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East Pittsburgh’s New Aerial

KDKA, which claims to be the world’s pioneer broadcasting station, will shortly erect a new aerial 750ft. in height; it is of a unique design, and the engineers claim that it will not only increase the range of the transmitter, but will do much to overcome the interference tendency to fading.

British India Becomes Radio-minded

ALTHOUGH, at present, notwithstanding its vast population, British India can only boast of possessing 28,000 listeners, this figure already shows a 50 per cent. annual increase over the past three years. Everything is being done to popularise radio entertainments, and the installation of further stations, it is thought, will increase considerably the desire of the natives to acquire wireless receivers.

Uruguay Aspires to a Fifty Kilowatt Station

FOLLOWING the example set by the United States of America and Mexico, Uruguay is now planning the construction of a high-power station to be installed in the immediate neighbourhood of Monte Video. The Servicio Oficial de difusion radio electrica is responsible for the development of the project. When completed the transmitter will work on 461.4 m. (600 kcs), and should be heard in Europe, as are some of the most powerful stations in Buenos Aires (Argentine Republic).

Poland May Acquire Another Relay

POLSKIE RADIO is said to be considering a further addition to its network by the installation of a 20-kilowatt relay transmitter at Lutsk in the province of Volhynia. This town is situated to the north-east of Lwow and is considered beyond the range of the latter’s broadcasts.

Do Radio Programmes Affect the Shoe Trade?

THIS question is one which has been interesting the boot and shoe industry in the United States. It has been computed that on radio star nights the large listening population is satisfied to stay at home, and, in consequence, proportionately less work is provided for the cobblers in repairs to footwear. The reason was actually put forward as being one of the staple causes for increased unemployment in this particular industry.

Is There To Be a Short-wave Plan?

IT is unofficially reported that following a recent conference a special commission appointed by the U.I.R. (Union Internationale de Radiodiffusion, Geneva) is now steadily working out a plan for the allotment of short-wave channels to recognised broadcasting stations. Such a scheme will not deal with Europe alone, but will comprise the short-wave transmitters throughout the world, and allot suitable frequencies in accordance with their geographical positions.

More Entries for the Kilowatt Stakes

The Czech broadcasting service proposed to build a 20-kilowatt transmitter, to be known eventually as Prague 2, on a suitable site between Melnik and Raudnitz, and an even more powerful station is to be erected near Brno; both are to be ready to operate by the end of 1937 or early 1938. Prague 2 will take over the Moravská-Ostrava channel. At Uzhhorod, in the Carpathian district, it is also planned to put up a 100-kilowatt station. The opening of relays at Carlsbad and Budweis are still under consideration.

Soft Lights and Sweet Music

K HBC, at Hilo, and KGMB, in Honolulu, both popular broadcasting stations in the island of Hawaii, have been recently endowed with new studios; in view of the warm climate artists perform in a surrounding of palms and exotic flowers. The studios are built of sugar cane!
THE PICK of the PROGRAMMES

Brass Quintet
FRANK BIFFO'S BRASS QUINTET, which broadcasts in the National programme on June 30th, consists of four brass and two trombones, and a piano. Nothing like it has ever been attempted before. Tired of hearing matrimonial string quintets and octets, Frank Biffo determined to present something entirely different. The instrumentation of four brass and a piano is quite unique, and consequently every number is specially orchestrated.

The Royal Show at Bristol
THE Royal Show, which comes to Bristol from June 30th to July 4th, will be discussed in the feature, "Singer, Vet and Farmer in Particular," on June 25th. - It is some twenty years since the Royal Show last visited Bristol, and no doubt those who saw the earlier Show will find many differences in the 1936 Show, which opens in Ashton Park, near Bristol, on June 30th. It is hoped that the President and the Honorary Show Directors will come to the microphone with A. W. Ling on June 25th, and that they will indicate what is to be seen at the Show.

Light Music from Edinburgh

Light Music from Bridlington
LIONEL JOHNS and his Orchestra, will broadcast a programme of light music from the Floral Pavilion, Bridlington, on June 30th, their programme including a selection from Ivor Novello's musical show, "Glamorous Night." Thomas Kay's xylophone will be the soloist in "Zits," by Charrois.

Wolf Ferrari Opera
ON July 4th the short opera, "Susanna's Secret," by Wolf Ferrari, will be given by the B.B.C. Midland Orchestra, conducted by Leslie Howard, and two soloists-Harold Williams and Noel Edric Robin Whitworth, who has gone to Midland Regional for six months, chiefly to do feature production work. The plot, delightfully handled by the composer, concerns Susanna's secret habit of smoking, which leads her husband, when he gets a whiff of tobacco-laden air, to suspect a lover!

Variety from Midland Regional
PATRICIA ROSSBOROUGH, who has been on tour with Elsie and Doris Waters and Clapham and Dwyer, is to return to the Midland programme on July 1st with her "syncopated pianism." The vocalist will be Jim Collier, of Birmingham, who spent some years in Canada and the States, and broadcast regularly there. He is known as "The Singing Lumberjack."

Recital by W. H. Squire
ON June 29th W. H. Squire, the cellist and composer, will give a recital, including three of his own works-a serenade, Meditation in C, and Larghetto in D. Mr. Squire was born at Ross-on-Wye, in Herefordshire.

Military Band Concert
THE R. A. Lister Military Band, conducted by S. W. Wedgwood, will broadcast in the Western Regional programme on July 3rd, when Lorna Cantor (soprano) will be the vocalist. The R. A. Lister Military Band, will be heard in many seashore places this summer, from Eastbourne in the South-east to Torquay in the South-west. Last year it spent one week at Bognor, Weymouth, and Bournemouth, and this year they have been engaged for a fortnight at each of these three places. Lorna Cantor belongs to a Concert Party called "The Melody Five."

Northern Concert Parties
TWO concert party shows will be included in the Northern programme on July 2nd. Broadcasting in the afternoon, the "Arendian Polka," from the South Pier, Blackpool, will also contribute to the main Regional "pool" programme. Harry Corris, the well-known Max comedian, will no doubt be remembered by listener, who heard this troupe last year. In the evening, the "Bouquets," presented by Murray Ashford, and broadcasting from the Spa Theatre, Lytham, will be shown. This concert party includes Gladys Sewell (comedienne), Laurel Goodwin (soprano), Frederick Carter (baritone), and Murray Ashford himself (entertainer).

The Silver Cord
LISTENERS who remember Edna Best's magnificent performance in "A Bill of Divorcement" will welcome the news that she will shortly return to the microphone in a special adaptation of a famous London stage success. "The Silver Cord" was first presented at the St. Martin's Theatre in 1927, and enjoyed a run of nearly two hundred performances. It is by the well-known American dramatist, Sidney Howard, and the radio version has been prepared by Barbara Burnham. The play deals in a highly dramatic fashion with a problem that is at once frequent and tragic—the conflict of wills between a highly possessive mother and her children. Gladys Young, an experienced broadcast artist, will have the part of her life as the mother, while Edna Best will take the role of the daughter. The play, which will be produced by Val Gielgud, will be broadcast from the North on June 29th, and from the Regional on July 3rd.

SOLVE THIS!

PROBLEM No. 197.

Newton was not satisfied with the reproduction obtained from his four-valve straight receiver and, therefore, as the volume of the required stations was more than ample for his requirements he decided to substitute a W. Westcott for the reacting detector. He joined the positive end of the Westcott to the plate of the coil and fixed the tuning condenser in the normal manner, and the negative end via a .25 mfd. fixed condenser to the P terminal of the existing L.P. transformer, with the H.T. and, G.R. terminals of this component joined to H.T. grid of output valve, and G.R. respectively. What were the results when the receiver was switched on ? Three books will be awarded for the first three correct solutions offered. Post your entries to the Editor, to reach this office not later than the first post Monday, June 27th, 1936.

One of the ordinary 25-watt 60-watt lamps normally used for lighting purposes could have been connected in place of the burnt-out dropping resistance.

The following three readers successfully solved the "magic" problem: C. C. Cossor, London; R. M. L. Brown, Smethwick, Staffs; and J. Maclean, near Bristol.
Mains Transformer Design

Some of the Important Features in the Design of the Mains Transformer with Special Reference to Commercial Components

There are many experts who hold that the mains transformer is the most vital part of a mains-operated receiver; but even if this is not so, there is no doubt that the performance of the A.C. receiver depends upon the efficiency of the transformer which is used to supply the various voltages from the A.C. supply. Firstly, it is understood that one of the great advantages of the A.C. supply (or of any alternating current, for that matter) is that it may be transformed to a higher or lower value, and this is a valuable feature which is denied to the user of a direct-current supply. One point must be emphasised, however, and that is that the wattage cannot be increased. In other words, if the voltage is stepped up, then the current will automatically be stepped down, and by stepping down the voltage the current may be increased.

The Principle of the Transformer

The principle upon which the transformer works is extremely simple, and merely consists of the transference of current from one winding to another by induction. If a coil of wire is placed near to another coil of wire, and an alternating current passed through one of the coils, a voltage may be measured across the ends of the other coil, and it so happens that the relationship between the voltage in one coil and that in the other is dependent upon the number of turns of wire in the two coils. Thus if a supply of 10 volts is applied to a coil consisting of 10 turns, and a coil consisting of 100 turns is placed close to it, 100 volts will be developed in the second coil.

In practice, the linkage between the two coils is increased by placing the coils over a core of iron in the usual manner, and this increases the inductance value of the coil and prevents certain forms of loss.

Regulation Factor

There are, however, some other precautions to be taken when designing a transformer to carry heavy currents, one of the most important being the question of the total wattage to be carried. Firstly, the gauge of wire employed for each winding on the transformer must be selected so that the maximum current may be carried without an undue rise in temperature; and secondly, the primary winding must be designed with a full knowledge of the total loading of the various secondary windings. The correct selection of these gauges, in conjunction with the choice of the size of the core, will govern the output, and in a well-designed transformer there will not be a great deal of difference in the voltage when the current is varied over a fairly wide band. The better the transformer the less the variation, and this enables the various details of the wireless circuit to be more accurately worked out.

Avoiding Hum

As the primary winding carries the alternating mains supply, there will be a similar alternation in each of the secondaries, and therefore the winding employed for the high-tension supply will have to be connected to a rectifier to convert it into a direct-current supply. This winding is very important, and in order to eliminate all possible risk of hum in the receiver there

(Continued on next page)
In some makes of transformer there is also a whole time the transformer is in use, and a free flowing current of air during the overrun, due either to temperature rise in the event of an overload. Normally the transformers do not run sufficiently hot to warrant this precaution, but it is a very good thought on the part of the makers. In the Savage Massicore transformer the windings are not enclosed, and the use of an extremely substantial core guards against the possibility of hot running. The Varley transformers, too, are built on these lines, and the windings should remain cool under all normal conditions.

