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A History of Westminster Abbey.
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By Dr. Jocelyn Perkins (Sachist of Westminster Abbey)
Fiction in this number by E. PHILLIPS OPPENHEIM, H. M. RALEIGH, HORACE ANNESLEY VACHELL, etc.

PEARSON'S MAGAZINE 1'

On sale at all Newsagents and Bookstalls, or by post 1/3 from the Publisher, C. Arthur Pearson, Ltd., Tower House, Southampton Street, Strand, London, W.C.2.
Fault Finding

The first step in locating a fault in a receiver is to measure the current or voltage at various points in the circuit, but, as every service man knows, it is often very difficult to locate some types of fault by this means. Such difficulties as broken tuning-coil windings, short-circuited transformer windings and so on, are not revealed by preliminary tests as above described, and there are other faults which will not be revealed at all by a meter of the usual kind. Short-circuited turns in such components as transformers are revealed by special types of apparatus which the average experimenter does not possess, and there are other faults which will only be located when a systematic substitution of components is carried out. In this issue we deal with such details, and even if you have not at the moment experienced such troubles you should study this article in order to be prepared against the time when one of these unforeseen difficulties arises.

Brighton Television Pioneer

The range of reception of the Alexandra Palace transmitter has been the subject of much controversy, and it is now stated that no definite limit can be placed upon the range. Rumours that listeners on the Continent have picked up the vision transmission and that even American experimenters can get some sort of signal, show that we do not yet know all that is to be known of the peculiarities of the ultra-short-wave transmissions. Mr. R. S. Burbidge, a well-known television pioneer of Brighton, was recently televised from the B.B.C. television transmitter in a talk on how a regularly received the programme at Brighton, a distance of 50 miles.

Loudspeaker Traffic Control

The General Electric Company has received an order for a loudspeaker announcing system for installation on Kincardine-on-Forth Bridge, for the purposes of traffic control. It is hoped by this means to direct traffic by loudspeakers at either end of the swing span, and thus greatly reduce delays caused by congestion. The engineer will have a microphone at his control desk, which is situated at the crown of the swing bridge, and he thus has maximum visibility. The amplifier is rated at 50 watts.

Empire Day Broadcast

The B.B.C. announces that on Empire Day (May 24th) listeners will hear broadcast on the National wavelength for half an hour a programme from India, with a contribution from Ceylon. Devised by All-India Radio, the programme continues the policy of fostering radio exchanges between various units of the British Empire. The series of this type of Empire Day broadcast began in 1933, when the programme, "News of Home," was provided by the United Kingdom. In the following years, the principal broadcasting organisations of the Empire have collaborated with the B.B.C. in the provision of a special programme on May 24th; in 1934 Australia, in 1935 Canada, and last year South Africa.

Television Lectures

A SPECIAL course of four lectures on Television is to be given at the London Polytechnic, Regent Street, commencing on May 31st. These lectures, delivered by Mr. H. J. Barton Chappie, will commence at 7.30 p.m., and will last for one hour and a half. Demonstrations of high-definition television, including the reception of the B.B.C. programmes, will be given at each lecture.

A Coronation Lesson

BENDIGEIDVRAN, in the Mabinogion, to have said: "A fo ben did bont," which, translated into English means: "Who would be foremost, let him serve." A special Coronation lesson on this subject will be given to Schools in the Welsh programme by Alun Oldfield Davies, on May 10th.

Summer Programmes

This year it is proposed to provide alternative programmes during the summer months, instead of a single programme as in previous years. During July, August and September, these alternatives will be radiated on the National and Regional wavelengths between 6.30 p.m. and 8 p.m. It is emphasised that this arrangement is experimental, and its resumption in future years is likely to depend largely on its welcome by the public.

Coronation Route in Music

The B.B.C announces that three days before the Coronation a description in music of the route that the Royal procession will take to and from Westminster Abbey will be broadcast by the B.B.C. Variety Orchestra, directed by Charles Shadwell. The programme will be heard on the National wavelength during the afternoon of Sunday, May 9th. Modern composers have written many famous and popular works around the sights of London and most of the important thoroughfares in the metropolis have been portrayed in music.

The programme will thus be able to cover all the important parts of the route, and it will include a Coronation march, "Royal Cavalcade," specially written by Albert Ketelby; two movements from Eric Coates' London Suite, "Westminster" and "Oxford Street," and "Massed Bands of the Guards," by Michael North.

