T.M.C.).
One 25 mid. tubular condenser (C10) (T.M.C.).
One 25 mid. electrolytic type 501 (C9) (T.C.C.).
One 5 mid. type 80 do. (C11) (T.C.C.).
One 5 mid. type 80 do. (C12) (T.C.C.).
One 5 mid. electrolytic type 501 (C9) (T.C.C.).
One 50 mid. , electrolytic type 521 (C13) (T.C.C.).
One Bulgin fuse plug (with fuses).
One 5,000 ohm volume control (C.P.157) (Varley).
One “Tru-speed” electric gramophone motor (B.T.H.).
One A.C./V.P., one A.C./H.L., and one A.C./Y valve (Hivac).
One “Truspeed” electric gramophone motor (B.T.H.).
One A.C./V.P., one A.C./H.L., and one A.C./Y valve (Hivac).
One 7 mid. valveholder (Clix).
One “Truspeed” electric gramophone motor (B.T.H.).
One A.C./V.P., one A.C./H.L., and one A.C./Y valve (Hivac).
One A.C./V.P., one A.C./H.L., and one A.C./Y valve (Hivac).
One A.C./V.P., one A.C./H.L., and one A.C./Y valve (Hivac).
with Matched Performance is assured with all Telsen Components—for example, in the case of Dual Range Coils, these after winding are first tested for "Insulation" and "Continuity." The coils are then fitted with "Iron" Cores, these having been previously tested for "Permeability"; the completed coils are then measured for "Inductance."

They are then graded into "Standard," "plus ½%" and minus ½%. Coils from these three grades are made up into twin or triple matched units providing "Inductances" which have been matched to within ½%, thus ensuring absolute accuracy for ganging purposes when Telsen coils are built into a modern receiver.
it is here!

TELEVISION

man's strangest dream comes true in your own home......

Plew researches . . . extending over a quarter of a century . . . at last bear fruit. A method has been perfected. Clear, steady Television for the home at a price all can afford . . . becomes suddenly practicable. See as you listen . . . the greatest thrill of this new age. Programmes are to be greatly extended . . . get in touch with your dealer today . . . be in the forefront of the most exciting discovery the radio world has known.

MODEL NO. 1 10 gns.
STANDARD MODEL 18 gns.
LONG RANGE 22 gns.

PLEW TELEVISION LTD., STAFFORD ROAD, WADDON, SURREY. Tel.: FAIRFIELD 5191.
The Pilot Kit

SERVICE was founded in 1919

IMPORTANT

Miscellaneous Components, Parts, Etc. Finished Receivers or Assemblies for Cash or C.O.D. or H.P., on our stocks of Fast Pay. Send in a list of your wants. We will quote you rates. C.O.D. orders value over £10 are carriage and cost charged on GREAT BRITISH ORED. OVERSEAS orders value less than £10 are carriage paid. To ensure delivery of goods for overseas orders, you must state your address and complete your order with the payment, or with a special express receipt and pay all delays. We will sell half paid orders. For full details write to us for full carriage. Any surplus received immediately. Note purchases are EXCLUDED in sales and Cash customers.

NEW SPEAKERS


NEW ELIMINATORS


NEW MANUFACTURERS' KITS


NEW BUILDING KITS

2/6 down and 6 monthly payments of 2/6.

NEW ELIMINATORS


NEW MANUFACTURERS' KITS


NEW ELIMINATORS


NEW MANUFACTURERS' KITS


NEW ELIMINATORS


NEW MANUFACTURERS' KITS


**Better 1935 radio means using 1935 COLVERN components**

The latest type Ferrocart coils, 32/6 each.

Constant research and continuous experiment have resulted in the new Ferrocart coils and "Colpax," illustrated — even further advanced in efficiency, prevision and design than last year. Only by fitting Colvern components in your set can you be assured of the most brilliant reception. Made under licence from patentee, Hans Vogt.

**FREE** Blueprints of splendid specially designed “up to the minute” sets.

To COLVERN, Ltd., Romford, Essex. Please send me full COLPAK CLASS B details and blueprint of the J.A.C. MAINS SET. Strike out name of blueprint not required. Stamps value 3d. to cover postage are enclosed.

NAME

ADDRESS

If you would like a copy of our Ferrocart Booklet, please put a X here.

---

When "cat-whiskers" were the order of the day...

The days when big men "fiddled" with cat-whiskers seem far off, yet from then until now Celestion has been known as the foremost name in sound reproduction. In 1934 as in 1924 Celestion held in popularity. The reason is obvious: Celestion engineers during ten years of specialization have set a standard never yet equaled. If you want faithful reproduction your inevitable choice is Celestion.

CELESTION

The Very Soul of Music

was the foremost name in sound reproduction.

---

**362 BATTERY VALVES.**

<table>
<thead>
<tr>
<th>Type</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>HL &amp; L</td>
<td>3/6</td>
</tr>
<tr>
<td>3/6 Power</td>
<td>4/-</td>
</tr>
<tr>
<td>Super Power</td>
<td>4/6</td>
</tr>
<tr>
<td>7/6</td>
<td>5/-</td>
</tr>
<tr>
<td>GS &amp; VS</td>
<td>7/6</td>
</tr>
<tr>
<td>Pentode Type</td>
<td>10/-</td>
</tr>
<tr>
<td>BA &amp; BX</td>
<td>9/-</td>
</tr>
<tr>
<td>9/-</td>
<td>12/6</td>
</tr>
<tr>
<td>ME &amp; HM</td>
<td>13/-</td>
</tr>
<tr>
<td>12/6</td>
<td>15/-</td>
</tr>
<tr>
<td>RB41</td>
<td>17/-</td>
</tr>
<tr>
<td>RB42</td>
<td>18/-</td>
</tr>
<tr>
<td>DC MAINS</td>
<td>Same Price as AC MAINS</td>
</tr>
</tbody>
</table>

**362 AC MAINS.**

<table>
<thead>
<tr>
<th>Type</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>HL4</td>
<td>7/6</td>
</tr>
<tr>
<td>PX4</td>
<td>9/-</td>
</tr>
<tr>
<td>SG4 &amp; VS4</td>
<td>9/-</td>
</tr>
<tr>
<td>ME &amp; HM</td>
<td>13/-</td>
</tr>
<tr>
<td>12/6</td>
<td>15/-</td>
</tr>
<tr>
<td>RB41</td>
<td>17/-</td>
</tr>
<tr>
<td>RB42</td>
<td>18/-</td>
</tr>
<tr>
<td>DC MAINS</td>
<td>Same Price as AC MAINS</td>
</tr>
</tbody>
</table>

**362 RADIO VALVE CATALOGUE.**

Stoneham Rd. LonlonHS.
Keeping Up to Date

Keeping his technical knowledge up to date is generally looked on with reluctance, but it seems a waste of time and energy to resist the temptation to overhaul or rebuild the family set has definitely come to stay. Any attempt to play tricks with it — or in other words to improve it or bring it up to date — is generally looked on with disfavour by everybody.

One Problem at a Time

Fairly long experience has taught me that, time being of ten, the experimenter occupies himself with one problem at a time. For example, he may wish to investigate for himself the advantages of Class "B" working, in which case it is only the low-frequency side of the set which requires any alteration. Even in all probability none of his existing receivers has sufficient space on the baseboard or chassis to accommodate the additional components required. Again, he may wish to experiment with some new type of coil or with a band-pass device. A completely new set may seem essential, but actually it is only the low-frequency portion which needs alterations.

Radio Bricks

In the very early days of radio something of this sort was developed, one firm selling different units, such as high-frequency amplifiers, detector units, audio-frequency amplifiers, and so forth, under the name of "Radio Bricks." The scheme certainly permitted a fair degree of flexibility in the design of a receiving set, although as each unit was in a sealed box, experiments with different circuit arrangements were not possible.

As a good many users of mains radio still have a separate room at their entire disposal for this purpose it is strictly limited, and by, if not most, have to content themselves with short leases of a corner of the kitchen table on privileged occasions, and similarly poorly off for storage room. It is, therefore, rather important that even the experimental apparatus should be fairly small and simple to look at, and should also be of convenient shape and size. And therein lies the snag.

An obvious solution to the problem would be to make up each experimental set on a proper baseboard or chassis, and enclose it in a cabinet of some kind. But this has certain disadvantages. In the first place, different circuit arrangements require vastly different sizes of base, they demand radical alterations to the grouping of components. Then, as speaker designs change, as improved forms of tuning dials and indicators are developed, and as other major modifications in radio practice come to pass, no one standard form of cabinet or chassis will suit all arrangements. Moreover, cabinets are expensive, and the outlay is scarcely justified in the case of a temporary and experimental receiver.