Methods of Connection

With regard to the methods of making connection to the transformer windings, the makers seem to be divided. One of the main requirements is safety, and if there is the slightest possibility of a lead becoming detached from a connecting point there will be a risk of short circuits which may result in damage not only to the transformer but also to other components of the receiver. Thus, for this reason, one manufacturer will provide soldering tags for connecting purposes, whilst on the Heavyd components a plug and socket connection is adopted, and the plugs are engraved with suitable markings to ensure the correct connection should they be removed at any time. Terminal connections are quite satisfactory provided they are correctly made, and ordinary flex should not be employed where the terminals are close together unless special precautions are taken. When ordinary flex is locked under a terminal head there is a possibility of one or more of the strands of wire becoming loose and projecting from the terminal, and it may come into contact with a similar strand projecting from another terminal. Therefore, a correct tag should be affixed to the ends of the wires, or the flex should be twisted between the fingers and the bared end dipped in solder or otherwise tunnelled to form a single solid connection, this may then be treated as a solid wire and bent into a loop which cannot come adrift.

H.T. Smoothing

In connection with the smoothing of the H.T. supply, a high-inductance choke must be employed, and to avoid some forms of interference which are carried from the actual mains supply, it is sometimes preferable to connect an H.F. choke in each mains lead. Such chokes must be specially designed and have thick wire so as to carry the high current. Furthermore, it is desirable that they should be screwed and totally enclosed to avoid the risk of shocks. The circuit shown on this page is designed on these lines, and consists of two chokes which should be connected as shown in the small inset diagram. It will be noted that the component is provided with a metal case for earthing purposes in order to comply with the standard regulations, and when ordinary home-made chokes are employed they should be similarly enclosed.

The problem of interference arising from the mains supply has been dealt with in previous articles, and the various forms of eliminating device may be joined between the mains leads to the transformer.

Mains Supplies

A final word of warning should be given concerning the connection of apparatus to the mains supply. When a receiver is designed for "universal" mains use, no transformer will be fitted. If a receiver is designed for A.C. mains use, and fitted with a mains transformer, is connected to a D.C. mains supply, the primary of the mains transformer will be burnt out (unless fuses are fitted). The question of the frequency of the A.C. supply must also be borne in mind, and it is possible to use a transformer designed for one frequency on mains of a different frequency, this course should not be adopted in view of the risk of hum and other difficulties.

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Aerials have always been considered an additional risk where lightning is concerned, but the possibility of the aerial or house being struck by lightning due to the aerial is, as statistics prove, very minute.

Lightning plays the most fantastic tricks, and there is no knowing where it will strike, but there are one or two facts which should not be overlooked. It invariably takes the quickest and least troublesome path to ground, and usually strikes the highest point in its striking area.

Knowing these details, it is possible to provide some means whereby, shall we say, the lighting’s requirements are fulfilled, and, at the same time, some reasonably secure protection for buildings and other earthed objects.

What is Lightning?

It is not necessary to go into the theory of the cause of lightning, the various forms it takes or its characteristics, therefore, for our purpose a general statement will do.

Electricity is always present in the atmosphere; it is usually accepted that the earth is at negative potential, and that it is possible for clouds to become highly charged with an opposite polarity. When a certain difference in potential is reached between the clouds and earth, a discharge takes place, the magnitude of which depends on the state of the atmosphere, and the charge held by the cloud or clouds.

The discharge usually takes the form of what is commonly called “forked lightning,” and, owing to the inconceivable amount of electrical energy it dissipates, it is capable of causing considerable damage to any object it may strike during the course of its travel earthwards.

It also happens, even when no storm is in the vicinity, that the atmosphere reaches a highly charged state, and while the quantity of electricity may not be sufficient to cause a violent discharge, it is often sufficient to charge up metal bodies to a high potential which is capable of giving an unpleasant shock if taken to earth through one’s body.

Lightning Conductors

It is evident, therefore, that some form of protection is desirable, and it is usual to employ “lightning conductors.” These consist of a stout metal low-resistance conductor, one end of which terminates in the earth, and the other end in a forked prong which projects above the building or object it has to protect. Good examples can always be seen on high buildings, churches, masts, and factory chimney stacks.

Each conductor, or arrester, as they are sometimes called, projects a certain area, and it may be stated, approximately, that the effective area is equal to a circular space around it, the radius of which is roughly double the height of the conductor. Bearing these details in mind, it is obvious that if any protection is to be given to an aerial, much will depend on the actual length of the aerial, its height and the surrounding objects.

Aerials and Arresters

We have seen that a discharge of lightning represents a terrific electrical power, and if any resistance is offered to its progress it is possible that the resisting body would be completely burnt. It is known that heavy metal objects and lightning conductors have been melted by a lightning discharge; therefore, it hardly seems feasible to think that the small gauge wire usually employed for arresters would stand much hope of remaining intact if struck, especially as it is invariably at right angles to the path of travel.

Details of a Simple but Efficient Lightning Arrester are Given in this Article. By L. Ormond Sparks

Lightning plays the most freakish tricks, and it may be stated, approximately, that an aerial is likely to conduct a destructive charge into or to a house, unless it happens to be in a very high and exposed part, and not surrounded by other earthed objects of a greater height.

In the case of ordinary atmospheric discharges, it is possible for the aerial to become highly charged, particularly if it is not earthed either through the set or by a switch, so some means of allowing the charge to escape harmlessly to earth should be provided.

All that is necessary is an efficient spark gap arrangement, the width of the gap being so adjusted that any excessive charge would jump or flash across the gap, one side of which is connected to the aerial, and the other side to earth. Various fuses are producing suitable devices which can quite easily be fitted to any existing aerial arrangement.

If anyone has any doubt about these static charges, I would suggest that they watch the spark-gap when a storm is taking place, or summer lightning is in the vicinity. With my own aerial, which happens to be rather high and exposed, I have not only seen quite large flashes, but I have also heard charges cracking off the free lead-in wire, and it was after one of these practical demonstrations of that kind that I decided to design some arrangement to keep the aerial free from such objectionable surprises.

A Simple but Effective Static Arrester

This arrangement, as will be seen from the diagram, consists of a single conductor, one end of which is terminated in the earth, and the other side to a forked prong. The forked prong is provided for the same reason as those fitted to a proper lightning conductor.

Inside the tin case shown in Fig. 2 is housed a very efficient multi-point spark gap, and one side of this is connected to the prong section and the aerial, thus allowing either a heavy discharge to have a straight line to earth or, a static charge on the aerial to be attracted to earth.

(Continued on page 398)
A LTHOUGH one of the most reliable pieces of apparatus included in those parts which go to make up a wireless receiver, the moving-coil loudspeaker is nevertheless a delicate instrument. In the accompanying sketch is shown a section of a typical movement from which it will be seen that the moving-coil A is wound on a paper tube which is in turn cemented to the cone. The cone is central with BC, the pole faces of the permanent magnet F. The flexible supports D (a flexible disc fastened to the centre pole piece and ‘spider’ E) and B (a soft leather ring connecting the outer edge of the cone to the supporting framework, or sometimes even a corrugated continuation of the cone itself) all ride with almost free movement of the coil and cone. When current passes through the coil in one direction, the interaction between it and the magnetic flux passing across the annular gap BC moves the cone one way. As the current is reversed, so also is the movement of the coil. In this way, audio-frequency alternating current causes the coiled wire to move in one direction and then in the other, and the cone is thus driven to and fro to produce music or speech as the case may be. The magnetic flux produced by the magnet F passes through the upper pole piece B across the gap to C and then down to the lower pole piece through the lower pole back to F. This energised moving-coil loudspeaker works on exactly the same principle with the difference that a large coil of many turns of wire, through which the D.C. current passes, is fitted round the centre pole-piece, thus forming an electro-magnet, which causes the magnetic flux to pass through the air gap.

Mechanical Faults

Since, by virtue of the use of a matching transformer, high alternating current can pass through the speech-coil, it follows that the faults most likely to develop in a moving-coil loudspeaker are mechanical, including the following :-

1. Dust particles in the air gap.
2. Warped speech-coil former, “spider” or cone.
3. Joints between speech-coil former and cone, “spider” and cone.

A section of a typical moving-coil loudspeaker.

Faults which are Most Likely to Develop, and Their Remedies are Discussed in this Article

A. W. FLINT

Out of Doors

THE eighth and final talk in the series “Out of Doors,” by Henry Williamson, will be broadcast on June 29th in the Western Regional Programme. It is not surprising that this series of talks has brought a large number of letters of appreciation from all listeners in parts of the country.

Northern Command Tattoo

RAVENSWORTH CASTLE, scene of the Northern Command Tattoo, has again been lent to the military for this event. The Castle, which stands some three miles south of Newcastle-upon-Tyne, is an imposing sight and is, in itself, an attraction to the Tattoo, forming as it does one side of a vast natural amphitheatre, eminently suitable for the evolutions of troops. Excerpts from the “full dress rehearsal” on July 1st are to be broadcast, but it is not yet possible to state precisely which items will be taken, and listeners are advised that only a fraction of the Tattoo will be heard. It is, however, fairly safe to say that listeners will hear the Massed Pipe and Massed Drums and Bugles Bands. The commentator’s comment is not yet available, but will describe such items as the reconstructions of scenes from early Northumbrian history and the horse and motor-cycle display by the Royal Corps of Signals. Gaps will be filled by musical interludes from the studios, supplied by Jos. Q. Atkinson and his Quintet.

The Gwen Lewis Entertainers

LISTENERS may remember that last year the Gwen Lewis Entertainers broadcast from the Adelphi Gardens, Paignton. This Concert Party is returning to Paignton this summer, and will broadcast the Western Regional Programme on July 1st. The Party made their first appearance in 1926 at Broadstairs and proved a great success. They were engaged for two more consecutive years, and since then they have had seasons at many other seaside resorts. Gwen Lewis has taken part in Empire broadcasts to India, Australasia and South Africa.

PROGRAMME NOTES

“Out of Doors”
Crooning Goldfish

This is not a new form of oath to replace 'ods fish, or 'ods bodikins! By my halidom I up and smite thee hip and thigh. I am referring to a recent news paragraph that a man has proved that while goldfish are dumb they can hear, and he claims to have taught them to listen to the radio. That must account for the sad wagging of the dorsal fin of the small vertebrata which swims about the bowl in Thermion Villa. It must have been listening to the B.B.C. about the bowl in Thermion Villa.

Teaching a goldfish to croon.

The correspondent referred to is certain that goldfish hear owing to the various habits they have of responding to varying broadcasts. The correspondent referred to is certain that goldfish hear owing to the various habits they have of responding to varying broadcasts. I understand that the sight of the poor fish gnashing its tail in fury on hearing crooners and "the foundations" brings tears to the eyes of the fish.