"Scotland Calling"

GOVAN BURGH BAND, conducted by Gregor J. Grant, will broadcast on May 6th. The programme will include the March Medley "Steps of Glory," Selection from "Oberon," and a Fantasia, "Scotland Calling."
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The first step in locating a fault in a rectifier is to measure the current or voltage at various points in the circuit, but, as every service man knows, it is often very difficult to locate some types of fault by this means. Such difficulties as broken tuning-coil windings, short-circuited transformers, and so on, are not revealed by ordinary means as above described, and there are other faults which will not be revealed at all by a meter of the usual kind. Short-circuited turns in such components as transformers are revealed by special types of apparatus which the average experimenter does not possess, and there are other faults which will only be located when a systematic substitution of components is carried out. In this issue we deal with such details, and even if you have not at the moment experienced such troubles you should study this article in order to be prepared against the time when one of these unforeseen difficulties arises.

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ENDIGRIDYBAN, in the Mabinogion, making his body into a bridge so that his men could cross over a river, is reputed to have said: "A fo ben did bont," which, translated into English means: "Who would be foremost, let him serve." A special Coronation lesson on this subject will be given to Schools in the Welsh programme by Alun Oldfield Davies, on May 10th.

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GOVAN BURGH BAND, conducted by Gregor J. Grant, will broadcast on May 6th. The programme will include the March Medley "Steps of Glory," Selection from "Oberon," and a Fantasy, "Scotland Calling!"
A Coronation Musical Acrostic

We are informed that Reginald Foort’s new Coronation Organ, to the programmes of Coronation Week will include a novel arrangement of songs, entitled “A Musical Acrostic in Melody and Rhythm.”

He will be accompanied again by Phil Park and Ivor Dennis at two pianos, Styx Gibling, of the B.B.C. Variety Orchestra, at the drums, and by Esther Coleman and Bert Yarlett.

He has so arranged the programme, which will be broadcast on the Regional wavelength on May 14th, that the initial letters of the titles of the songs will, together, from an appropriate acrostic.

All British Variety

The Empire Theatre, Belfast, has arranged a brilliant programme of All-British Variety to celebrate Coronation Week, and on May 14th a broadcast from this Theatre will be included in the Northern Ireland programme. The popular comedians, Hassell and Day, who broadcast from Belfast during the special week after the opening of the Lisnagarvey transmitter in March, 1936, are returning to Belfast, and among the other artists at the Empire will be Alex Findlay and Lou Bedford with his xylophone. This should prove an outstanding variety programme, and it will be compered, as usual, by Raymond Glendening.

Salisbury Cathedral Organ Recital

On May 10th, in the Western programme, Sir Walter Alcock will give an organ recital from Salisbury Cathedral. He has been organist of the Cathedral since 1916.

The following, the first broadcast for Problem No. 240, and books are accordingly being issued to the lucky winner.

Solution to Problem No. 241

The hum and high readings were due to shorted sockets of the receiver satisfactory results were obtained. Where was the fault? Three books will be awarded for the first three correct solutions opened. Address your solutions to the Editor, Practical and Amateur Wireless, Geo. Newnes, Ltd., 10th, 1937.
This Article, which Explains the Functions of Valve Rectifiers, is Specially Written for Beginners

By RADIO ENGINEER

The Valve as Rectifier

Before one can consider using alternating current supplies for the purpose of providing the necessary high tension for a receiver or transmitter, it is essential to arrange some means whereby the alternating current can be "rectified" so that a steady current, flowing in one direction only—direct current—is obtained.

The process is known as "rectification," and in this article it refers to alternating currents of low frequency—the standard frequency of commercial supplies in this country, being 50 cycles per second—and not, as in the case of rectification or detection, to alternating currents of radio or high frequency.

When dealing with batteries or D.C. supplies, the potential can be considered to be steady, while the polarity is always constant, one side of the circuit being negative and the other side positive. With A.C., however, the state of affairs is very different, as the polarity alternates between a positive and negative maximum value.

It is possible to represent the difference between the two supplies graphically, and "x," Fig. 1, indicates the wave form of a direct current, while "y" shows that produced by an alternating supply, the change in polarity being clearly indicated. The distance between the two points "a" and "b" represents a complete cycle, during which the current passes from zero to positive maximum, back to zero and on to negative maximum, finally completing the cycle by returning to zero. This cycle is repeated very frequently, and it is the number of times per second that it takes place which determines the periodicity or frequency of the current.

If the two curves are drawn with a little consideration, it will be appreciated that to obtain the required results the alternating current has to be stopped from flowing in alternate directions; i.e., above and below the zero line; therefore, various methods have been devised to do this, but in this article we are only concerned with the thermionic valve as a rectifier.