A still more powerful argument against the construction of experimental radio sets in a fully-finished form is that, if the circuit is properly designed and laid out, it is not a very easy matter to make alterations to it, yet it seems a waste of time and energy to rebuild the set for every experiment.

One Solution

The first solution is to experiment on a separate experimental cabinet, building up new circuits, making improvements, and so forth, under the name of "Radio Bricks." The scheme certainly permitted a fair degree of flexibility in the design of the set, although as each unit was in a sealed box, experiments with different circuit arrangements were not possible.

As a good many users of mains radio still have a separate room at their entire disposal for this purpose it is strictly limited, and by, if not most, have to content themselves with short leases of a corner of the kitchen table on privileged occasions, and similarly poorly off for storage room. It is, therefore, rather important that even the experimental apparatus should be fairly small and simple to look at, and should also be of convenient shape and size. And therein lies the snag.

An obvious solution to the problem would be to make up each experimental set on a proper baseboard or chassis, and enclose it in a cabinet of some kind. But this has certain disadvantages. In the first place, different circuit arrangements require vastly different sizes of base, they demand radical alterations to the grouping of components. Then, as speaker designs change, as improved forms of tuning dials and indicators are developed, and as other major modifications in radio practice come to pass, no one standard form of cabinet or chassis will suit all arrangements. Moreover, cabinets are expensive, and the outlay is scarcely justified in the case of a temporary and experimental receiver.

A still more powerful argument against the construction of experimental radio sets in a fully-finished form is that, if the circuit is properly designed and laid out, it is not a very easy matter to make alterations to it, yet it seems a waste of time and energy to rebuild the set for every experiment.

One Problem at a Time

Fairly long experience has taught me that, time being of ten, the experimenter occupies himself with one problem at a time. For example, he may wish to investigate for himself the advantages of Class "B" working, in which case it is only the low-frequency side of the set which requires any alteration. Even in all probability none of his existing receivers has sufficient space on the baseboard or chassis to accommodate the additional components required. Again, he may wish to experiment with some new type of coil or with a band-pass device. A completely new set may seem essential, but actually it is only the low-frequency portion which needs alterations.

— the audio-frequency amplifier arrangements can remain unchanged.

It seems to me, therefore, that anyone who undertakes experimental radio work for his own amusement, as thousands of readers of this journal undoubtedly do, might profitably consider building his experimental receivers on a multiple unit plan. In this way the equipment would be always complete although, perhaps, never finished.

Radio Bricks

In the very early days of radio something of this sort was developed, one firm selling different units, such as high-frequency amplifiers, detector units, audio-frequency amplifiers, and so forth, under the name of "Radio Bricks." The scheme certainly permitted a fair degree of flexibility in the design of the set, although as each unit was in a sealed box, experiments with different circuit arrangements were not possible.

As a good many users of mains radio still have a separate room at their entire disposal for this purpose it is strictly limited, and by, if not most, have to content themselves with short leases of a corner of the kitchen table on privileged occasions, and similarly poorly off for storage room. It is, therefore, rather important that even the experimental apparatus should be fairly small and simple to look at, and should also be of convenient shape and size. And therein lies the snag.

An obvious solution to the problem would be to make up each experimental set on a proper baseboard or chassis, and enclose it in a cabinet of some kind. But this has certain disadvantages. In the first place, different circuit arrangements require vastly different sizes of base, they demand radical alterations to the grouping of components. Then, as speaker designs change, as improved forms of tuning dials and indicators are developed, and as other major modifications in radio practice come to pass, no one standard form of cabinet or chassis will suit all arrangements. Moreover, cabinets are expensive, and the outlay is scarcely justified in the case of a temporary and experimental receiver.

A still more powerful argument against the construction of experimental radio sets in a fully-finished form is that, if the circuit is properly designed and laid out, it is not a very easy matter to make alterations to it, yet it seems a waste of time and energy to rebuild the set for every experiment.

One Problem at a Time

Fairly long experience has taught me that, time being of ten, the experimenter occupies himself with one problem at a time. For example, he may wish to investigate for himself the advantages of Class "B" working, in which case it is only the low-frequency side of the set which requires any alteration. Even in all probability none of his existing receivers has sufficient space on the baseboard or chassis to accommodate the additional components required. Again, he may wish to experiment with some new type of coil or with a band-pass device. A completely new set may seem essential, but actually it is only the low-frequency portion which needs alterations.

— the audio-frequency amplifier arrangements can remain unchanged.

It seems to me, therefore, that anyone who undertakes experimental radio work for his own amusement, as thousands of readers of this journal undoubtedly do, might profitably consider building his experimental receivers on a multiple unit plan. In this way the equipment would be always complete although, perhaps, never finished.

Radio Bricks

In the very early days of radio something of this sort was developed, one firm selling different units, such as high-frequency amplifiers, detector units, audio-frequency amplifiers, and so forth, under the name of "Radio Bricks." The scheme certainly permitted a fair degree of flexibility in the design of the set, although as each unit was in a sealed box, experiments with different circuit arrangements were not possible.

As a good many users of mains radio still have a separate room at their entire disposal for this purpose it is strictly limited, and by, if not most, have to content themselves with short leases of a corner of the kitchen table on privileged occasions, and similarly poorly off for storage room. It is, therefore, rather important that even the experimental apparatus should be fairly small and simple to look at, and should also be of convenient shape and size. And therein lies the snag.

An obvious solution to the problem would be to make up each experimental set on a proper baseboard or chassis, and enclose it in a cabinet of some kind. But this has certain disadvantages. In the first place, different circuit arrangements require vastly different sizes of base, they demand radical alterations to the grouping of components. Then, as speaker designs change, as improved forms of tuning dials and indicators are developed, and as other major modifications in radio practice come to pass, no one standard form of cabinet or chassis will suit all arrangements. Moreover, cabinets are expensive, and the outlay is scarcely justified in the case of a temporary and experimental receiver.

A still more powerful argument against the construction of experimental radio sets in a fully-finished form is that, if the circuit is properly designed and laid out, it is not a very easy matter to make alterations to it, yet it seems a waste of time and energy to rebuild the set for every experiment.

One Problem at a Time

Fairly long experience has taught me that, time being of ten, the experimenter occupies himself with one problem at a time. For example, he may wish to investigate for himself the advantages of Class "B" working, in which case it is only the low-frequency side of the set which requires any alteration. Even in all probability none of his existing receivers has sufficient space on the baseboard or chassis to accommodate the additional components required. Again, he may wish to experiment with some new type of coil or with a band-pass device. A completely new set may seem essential, but actually it is only the low-frequency portion which needs alterations.

— the audio-frequency amplifier arrangements can remain unchanged.

It seems to me, therefore, that anyone who undertakes experimental radio work for his own amusement, as thousands of readers of this journal undoubtedly do, might profitably consider building his experimental receivers on a multiple unit plan. In this way the equipment would be always complete although, perhaps, never finished.
WHENEVER any startling change takes place, no matter in what sphere, somebody is certain to raise the query: "Will the so-and-so survive?" Even so young a science as radio has not been free from this particular topic. From time to time there have been such scares as "Will broadcasting survive?" "Will the superhet survive?" and so forth. Now some people are asking "Will the valve survive?" It must be admitted that the conditions of radio reception have suffered most startling and rapid changes during the past ten years or so. Many radio inventions and devices have passed into oblivion, and many more will do so as new developments arise. But what of the valve?

Development

Consider for a minute the history of valve development. Next year we shall celebrate the thirtieth anniversary of the birth of the first valve—Fleming's two-electrode oscillation valve used originally as a diode detector. This was evolved from the well-known "Edison effect," and Fig. 1 illustrates a lamp, now many years old, which shows very clearly why the "electron shadow" on the bulb is important. The discovery which led Sir Ambrose Fleming to undertake his experiments. Two years later America added the control grid and gave us the triode valve which would also amplify. Up to the year 1923, radio receivers used only a single type of valve—a "general purpose" bright emitter valve—in every stage. In that year, however, power amplifying valves were developed, for use in the last stage of sets employing loud-speakers. Only a few months later the valve again showed its ability to evolve and improve when improvement was called for. General purpose types split into two sub-types—H.F. valves for use as radio-frequency amplifiers or for detection; and I.F. valves for audio-frequency amplification. Side by side with these improvements in fundamental characteristics, valves responded readily to the demand for working economy. At a time when four, five, six or more valves were necessary for efficient reception, bright emitters, each taking nearly three-quarters of an ampere of low-tension current, were costly to run. From 1923 onwards, dull emitter filaments of successively more efficient types evolved until, to-day, valves vastly more sensitive than the best bright emitters operate with only 0.1 amp. low tension at 2 volts, or 0.2 watt, as compared with 75 amp. at 4 volts (3 watts) for bright emitter types.