Lessons by Television

Reading my weekly newspaper the other day and the sensational blurb about television, I learned that among the first things to be televised will be complete courses of lessons in flying, riding a horse, and swimming.

Therefore next winter you may picture me anxiously grasping an umbrella as a joystick and with feet on the hearth simulating the movements of a pilot, and enjoying all of the delights of flying with none of the risks. Of course, I do not take these blurbs seriously. I am sure the B.B.C. has found out its mistake in using the radio chiefly for uplift and that it will not make the mistake of using the television programmes for educational purposes only. Will the children's hour consist of a blackboard lesson in the multiplication table and the alphabet—"a" for horses, "b" for mutton, "c" for a holiday, "j" for oranges, "l" for leather, "i" for Novello, and so on? The television programmes I hope will be used for Cabaret, the presentation of sweet and dainty dancing girls, singers, conjuring, and acrobats. We already have two pretty television hostesses whom I have met, and if that is an augury of the good things to come it will not be difficult to sell television receivers at £50 a time.

Running Commentaries

Now that the sports season is in full swing we shall have the usual spate of staccato commentaries. They are called running commentaries, but they usually consist of long recitatives, staccato interjections, and asides which give you anything but a mental picture of the event. There will be five in one afternoon very shortly. There are commentators and commentators. Some years ago I heard the Reverend B. W. Davies, the well-known motor-cycling journalist, broadcast a commentary of the Tourist Trophy Motor-cycle Races vastly different from some of the commentaries I have heard. I think the trouble arises from the fact that the B.B.C. is so anxious to put up a good show that it selects as commentator a man who is known to be an authority on his subject rather than an enthusiast, and more often than not they get "mike" fright and tongue-tied, while others have seen so much of the sport that they sound like it. The sort of commentary to which I object is of the "er-er-er" variety, with too many withdrawn interjections—"He's scored a goal—no, he hasn't!" Many of the commentaries are inconsequential and purely waste of time—listening time.

Sleepy Music

It is suggested that the B.B.C. should broadcast dreamy slumber music, so that Orpheus may coax us to sleep. You remember, probably, the words in Rathbone's Pastoral Medley:

"We welcome thee, we welcome thee,
Welcome thee, O sleep.
Come! Claim us for thine own."

I will omit the obvious comments, but a lot of the music sends me to sleep already, and I am not of a somnolent turn of mind.

There are a number of pieces of music which would be suitable for the purpose, Rock-a-bye Baby, for example; perhaps between the items we could have music to wake us up!

Contentious Subject

Although it is undoubtedly a dangerous subject to broach, it is perhaps arguable that two of the ten (?) most popular voices since the birth of the B.B.C. are those of Olive Groves, and Les Allen. Both these artists have been booked for Sunday afternoon programmes in the near future. Olive Groves has been heard in the Horlick's Tea-Time Hour from Normandie and Luxembourg on June 20th, and Les Allen and his Canadian Bachelors open from the same stations in this programme (with Debroy Somers' Band) on June 27th. It is not unintriguing to note that the Bachelors are not only genuine bachelors, but are also under contract to remain so! The Three Erics, equally genuine sisters, are also under contract for this programme, which is always from 4.0 p.m. to 5.0 p.m.

By Thermion

Learning to fly by television.
Inferiority Complex

A READER whose handwriting I can scarcely read and whose address I take it is Crazy Island, Port Swittenham, of the Federated Malay States, thinks I suffer from an inferiority complex because I don't like Dickens and crooners. This reader's name is one of those which to pronounce causes your false teeth to fly out and bite someone. It looks from his handwriting to be a guttural semi-German, Irish-Scottish name, so I must make allowances for the fact that he is annoyed that I should dare to criticise Robert Burrerrrrrrrrrrrrrrrrrrrrr. This reader, I doubt not, prefers shrimps to my salad, and the tinginizations of the natives twanging their guitars on the sylvan shores of Crazy Island to the intelligent music which is my wont. In any case he has just wasted a 14d. stamp in writing to me, for with due con-tumely, without punctilio or ceremony, I scattered the pieces incontinently into the wastepaper basket.

What the Schools Like

I SEE that statistical experts at Broadcasting House have been finding out which of the educational broadcasts are the most popular with the Schools, and the following is the result of their research.

Travel Talks lead the field in order of popularity with 2,120 schools listening to them. These broadcasts are given by speakers chosen for their intimate knowledge of the country they describe and certainly carry out the aim of Schools Broadcasting in helping the teacher to do what he himself is unable to do. By their aid he is, in effect, enabled to say to his class, “Before we begin our lesson on Finland, here is Mr. So-and-so, who has lived in the country for years, to give us his intimate impressions.”

Nature Study Talks, designed for listeners in rural schools, and British History take second place with 1,792 listening schools. Anyone who has listened to one of Miss Rhoda Power's fascinating British History narratives, either at school or at home, can easily understand the reasons for their popularity. They are history without tears; little scenes from the past enacted before the microphone by experienced radio players. When Kings and commoners of old England can thus speak in our class rooms it is easy to see that the teacher has an endless fund of reality upon which to draw in order to vitalise his lessons.

Regional Geography, Discovering England, Friday Talks, Senior Music and Tracing History Backwards follow in order of popularity with the schools.

Out of the twenty broadcast courses available, ten are listened to by well over a thousand schools, and the numbers in every case show at least a hundred per cent. increase since the last census was taken a year ago. The number of schools listening to the Friday Talks and Stories has increased by six hundred per cent., while a four hundred per cent. increase is shown for Discovering England, a course designed to encourage listeners in rural schools to learn about their districts and compare them with others. The Friday Talks are planned to give children something rather out of the ordinary for the last day of the week, and are given by a variety of interesting people.

Recent talks have been given by an engine driver, a life-boat man, a deepsea diver and a famous air pilot.

The figures show that every day more and more teachers are deciding to enlist the aid of broadcasting experts in their class-rooms and are using the broadcasts with care and intelligence to illuminate their ordinary lessons. It is expected that when the next census is taken this autumn, another substantial increase will be shown.

In addition to the schools, it is known that a large number of adults regularly follow the broadcasts. Parents in particular have been requesting the pamphlets which are issued in connection with the courses so that they may follow the same broadcasts as their children, and discuss them in the evenings.
Panel Control of Condenser-Trimmers

Here is a method of controlling any trimmer of a ganged condenser from the panel, which should frequent adjustment be necessary. The knob drives a worm wheel, which engages a contrate gear, as shown in the sketch, thus turning the trimmer screw through the shaft. The end of this shaft is ground or filed, as indicated, and the shaft itself is centred by a bracket bolted to the cover of the condenser. Bevel gearing may be employed, but it does not give such a smooth drive.—A. M. Wilding (Wallasey).

An Alarm Fuse Holder

This accompanying illustration shows clearly the assembly of this useful contribution to the test bench. The only materials needed are the base, a couple of vanes of an old Formodensor, and two nuts and bolts, together with three soldering tags.

Firstly, the base should be drilled to take the bolts, and two holes as shown (counter sunk), for fixing the device to the panel, or other suitable position. Next affix bolts F, E, and G, then screw the unit down. Place the springy contact vane A (which, by the way, has already the brass strip C riveted to the end) into position, after having drilled a large clearance hole to take the bolt E, and cut two slots as shown. Now take another vane B, and, using two locking nuts, fix it to bolt G.

The contact D was made with a piece of contact spring from an old telephone switch, a slot being cut at the end to engage the fuse wire easily. When fixing the fuse wire see that there is sufficient gap between vane B, or contact, and, the end of brass strip C. The operation of this gadget is quite snappy.—W. R. Hoans (Ilford).

An Improved Carbon-type Microphone

The microphone shown in the accompanying sketches is an improvement upon the ordinary carbon-type of which I have seen illustrated at different times in Practical and Amateur Wireless. I found, when constructing these mikes, that the greatest difficulty was to get in the right amount of granules, so I devised a way of placing them in through a hole made in the back of the mike, as indicated. The blue transparent linen paper is incorporated to prevent waste of current when the mike is not in use.—H. J. Drier (Devonport).

A Loudspeaker Switching Device

This simple switching arrangement is for selecting one or two loudspeakers at a time by turning a knob at the back of the receiver.

Take an old rheostat and strip off all resistance wire; then wind a portion of the former with copper wire for about 1 in., and mount a terminal as illustrated. Leave a space a little less than the width of the rotating arm, and continue winding as above, until you have the number of contacts required, one for each speaker. Connect the switch as shown in the theoretical circuit, and mount it on the back of the set, together with rockets for extension speakers. Two speakers can be used for simplicity, and if the switch is set with the rotating arm bridging two contacts.—J. Walker (Perth, Scotland).
A Special Use

The other week we suggested in these notes that those people afflicted with a loss of speech will find television of great value if they use the lip language. This has now been substantiated in Germany by two deaf and dumb people who employed the television telephone service established between Berlin and Leipzig. A girl and her fiancé at each end of the line were able to "converse" with one another for the scheduled three-minute period and make arrangements to meet at a mutually convenient place. Ordinary radio has given no pleasure to the deaf and dumb, but television is destined to give them a new outlook and bring great joy by this new form of entertainment in the home.

The Alexandra Palace Mast

After weeks of careful work the tall steel lattice mast set on the summit of one of the partially demolished towers of the Alexandra Palace has been finished by the constructional engineers who secured the contract for this difficult task. The mast itself is just over 200 ft. high and weighs approximately 30 tons. The foundations are set deep in concrete and many thousand rivets have been used by the workmen perched on platforms and scaffolding employed in the erection. Since the height of the tower is 80 ft. above the ground and the ground itself 300 ft. above sea level, this makes the tower top 400 ft. above sea level, that is, 100 ft. lower than the top of the South Tower at the Crystal Palace. Full allowance for the strongest wind pressure has been made, while from the summit will glow a red light as a warning to aircraft in the neighbourhood. The mast is a landmark for miles around and will be made even more conspicuous at its tapered top when the two sets of aerial units, one for vision and one for sound, are positioned one above the other like spokes holding a ribbed drum. This double aerial with a separate feeder for each, linking the sound and vision ultra-short-wave radio transmitters, is the next task to be tackled, so there is still a chance that experimental signals will be "on the air" just prior to the Radio Exhibition at Olympia. July 1st was the latest date furnished for this to be possible to arrange some very striking demonstrations of television, free of charge. The B.B.C. are rendering assistance in this connection, giving advice as to the best method to be adopted for staging the shows, the audience being limited to about forty to fifty people so that comfortable vision for all will be assured. The idea is one which should find favour and resembles the scheme adopted in both Paris and Berlin, except that in those cities the receiving stations were sponsored by official government bodies. In the same connection it is stated that the chairman of an American film corporation is in this country for the purpose of planning theatres in which both radio demonstrations and films could be shown, and so appeal to a larger public. If sponsored programmes are accepted by the B.B.C. to meet the heavy drain on staff and labour for the television equipment, then it should be possible to arrange some very striking link-ups between those National advertisers who support the scheme and any of the large stores who are exhibiting television receivers to their customers.