Fig. 2.—Simple or basic rectifying circuit.

The Valve Rectifier

The original thermionic valve (Fleming) employed two electrodes only (diode valve), a filament and an anode, as indicated in Fig. 2. For its operation it depended on the filament, when heated, emitting electrons which passed across the intervening space to the anode, providing the anode was maintained at a positive potential with respect to the filament. The flow of electrons constitutes an electric current, and the milliammeter M will indicate its presence when the required operating conditions are fulfilled.

The rectifying valve of to-day is fundamentally the same, though, of course, vast improvements have been made as regards design, construction and efficiency.

The modern rectifying valve can be of the directly or indirectly heated type; it can be fitted with one or two anodes for half or full-wave rectification, while larger electrodes are employed to allow the necessary output and life to be obtained.

One of the main considerations in design is the reduction of voltage drop across the valve, perfect insulation, and a filament which is capable of giving a generous emission without excessive loss of life.

The placing of the anode in relation to the transformer winding has a direct bearing on the frequency of the current.

If two half-wave rectifiers are connected as shown in Fig. 4 it will be possible to utilise the complete A.C. cycle and obtain a greatly improved output wave form.

The source of alternating current is obtained from the mains via the transformer T, which can be so designed that the voltage output of the secondary windings is greater or less than the actual mains supply.

The secondary "s" is provided with a tapping at its dead electrical centre, and it is essential that the voltage across "s" and "s.l." is equal to twice the voltage required by the anode of each rectifier, thus giving between "c.t." and "s" and "c.t." and "s.l." a voltage equal to that required by each valve.

When the secondary is positive at "s," current will flow through the rectifier "R," but "Rl" will be inoperative. As soon, however, as the polarity of the secondary changes, "s.l." will become positive and the current flow will be through rectifier "Rl," while "R" will cease, as that end of the winding is then negative.

By adopting this method, and it is the one most widely used, both half-cycles of the A.C. wave are rectified, and the resultant output is considerably smoother or, in other words, the big gaps between the pulses A, Fig. 3, have been filled in, as shown by "B" of the same diagram, by the rectification of the additional half wave.

Full-wave Rectification

If two half-wave rectifiers are connected as shown in Fig. 4 it will be possible to utilise the complete A.C. cycle and obtain a greatly improved output wave form.

The system described deals with only half of the A.C. wave, it being the most simple method possible, and it is usually known as half-wave rectification.

Fig. 3.—Graphical representation of the effects of rectification and smoothing of an A.C. supply.
THE VALVE AS RECTIFIER.
(Continued from previous page)

It is not usual, for average amateur work, to use two separate half-wave rectifying valves to obtain full-wave rectification, as full-wave rectifying valves, containing two sets of electrodes within one bulb, are standard products of the various valve manufacturers.

Smoothing
It has been agreed that the outputs obtained so far are still far from perfect to the rectifier by excessive charging currents, while, on the other hand, if the capacity is too small, the condenser will discharge its load too quickly or too much before it receives the next charge, thus producing a pronounced ripple.

If the curve "C" (Fig. 3) is examined, the general effect of the condenser can be seen. During the positive half-cycles the condenser receives a charge which is discharged, or partially so, during the following negative half-cycles, thus, as the curve shows, filling in, so to speak, the gaps between the pulses or peaks, the part "z" being condensed voltage.

For the average amateur working voltages a capacity of 4 mfd. is quite satisfactory, but it will be found that half-wave rectification requires more smoothing than full-wave.

The unevenness of curve "C" is due, to a great extent, to the presence of "ripple" voltages superimposed on the direct current, and if such are allowed to remain it is highly probable that pronounced "hum" will be experienced, so a simple filter circuit has to be embodied to remove all traces of them.

A good L.F. choke and another fixed condenser are all that is necessary, at least, in the majority of cases, and they are introduced into the circuit as shown in Fig. 5, which shows the complete full-wave rectifier arrangement.

With the output of the full-wave circuit, the condenser smoothing has an even greater effect than in the previous case, the resultant curve being shown as "D" (Fig. 3), where it will be seen that the output is no longer a series of heavy pulses, but a fairly steady supply.

The filter circuit is still, however, essential, and its effect can be seen by examining the curve "E" (Fig. 3), which represents a reasonably good D.C. supply.

The choke "Ch," Fig. 5, should have an inductance of at least 20 to 25 henries when carrying the maximum current output of the rectifier concerned, while "C1" should be 4 mfd. to 6 mfd., and, for safety's sake, it is advisable to see that it is made for a "working" voltage of, say, 50 per cent. higher than the rectified output.