Amazing Improvements

These figures in themselves show the valve as a virile and accommodating device, but much more was to follow. Listeners wanted better long-distance reception, and long-distance reception conditions became worse. But the valve grew another grid and the screen-grid valve was born, not only restoring long-distance reception, but effecting amazing improvements.

Economy—A reduction in the number of valves—increased output from the receiver; these were the next demands of the insatiable listener, and the valve grew yet another grid and became a pentode, capable, for a given input, of providing an output previously requiring two stages of amplification.

Next, people whose homes were wired for electric light clamoured for radio sets which could be operated from the mains without the use of batteries. The accommodating valve responded nobly, surrounded its filament by an indirectly heated cathode, and operated, without the faintest hint of a cycle murmur of complaint, on the A.C. mains.

By now the diversity of valve types was very great. Screen-grid valves for high-frequency amplification, triodes for detection and low-frequency amplification, output triodes and pentodes—all were available in a variety of types for both battery and mains operation, and the actual characteristics were constantly being improved.

When component makers developed better or more efficient couplings, valves with improved characteristics, calculated to take the fullest advantage of the new components immediately appeared. Indeed, sometimes improvement in valve technique has actually set the pace for component manufacturers, the technical possibilities of new valve types calling for all the ingenuity of the makers of coils, transformers, and so forth.

Recent Cases

Two recent and outstanding instances in which the radio valve has, so to speak, broken fresh ground are the high-frequency pentode and the Class "B" valve. In the former, the pentode principle, whereby an earth grid between the auxiliary grid and the anode acts as a screen to prevent secondary emission from the anode reaching the auxiliary grid, is applied to high-frequency amplification. The pentode valve has a much higher amplification than any ordinary screen-grid valve, and will also handle a larger output without risk of instability. Even in the average receiver a screened pentode provides a bigger overall gain than any screen-grid valve, and is, of course, immeasurably superior when used in conjunction with tuned couplings of the highest efficiency.

The second development, Class "B" amplification, as readers know, is a device which charges a battery set is given output capabilities on a par with those of a mains set without an extravagant use of high-tension current. The Class "B" valve, it should be noted, comprises two valves in a single bulb (actually two high-magnification triodes operated in push-pull without bias) and an example of the interior construction of one of these is seen in Fig. 2. Nor is this the only type of "multi-valve" now available. During recent months several types of such valve have appeared in the assembly of an octode.
peared, mostly combining one or more diodes with a low-frequency amplifying element.

**Multi-electrodes**

Of such valves mention must be made of the double-diode-triode comprising two diodes with a triode. The usual application of this valve is to use one diode as a detector, the triode portion as first stage low-frequency amplifier, and the second diode for applying automatic volume control, either amplified or both amplified and delayed to the high-frequency stages.

Another interesting type is the diode-tetrode, which consists of a single diode to be used as detector and a screen-grid valve for low-frequency amplification. Similar to the double-diode-triode is the double-diode-pentode, the two diodes being used as detector and automatic volume control respectively, and the pentode, which has variable-mu characteristics, being operated as a low-frequency amplifier.

The advantage claimed for this valve is that it permits automatic volume control to be applied both to the high-frequency and to the low-frequency side of the receiver, thus attaining a more uniform volume level.

Other directions in which the multi-electrode valve has developed concern the detector oscillator stage in superhet receivers. The "pentagrid" valve, which has a cathode, anode, and five grids is a case in point. While this is not, strictly speaking, two valves in one, it is so in fact. The cathode is a similar valve and a section is shown in Fig. 3. Some highly interesting multiple valves have, according to report, been developed in America, and there is no doubt that still more startling innovations will appear in the none too distant future, particularly in connection with valves for superhet receivers.

One result of these developments is that the number of actual valves in receivers is now less than the number of reception stages, and it is becoming the practice of set makers to rate their sets according to the number of stages, rather than according to the number of valves. This tendency is likely to increase, and there is little doubt that the time will come when a high-powered superhet receiver will possibly be using only three, or even two "valves."

Yes, I think the radio valve is very much alive, has wonderful possibilities for further development, and is fully adaptable to circumstances. Therefore, it will survive—changed greatly indeed from the original Fleming diode, but recognizable as a valve and gathering up in its more complicated design the best of the various improvements which have been made during thirty full and adventurous years.

---

**YOUR FUTURE**

Radio enjoyment will be assured by the use of a Pifco A.C. and D.C. Radiometer

The stars cannot foretell, nor can a crystal-gazer, that some time—perhaps to-night—your radio will become silent for no apparent reason. But... leave nothing to chance. In case of an unexpected breakdown in your set, be prepared to track down the fault immediately by getting now a Pifco A.C.-D.C. RADIOMETER. It is an amazing instrument which tests everything in radio—low tension, high tension, A.C. or D.C. Solidly constructed and supplied in a finely-finished bakelite case, it is made, adjusted and tested by highly-skilled British instrument makers. As a safeguard against any possible damage being caused by accidental, wrong connections there is a safety fuse included to protect all ranges.

You would doubtless regard such a fine instrument cheap at five times its amazing price of 12/6! Ask your dealer to show you one now, or write for fuller details to PIFCO, LTD., Shudehill, Manchester, or 150, Charing Cross Road, London, W.C.2.

Adapters for testing 7 and 9 pin valves with a Pifco Radiometer may be had for 3s. extra.

**AVOID and REFUSE SUBSTITUTES**

**PIFCO**

'All-in-One' RADIOMETER A.C. and D.C.

PIFCO ON THE SPOT WILL TRACE YOUR TROUBLES LIKE A SHOT

---

**THE PRACTICAL MOTORIST**

3d.

EVERY WEDNESDAY.

Published by George Newnes, Ltd., 8-11, Southampton Street, Strand, W.C.2.

---

**LEARN TO SWIM**

by SID G. HEDGES.

This admirable little booklet by Mr. Sid G. Hedges, the well-known authority on swimming, will prove equally valuable to the novice and the more proficient swimmer. It is illustrated with exceptionally clear diagrams, and covers every important aspect of the sport from first bathing hints and water games, to the more intricate strokes and dives.

Obtainable at all Newsagents and Bookstellers, or by post 4d. from George Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2. 3d.
AUTOMATIC TIME CONTROL

A Device that can be Set Automatically to Switch Your Wireless Set On and Off

It is designed to work on two stations and uses a separate tuning condenser and switch for each station.

The Framework

The framework, which is of wood, consists of a bridge, shelf, clock stand, and base as shown in Fig. 1, as well as supports for wheels D1, D2, Cl, and C2.

Both the hands are removed from the clock and a pulley wheel X is attached to the hour hand spindle. X is connected by means of a belt driving the condenser connections on the set.

The Tapes and Keys

Attached to both tapes are movable lifting keys. These consist of small wooden blocks mounted on metal collars, through which the tape is free to slide.

To fix the key, drive the screw home to Y. Cl, C2, and W work on one spindle. X revolves twice a day, therefore, if a seven-day clock is used, the tape should be equal in length to fourteen times the circumference of X. They will thus require exactly a week to complete the revolution.

The How it Works

When the switch rises, the metal collar connects S and S, as shown, thus switching the set on. Simultaneously the pieces E and F rise to touch G and H, thus joining up the condenser with E and D. As soon as the keys have passed, the switch-holder drops again and the connections are reversed. Fig. 2 shows how to mark the tape. Each lifting key should be just large enough to cover one of the hour spaces.