Television Demonstration Room

It was stated originally that the B.B.C. intended installing public television demonstration rooms in certain parts of London, but this project has now been abandoned. In place of this encouragement is to be given to private enterprise, and several West End stores and other public places, including possibly London railway termini, are making investigations with a view to setting up receivers so that anyone interested in this new form of entertainment may see for himself the programmes as televised as well as heard. The whole atmosphere would be more in keeping with the service, as those participating by the aid of television would be able to concentrate wholly on the broadcast instead of being tempted to regard it as a background of sound while other activities were being indulged in. Now it is stated in the Press that the Pope has expressed his desire to learn more concerning the possibilities of television. In keeping with modern progress a short-wave broadcasting station has been set up at the Vatican in the years, and the idea of being able to appear on the screen to a proportion of his listeners is said to appeal very forcibly to the progressive mind of the head of the Catholic Church.

Television Abroad

The tenfold increase in aerial power which has been effected with the Parisian equipment situated at the base of the Eiffel Tower has made an enormous difference to the French experimental ultra-short-wave television service. Good signal diffusion is claimed for an area having a radius of about 35 to 40 miles from the centre of Paris. This is being hailed by France as sufficient to put them in the lead as far as world development of television is concerned, and although one of the last in the field they are quite rightly priding themselves on their achievement in the face of competition from other nations. While the comments concerning the quality of the pictures which are still being maintained at a definition of 180 lines and reproduced at 25 pictures per second, the scanning being of the successive type. In Japan the study of television has been going on for a period of years and several demonstrations were staged on low defining standards. It is now claimed that the various interests, each working on different systems, are to be amalgamated under the Nippon Broadcasting Associations, and a united policy has led to this pooling of technical resources. If success is achieved, steps will be taken to television important outdoor events during the course of next year.
CONSTRUCTORS, as a whole, are becoming far more familiar with the superheterodyne, but in many cases they are still too inclined to regard these sets as "experimental" when the receiver fails to function properly after construction. This presents a far greater difficulty than that which arises when components are differently connected in a set where they have previously operated correctly, because then it is more a matter of searching for a defective component or loose connection than of looking for a fundamental fault. Besides, the general tests which have to be applied are similar to those obtaining when a normal "straight" set is concerned.

Gang-condenser Connections

The tuning circuit is the part which probably causes more difficulty than any other; this is to be expected in view of the fact that it is this which differs most from the corresponding part of the older types of receiving sets. Sometimes it is found, for instance, that nothing but the local stations can be heard, the signals from these being much weaker than they should be, and the dial readings being entirely different from what would be anticipated. Such a fault generally points to the fact that the gang condenser has been wrongly connected, the oscillator portion being joined to one of the signal-frequency coils instead of to the oscillator coil. This mistake can easily be made because there is no standard position for the oscillator section (which has quite a different capacity and a different "shape" from the others), and it is sometimes placed at the end nearest to the operating spindle, and sometimes at the other end. Very often the condenser is positioned in some way, but this is not universal.

The Oscillator

Should there be any doubt concerning which is the oscillator section it is easy to check up by removing the screening cover and examining the vanes. In most cases the moving vanes are of different shape, whilst the fixed vanes are cut away more in the centre where the spindle passes them. When the condenser is of the three-gang type it is easy to find one section which is different from the other two, but this is not possible when using a two-gang component. Fig. 1, however, shows the general shapes of the vanes in both sections, and this should clear the difficulty.

Incorrect Intermediate Frequency

Another trouble which is experienced by those who do not follow any published design, or who do not employ the specified components, is similar to that just described, but normally less severe. This is due to using a condenser designed for an intermediate frequency of one figure with coils designed to work at a different I.F. This is a trap which is very easily fallen into by those who build from "junk" parts picked up at a cheap store! Yet another similar trouble is due to using I.F. transformers of the wrong frequency calibration; in this case the dial readings will be approximately correct, but all signals will be very weak—if received at all. When tuning is not perfectly sharp—as it should be with a superhet—it is generally indicated that the trimmers on the intermediate-frequency transformers have not been correctly adjusted, although attention

Superhet Receiver and

BY FRANK PRESTON

One simple modification which is often successful in removing the trouble consists of inserting an H.F. choke of low inductance between the anode of the frequency changer and the anode terminal of the first I.F. transformer, as shown in Fig. 2. A small, inexpensive and unshielded "reaction" choke can often be used, but the inductance of a better-class component is so high that it will probably silence the set, or otherwise cut down signal strength. A choke can be made by winding about 200 turns of 36-gauge enamelled wire on a bobbin of tin, internal diameter. It is not essential to split up the winding, because the small self-capacity which results from pile-winding is not sufficient to have any serious effect. The bobbin can be made by screwing two cardboard end-covers, tin, in diameter to the ends of a wooden rod about tin. long, as shown in Fig. 3. The rod and chokes should be given a couple of coats of shellac or cellulose varnish, and connections can be made by soldering short lengths of flex to the ends of the winding.

Instability

The same cure is often satisfactory in the case of instability or persistent oscillation, which renders reproduction poor and causes the set to "howl" at each side of the tuning point of a signal. Another reason for this instability is too close a coupling between the interlocking windings of the I.F. transformers. When the positions of the windings are variable it is an easy matter to effect a remedy by moving them farther apart. When they are fixed, a similar result can be obtained by connecting a fixed resistance of about 200 and 1,000 ohms between the ends of the primary winding of one or both of the transformers. In most cases it will be sufficient to join a 500-ohm resistance in parallel with the primary of the first I.F., as shown in Fig. 4.

For Medium Waves

It is very often found that the instability is experienced on long waves only, or when receiving one or two powerful transmissions. When this is the case it is a good plan to connect an on-off switch in series with the resistance, as in Fig. 4, because the resistance does actually reduce the sensitivity of the receiver to a certain extent, and thus impairs the reception of weaker signals. Leads to the switch should be short and screened.
In the hands of hundreds of amateurs the simple short-wave receiver employing a detector stage followed by one or two L.F. stages gives most remarkable results, picking up stations from the other side of the world very often at sufficient volume to operate the loudspeaker. There are conditions of freak reception, of course, but it is really surprising what can be done with this type of receiver when connected to a suitable aerial and earthing system, and verification of the above statements may be obtained from the various letters which we have published from time to time on our Practical Letters page.

In spite of this remarkable performance, however, it is often found that reaction effects are rather erratic. Or, on the other hand, it may be found that at certain wavelengths the receiver seems to become lifeless and no signals of any kind can be picked up. Whilst this is often due to the particular characteristics of the aerial-earth system, it is, unfortunately, experienced in the majority of receivers on various occasions, but not consistently. Furthermore, it is often found that there are many stations which are just not loud enough for comfortable reception, and the desire is felt for some additional amplification. This cannot be carried out on the L.F. side owing to the increased amplification of background noises, and the limiting factor in short-wave reception is found generally to be the noise-to-signal ratio.

H.F. Amplification

It has often been stated that high-frequency amplification is ineffective on the short waves, but this is only a partial truth. At certain wavelengths (chiefly below 10 metres) and with certain types of circuit there is, indeed, very little to be said for H.F. amplification. It may even be found that the fitting of an H.F. stage will result in a reduction of the general sensitivity, or in complete instability. With care, however, it is definitely possible to build an H.F. stage in such a manner that a good measure of amplification may be obtained, but what is more important, the effect of such a stage is to level up the reaction control which, in itself, enables more to be obtained with the receiver, and the circuit becomes practically independent of the aerial. It will not, however, be found worth while using a stage of this kind below 10 metres without very special precautions.

The Best Circuit

There are two main types of short-wave H.F. amplifier, that in which an aperiodic aerial circuit is employed, and that in which a complete tuned circuit is provided. In the former case one can employ either an H.F. detector or a frequency changer, and in the latter case a complete H.F. circuit is included. Consequently, if we are to make the receiver very efficient we must design it so that it may be used on practically any wavelength, and as the majority of experimenters employ a specially-constructed ultra-short-wave receiver for wavelengths below 10 metres, it is worth while to build the H.F. amplifier with a tuned circuit.

The amplifier now to be described has been designed and tested in conjunction with the popular Prefect Short-Wave Three receiver which was described in our issue dated February 8th last, but any similar type of receiver may be employed in conjunction with this amplifier, provided that a six-pin H.F. transformer is employed for coupling between the H.F. and detector stages. The circuit of the H.F. stage is given in Fig. 1, and it will be seen to be exceedingly straightforward.

For tuning purposes a standard 4-pin short-wave coil is employed, and the aerial may be joined direct to the primary or secondary coil, or may be connected through an air-dielectric pre-set condenser, and this provides variations to allow of different circumstances, although, in certain conditions, it may possibly be found that the condenser is not necessary. However, experimental work will soon enable this fact to be ascertained. A similar variable condenser to that employed in the Prefect is used for tuning and it should be mounted in a similar manner and the terminals must be insulated from the metalised chassis.

Important Details

Some important details must now be mentioned in connection with the use of this unit. Firstly, the 6-pin coil which is employed in the aerial circuit of the Prefect (or similar) receiver must now be used as an H.F. transformer, in which arrangement the coil which was originally included in the aerial circuit must now be included in the anode circuit of the H.F. valve. Consequently, one wire must be removed from the six-pin coil base in the Prefect. This is shown in broken lines in Fig. 2. The coil-holder diagram which is shown in this illustration is taken from the article on page 132 of our issue dated April 18th in which instructions were given for modifying the connections to this coil in order to bring it into line with all modern six-pin coils, and therefore if you are using a Prefect or similar receiver wired on the older arrangement the connections should be brought into line with the present arrangement. Terminal No. 6 on this holder has now to be connected to H.T. positive and it may be connected direct to the positive L.S. terminal, as shown in the chain line in Fig. 3. No other wiring alterations are required and it now only remains to describe the construction of the unit and the method of connecting to the original receiver.

Construction

The coil- and valve-holders may be mounted on a small-wooden chassis with metalised surface, or on an ordinary wooden chassis with a metal surface. The

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**Fig. 1.—Theoretical circuit employed in the short-wave H.F. unit.**

**Fig. 2.—The lead shown by the dotted line above must be removed from the coil-holder in the Prefect Three.**

**Fig. 3.—The additional lead shown above must be joined to complete the circuit to the H.F. in-
A Short-Wave H.F. Stage of the Prefect Three, but Which May be Added to a Receiver Not Already Provided with One

By W. J. DELANEY.

The arrangement is shown in Fig. 4. The chassis used is the same as the Prefect (6(in.)) and the H.F. unit should preferably be placed immediately alongside the Prefect chassis, with a vertical metal screen 8(in.) high, attached to the side near to screen completely the H.F. stage. The screen is most important, and without it absolutely no results can be obtained.