SOUTHAMPTON'S WIRELESS COLLEGE

The increasing interest which is being taken in radio and television technique has led to an increased demand for training centres. The Wireless College at Colwyn Bay has specialised in radio training for many years, and on April 14th a branch was opened at Calmore, Southampton. The opening ceremony was performed by Sir Ambrose Fleming, M.A., D.Sc., F.R.S., who was presented with a gold key for the purpose by Miss Pamela Whale, aged three years. A tablet is mounted in the Hall to commemorate the occasion and an address was given to the guests by a representative of the Marconi Company. A tour of inspection of the college, its grounds and equipment was made, and the proceedings terminated in the evening with a concert given in the College Theatre by the students. Full details of the training provided at the college may be obtained on application to the Principal, Gordon S. Whale, A.M.I.R.E., M.A.A.A.S., at Calmore, Southampton.

Sir Ambrose Fleming, with the principal of the Wireless College, Mr. Gordon S. Whale, reading a tablet he unveiled at the opening of the college recently.
The outstanding event will, of course, be the televising of the Coronation procession at Apsley Gate, Hyde Park Corner, and from Westminster Abbey. The broadcast, which is expected to last one hour, will open at 2 p.m., with views of the Park and crowd scenes between Stanhope Gate and Hyde Park Corner. Telephoto lenses will pick out the head of the procession a quarter-of-an-hour later as it approaches down the East Carriage Drive, and from then until the last horsemen have passed through Wellington Arch to Constitution Hill the whole of the two-mile procession will be shown on the television screen. A descriptive commentary will be given by Frederick H. Grisewood, who will be stationed at a microphone beside the cameras at Apsley Gate.

As mentioned in a recent issue, three Emitron cameras will be used. Two will be mounted on a special platform at Apsley Gate and will be fitted with telephoto lenses for obtaining distant and mid-shots of the procession and the crowds to the north and south of the gate. A third camera, installed on the pavilion to the north of the gate, will give close-range views of the Royal Coach and other important parts of the procession as they pass through the gate.

The cameras will be connected by some fifty yards of cable to the new mobile television unit behind the parkkeeper's lodge, whence the sound and vision signals will be conveyed by cable to Broadcasting House and Alexandra Palace. The mobile television unit has three vanes: one contains the control apparatus and scanning equipment, one the power plant, and the third an ultra-short wave radio-link transmitter of 1 kilowatt power, which on May 12th will be used as a stand-by for conveying signals to the television station.

The Week's Programmes

Outstanding among the studio programmes in Coronation Week will be the appearance of Alicia Markova and Anton Dolin on Tuesday, May 11th, with members of their company in a Pas de Quatre and Tchaikowsky's "Blue Bird" suite. Special Coronation editions of "Picture Page," television's topical "magazine," will be presented in the afternoon and evening, and it is expected that many of the visitors will have been directly concerned with the Coronation Procession. On the evening of May 15th, Gerald Cook, Director of Television, will give an illustrated account, both in the afternoon and evening, of the arrangements for televising the Coronation Procession. Films and photographs will be used and, through the co-operation of Sootland Yard, special plans will show how London traffic will be controlled on Coronation Day.

"Starlight." The first performance of a new modern rhapsody by Ord Hamilton, "Rhythm in the Dawn," will be given by the Television Orchestra in the same programme.

On Friday, May 14th, Jack Hylton will bring his band to the television studio. The instrumentalists and vocalists number nearly forty—the largest musical combination yet televised, and as was the case on the Band's previous appearance, a special rearrangement of the studio will be necessary.

Television will televise itself on Saturday, May 16th, when both afternoon and evening programmes will be devoted to a tour of the London Television Station. The guide will be Leslie Mitchell, television announcer, who will accompany the roving camera to the reception hall, to rehearsal, the sound and vision transmitters, the make-up and dressing-rooms, production shop, film projection room, control room and studios. During the visit, viewers will meet G. H. Middleton, the gardening expert, and the Television Orchestra.

Another Historical Film

Prior to the official opening of the postwar Alexandra Palace station the B.B.C. staff prepared a film entitled "Television comes to London," and televised it several times in the initial programmes. It traced some of the early history of television but dealt more specifically with the building and installation of the television equipment, together with the very considerable structural alterations in the Palace building itself. It is now learned that a more ambitious effort is to be made, for plans are already well in hand for an elaborate production which aims at portraying the historical development of television from the earliest work of the pioneers up to the advanced equipment now in daily use.