If possible join the two ends of the tape with a hook and eye as in other fastening so that it is possible to remove or add any number of keys. To prevent the clock stopping when the keys are up, the extra key should be replaced by one of the Q.M.B. type, there is no reason why this should not suitably modified. It will, of course, be necessary to provide a two-way method of switching both on and off, and the extra trouble may be found worth while. Similarly, it may be found desirable for some listeners to modify the size of the lifting keys in order to produce varying lengths of time during which the receiver is switched on and off, and in the case of a receiver fitted with remote control, the apparatus could be stowed away in a distant place and the receiver operated through the remote control system. There are, in fact, many applications of the device of the rotating tape and the removable contact pieces, and some interesting experiments may be carried out with it.
SUPPLEMENT TO "PRACTICAL WIRELESS"

AMATEUR TELEVISION

THE TELEVISION RADIO RECEIVER.—PART II.

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

An Article Dealing with the Essentials of Modern Television Receivers

In the low frequency amplifier, the detected signals obtained from the receiver proper have to be used to release a substantial amount of power which will vary strictly in sympathy with the detected signals, these signals being, of course, an electrical representation of the light and shade or movements of the light itself, as transformed by the scanning mechanism at the transmitting end.

Assuming that the high frequency and detector stages have performed their parts so well that no sensible degree of distortion has been introduced, it is necessary to ensure that the low frequency stages are equally satisfactory. No matter whether the amplifier is intended for the simplest type of equipment using a small neon lamp, or one of the more advanced type requiring half a dozen watts or so of low frequency output for operating a Kerr or Grid cell, the main ingredients are the same, and can be summed up in the words—"Several stages of low gain amplification." In other words, this is one of the cases in which economy and efficiency for once have to take second place in favour of quality of output if the best results are desired.

Good Reproduction

Really good quality can be assured by correct design of the amplifier combined with care in operation. Those who have built one or two complete radio receivers for sound reproduction are apt to consider the low-frequency end of the set a simple matter in which it is almost impossible to go wrong. But while the technical aspects of amplifier design are somewhat intricate than those of the radio-frequency stages, there are pitfalls, and particularly in the design of amplifiers intended for television work.

In the first place, as was pointed out in the first article, the eye is not so readily deceived as the ear, so that it is vitally necessary to reduce distortion to a minimum. This necessity is emphasized by the fact that in the case of a sound amplifier the overall fidelity of the output is governed not by the amplifier alone, but also to a great extent, by the loud speaker, so that there is a chance of correcting a certain amount of distortion in one direction by a similar amount of distortion in the opposite direction. In television, however, the viewing apparatus reproduces the picture in exact accordance with the electrical impulses supplied by the amplifier, and any distortion introduced at any stage will be shown up.

The most important point about the design of an amplifier for television purposes is the type of interstage coupling employed. Obviously the most efficient coupling for normal work is the iron-cored transformer, obviously the most efficient coupling for normal work is the iron-cored transformer, which gives a stage gain several times greater than that provided by the valve itself, depending upon the ratio of turns in the two windings. Unfortunately, however, transformers do not give a very even response throughout the range of frequencies required for television reproduction. Usually they have a fairly level characteristic between a few hundred, and up to a few thousand cycles per second, but below and above these limits the response falls off more or less seriously. These variations in performance are the result of variations in the constants of the transformer at various frequencies, and are inevitable. It is true that very considerable improvements have been made in transformer design since the early days of radio, and that for sound reproduction a good modern transformer leaves little to be desired as an interstage coupling, but for television the infidelities of even the best transformer will seriously mar the quality of the picture.

R. C. Coupling

It has therefore become standard practice to adopt the resistance capacity coupling form of coupling between the L.F. stages of television amplifier. Although with this form of coupling the amplification is limited to that which can be obtained from the valve itself, and seldom amounts to much more than two-thirds of the amplification factor of the valve, resistance-capacity coupling correctly applied gives a substantially uniform response throughout a wide band of frequencies.

In view of the smaller stage gain obtained with this form of coupling, it may be necessary to employ rather more amplifying stages than would normally be employed. A decision on this point will depend largely upon the input supplied to the amplifier and the type of output valve used. For example, a receiver having efficient high-frequency amplification and a sensitive detector will pass to the low-frequency amplifier signal voltages of very considerable magnitude. In order to load a triode giving an output of some 2 watts, two stages of coupling. Low frequency stages would probably be necessary. With a pentode output valve of similar rating, however, it is possible that only one other low-frequency stage would be required.

If the receiver is not provided with high-frequency amplification, or if for any other reason the grid bias output from the detector is comparatively small, three R.C.C. stages will undoubtedly be necessary with a triode output valve, and two with a pentode.

It should be the aim of the designer to obtain in each stage a gain of from one-half to three-quarters of the valve's amplification factor. This proportion is determined by the value of the anode resistance, the stage gain being calculated by dividing the value of the anode resistance by the sum of the anode resistance and the valve impedance. Thus,

\[ \text{Stage Gain} = \frac{\text{Anode Resistance}}{\text{Anode Resistance} + \text{Valve Impedance}} \]

Another important point to be borne in mind is that, as the signal passes from stage to stage and increases in strength, the successive valves should be of types capable of handling the increasing signals without overloading. In this connection it is useful to remember that there is a guide to the signal handling capabilities of various valves is the recommended values of grid bias voltage.

So much for the distortion which might be introduced by the general design of the amplifier. It is, however, necessary to guard against distortion which may be generated within the apparatus itself. One of these forms of distortion has already been hinted at, namely that due to overloading one or more valves by applying abnormally large signals. In order to prevent any tendency to overloading, it is wise to fit some form of volume control. To be really effective such a control should be placed at the input end of the amplifier, as in Fig. 1, where the potentiometer also forms a variable leak in the grid circuit of the first low-frequency valve.

(Continued overleaf)
Do You Know What This Graph Means?

- The man who can analyse these curves and understand what they indicate knows his job. But if they are not real to him perfectly definite information, it would appear that he needs more training than he has had. He is not competent to fill a responsible position in wireless.

Music

Radio has developed so rapidly throughout the last ten years that it has now greatly outgrown the supply of technically qualified men required for the better posts. Moreover, it continues to develop with such speed that only by knowing the basic principles can pace be kept with it.

The I.C.S. Radio Courses cover every phase of radio work. Our instruction includes American broadcasting as well as British wireless practice. It is a modern education, covering every department of the industry.

Ours Courses

Included in the I.C.S. range are Courses dealing with the installing of radio sets and, in particular, with their servicing, which to-day intimately concerns every wireless dealer and his employees. The Operating Course is vital to masters of operating and transmitting.

There is also a Course for the Wireless Salesman. This, in addition to inculcating the art of salesmanship, provides that knowledge which enables the salesman to hold his own with the most technically advanced customer.

Then there are Preparatory Courses for the City and Guilds and I.W.T. Exams.

We will be pleased to send you details of any or all of these subjects. Just fill in, and post the coupon, or write in any other way.

International Correspondence Schools, Ltd.,
Dept. 94, International Buildings,

Without cost, or obligation, please send me full information about the Courses I have marked X

[ ] COMPLETE RADIO
[ ] RADIO SERVICING
[ ] RADIO EQUIPMENT
[ ] RADIO SERVICING AND SALESMAHON
[ ] WIRELESS ENGINEERING
[ ] WIRELESS OPERATORS
[ ] EXAMINATION (state which)

Name
Address

September 1st, 1934

AMATEUR TELEVISION

(Continued from previous page)

Recording Television Signals

When using gramophone records for recording television signals the wear on the record has little effect on the results. For this reason it has been suggested that one way of overcoming the defect of silent intervals in television signals would be to record the television signals on a film just the same as sound is recorded with the phonograph. As far as this method has not been tried, and on the surface it appears to offer one solution where the phonograph could not be recorded and supplied to the public. Of course the vision equivalent of a sound head would be needed, but this should not need to be very small, since the idea would prove practicable. In any case, if the difficulties surrounding recording television signals are satisfactorily overcome it will prove a boon to every household possessing television apparatus, and stimulate the sale of machines and apparatus very considerably.

Removing Objectionable Disc Lines

With television being more and more taught to the young, we find newcomers in the home construction field, it is only natural that a certain number of unfamiliar conditions may crop up when the receivers are being tried for the first time. One of the first to be noticed, when using a disc machine in its simplest form—that is, a small direct current-driven scanning disc, the holes of which explore pass over the surface of a neon lamp—is generally unwanted lines.

Each hole in the disc in its passage across the glowing neon area creates a strip of light, and with a thirty hole disc used to receive the previous R.C. talkies, each strip should fit exactly against its immediate neighbours. If the stripes overlap, a white line will be noticed, while if they do not quite touch at any point, then a thin black line will make its appearance. To overcome this trouble, first of all remove the disc and clean away with a fine camel-hair brush any trace of dust specks in the holes, as these are shown here. Then, to overcome the trouble, small transmitter. The best preventive is a non-capacitive resistance of about 100 ohms in the grid circuit of his customers.