The lead from the screen is the same as that employed for the Prefect, and thus two chassis may be accommodated in a single cabinet. Where an existing cabinet is being employed and will not accommodate the additional unit, the connections must be brought out in a flexible cabinet for accommodation on the present chassis, but the lengthy leads so introduced probably result in losses, and it will be desirable to endeavour to accommodate the H.F. unit close up to the original chassis. If a separate cabinet is employed the F-in. side of it should be lined with foil connected to earth.

Circuit Connections

The filament terminals on the valve-holder of the H.F. unit have to be joined to the earth terminals in the detector stage. The simplest way of doing this is to fit a pin-adapter to the detector valve into which the detector valve is fitted. It will be found then that the H.T.+1 lead in the H.F. coil must be used for the H.F. stage. If a separate cabinet is employed the lead from the earth terminal on the H.F. unit should be connected to the earth terminal of the cabinet. The H.T.+1 lead from the earth terminal should be taken to the earth terminal of the cabinet, and then connected through the lead to the earth terminal of the cabinet. A short bare wire may also be attached to one of the H.F. coil terminals which are now shown joined together, and this wire may be turned under the coil holder and held in contact with the metalised surface of the chassis by means of the holding-down screw.

The earth return lead for the vertical screen is completed through the metalised surface of the chassis, but to ensure maximum screening effects, a lead must be taken through the side runner of the chassis and bolted to the screen, and then connected directly to the earth terminal. A short bare wire may also be attached to one of the H.F. coil terminals which are now shown joined together, and this wire may be turned under the coil holder and held in contact with the metalised surface of the chassis by means of the holding-down screw.

List of Components

- One .00025 mfd. popular low tuning condenser, Type 1040 (Jackson Bros.).
- One dual-ratio slow-motion drive, Type 1092 (Jackson Bros.).
- One 4-in. chassis-type valve holder, Type U.H.A (B.T.S.),
- One 4-pin coil holder, Type 4 C.H. (B.T.S.),
- One 4-pin short wave coil, Type B. No. 2 (B.T.S.),
- One 4-in. tubular condenser, Type 300 (T.C.G.)
- One Metaplex Chassis, 5½ by 6½ with 2½ in. runners (Peto-Scott)
- One sheet of aluminium 8½ by 6½ (Peto-Scott)
- Two type R Terminals, A1 and A2 (Bellingham Lee)
- One Pre-set condenser, Type U.T.C. (B.T.S.)

Leads pass through holes in chassis & screen.

Fig. 4—Wiring diagrams of the H.F. unit.
FROM time to time it is a good policy to spend an hour or so in searching through a small section of the wave-band, although it is true that with a view to a large catch one is tempted to try out the entire condenser dial at one sitting. The fact remains that a thoroughly patient search over a few degrees in a busy portion of the short-wave band will bring in rewarding results. At this period of the year broadcasts on the higher frequencies are heard until the later evening hours, but, without doubt, after midnight, and until dawn the next day. A search over 49.50—50.50 metres should supply many entries in your log. Work up slowly from such a convenient landmark as the condenser setting of Skamlebaek (Denmark), on 49.5 m. (6,000 kc/s), a transmission which can be tuned in on almost any evening.

Philadelphia

On the same reading from B.S.T. 01.00 you should hear without difficulty WXZAU, Philadelphia, which is on the air until 04.00, or W3XAL, Cincinnati, working somewhat later. A fraction above, although the wavelength is somewhat variable, we find HJABD, Medellin (Colombia), La Voz de Aburra, and again, slightly higher on 49.55 m. (6,065 kc/s), it may be worth while to try for XEU, Avenida Independencia, 98, Vera Cruz (Mexico), which relays XEU, in that city. The interval signal is a bugle call followed by chimes. If you should succeed in picking up the broadcast you may secure a "vear," by writing to the Radiodifusora Comercial XEU, Avenida Independencia, 98, Vera Cruz (Mexico).

Bogota

There then follows another Colombian, namely, HJ3ABG, Bogota, last reported on 49.39 m. (6,050 kc/s), which calls itself Colombia Broadcasting, and must not be confused with HJB, Santiago de los Caballeros (Dominican Republic), opened as recently as last January, and since logged on many occasions, but which styles itself Broadcasting Colombia for some reason or other. It is on the air nightly, and has already been heard as early as 22.30. When last picked up it was a fraction of a degree below GSA, Daventry. On 49.67 m. (6,040 kc/s) there are two separate stations to be logged, and this is often possible in view of the fact that programme times do not clash throughout the night. WIXAL, Boston (Mass.), works on Sundays from B.S.T. 22.00 until midnight; on Mondays, Tuesdays, and Thursdays, from midnight to 02.00. On the other hand, W4XBL, relaying WOTD, Miami Beach (Fla.), operates from 18.00-23.00—enough listening for us—and again from 02.30-06.00. Moving slightly higher up the scale a search should be made for HJF5, Panama City (49.74 m.—6,030 kc/s), of which the daily schedule is B.S.T. 18.00—19.00 and 02.00-04.30, but a slight deviation may give you a much more powerful broadcast from FRAG, Pernambuco (Brazil), on 6,028 kc/s, with a continuous programme from B.S.T. 21.00—01.30; its signals are usually very loud and on most nights the capture would be termed by the Yankee "a sure bet." Interval signal: Gongs (Notes: E, G, A, G repeated). Bear in mind that the language used is Portuguese and not Spanish. In passing, make a note also that on 49.8 m. (6,025 kc/s) you might hear, at some time or other, with luck, a transmission from s.s. Kanaimba, 6,013 kc/s for the German station, especially as at the moment of tuning, you might chance to hear the alternate German announcement. The deep booming note of the gong, however, should set you right.

Colombia and Cuba

HJ3ABG, Bogota (Colombia), which comes almost on top of this transmission (49.9 m.—6,012 kc/s) gives us as a clue three chimes something like those used by the N.B.C. short-wavers. On 49.92 m. (6,010 kc/s) at the moment there are two broadcasters, namely, COCO, Havana (Cuba), and YNLF, Managua (Nicaragua), which had recently adopted this channel. It would be

**Leaves from a Short-wave Log**

更高处的尺度应由海豚作多度的搜索。为HJF5, 巴拿马城（49.74 m.—6,030 kc/s），它的日常节目是B.S.T. 18.00—19.00和02.00-04.30，但稍微偏移可能给你一个更强大的广播FRAG，累西腓（巴西），在B.S.T. 21.00—01.30；它的信号通常是非常响亮的，在大多数晚上，捕捉会被认为是Yankees的“肯定的”。间歇信号：钟声（音符：E，G，A，G重复）。要记住，所使用的语言是葡萄牙语而不是西班牙语。在经过时，注意在49.8 m. (6,025 kc/s) 你可能会听到，时不时地，通过运气，来自s.s. Kanaimba，6,013 kc/s的德国广播，特别是在调谐时刻，你可以听到交替的德国公告。这种公告的深度炸裂的钟声，不过，应该会设置你。

**Gloucester Hospitals Pageant**

On July 2nd in the Midland Regional programme, David Greston will describe the Gloucester Hospitals Pageant, in which over five hundred performers are taking part. There are five episodes, and a final procession representing “Gloucester down the Ages.” The two episodes which listeners will hear are the celebration of the grant of a Fair to Gloucester to be held on the 2nd July by John Baptist, Bishop of London in 1356; and the visit of Henry VIII and Anne Boleyn to the city in 1535, when they were welcomed by the civic dignitaries and the pageant was presented at the end of the day’s transmissions. In consequence the last official news broadcast is heard well to remember that on 49.96 m. (6,005 kc/s) you will no longer pick up the calls VE9DR or VE9DN; the stations appear to have been replaced by CPCX, also at Drummondville (Quebec), which is now relaying nightly the Canadian Radio Commission programmes from CFNU, Montreal. The time to try for this newcomer is between B.S.T. 23.00 and 05.00.

**Short-wave enthusiasts carrying their apparatus to the wireless station on Mount Snowdon.**

**ITEMS OF INTEREST**

in 1643. The Pageant is being held in Gloucester Park.

Where the Anthem Does Not End Programme

As the Budapest (Hungary) radio entertainments are calculated to interest foreign listeners, the studio director has decided that the news bulletin in Magyar should be given, not as a final item, but as a special feature at the end of the day’s transmissions. In consequence the last official news broadcast is heard after the announcements have bid the unseen audience good night, and follows the playing of the Hungarian National Anthem.

**When Portugal Settles Down**

The scheme passed by the Ministry of Communications for the reorganisation of broadcasting in Portugal has been shelved owing to political differences, but it is anticipated that, for the welfare of the country, some move in the development of the plan will be shortly made. It is reported that the first step to be taken will be the increase in power to 100 kilowatts of the Lisbon National transmitter, to be followed, at short interval, by stations of the 20-kilowatt type in North and South Portugal.
QUEER RECEIVER FAULTS

Even Mysterious Faults Can be Traced to Quite Simple Causes if Systematic Testing is Adopted. By H. J. Barton Chapple, B.Sc.

One point which the radio amateur must recognize is that all receiver faults, no matter how mysterious they may appear, must have a definite cause, and that that cause can always be found and remedied provided the business of testing is tackled in the right way. Another important point to bear in mind is that no step in the systematic testing of a set should be omitted just because you are certain in your own mind that "it cannot be that."

In the H.F. Stage

A fault in the H.F. stage of a receiver was vividly brought home recently when a well-made amateur "straight three" was reported to give good reproduction on gramophone, but nothing on radio. Obviously the H.F. valve or the tuned circuits were at fault, and the valve proving in good condition because there only remained the tuned input circuit and the detector tuned grid circuit, with the associated components and wiring. Components must be tested and passed satisfactorily—grid leak, grid condenser, bias resistance, H.F. chokes, until only the coils and gang condenser remained. The anxious owner was confident that there was no need to test these. They were, he said, one of the best makes and quite new. Although the coils proved to be faultless, the condenser showed a short to earth in one section, due to the fact that the slip of mica forming the insulation of one of the trimmers had become displaced and permitted the moving section of the trimmer to short. After being gently coaxed back into position, the receiver behaved itself in a receiver which was otherwise in good working order.