Not only will this serve as a record for present and future generations, but it will be employed for propaganda purposes by being radiated in television signal form in the new hourly morning sessions which are being planned. These additional daily periods from 11 a.m. to noon are for the benefit of dealers so that they can demonstrate sets to prospective purchasers, and to enable manufacturers to test their new models and designs under strict service conditions before going into big production. Both the production and direction of the film will be in the hands of the B.B.C. television producer, Dallas Bower, while the late chief cameraman of the B.B.C. Television, L. A. Allan Lawson, will be in charge of the photographic side. This move on the part of the B.B.C. is an indication that they are making the most of the opportunity to see their remembrance take form and substance as the favourite programmes of their company in a Pas de Quatre and "Musical Cavalcade," which will be the main feature in the evening television programme on Coronation Day, will be presented in a novel manner. An elderly couple who recall the grand old days of Victorian and Edwardian music-hall will see their reminiscences take form and substance as the favourites of yesterday and to-day reappear on the television screen. The artists will include Albert Whelan, entertainer at the piano; Ada Cento, singing her celebrated "widow" song; Tom Costello, singing "At Trinity Church I met my Doom"; Marie Lloyd, junior, who will be heard in her mother's great number, "One of the Ruins that Cromwell Knocked About a Bit"; and Ida Barr, singing "Oh, you Great Big Beautiful Doll." The studio will be decked out as an old-time music-hall and the traditional chairman and the sellers of bath buns and sweetmeats will be very much in evidence.

Harry Roy's Band will be televised, with Princess Pearl, in the afternoon programme on May 16th. In the evening transmission Clapham and Dwyer will be featured in a novel modern rhapsody by Ord Hamilton, "Rhythm in the Dawn," will be given by the Television Orchestra in the same programme.

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**THE TELEVISION O.B. VAN**

Advance Details of the Special Mobile Control Room Which will be Used When Televising the Coronation Procession

For the purpose of televising the Coronation procession, the B.B.C. have purchased from the Marconi-E.M.L. Television Factory a special mobile control room in which the various incidental pieces of machinery are housed. The complete installation is incorporated in a large motor vehicle about the size of a Green Line coach, and this will be parked on the grass on the west side of Apsley Gate, behind the park-keeper's lodge. The apparatus itself is mounted on two rows of racks along the sides of the vehicle, with a small central aisle along which the operators can walk when inspecting and operating the equipment. The racks, of which there are six on each side, measure 7ft. 6in. in height and 19ft in width, and the total weight of the vehicle is 8½ tons. A monitoring receiver is fitted in a compartment over the driver's head, and thus the operators can see the televised picture and make the necessary adjustments by means of the controls provided for the purpose.

**Sound Control Room**

In addition to this section, there is a small sound control room incorporated in the vehicle, with all the necessary faders and amplifiers to deal with four microphones which will pick up the voice of a commentator and local sounds associated with the scene being televised. Three special multiple cables will run from the vehicle to the top of Apsley Gate, across which cables will pass, concealed, to drop down behind a pillar at the point where the three television cameras are mounted. These cables are about 1½ in. in diameter, and contain 27 insulated conductors, two of which are of a special low-capacity type designed to carry the very high-frequencies involved in a television picture transmission.

**A Stand-by Transmitter**

A special stand-by transmitter vehicle will be parked alongside the main van, and this will radiate the vision signal from a small highly-directional aerial which is mounted on top of the main transmitting mast at the Alexandra Palace. A spare aerial, with all the necessary equipment, is housed in the standard mobile transmitter in the same way as with signals from the studios there. To avoid any troubles from breakdowns, duplicate circuits are being arranged and special care has been taken to avoid interference from cars and other electrical equipment, which may be in the vicinity of the cameras and vans. No doubt the experience gained with this particular equipment at the Coronation procession will provide valuable data for subsequent television broadcasts of important events which take place from time to time.

**Space Equipment**

Is an effort to prevent the breakdowns in the television service from Alexandra Palace the B.B.C. is taking steps to install duplicate equipment. The system of oscillators, correctors, modulation amplifiers, and so on, now in operation is very elaborate even if the failure of a small component is capable of wrecking the whole chain. No doubt the Baird radio transmitter could be adapted to suit the B.B.C. picture standard, and this would then provide an admirable standby in case of a transmitter fault. It would be very welcome to know how the popularity of the service will be affected if picture failures occurred when many of the proposed ambitious outside broadcasts were scheduled to take place.