An amateur-built television receiver, with the lamp positioned for the reception of the continental transmssions.

Small transmitter. The best preventive is a non-capacitive resistance of about 100 ohms in the grid circuit of his customers.
detector. All components are of standard type, and the two tuned circuits may, if desired, be tuned by means of a two-gang condenser, provided that two cells of similar type be employed.

The circuit now in question is an efficient one which is capable of good reception and reasonably good quality, so long as no attempt is made to obtain great volume. A variable bias voltage is applied to the first valve by means of a potentiometer in parallel with a 41-volt G.B. battery. By this means it is not a difficult matter to find a setting at which the valve will function fairly well in both high- and low-frequency capacities. To avoid overloading, the L.F. transformer is of only 2:1 step-up ratio, whilst a ratio of even 1:1 might prove better in many cases. No matter which transformer ratio is employed it is to be pointed out that the component should be of good quality, and having a high secondary impedance. The other constants of the circuit conform to present-day standards, whilst the anode circuit of the detector valve is suitably decoupled so that only one main H.T. positive tapping is required. A second tapping is not quite so effective, it will certainly function, and although this will not prove quite so effective, it will certainly function quite well. Should the experimenter so desire, he may employ plug-in coils instead of the two tunsers mentioned, in which case coils L.1 and L.2 should be of the same sizes as for the circuit previously dealt with. A 75 coil can be used for L.1 for both wavelength ranges, whilst suitable sizes for L.3 are 25 and 100 respectively for the two wavebands.

There are various modifications of the two general circuits dealt with, and, provided that the principles are understood, the experimenter is quite at liberty to try a number of alternative arrangements. Provided that the principles are understood, the experimenter is quite at liberty to try a number of alternative arrangements.
work, it will be remembered, was commissioned by the B.B.C. A few bars had been orchestrated, but only a moderately complete sketch of the first movement and fragments of the others are in existence. No attempt, however, will be made to put the work into a form suitable for performance. The manuscript will be placed in the B.B.C. archives.

Empire Service Developments

ACCORDING to a recent announcement by the B.B.C. in connection with the development in the coming autumn and winter seasons of Empire broadcasting, Mr. Eric Fogg has been appointed to the position of Empire music director. Mr. Fogg has been associated with Northern broadcasting since 1923. In the following year he became station accompanist at Manchester. He was appointed assistant to the music director of the North Region earlier this year.

The B.B.C. will in future be able to work as a producer, after some years' experience in other departments of the B.B.C. The dramatic programmes will be more strongly developed; there will be revues with an "Empire angle" and, among other features, gossip hours in which the programme devisers will introduce to the audience overseas pearly kings and queens, composers young and old, artists famous and unknown, shows, films, novels, and fashions.

Radio and Army Tactics

WIRELESS played an important part in the Army manoeuvres held recently in Surrey. Quite unexpectedly, a baby cow would dash up at great speed to a selected spot, a metal rod was raised, and in a few seconds an officer is in communication with a cavalry patrol near the enemy lines and with G.H.Q. in the back areas.

It was a thrilling experience to see a mass of armoured cars and other fighting vehicles moving forward and performing strange evolutions in response to command from a machine some distance away. Cooperation between reconnaissance aeroplane and land forces, too, has been revolutionized by radio telephony.

Sir Edward Elgar's Unfinished Symphony

MISS BLAKE, daughter of the late Sir Edward Elgar, recently visited Broadcasting House and handed over to Dr. Adrian Boult, Music Director of the B.B.C., the manuscript of the Symphony which Sir Edward was engaged in writing for some months before his death. This provide, by means of a new orchestra which Mr. Fogg will conduct, special concerts for parts of the Dominions where the big English-speaking communities would otherwise rarely, if ever, hear "live" performances from England. Apart from conducting the orchestra and supervising music programmes, Mr. Fogg will have opportunities of finding Empire music so far unheard or unknown in this country, and he will devote special attention to artists visiting this country from overseas.

Mr. J. B. Clark, Empire programmes director, states that while the simultaneous radiation from the Empire station of many programmes heard in this country will continue another stage will be reported in the step-by-step development of the Empire service. Cecil Madden, who has had considerable experience of broadcasting, and whose plays will be known to theatre-goers on both sides of the Atlantic, recently joined the Empire Department. He has already been responsible for many individual productions, and for series of programmes and talks. William MacLurg, a Canadian by birth, is also joining the Empire Department as a producer, after some years' experience in other departments of the B.B.C. The dramatic programmes will be more strongly developed; there will be revues with an "Empire angle" and, among other features, gossip hours in which the programme devisers will introduce to the audience overseas pearly kings and queens, composers young and old, artists famous and unknown, shows, films, novels, and fashions.

Broadcast Talks

MANY of the regular series of talks will not begin until the end of September, and it is specially arranged to meet the needs of discussion groups which do not start until October. The morning talks, however, will be in full swing from September 3rd, and those on Mondays at 10.45 during the month will be specially interesting. They are called "Family Album," and are taken from records and diaries in the possession of Mr. and Mrs. S. R. Littlewood. His maternal grandfather, Thomas Thornton, who was born in 1786, remembered the execution of Louis XVI, saw Nelson, and served as a volunteer against Napoleon in 1803. He left a very full record of the life of his day, and the first talk on September 3rd will be called "Tales of a Grandfather." The second, "Round Regency London," deals with the days when one took a country walk from Stamford Street, now just south of Waterloo Bridge, to the Elephant and Castle, and the third will be his brother's reminiscences. "When Queen Victoria was very young." The fourth returns to earlier days and tells the story of "Poor Robin," who as a boy of fifteen rode to London with William Kitchen, an ancestor of Kitchener of Khartoum.

Sunny Joy

VARIETY fans in the Scottish Region will be catered for on September 5th, when they will hear an excerpt from Harry Kemp's show, "Sunny Joy," relayed from the Concert Hall, Troon. A popular cast includes Bert Denver and Pete Davis; Herbert Carse and Lilian Wakefield; Betty Hall; Nan Kennedy; The Four Sydney Steppers; Bond Rowell; and Eric Roper and the Pensioners. The whole is produced by Pete Davis.

Motor Race Broadcast

IN the National programme on September 1st a running commentary on the R.A.C. International Tourist Trophy Motor Race from Belfast will be given.

Sir Edward Elgar's Unfinished Symphony

The new Ekko receivers have been designed and tested against a "synthetic" Droitwich which has been in operation at Ekko works for some weeks past. This instrument produces conditions of reception almost exactly identical with those which the new " giant " will bring about. A special night staff is engaged checking production models against the B.B.C. test master to ensure that the Ekko receivers will give perfectly satisfactory results under the new broadcasting conditions.

Pifco Ltd.: Change of Address

THE firm of Pifco Ltd., the well-known electrical fittings and instrument makers, in step with advancing business, are changing their address. Pifco House, with the thirtieth century, this manufacturing firm has, during its thirty years, outgrown their address. The new premises have been transferred to new Manchester, the business having been transferred to new and much larger premises. The new address is, Pifco House, Shudehill, Manchester. The telephone numbers remain unaltered—City 4044 and City 0991 (Manchester).

Random Gattlings

By Jace

"Synthetic" Droitwich

The new Ekko receivers have been designed and tested against a "synthetic" Droitwich which has been in operation at Ekko works for some weeks past. This instrument produces conditions of reception almost exactly identical with those which the new "giant" will bring about. A special night staff is engaged checking production models against the B.B.C. test master to ensure that the Ekko receivers will give perfectly satisfactory results under the new broadcasting conditions.

Pifco Ltd.: Change of Address

The firm of Pifco Ltd., the well-known electrical fittings and instrument makers, in step with advancing business, are changing their address. Pifco House, with the thirtieth century, this manufacturing firm has, during its thirty years, outgrown their address. The new premises have been transferred to new and much larger premises. The new address is, Pifco House, Shudehill, Manchester. The telephone numbers remain unaltered—City 4044 and City 0991 (Manchester).
Sunday Programmes Are Guaranteed at

Buying, Building or Begging a New

to televise me—nobody wanted my advice

stir-how she stirs you up!

stirrups

"Cinder

master) to introduce me over the 'phone as

expected Signor Spaghetti-Resisti (the ring-

fags burn your lips, and cigar-getting gives

response

them sets they saw, see?

my eloquent hands; they simply yelled

cheered and cried "Shucks

they laffed all the time I spoke;

tions," I cried eagerly, vaulting the counter

stop

up, m'boy.

like mad and shootin' answers like "Cheer

'em, it does.

the States!

miring sets and asking Qs.