Hum

Hum is undoubtedly one of the most annoying faults, because it usually occurs in a receiver which is otherwise in good working order. It can be due to so many things, and in most cases one can only cut out methods of eliminating it which involve fairly big changes in the wiring or layout. Sometimes, however, the cause is easily determined and found to be just false economy. In two cases quite recently the circumstances were very similar. With the first—a home-built mains-fed, the only power transformer available was one having two low-tension secondary windings—one for the rectifier, and the other for the receiving valves, while in the second case the set builder had used an old type transformer with a high-tension winding only, in conjunction with a metal rectifier and an equally old filament transformer for heating all the valves. As the directly-heated output valve needed about 25 volts bias, it must be the cathode potential of all the other valves by this amount above the heater potential—not a very desirable proceeding at the best—and make it possible for all sorts of pick-up in the cathode leads. In the first instance the owner was persuaded to substitute a metal rectifier for his valve rectifier, and to use the 4-volt winding thus released to heat the early stage valves, using a hum balancer as close to the valves as possible and in the second case the owner consented to buy a new transformer with its due proportion of low-frequency windings, and to adopt the same procedure with respect to balancing potentiometers, after which no further trouble occurred.

There was, however, a rather amusing case in which the listener complained of considerable hum in the speaker of his home-built set, but none when operating another set which worked perfectly in one house, but gives nothing but trouble in another? A case in point in was a universal set where the owner complained that the hum was unreasonably loud. The set was found to be in excellent condition and was tuned up in the shop, some miles away, and little fault could be found with it—the customer admitted as much when he called for it. But the next day the same complaint was made, and, indeed, the hum was acknowledged by the service engineer to be above normal, and back to the shop it went again, and again it worked with scarcely a trace of hum. Then someone remembered that the customer's house was in a new part of the town, and served from a C.C. mains whereas the shop, in the old part of the town, was on D.C. This gave a clue, since the rectifier valve, and its transformer, when the set is operated on C.C., acts merely as a low resistance on D.C. mains, and this valve, also, has a very large difference of potential between its heater and cathode. Careful test revealed the insulation between heater and cathode was sub-normal, and replacement left the set in quite a satisfactory condition.

The speaker in the sitting-room was first examined, and was found to be a good-quality moving-coil instrument, giving the programme with only the very faintest trace of hum—certainly not enough to be noticeable a few feet from the instrument. A move was then made to the study where the set was located with another speaker mounted on a baffle quite near it. Sure enough a very pronounced hum emanated from the corner where the equipment was set up, but it did not take long to discover that the hum did not come from the speaker at all but was entirely due to mechanical vibration of the laminations of the power transformer and smoothing choke! It was found possible to lighten the clamping plates of the choke which somewhat reduced the trouble, but the transformer was of a type in which it was impossible to gain access to the clamping bolts. Short of replacing the transformer, therefore, nothing could be done to cure the receiver in a substantial case which had the effect of deadening the sound to some extent.

Curing Instability

Instability of one sort or another is sometimes hard to track down, but when all decoupling arrangements have been checked it is as well to examine all the connections which should normally go to earth, or the chassis. Of the little breakdowns which have been noted to cause instability the list contains such items as a badly soldered connection to the sheathing of a screened lead, and a dry joint at a soldered connection to the chassis. A rather unusual fault which had the same effect—the introduction of instability—was in a battery set where it was found that the winding of the transformer had made connection between the metalising and one of the filament pins, had broken loose inside the cap. Many were put right by winding a piece of tinned copper wire round the neck of the valve to make good contact with the metalising and connecting to the side of the filament circuit.

What could be more annoying than a receiver which works perfectly in one house, but gives nothing but trouble in another? A case in point in was a universal set where the owner complained that the hum was unreasonably loud. The set was found to be in excellent condition and was tuned up in the shop, some miles away, and little fault could be found with it—the customer admitted as much when he called for it. But the next day the same complaint was made, and, indeed, the hum was acknowledged by the service engineer to be above normal, and back to the shop it went again, and again it worked with scarcely a trace of hum. Then someone remembered that the cus-
THE VIDOR
S.W. CONVERTER

MESSRS. VIDOR, LTD., have just released an interesting short-wave converter which will be found of great utility to all those who are anxious to indulge in short-wave listening, but who are not anxious to build a special short-wave receiver. The converter, as most amateurs are by now aware, enables any standard broadcast receiver employing H.F. amplification to be converted into a superhet merely by placing the unit in the aerial feed to the receiver, when the H.F. amplifiers in the broadcast receiver become intermediate-frequency amplifiers on the short-waves, and tuning is then carried out only on the converter unit. In the Vidor Unit which is shown on the right, a heptode coil which is fitted covers from 13 to 50 metres by means of a single condenser which is provided with a fast and slow-motion dial. To avoid difficulties in connection a special change-over switch is provided, and the aerial is automatically changed over when it is desired to listen to the broadcast wavebands.

Battery Supplies

The arrangement adopted in the receiver enables the necessary L.T. and H.F. voltages to be obtained automatically from the broadcast receiver and thus reduces the difficulties of using the unit to the very minimum. If it is desired to use the unit with a broadcast receiver of the mains-operated type, a battery supply may be used with the converter without difficulty. The unit may be employed with a superheterodyne receiver, provided that no special whistle-interference eliminating devices are connected in the aerial circuit, and this fact should be ascertained before endeavouring to use it with this type of receiver.

The special patented double-motion knob enables tuning to be carried out in the simplest manner, as the control is used to provide an approximate setting, and then a band of approximately three metres is covered by the knob in the slow-motion position. The scale, which covers the entire front of the cabinet, is calibrated in megacycles and metres.

The cabinet is all-metal and measures only 7in. by 52in. by 34in., and can be placed in any convenient position close to the broadcast receiver and left permanently connected. The price is 47s. 6d. complete.

BEGINNERS SUPPLEMENT

(Continued from previous page)

listening. For example, a listener who had recently acquired a very expensive long-coil speaker—of a make renowned for its excellent frequency response over a wide range—complained bitterly that the set was of no use to him when he was using a much cheaper instrument. When asked for more precise information concerning his complaint he explained that the performance noted was sadly deficient in the upper or treble register. Further inquiries elicited the information that he was using a superhet receiver of the most selective type, quite incapable of giving any noticeable output at audio frequencies above about 4,000 c.p.s. Thus, while a fairly long time before the listener could be convinced that a speaker, however good, cannot reproduce frequencies which do not exist in the power fed to it from the set. The reverse case, in which a "quality" receiver is worked in conjunction with a speaker having a very limited frequency response does not occur quite so often. It would appear that listeners sufficiently interested in good reproduction to make a special quality receiver are generally willing to employ a quality speaker as well.

Under modern reception conditions a radio receiver is something of an instrument of precision, and if a published circuit or one's own design calculations indicate that a resistance of 20,000 ohms should be used, it is no good using 30,000 or 15,000 because this size happens to be handy. And to obtain good efficiency it is better to invest in some modern non-inductive fixed condensers instead of making do with the oddments lying at the bottom of the junk box.

Writing of resistances is a reminder that resistors have differed considerably from that indicated by their colour code markings. To avoid trouble due to this, or to the use of any other component of doubtful value or quality, the constructor should, where possible, make a practice of testing every component before it is incorporated in the set. Continuity, insulation, and resistance can be measured or tested by the simplest means—a battery and milliammeter/voltmeter outfit of inexpensive make are all that is required, and the few minutes spent in such tests may well save hours of labour in locating abstruse faults, the isolation of which may mean practically rebuilding the set.

THE EFFICIENCY OF COILS

(Concluded from page 367, June 20th issue.)

Such a wire not only presents a much larger surface area than a solid wire of equal cross-sectional area, but the separately insulated strands reduce the losses from eddy-currents in the windings. The next best alternative to "Litz" wire is solid copper of heavy gauge. The lower the wavelength on which the coil is to be used, the greater the size of a design giving low values of H.F. resistance. Thus, while a fairly small gauge solid wire is reasonably satisfactory for the long-wave band, "Litz" or a large gauge copper wire should be employed for the medium-wave windings, while for short-wave coils heavier gauges still must be used, and for ultra-short-wave working the coils are frequently made of copper tube instead of solid wire.

Classification

Probably the most efficient type of coil yet produced, from the point of view of low losses from self-capacity and H.F. resistance, is the Litz-wound solenoid with a large number of turns placed on a ribbed former about 3ins. in diameter, such as was used largely in receivers of a few years ago. The only reason why it is not so frequently seen-to-day is that its external field is large, and in order to preserve the stability of the circuit, and at the same time reap the benefit of its efficiency, the necessary screening arrangements are unwieldy in size.

Next on the list in general order of overall efficiency are the iron-cored tuning coils, particularly when wound with Litz wire for the medium-wave section. The main advantage in that the iron-core permits the required inductance to be obtained with much smaller overall dimensions, allowing, among other things, the use of very compactly-dimensioned screens without introducing undue losses. Smaller air-cored Litz-wound coils come next on the list, followed by the various designs of coils on ribbed formers and employing solid wires.

Choice of Coils

Finally, a few words concerning the relative suitability of the various types of coils in different kinds of sets should be helpful. In the case of a multi-stage set having three tuned circuits, although iron-cored coils would normally be recommended, sufficient selectivity for receiving requirements should be obtained with ordinary air-cored coils. For a simple set with two tuned circuits, if reasonable selectivity is wanted, either good Litz coils or iron-cored must be used. But should the selectivity requirements be less stringent, as, for example, in the local-station quality set, a much less expensive arrangement could be used with impunity. Excellent results can be obtained for local station reception only when using a pair of medium-wave coils of the solenoid pattern wound on fairly large paxolin formers.
**Police Radio**

It is stated that a new high-power radio station is shortly to be erected in Lancashire to supersede the present Liverpool police radio transmitter at Old Swan, where for the last four years several successful experiments have been carried out.

The entire transmitting plant as well as the new bicycle receiving sets have been developed by Sergeant Menzies, who in private life is a keen radio amateur and developed by Mr. S. Sagar, the Chairman of E. K. Cole, Mr. W. S. Verrells, is Deputy Chairman of Scophony Limited.

**Scophony Limited**

The problem has lately been made more acute by a growing number of requests from overseas broadcasting authorities for the help of men trained in the B.B.C. service.

Among the methods suggested for this purpose has been the establishment of a special school through which new entrants should pass on admission, and to which existing members of the staff could from time to time be attached for refreshers and similar purposes. The scheme in question, which has not yet passed beyond the stage of discussion, on which new entrants should be worked on in any complete detail, contemplates a training establishment of a special school for this purpose.

**Scophony System of Television**

The entire transmitting plant as well as the new bicycle receiving sets for television are unique, in that its receiving apparatus is capable of giving projected pictures of a size suitable not only for home entertainment but for distances of twenty miles from headquarters, and with Morse the range is extended to thirty miles.

**Scophony Limited**

RESOLUTIONS authorising the conversion of Scophony Limited, the Television Company, from a private into a public Company, and the increase of the capital from £140,000 to a nominal capital of £300,000, consisting of 1,200,000 5s. shares, were carried unanimously at a shareholders' meeting of Scophony Limited, held on Thursday, June 4th, and presided over by Sir Maurice Bonham-Carter, the Company's Chairman.