**A Similar Characteristic**

Regarding cathode-ray tubes, it is possible that many readers have failed to realise that one of the characteristic curves resembles very much that of the familiar family of characteristic curves about which so much was said in the earlier days of radio. If a graph is made showing the relation between the negative bias voltage applied to the control electrode of the C.R. tube (horizontal ordinate), and the brightness (beam current) of the spot observed as fluorescence on the screen, it will be identical in shape and nature to a valve curve plotting anode current against grid bias for a steady anode voltage condition. The beam current will be zero for a certain negative potential on the modulator anode (similar to the valve grid)—some value between 50 and 90 volts—and after a sharp curve will rise steadily with reduced negative bias until a certain maximum value is reached corresponding to the saturation anode current condition of a valve. The shorter the bias range between black (zero beam current) and white (maximum beam current), the greater the sensitivity of the tube, but this characteristic has to be designed to match in with all the other features and operational data of the tube to ensure that good pictures materialise. If the picture is too bright a well modulated signal will extend the voltage beyond the zero bias condition, rendering the modulator electrode positive and spoiling the picture. The static bias condition must be comfortably within the normal signal voltage range if the full black to white distances variation is to show correctly.

**American Receiver Design**

Some of the objections levelled against American television receivers included the small size of the picture—it seldom was greater than 10cm wide and more frequently was less—its colour, since the designers showed a marked preference for green, and the total number of valves employed was of the order of thirty. Apparently these have been taken to heart, for in the later designs now being prepared by some of the more important companies the number of valves is about a dozen, while there is a diminution in the number of external controls which the user can handle. Some are being taken to increase picture size and improvements made in both the estimated life and performance of the cathode-ray tube which still features as the prime picture reproducer. Few, if any, of the companies show any partiality towards American radio is concerned. As in this country controversies still rage between the cinema and television interests, but signs of a spirit of co-operation seem to be emerging and this is a favourable factor. The two industries must be interdependent for some time, and the signal ideas will operate for the benefit of both sides.

**TELEVISION NOTES**

In an effort to prevent interference from cars and other electrical equipment, which may be in the vicinity of the cameras and vans. No doubt the experience gained with this particular equipment at the Coronation procession will provide valuable data for subsequent television broadcasts of important events which take place from time to time.
YOU HAVE BEEN WARNED BY RADIO

Professor Hilton, on November 19th, 1936, from the B.B.C. broadcast a warning. Colleges teaching by correspondence, there are many others which are colleges in name only. He said some well-known colleges are not intent to fail. Some claimed successes they could not prove. In some cases the warning was to the effect that while there are many really good and reliable colleges teaching by correspondence, there are many others which are colleges in name only.

NOW BE ADVISED BY ME

The big name of a College is no proof of its national standing. The Bennett College has been established over thirty years and our entire building is devoted to Bennett College work. No other business of any kind is either on or attached to The College. Bennett College work. No other business of any kind is either on or attached to The Bennett College work. The College has been established over thirty years and our entire building is devoted to Bennett College work.

Staff have all passed their examinations, and our tutors are all experts in their specialisation for tutorial purposes. Our tutors specialise in teaching students for the examinations they themselves have already passed.

THERE IS NO OTHER COLLEGE IN THIS KINGDOM THAT CAN CLAIM ALL THE ABOVE ADVANTAGES.

It is not necessary for students to attend the College; we can send exactly the same tuition to you by post for a reasonable fee payable monthly. Anybody who reads the journals knows that there are many things advertised that one can study, and any kind of study is good. It is training for the brain, but the best thing to study, surely, is a course specially prepared to teach your own vocation, or prepare you for the examination which you have in view.

Knowing that you are master of your job gives you self-confidence and personality, but a Diploma from a College is absolute proof of your efficiency. We prepare Candidates for all examinations whatever. It is our pleasure to help. We never take students for courses unless we feel satisfied they are suitable. No other business of any kind is either on or attached to The Bennett College work.

SPEECHES

There is a tide in the affairs of man which, if taken at the flood, leads on to fortune and success. There are three things which come not back: the sped arrow, the spoken word and the lost opportunity—this is your opportunity. If it is your desire to make progress and establish yourself in a good career, write to us for free particulars on any subject which interests you, or if your career is not decided, write and tell us of your likes and dislikes, and we will give you practical advice as to the possibilities of a vocation and how to succeed in it. You will be under no obligation whatever. It is our pleasure to help. We never take students for courses unless we feel satisfied they are suitable.