WIRELESS

found myself at that darn

sniggered.

I SAW THE SHOW

FRISCO.

drawers!—FRISKY

that.

see?

guess?

where-a

Limp." (They shinned me, see?)

found I had a new complaint—"Olympia

Asked for an intro. to Kath. O'Dray, then

slick jane in flannels—on the Cootyvision

music—harps, it sounded like—so with-

hole in it, but saw nothing!

15.00:—Put my head in a box with a

1/2 from

94

1/2 from

GEORGE NEWNES, LTD., 8-11, Southampton Street, Strand, London, W.C.2

STENTORIAN

Whiteley Electrical Radio Co., Ltd. (Dept. D), Radio Works, Mansfield, Notts.

32/6

Write for the new W.B. Stentorian leaflet.

Model PMS1

You must not fail to hear a "Stentorian" on your set. You will be amazed at the difference.

Stentorian Senior

(PMS1) . . . 42/-

(10% disc. protection. (Oversize case.)

Stentorian Standard

(PMS2) . . . 32/-

Stentorian Baby

(PMS6) . . . 22/-

You have surpassed yourselves

says Mr. F. J. Camm! (Editor, "Practical Wireless")

"You have surpassed yourselves with this new 'Stentorian' speaker. I thought you had reached the apex when you introduced the 'Microlode' last
year; but to this present speaker, which I have sub-
mitted to test, I unreservedly accord full marks for a rich and enhancing quality in tone, and for an even greater sensitivity for a given input than was obtainable from your past high standard of speaker.

I feel that your engineers must always be at work striving after the apparently unattainable and attaining it!"

Such an opinion from one of the foremost

designers of to-day is not lightly given. To

a technician of Mr. Camm's experience a list

of interesting technical features alone is not

sufficient—he requires results to prove the

value of any revised design or new discovery.

In the W.B. "Stentorian," Mr. Camm

found them.

A W.B. "Stentorian" will bring an un-

believable improvement to your set!

You will hear a con-

siderable increase in

volume, due to the ex-

clusive "Nital" magnet

which at the same cost

provides an enormous

strength never before

obtainable with a "com-

mercial" material. Due
to a new method of speech coil assembly you

will find in your repro-

duction crisper "attack"

and fuller natural base, and a new "realism"

which will astonish you.

NEWNES' HOME MECHANIC SERIES

Accumulators

An up-to-date and practical Handbook dealing with every type of Accumulator. Correct methods of home-charging, care and maintenance fully described. Useful advice also given on the erection of a Charging Station. With many illustrations and diagrams.

NOTE: A complete list of subjects dealt with in this Series will be forwarded on request.

From all Booksellers and Newsagents 1/- each or by post 1½/- from
The Graham Farish "Max" Transformer

This is one of the new season's products, and is undoubtedly one of the most compact components which we have yet seen. Actual dimensions are: length 2\(\frac{1}{2}\)in., breadth \(\frac{1}{2}\)in., and overall height only \(\frac{1}{4}\)in. The windings are arranged to form an auto-transformer, and the four terminals are numbered 1, 2, 3, and 4 (in place of the more usual P., H.T., G., and G.B.). The method of winding and the tapping-points have been so designed that it is possible to use this transformer in a parallel-fed circuit, with the connections made to the terminals so as to obtain seven alternative ratios, namely 1-1, 1-2, 1-3, 1-4, 1-5, 1-6, and 1-7\(\frac{1}{2}\). The transformer therefore has great utility for the home constructor and experimenter and should find many adherents during the coming season. The advance samples which we have seen are finished in grey cellulose, with a terminal inset into a paxolin disc at one end, and a short threaded portion with lock-nut at the other end. These two points form the two poles of the condenser, and thus when it is mounted on a metal chassis one connection is automatically made in the same manner as with the normal electrolytic condenser. There are two points of criticism which we might raise, although it is possible that these will be rectified in the finished product. The first is the length of the fixing thread, which is of such a size that one can take hold of the washer and so rotate the condenser—being easily mounted on a wooden chassis, such as is used exclusively for our receivers. The second is the lack of a satisfactory identification of value. In the samples submitted this is scratched on the paxolin disc, and in the smaller values there is very little room, which prevents the value from being easily read by those whose eyes are not very keen. The name is printed on a paper band which is secured round the body of the condenser, and it would appear a simple matter to use part of this band for recording the capacity by means of a stamp. Apart from these two points, the condenser is very novel and will undoubtedly prove of great use in socket circuits where the screening will play an important part. The range at present covered, together with the prices, is given below:

- 1 mfd., 1s. 6d.
- 2 mfd., 1s. 6d.
- 3 mfd., 1s. 6d.
- 4 mfd., 1s. 6d.
- 5 mfd., 2s.
- 6 mfd., 1s. 9d.
- 7 mfd., 5s.

In addition to these condensers the new Formo range of components includes some further novelties, consisting of variable condensers, tuning dials, etc., and these are also very attractive items designed and manufactured exclusively for the home constructor. Test reports on the individual items will appear in these pages in due course.

Formo Screened Paper Condenser

This is a completely new type of condenser, which has been produced exclusively for the home constructor and which will undoubtedly find many adherents during the coming season. The advance samples which we have seen are finished in grey cellulose, with a terminal inset into a paxolin disc at one end, and a short threaded portion with lock-nut at the other end. These two points form the two poles of the condenser, and thus when it is mounted on a metal chassis one connection is automatically made in the same manner as with the normal electrolytic condenser. There are two points of criticism which we might raise, although it is possible that these will be rectified in the finished product. The first is the length of the fixing thread, which is at present not sufficient to permit of the condenser being easily mounted on a wooden chassis, such as is used exclusively for our receivers. The second is the lack of a satisfactory identification of value. In the samples submitted this is scratched on the paxolin disc, and in the smaller values there is very little room, which prevents the value from being easily read by a very short screw and no difficulty will be experienced on the score of being unable to find a sufficiently long screw for the purpose. In addition to its characteristics and general small dimensions, it has two other favourable points, the first being the very satisfactory terminals which are fitted and the second its low price. The latter is 4s. 6d., and the terminals have been previously described under the Graham Farish products, and they provide a really satisfactory contact which will not easily pull undone or come loose.

Two of the new Formo shielded condensers.

A 300-Volt H.T. Battery

A new size of H.T. battery has made its appearance this season in the Siemens Full o' Power range, and this has a rating of 300 volts. It has been designed primarily for use with cathode-ray tubes as used in television apparatus, and for this purpose it is necessary to apply approximately 900 volts. Where mains are not accessible, or it is desired to have an absolutely smooth voltage supply, three of these super-voltage batteries are joined in series and thus the battery is supplied with only two sockets, positive and negative. In view of the risk which would attend the touching of these two sockets, the word "Danger" is clearly stamped and filled in red between the sockets, as may be seen in the accompanying illustration. The experimenter will find this battery of use for many other purposes where a high voltage is required, and the capacity of the battery is sufficiently large to warrant a very long life with a moderate load. The price is 30s. The size of the battery is 11\(\frac{1}{2}\)in. by 2\(\frac{1}{2}\)in. by 9in.

The chassis of the Lissen receiver which will be reviewed next week.
PRACTICAL WIRELESS

September 1st, 1934

RADIO CLUBS AND SOCIETIES

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

INTERNATIONAL SHORT-WAVE CLUB (LONDON)

At the meeting of the London Chapter, held on August 12th, a very interesting audience listened to a lecture entitled "Electrical Instruments." Such a subject was very much appreciated by the members who are enthusiastic experimenters.

The London Chapter also held a very successful field day on Wednesborough Hill, Kent, on Sunday, August 15th, where four receiving stations were installed. The winning station, under the leadership of F. Rand, ZAH, obtained 173 points, and the runner-up, under J. H. Hunter, 2B//H, obtained 144 points. A. B. Bear, Secretary, 10, St. Mary's Place, Leicester, S.E.11.