Scophony Limited is developing the Scophony System of television, based on opto-mechanical principles, and its position is unique, in that its receiving apparatus is capable of giving projected pictures of a size suitable not only for home entertainment but also for large cinema theatres. In recent months the Company has been actively engaged on the development of apparatus for reception of television broadcasts from the B.B.C. Alexandra Palace television station, which should commence its regular transmissions some time this autumn. Some of the Company's inventions deal with methods for transmitting vision over telephone lines.

The Company has an exceptionally strong patent position: it holds 117 granted patents all over the world, while 105 more are still pending. The Patent Office of the United Kingdom has confirmed that it has been granted exclusive rights to the essential parts of its patents. The Company has been advised by its Patent Attorneys, Messrs. E. K. Cole, Ltd., and the Chairman of E. K. Cole, Mr. W. S. Verrells, is Deputy Chairman of Scophony Limited. The Managing Director is Mr. S. Sagar, founder of the original Scophony Limited some six years ago. Mr. Arthur Levey, film industrialist, is a prominent shareholder.

**Proposed School for B.B.C. Staff Training**

THE B.B.C. has lately been considering whether its present system of training new entrants to its service by attaching them immediately to the particular branch for which they have been recruited ought not now to be modified in view of the growing range and specialisation of B.B.C. work. It has at the same time explored the best means of keeping its existing head-quarters and regional staff in up-to-date touch with the latest developments in their work, and of employing to the best advantage a small reserve of staff for emergency and holiday requirements.

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Ronald Frankau as Composer

It is interesting to learn that Ronald Frankau, whose quick-shot repartee in "Murgatroyd and Winterbottom," and whose soulful ditties in variety programmes are so well known, has burst forth as the composer-author of a complete musical show to be broadcast in July.

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**A Choral Society Centenary**

THE Centenary of Stratford-upon-Avon Choral Society is to be celebrated on June 29th by a special concert in the Shakespeare Memorial Theatre. Warwick Musical Society is co-operating, so that altogether there will be a chorus of about 120 voices. The City of Birmingham Orchestra has been engaged. Leslie Heward and John Brough, of Stratford, will conduct. The second part of the concert will be broadcast; this consists of Schubert's "Rosamunde" overture and Elgar's "The Music Makers," with Mary Jarred as the contralto soloist.

**Amplifier at Euston Station**

These illustrations show part of the public call system installed at Euston Station by the General Electric Co., Ltd. Above, the main amplifier equipment, and on the left, the microphones and switching controls in the announcing box.

**Random Jottings**

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REPLIES IN BRIEF

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

R. F. H. (Alton). A short line was inadvertently left in the diagrams by the draughtsman, and the calculation also seems to be in error. We will apologize to the poster. The statement regarding suitable universal valves is quite correct. To obtain the anode current and H.F. and screen voltages were also considered.

J. M. C. (Sheffield). It is very difficult to suggest the trouble as the set is house-designed, but it would appear that the condenser would not be necessary in order to locate the possible trouble. Apparently you have not obtained any assistance in order to find whether the valves applied are correct.

F. P. R. (Eamesh). We cannot give you the value of the resistance required to approach the makers of the instrument. There may be some substitution necessary, but you have not described the make or the detail of the instrument. By what means do you intend to change the scale and must by-pass the greater portion of the section. We cannot calculate the resitances required to any particular purpose.

J. C. V. (Hambrook). Mention in the advertisement that the value is variable and, if always cured by the use of a By-pass condenser, we suspect a By-pass condenser which has already been employed. You should have by this time the details of the type and the condenser faces to set as well. With reference to the use of the a.d. and off-switching, and the type.

D. A. H. (E. Croydon). We do not recommend a By-pass valve for the set as described.

L. R. R. (Margate). For full details concerning the R.F. circuits quoted, apply to the Radio Society of Great Britain, 43, Queen Victoria Street, S.W.I.

R. T. (Brighton). It is not necessary to construct a volume control in the circuit in question as would be necessary to construct the secondary of the L.F. transformer. A variable rotation of the control is to be operated by the turning of the terminals. The resistance of the secondary is disconnected from the secondary and is joined to the terminals by means of a By-pass condenser. W. H. (Almshome). The machine may be obtained from the Automatic Coil Winder and Electrical Equipment Co., Ltd., W. Oder House, Doughty Street, London, S.W.1.

J. F. L. (Bomaby). The choke may be wound with 30 or 22 gauge D.C. wire on a 20 former. A bandwidth of 200 to 1,000 cycles and a high degree of insulation must be maintained.

A. S. (Markfield Drayton). If it is essential to change the entire coil, you could only do this by means of a By-pass valve control. On each side of the set as described.

D. S. (Godalming). If you cannot answer the question raised to your apology, you would be unable to obtain a battery-validating licence, and should therefore study the subject under the guidance of a qualified authority.

C. D. (Belfast). The cost would be about 10s. or 12s. See the article in our issue dated February 8th last.

J. H. G. (Northwich). We can give you no advice as to how you may prove practicable to try and make one eliminator or a separate by yourself on the premises of the manufacturer. L. K. (Bolton). The EF14 Valve which was recently described should prove ideal for your needs.

R. D. S. S. (Enfield). We cannot give you the information required. You have not mentioned any of the queries raised you cannot obtain a validating licence for no reason. The conditions also point out that a condenser is not rated by its resistance but by its capacity.

E. R. (B.E.S.). We report that at 2nd the 300,000 ohm of the ohm is out of print.

S. B. (Slough Stratford). We do not recommend the mcintosh method of using the Cl5 valve. It would be preferable to remove this and use a super-power valve with a transformer to feed it.

C. E. (S.E.). We cannot give you the resistance values without knowing the resistance of the meter. If you do not have all the data of the meter we would be in a position to give you full details of the circuit. This point is of course will be completed in the case of the meter on the circuit. G. F. D. (Prestwich). The power source must be 2s. 6d. condenser. A single line of speech will be required to be changed. The condenser on the control should be joined to the anode and not to the grid. The control is not of the head-speaker type, but is by this time the transformer. The resistance of the wire is then attached to the anode and if taken into the circuit the point is then fixed to a second terminal. The other terminal of the condenser is provided with a short piece of wire attached to the short anode wire, which should be taken into the circuit. B. R. (Rochdale). The wire used for the coil is 20 gauge enamelled. All turns are wound evenly by side. K. T. R. (Kingswood). The valve is not suitable for use with battery valves, and is standard high vacuum type of the transformer. We cannot check the resistance values as we have no equipment for the purpose. We cannot check the resistance values as we have no equipment for the purpose.

THE CYCLIST

2d EVERY WEDNESDAY

The Great New Weekly. Packed with interesting touring and technical articles—lavishly illustrated. Get a copy to-day!

Published by George Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2.
A New Tenor PERCY MANCHESTER, who has appeared on the stage and on the air, makes his first recording this month on Columbia DB 1642. He sings “Dear Mary,” on Columbia, DB 1642.

A New Humorist to the Columbia Company this month on Columbia FB 1391. Allen is a B.B.C. announcer, and asks you to imagine a broadcast of “In Town Tonight” as it would have sounded three hundred years ago.

A New Humorist to the Columbia Company this month—Columbia FB 1398. “Listen to Liszt” is the title, and it contains excerpts from the “Hungarian Fantasia” and the “Hungarian Rhapsody.” No. 2.

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A Scottish Reader's Log

SIR,—Please allow me to thank you for your excellant paper, PRACTICAL AND AMATEUR WIRELESS, of which I have been a reader since No. 1. I am very interested in the various logs which are published from time to time, but I have still to see one from my district. I enclose extracts from my log compiled in the last two months. My receiver is an 0-v-1, which was published in the short-wave section of PRACTICAL AND AMATEUR WIRELESS dated June 15th, 1935.

The individual stations are too numerous to mention separately, so I will give particulars of the few that are of interest. The stations included are: W1,2,3,4,5,8,9, HB, LY1, V66, C06-7, F3-8, W1,2,3,4,5,8,9, FA8, VE2-3, SP1, EA2-5, GI, Q2-5-6, PY, J1J, NY2, CT1, R4, OZ7, VO, NV2, DX1 and CXL. Broadcast or commercial stations: VK3ME, HASS, CTIAGO WX3AL (16 metres), SUZ, DJJ, DZH W509, W5HR, FYX and JYP. I have QSLs from all the above and hope to receive confirmations from the following: H1A COBY, PK4AU, SU1RO, SU1CH, L6IA, YK1A, HJ1ABD, HJ1ABP, JYM, JVH and URAB, HP1A, HP2A, PY2BA, YV12RM, PY2ET, YV1ORSC, CO2KY, TICK, HCJB, HC2RL, HJ4ABC, HJ4ABE, HJ4ABA, HJ3ABD, HI5N, HI1C, HI2RF, YNVA, HP5J and HP5F.

I suggest that when listeners send in their logs which will include some of these "key" stations they should state the following: type of receiver, headphones or earphones used, date, time of reception, and signal strength. From this data other listeners could check their own logs and compare them, and if any difference in strength of a certain station was observed the experimenter could take himself by trying to find a suitable solution for such a state of affairs. In this way, I believe, some useful data could be compiled which would be of some use to experimenters.—A. W. BIRT (Kings Langley).

DX Reception

SIR,—Please find enclosed list of amateur stations heard during period January-June. All the Americans were 7 mc. C.W. The log is representative of all countries heard. Some 4,000 logsgeries have been received. Have any of your readers noticed that DX signals on 14 mc. are rarely below 5, while those on 7 mc. usually fall below 1? I think my log proves the value of learning Morse. My receiver is a 1-v.s.a.g.-g.-s.p.-pen. (tuned H.F.) with a 660 ft. loop aerial (closed H.T. coil).—E. N. NAIRIE (Hayes End).

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New Ferranti Electrolytic Condensers

A NEW range of high-grade electrolytic condensers has just been made available by Messrs. Ferranti, and it includes four two-unit types, consisting of an 8 plus 16 mfd., or 8 plus 8 mfd. unit. These condensers are all of the dry electrolytic type, and are available in the carton or tubular form. The ratings of these models range from 6 to 900 volts, and prices extend from £1. 6d. to 7s. As usual with these types of condenser they are intended for use only in D.C. circuits or in circuits where there is D.C. with a certain degree of A.C. ripple, such as in a mains rectifier circuit. The sum voltage of the D.C. and peak ripple must not exceed the ratings given for the various types. The condensers are non-polarized, and to prevent reversal the leads which are provided on the carton type are coloured black for negative and red for positive. The tubular models are fitted with soldering tags and these are shorter than the depth of the sealing compound to avoid the possibility of contact with the electrolyte. Further details may be obtained by writing for the Ferranti leaflet R102/CE.