THE APOLOGETIC ORGANISATION CAN HAVE BEEN CREATED ONLY BY THE SUCCESS OF OUR STUDENTS.

There is a tide in the affairs of man which, if taken at the flood, leads on to fortune and success. There are three things which come not back: the sped arrow, the spoken word and the lost opportunity—this is your opportunity. If it is your desire to make progress and establish yourself in a good career, write to us for free particulars on any subject which interests you, or if your career is not decided, write and tell us of your likes and dislikes, and we will give you practical advice as to the possibilities of a vocation and how to succeed in it. You will be under no obligation whatever. It is our pleasure to help. We never take students for courses unless we feel satisfied they are suitable.

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Construction Details of "Practical Wireless" Receivers—3

For good long-distance reception, two H.F. stages are essential, and many amateurs prefer a "straight" receiver of this type to one of the superhet designs. There are, of course, the advantages of absence of whistles and the avoidance of tricky ganging and trimming adjustments, and in the Fury Four receiver greater simplification is introduced by utilizing separate tuning condensers. The two H.F. stages are tuned by means of a two-gang condenser, the flatness of tuning of the aerial coil rendering it unnecessary to make use of any panel trimming device. The detector tuning coil is then tuned by a separate tuning condenser, and the only disadvantage of such a scheme is that it is possible to find two adjustments for certain powerful stations. However, if the trimmers mounted on the condensers are adjusted carefully, and the series aerial condenser also set to a certain position, it may be found in most cases that the dial readings of the two tuning controls will coincide, thus facilitating the tuning process.

Modifications

To bring this particular receiver up to date, modern iron-core coils are recommended in place of the original air-core variety, and the Varley combination will be found ideal. A set of three type BF.50 coils should be obtained, and the attached diagram shows the tuning of the coil unit, the majority of the wires in this diagram being placed in the same position as on the blueprint, which may be obtained for this receiver.

For tuning purposes, we now recommend the J.B. "Nugang" type condensers, the make originally specified no longer being on the market. To keep in line with the original design, the J.B. drive Type A should be specified when ordering these condensers. Of the remaining components in the original specification, the aerial-series condenser, output choke, and volume control are now unobtainable, and for these, substitutes are given in the list of components which is attached.

One of Our Most Popular Early Receivers Was the Fury Four, and This Article Gives the Main Constructional Details and the Modifications Necessary to Bring It Up to Date

Construction

The receiver is assembled on a baseboard 16in. by 16in. with 2in. runners along two sides, and a panel 16in. by 8in. carries the controls and tuning dial escutcheons. Although not essential, the board could be covered with a sheet of metal foil, either copper or aluminium. The latter would enable various earth return leads to be connected to it by soldering. In wiring a receiver of this type it is preferable to do as much of the work as possible before the condensers and coils are mounted as by this means the weight of the receiver is kept to a minimum, and it may be more easily handled.

It will be noticed that certain slight alterations have now to be carried out to the under-chassis wiring in order to enable the new coils to be used correctly. These are provided with a special change-over tapping on the coils, joined to terminal No. 3 on each coil unit. Therefore, the present connections from the grid line of each of valves V2 and V3 to the H.F. circuit of the preceding stages must be broken in order to enable this to be done. Condenser C5 (0003 mfd.) is now joined to the grid of V3 and through hole No. 4 to the anode of V1. This lead must be left intact, but the lead which goes from the grid of V2, through hole No. 5, to the tuning condenser must not come into contact with the 0003 mfd. fixed condenser. The tag shown joined to this line should be connected to terminal No. 3 on the centre coil, another hole being drilled in the chassis to enable this lead to pass from one side to the other. The other condenser, C10, is joined in the blueprint to a lead running from hole No. 10 in the chassis, and accordingly it is necessary to

THE FURY FOUR

(_blueprint No. P W 11)