INTERNATIONAL SHORT-WAVE CLUB (LEICESTER CHAPTER)

A demonstration of short-wave receivers and apparatus is to be held at the Leicester Chapter's head-quarters at 4B, Princess Road, Leicester, on Wednesday, August 29th, commencing at 8 p.m. C. Crump, Hon. Sec., 49, Avenue Road, Leicester.

INTERNATIONAL SHORT-WAVE CLUB (MANCHESTER CHAPTER)

The tenth meeting of the above Chapter was held at 75, Long Street, Middleton, on July 31st. As winter is now on its way, meetings will have to be held more frequently. B. Lowton, Secretary, 10, Dalton Avenue, Thatch Leach Lane, Whitefield, near Manchester.

CATALOGUES RECEIVED

To save readers trouble, we undertake to send on catalogues of any of our advertisers. Details, prices, illustrations and descriptions and prices of the latest two volt, A.C., and Universal receiving valves, together with some very interesting illustrations showing constructional details. Following this a large section is devoted to tubes covering full characteristics and operating data of the complete range of Mullard receiving valves, including earlier types which may be required for re-valving. The information contained in this section includes anomot current, characteristics, modes and auxiliary grid voltages, appropriate values of grid bias voltages, and filament operating values of anode current. In the case of output valves the optium load is also given. This is followed by a column giving an indication of the type of base fitted to each valve, and another column stating whether the valve is obtainable with metalized base. Copies of this catalogue are now available.

EASY TERMS

Every Radio requirement, however extraor dinary or modest, is supplied by us on the most convenient terms, and with the utmost expedition and courtesy. Continuously established since 1925, we maintain our reputation which increasing numbers rely. We deal with you direct and all transactions are strictly private. May we have your orders and inquiries?

New Mullard "M.B." receiver, complete with all batteries and valves, ready for use. This set is a great advance on any battery receiver heretofore available. Cash Price £1-4-0 or H/10, with order and 12 monthly payments of 15/-.


New Blue Spot Pick-up, with volume control. Cash Price £1-7-0 or H/9, with order and 5 monthly payments of 5/-.

New W.B. Stentorian Senior L.S. Unit. Cash Price £2-2-0 or H/15, with order and 8 monthly payments of 5/6.

New W.B. Stentorian Senior L.S. Unit. Cash Price £3-9-6 or H/15, with order and 12 monthly payments of 5/6.

New Blue Spot Test Meter. (A most valuable equipment, enabling faults to be rapidly traced) Cash Price £2-4-0 or H/15, with order and 12 monthly payments of 5/-.

Full specification and illustrated list of any of the above will be sent on request.

Everything shown at Radiolympia can be supplied by us on the most convenient terms. Quotations by return of post. All Carriage Paid.

To avoid delays, will customers kindly send first payment with order.

LONDON RADIO SUPPLY COMPANY

10, LITTLE NOLAN STREET LONDON, E.C.2

CUT THE CRACKLE OUT OF RADIO

Do your radio programs suffer from buzzing, clicks and crashes caused by electric signs, etc. Write for this book, which gives details of the methods evolved by the Post Office and by engineers throughout the world for suppression of electrical interferences with Broadcast. Results of extensive research work conducted by Belling & Lee, Ltd., are also included, together with 37 illustrations.

GET THE MARVELLOUS NEW STENTORIAN BABY SEN-ROR FOR 7 DAYS TRIAL

W.B.'s most remarkable achievement! Includes the secret of an auxiliary new "Babyl" valve, giving nearly TWICE THE VOLUME of any current commercial receiver, yet cost only amazingly AMAZING, ABSURD. You must try it!

E. J. HERAUD, Ltd. (Dept. P.51), NUMBER ONE, EDMONTON, LONDON, N.14

Cut this book from your radio dealer or post free 6d. to E. J. Heraud Ltd., 114, Oval Lane, Enfield, Middx.

BELLING & LEE LTD

CAMBRIDGE ARTERIAL ROAD, ENFIELD, MIDDX

Please forward this "Cutting the Crackles out of Radio" book is 6d. in stamps.
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.

"Points about Servicing II"

Sir,—I agree with Mr. Whitehouse that good meters are essential in radio, but why does he contradict himself in his climate, when writing about untrained representatives of firms who are sent along to find out the cause of the trouble, one who cannot even talk intelligently about wireless, let alone trace an error on the instalment plan; a man was sent to fix it. The purchaser having no knowledge of wireless asked me to drop in and pass an opinion on the set.

After transferring the aerial lead from the earth terminal to the aerial, and race sets, I told him that the money I considered the set satisfactory.

Everything was O.K. for several months, until, when the set dropped in one day, I noticed the set was tied round with rope attached to a book above. Upon asking the reason for this, I was informed that the set had been serviced at least eight times before, and the dealers had been notified, the service man arrived, switched on the set, turned it in the direction described above, when a station suddenly came in. The service man then explained that the set must be turned in the direction of station in it was desired to receive.

Well, I switched on the set and tuned in a station, then gradually moved the set back to its original position, when I again ceased with a click. I then took hold of the aerial lead-in and gently shook it. Terrific crackling arose with intermittent reception. Repeating the aerial plug, it was found that the type of which the lead-in is threaded and an insulating head, and pin screws were tight, replacing the wire between top of pin and inside of head.

This pin had become slightly unscrewed, so when the set dropped in one day, the aerial position the aerial lead-in was forced off the head of pin. The fact of turning the set slightly caused wire to be forced in the proper direction on to the pin.

The same service man, when asked about an extra speaker so that reception could be heard in other rooms, said that it was possible; sible as speaker was incorporated in the set, and it was only in sets having the speaker separate, that this could be done. These may be exceptional cases, but they only go to show that the heads of firms are not sufficiently careful in their choice of employees.—OBSERVER (Southampton).

Radio in Ceylon will—On page 426 of your June 30th issue, there appeared an article entitled "Radio in Ceylon." We agree, in the main, with your contributor's comments, but it is worth pointing out that correct, the Ceylon Broadcasting Service is run . . . with the modest income of about Rs. 5,000. It would be more correctly say "with a modest sum of about Rs. 5,000 for provision of programmes." With regard to the statement that the Ceylon market is held by the Japanese and Americans, the Customs return does not support this.

During the eighteen months ending June 30th, 1934, wireless goods to the value of Rs. 173,284, have been imported into Ceylon ; of this total, the United Kingdom was responsible for Rs. 107,892, for the United States, for Rs. 7,321; and Japan Rs. 5,796. It is conceded, however, that unless British wireless sets take steps to equalize prices before the notice of the Ceylon buying public, they will assuredly lose the market to the United States, Germany, and Japan.

There were two other inaccuracies in the article. Firstly, the duty on foreign wireless goods is 25 per cent. (not 15 per cent.), while the duty on British wireless goods is 15 per cent. (not 12 per cent.). Secondly, wireless sets for use in Ceylon should be capable of reception of signals from 15 metres to 500 metres (not 400 metres).—H. H. BENNETT (London, E.C.)
The New Long-wave Station

"I am building a Quality local station set, but am in a little doubt regarding the new long-wave station that will be in operation soon. I do not wish to incorporate long waves if possible. Will the B.B.C. still broadcast on the medium-wave National? If so, will the quality be up to the same standard as the new long-wave station?"—J. F. (Kilburn, N.W.)

So far as we understand at present, the intention is for the Droitwich transmitter to take over most of the London National transmitter, which will close down. The higher power of the long-wave transmitter will, I hope, enable you to obtain better quality, although much depends upon the circuit which you intend to use. The National programme will be radiated from Droitwich and the Regional programme from the London station, so that you will need medium and long waves to receive the alternative programmes. It would be advisable, however, to wait for full details concerning the B.B.C.'s proposals regarding this before deciding upon your proposed one-hand receiver.

Modifying a Choke

"I have built a one-valve set, and although I get very good results on the medium waves, I do not get very loud signals on the long waves. I turn the reaction knob and the set does not oscillate so well on long waves, and it seems that the H.F. choke is not large enough. I am not certain regarding this, however, and should like your remarks concerning whether I should add any turns to it, and, if so, how many."—T. R. (Leicester).

We do not think your solution is the correct one, as the choke should function satisfactorily on both bands. It is more probable that the reaction winding is not large enough, and if you use a coil with a single reaction winding, operating on both bands, the coil may be spaced too far from the long-wave grid winding, or if separate reaction windings are in use, then the long-wave reaction winding needs more turns. Try also an increase in H.T. voltage.