Goltone Mains Bell

WITH A.C. mains facilities it is not worth while operating a door-bell from a dry battery. The only difficulty which attends the use of the mains, however, is in transforming the voltage to the low value required for the ordinary type of bell, and this means that the primary of such a transformer must be in circuit with the mains supply the whole time, unless the bell-push is fitted in the primary circuit—a very unsafe procedure. Special high-voltage mains windings may be fitted to bells, but the operation of the make-and-break which causes the hammer to strike the bell will result in a radiated influence which will affect wireless receivers over a considerable distance. In certain instances the authorities insist that such a bell must be fitted with an interference eliminator or not be employed. The new A.C. bell introduced by Messrs. Ward and Goldstone is entirely non-radiating, will operate on any mains supply from 200 to 250 volts at frequencies from 40 to 100 c.p.s. It requires no separate transformer, the necessary transformation of voltage being carried out inside the bell, in an efficient manner. There are no make and break contacts to create interference with radio outfits, and the absence of sparking contacts renders the bell proof against wear and breakdown. There are also no contacts to be replaced or cleaned periodically.

The ordinary low-voltage push button indicator and wiring may be employed and through installations are low, and conform with regulations, the entire assembly is housed in a metal box provided with a separate earthing terminal. The price is £6. 3d.

Brush Crystal Headphones

THE Brush Development Co. has just announced the introduction of two new models of Brush crystal headphones to supplement the Brush Type A 2-phone model that has already won such wide popularity. First of these two new developments is a single 'phone instrument with head band and soft rubber pad which holds the phone securely in place against the ear of the user. It is ideally suited for use in installations where the preference is for a single 'phone, rather than the double 'phone model.

The second of the new models is also a single 'phone instrument, but with the phone mounted on a 12in. lorgnette handle. A 6in. extension (to 18in.) is provided, and enables the user to hold the instrument against the ear from any of several convenient and comfortable positions. Brush lorgnette handle headphones have already been used with outstanding success in conjunction with public address installations in churches, etc.

Both the single 'phone headband and lorgnette handle headphone are of typical Brush design and are representative of the company's traditionally high electrical manufacturing standards. They are extremely sensitive—can handle excess volume without overloading—have no magnets to cause the diaphragm to chatter in the user's ear. They are of rugged construction and light in weight.

Complete details, including descriptive literature, circuit diagrams, complete installation data and prices can be secured from Messrs. Rothermel & Co., 1023 Canterbury Road, High Road, Kilburn, N.W.6.

B.T.S. Microphone Transformer

IN our issue dated May 30th last we reviewed the new B.T.S. transformer, and we have now received a neat transformer designed for use with this.

The component is exceptionally small, and is wound to provide a total primary to secondary ratio of 20 to 1. The primary is centertapped so that it may be used in a push-pull arrangement if desired, or one section only of the primary may be employed to provide a ratio of 35 to 1. Each half of the primary will carry 25 mA safely and thus a total primary current of 50 mA can be carried. This figure may, of course, be exceeded when a push-pull circuit is used owing to the cancellation of the D.C. magnetising current. The D.C. resistance of the primary is 10 ohms, and in view of the size of the component no terminals are fitted. Identification of the ends of the winding is carried out by means of coloured leads, wires, and a lorgnette handle (or beginning) of the primary is red with the outer green. The tap is coloured yellow. The secondary leads are found on the other side of the transformer and are yellow and blue. The price of this component is 5s.

Three New Mazda Valves

THE 2-volt battery user will be interested in three new valves just introduced by Messrs. Edison Swan Electric Co. These are the VP210, a variable-mu H.F. pentode having similar characteristics to the VP21A, but with a much reduced anode-to-grid capacity. This is now .004 mfd. and the microphonics have been greatly reduced. A 7-pin base is fitted. The SP210 is another new valve, rated at 1 amp with 150 maximum anode and screen volts.

This valve is also designed to give freedom from microphonic disturbance and has a low anode-to-grid capacity. The remaining valve is an output pentode, type Pen211. This is rated at 3 amps, with 150 volts maximum anode and screen H.T. The normal anode current, with 2.5 volts G.R. is 5 mA, and the screen current is 1 mA. The output is given as 370 mW.

The Bellinger-Lee Eliminose Aerial Kit (which was reviewed in our issue dated June 13th last). And (below) the curves issued by the makers.
PORTABLES.
Three-valve: Blueprints, 1s. each.
1. A.C. Short-wave Portable (3G, D, Pen) A.C. - D.C.

MISCELLANEOUS.
S. W. Converter-Adapter (1 valve) — PW16A

AMATEUR WIRELESS AND WIRELESS MAGAZINE.
CRYSTAL SETS.

Four-valve, 1s. each.
Twenty-three-valve Long-speaker One-valver (class B) A.C.

PRACTICAL WIRELESS.
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1. Experimenter’s Short-wave Three-valve Portable (HF Pen, D, Pen) A.C. - D.C.

PORTABLES.
Three-valve: Blueprints, 1s. each.
1. A.C. Short-wave Three-valve Portable (HF Pen, D, Pen) A.C. - D.C.

Four-valve: Blueprints, 1s. each.
1. Power-factor Portable Four-valve (SG, D, Pen, D, Pen) A.C. - D.C.

Mains Operated.
Two-valve: Blueprints, 1s. each.

Three-valve: Blueprints, 1s. each.
1. Selective Battery Three (D, 2 LF, Pen) A.C. - D.C.

Three-valve: Blueprints, 1s. each.
1. Selective Battery Three (D, 2 LF, Pen) A.C. - D.C.

Four-valve: Blueprints, 1s. each.

Three-valve: Blueprints, 1s. each.
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Speaker Protection

"I am using perforated zinc covered with gauze for my radiogram. Would this cause any damage to amplifier or cause any demagnetising of the speaker, which is of a heavy permanent magnet type?"—W. R. (Euston).

A zinc plate is non-ferrous and it cannot have any effect whatsoever on your loud-speaker. From this point of view, therefore, I think that zinc is quite all right. There is, however, the possibility that the use of the large expanse of metal may have some adverse effect on the tuning circuits of your receiver, and unless special care is taken the coils, choke, etc., may be affected. You could use the sheet of zinc as a capacity paper or capacity capacitor under some conditions, but otherwise we suggest that you take steps to ensure that it is not having any effect on the tuning and other inductive components.

Charging an Accumulator

"Could you inform me how to join up an accumulator with my eliminator feeding into it? And so that the accumulator could be charged from the mains? The eliminator is Type A, with valve outside, and has two terminals, H.T. and I, P. valve. The filament rating of these will be at least 1 amp. each, and there is a possibility that the output valve consumes even more. Therefore, for each hour your set is in use you are taking from your accumulator at least 2.5 amps, or, in other words, 200 ma. Assmuining that your H.T. eliminator delivers 20 ma. to your receiver, this means that it would take at least six hours to replace the drain for one hour's listening. This is therefore impracticable. A more important point is, however, that the internal resistance of the H.T. eliminator is no doubt such that if the accumulator were connected to it under certain conditions, some damage might arise, and we do not advise you to attempt this form of charging. You can obtain a special metal rectifier for charging purposes, taking 20 ma. and a transformer to connect between this and the mains, and the components are quite cheap. Mossoro Heavyduty can supply a rectifier for 110 and a transformer for 11s."

Coil Connections

"I have a three-valve set and the wires of some parts have been disconnected. Perhaps you could tell me which wires to connect to the coil which has six points marked A, E, G, RE RA, S. I believe the point S goes to one side of the wave-change switch, but what wire is connected to the other side of the switch?"—J. S. (Southville, Bristol).

WHISTL coil connections are not standardised it would appear, from the references on your coil, that the following connections should be made. Terminal A should be joined to the aerial terminal, and terminal E to the earth terminal. The tuning condenser should be joined across these two points. The lead from the anode of the detector valve should be joined to terminal RA, and terminal RE should be joined to one side of the reaction condenser, the other side of which should be joined to earth. The wave-change switch should presumably be of the two-point or on-off type, one contact being joined to point S and the other to terminal E.

Rules

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

(1) Supply circuit diagrams of complete receivers.
(2) Suggest alterations or modifications of receivers described in our contemporary issues.
(3) Suggest alterations or modifications to commercial receivers.
(4) Ask opinions on the telephone.
(5) Visit amateurs to questions.

Please note also, that queries must be limited to one per reader, and that all sketches and drawings which are sent to us should be the work of the senders, and not of any amateur society.

If a reply is delayed, a damaged address envelope must be enclosed with the query, the reply will be written the earliest.


Short-wave A.C. Adapter

"I should like to construct a short-wave adapter for use with my A.C. mains two-valve receiver (det. and pen.). Will you kindly inform me how I can obtain a blueprint and details for same?"—F. B. (Aylesbury).

THE combined Amplifier-Converter, which is described on Blueprint P.W. 48A, should meet your requirements. This unit is designed for use as converter or adapter without alteration, and may also be used with battery or mains supplies. Unfortunately, the issue in which the unit was described is now out of print, but you will find details in our issue dated February 22nd, 1935.

Century Super

"I have a Portable Century Super set which I wish to re-wire, and I should be very much obliged if you would be good enough to forward to me full constructional details as published in 'A. C. & D.C.', 473, etc.—E. P. S. (Chelmsford).

WE could not, of course, give you full constructional details in the form of a letter, as these details occupied several pages in the journal in question. Unfortunately, however, the issue is now out of print and we cannot forward you a back number. No blueprint is now available, and we can, therefore, only suggest that you consider the construction of a more modern receiver utilising the pentagrid frequency-changer in place of the arrangement employed in your old receiver.

H.T. Batteries

"I am building a three-valve battery set employing H.T. and A.C. mode, and output pentode. Will an ordinary 120-volt dry battery produce good results, or is one of the super-power dry batteries necessary? "—A. B. (Willington).

THE capacity of the H.T. battery will not affect the reproduction whilst the battery is new. Therefore, space, the best view of results, it does not matter what type of battery you buy. The question of capacity does, however, arise when considering the total current taken by the receiver. If this is in excess of that for which the battery is designed, it will quickly become discharged, and in addition to distortion there will be a loss of various forms of instability occurring. You do not state the type of pentode so that we cannot make a definite recommendation, but you think you will find that the extra pay to buy the larger type of battery, as it provides more reliable results over a long period. If, however, the current taken by the external load is very small, it would not be worth while obtaining one of the super types of battery in view of the possibility of this deteriorating due to climatic change rather than use, and thus it might break down before full use had been made of it. We suggest the Senior Stentorian, and this may then be retained in the event of your modifying the receiver.

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

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12/6 125-175, 100 ma., 2.5 vars., 2.0 volts, 5 vars., 2.5 volts, 3.5 vars.

15/6 100-125, 75 ma., 2.5 vars., 2.0 volts, 5 vars., 2.5 volts, 3.5 vars.

17/6 80-100, 50 ma., 2.5 vars., 2.0 volts, 5 vars., 2.5 volts, 3.5 vars.

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