Screening a Pick-up

"I am using an electric motor with a pick-up which has a bakelite case. I get a lot of hum from the motor and I prove this by putting the pick-up over the turntable with no record, and you can hear the hum very loud. Can I stop this in any way?"—Y. W. S. (Brighton).

A great deal depends upon the type of motor. If this is of the standard type it may be found quite sufficient to place a sheet of metal or metal foil between the motor-board and the motor and to earth this. If, however, the motor is of the synchronous type this will not be of any use and the only satisfactory solution is to use a pick-up fitted with a hum-bucking winding. It may be found possible to cut a disc of thin tin, as large as the turntable, and to mount this on the present turntable, and to cover the tin with felt, but the difficulty of providing an effective earth connection to the tin renders the device rather impracticable.

Condenser Punctures

"I have made up a mains unit which has been in use for about eight months. I am, however, continually having trouble with the smoothing condenser across the choke. This keeps on puncturing, and I have always used a good make. Can you tell me how to prevent this trouble? Does it indicate that the mains unit is wrong somewhere?"—J. N. (Doncaster).

The most likely cause of the trouble is that the condensers which you are buying are not of the correct rating. We presume that by the term "across the choke" you mean between the H.T. positive and negative lines. The condenser should be of the type designed for a working voltage which is double that of the rectified output of the rectifier. By using this rating you will be assured of freedom from breakdown. You have probably chosen condensers having a rating equivalent to the rectified output.

A Dual Circuit

"I have been looking up some old books, and have seen a reference to dual circuits. I cannot find any trace of the meaning of the word "dual," and should be glad if you could explain it."—K. H. Y. (Durham).

The term is another expression for what was once a popular circuit, namely, the Reflex circuit. In this arrangement a valve acted as an H.F. amplifier as well as an L.F. amplifier, acetification being carried out by means of a crystal detector. An article is included in this issue dealing with this type of circuit, and you will no doubt find this of interest.

Valve-holder Adaptor

"I am very keen on experimenting and have an experimental three-valve set. I want to be able to use H.F. pentodes and Class B output valves, etc., without the necessity of changing the valve-holders and the wiring each time. Can you tell me whether there is on the market a four- or five-pin to seven-pin adapter which could be plugged into my present four-pin holder so that the seven-pin valve could go into the adaptor without any more wiring?"—W. R. (Bolton).

We do not know of any adaptor of this type. The extra connections required with the seven-pin valve will necessitate certain connections to the adaptor and you will not be able simply to remove four-pin valve and plug in a seven-pin valve in the adaptor without making other modifications.

Moser_Bulgin are marketing a multi-valve feter in which a similar arrangement is employed, and the new Avodaptor employs a 7-pin adaptor and plug. Probably the Bulgin parts will be obtainable separately at a later date.

A Low-pass Filter

"Can you please explain what a low-pass filter is? The term was mentioned in one of your articles recently, and I find that the whole purport of the article is lost to me as I cannot understand what is meant by this type of filter."—W. S. (Bodmin).

A low-pass filter is an arrangement of impedances, designed to pass low frequencies and to stop high frequencies. The name is therefore self-explanatory. A typical example of a low-pass filter is to be found in the anode circuit of a standard detector valve, where an H.F. choke is wired in series with the anode and a fixed condenser is joined between anode and earth. The choke prevents the passage of high frequencies, but permits low frequencies to pass on, and the condenser acts in the opposite manner. The smoothing circuit of a mains unit (choke and condensers) is a similar example.
PREMIER SUPPLY STORES
Offer the Following Manufacturers' Surplus Goods at a Fraction of the Original Cost; all goods guaranteed perfect, carriage paid over 5/-, postage 6d. extra, I.F.A. and abroad, carriage extra. Orders for less than £1 cannot be sent O.O.D. PLEASE state whether power or Pentode required ; write for quotations and Lists Free.-Queen's Place, Strand, Strand, London.

PREMIER PRACTICAL WIRELESS
September 1st, 1934
COMPLETE AUGUST LISTS NOW AVAILABLE.

THE 'GOLD-MINE' STORES

delivery. (ordering 3d. stamps) to-day.

ponents and accessories) yet produced, with a general

prehensive lists

"RADIO GOLD-MINE."

I

2/3

2/11

2/11

COMPLETE AUGUST LISTS NOW AVAILABLE.

The 'GOLD-MINE' STORES ('phone National 7473

7/00, 1-5 megs. 2 watt. 9d.

L.F. CHOKES, 20 hen., 6-terminal base.

densers, .0003-.0005.

xtr.

GRANIC Pentode tapped Choke. provides tappings

VTERMinals, 6/-.

Radiophone Straight Line

ELECTRA DIFFERENTIALS, .01

ASTRA DIFFERENTIALS, .01

id.BROWNIE

Vterminals, 6/-.

COLUMBIA L.F. TRANSFORMER, 3

H.T. 9 MAINS TRANSFORMERS, .99.

H.T. 7; H.T. 9 TRANSFORMERS,

H.T. 10... Baseboard or Panel mounting, 1/3.

GRANT DIFFERENTIALS. complete, 4/9.

VAUXHALL.-Radiophones, Band-pass or R.P. superhet., with Lucite wavemeter, 10 ft. long, 8/-.

VAUXHALL.-Radionics radio, with switch. 3/-6.

Utility Twin Gang condensers with

Utility Fast and Slow Motion, airspaced variable condensers.


WESTERN ELECTRIC MICROPHONES, boxed, very sensitive, at 2/6 each, also transformers for use with above (80 v., 500 v., 1000 v., 2500 v., 5000 v., 10,000 v.) every one guaranteed perfect. 2/6 lot, post 3d. Parcel B, containing 26 transformers, including all above: thirteen additional useful values, including several 2 watt, 7/6 post teen.

WESTERN ELECTRIC MICROPHONES, boxed, very sensitive, at 2/6 each, also transformers for use with above (80 v., 500 v., 1000 v., 2500 v., 5000 v., 10,000 v.) every one guaranteed perfect. 2/6 lot, post 3d. Parcel B, containing 26 transformers, including all above: thirteen additional useful values, including several 2 watt, 7/6 post teen.

PARCELS.-Let us quote for your valve and component requirements.

PRACTICAL WIRELESS

PRACTICAL WIRELESS

IT SIMPLIFIES ALL SOLDERING

All Ironmongers sell Fluoxite in tins : 4d., 6d., 8d., 10d., 12d. Ask to see the FLUOXITE POCKET SOLDERING SET-complete with four attachments.—6d. Also ask for our leaflet on HARDENING STEEL with Fluoxite.

FLUXITE, LTD. (Dept. W.P.),

Dragon Works, Bermondsey Street, S.E.1.

ALL MECHANICS WILL HAVE

IT SIMPLIFIES ALL SOLDERING

All Ironmongers sell Fluoxite in tins : 4d., 6d., 8d., 10d., 12d. Ask to see the FLUOXITE POCKET SOLDERING SET-complete with four attachments.—6d. Also ask for our leaflet on HARDENING STEEL with Fluoxite.

FLUXITE, LTD. (Dept. W.P.),

Dragon Works, Bermondsey Street, S.E.1.

FREE ADVICE BUREAU

FLUOXITE COUPON

This coupon is available until September 8, 1934, and must be attached to all letters containing orders.

PRACTICAL WIRELESS, 1/9/34.

ADVERTISMENT INDEX

Bellings and Lee

British Blue Spot Co., Ltd.

Carnation, Ltd.

Cassett, Ltd.

Electric Radio

Flaxco Ltd.

Gilbert, J. Co.

Holmes, H. Ltd.

International Correspondence Schools

Fluxite, Ltd.

George Electrical Co.

Herold, E. Ltd.

London Radio Supply Co.

Peto-Scott, Ltd.

Whitley Electrical Radio Co., Ltd.

Wigram and Rogers

Our New Monthly

Practical Television

Electric Radio Frequency Records

For Testing, Speaker, Set and Microphone.

These Grams. Records are all constant in sound quality and the harmonic content is less than 5 per cent.

100 cycles per second at 100 and 500 cycles per second at 2000 and 6000 cycles per second. one minute of each.

Short bands of 20, 30, 40, 50, 60, 70 cycles per second. the 2000, 4000 and 6000 cycles per second band for test purposes only.

2/6 Per Record. £1 Set of Ten.

Write for Special Exhibition Bargain list "N" ELECTRACOw RADIOS


Telephone: Central 4611.
Thousands of listeners have proved the greater purity of tone and the definitely longer life.