LIST OF COMPONENTS

<table>
<thead>
<tr>
<th>Component Description</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>One three-gang coil assembly (B.P.30) (Varley).</td>
<td></td>
</tr>
<tr>
<td>One two-gang &quot;Nugang&quot; condenser</td>
<td>type A drive (J.B.)</td>
</tr>
<tr>
<td>One single gang &quot;Nugang&quot; condenser, with type A drive (J.B.)</td>
<td></td>
</tr>
<tr>
<td>One Formo® condenser, type J (Formo Products).</td>
<td></td>
</tr>
<tr>
<td>One Wearite S.G. choke, type H.F.P.A. (Wright and Weaire)</td>
<td></td>
</tr>
<tr>
<td>One S.G. choke, type H.F.4 (Bolgin).</td>
<td></td>
</tr>
<tr>
<td>One screened H.F. choke (B.T.S.).</td>
<td></td>
</tr>
<tr>
<td>One L.F. transformer, ratio 3 to 1 (B.T.S.).</td>
<td></td>
</tr>
<tr>
<td>One Pentode output choke, type D.P.9 (Varley).</td>
<td></td>
</tr>
<tr>
<td>Three 1 mfd. fixed condensers, type B.B. (Dubilier).</td>
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<tr>
<td>Two .0003 mfd. fixed condensers, type 665 (Dubilier).</td>
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<tr>
<td>One .0002 mfd. fixed condenser, type 665 (Dubilier).</td>
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<tr>
<td>Two .1 + .1 C mfd. fixed condenser, type BE.31 (Dubilier).</td>
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<tr>
<td>One .0002 mfd. differential reaction condenser, type V.G.47 (Bulgin).</td>
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<tr>
<td>One fuse-holder, type F5 with fuse (Bulgin).</td>
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<tr>
<td>One 50,000 ohm potentiometer, type V.G.47 (Bulgin).</td>
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<tr>
<td>One 0003 mfd. differential reaction condenser (B.T.S.).</td>
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<tr>
<td>One three-point switch, type GC (Wright and Weaire).</td>
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<tr>
<td>One chassis, 16in. by 8in. (Peto-Scott).</td>
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<tr>
<td>Four valves: Type 220 S.G., 220 S.G., 210 H.F., and 220 FT (Cossor).</td>
<td></td>
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</tbody>
</table>

Complete theoretical circuit diagram of the Fury Four showing the terminal connecting points for the new coils.
A Jam in the Studio

THE B.B.C. we must admit is bright and breezy and up-to-date in its outlook. Further evidence of this was provided by the recent jam session in which a room full of highly-paid musicians extracted from the leading bands in London were invited to broadcast themes on certain popular tunes without previous rehearsal. The result was better imagined than listened to—it was certainly easier imagined than described. I was left speechless, tongue-tied, and my usually prolific vocabulary, with its rich store of appellations, execrations, objurgations, and expletives, entirely broke down in my effort to find suitable words with which to describe it. I can only tamely say that it was the greatest insult to the ear that the B.B.C. had yet broadcast. Or is it? After all, why shouldn't the B.B.C. do what the Minister of Transport is allowed to do and is paid to do? I expect many members of the B.B.C. arrive at Portland Place by means of their Rolls-Royces—a vehicle, I understand, which even the most lowly paid luminary employed in that ugly building is wont to use. They must always be on the alert for ideas for new programmes. In travelling through London they must, as I do, become simply frantic at the muddle and the chaos which has been created by Hore-Belisha. When they arrive at their offices, their nerves must be frayed to tatters, and on the grounds that after the night before you want the hair of a dog that has bitten you to effect a cure, they plan this cacophony to assuage their trembling nerves and bodily torments. The world is a mad place nowadays anyway, where rules of decorum and proprieties are relegated to the limbo of bustles, harpsichords, antimacassars, and the cult of dirt in which it was considered unclean to wash every day. A world which can tolerate jazz and crooners can tolerate anything. Therefore, I congratulate the B.B.C. on having created the Big Din, and thereby set an example to America. The interlarded remarks such as "Yeah, Sir," "Swing it, Boys," "Gee, that's meller," or "Atta Baby, that's a hot one," add to the lunacy.

New Use for Crooners

I LEARN that the General Electric Company are installing a speech amplifying system on the Kincardine-on-Forth Bridge which is to be used for controlling traffic. The Control Engineer will be able to speak into a microphone from his cabin situated at the crown of the swing span, and when he wants the traffic to stop I suggest that he puts on a record of a crooner when the motorists will just fade away.

Good News for Norfolk?

I HAVE had a number of letters from readers in Norfolk and district who have bemoaned their lot for years. It appears that reception conditions there are very bad, and even the experts who have visited Norwich and its surroundings have been unable to say just why conditions should be so bad. On the long waves signals are received fairly well, but on the medium band even London does not provide a good signal. Apparently the complaints have also been sent to the powers that be, for it is now announced that a station is to be built at Norwich by the B.B.C. So perhaps now the residents in that part of the country will rest content—or will they? I forgot to mention that the station will not be in operation until 1939!

Songs You've Never Heard!

Some time ago the B.B.C. had another bright idea—namely, to broadcast songs that had not been accepted by various music publishers. We were told that these songs had been submitted to the publishers who had either refused them, or placed them on their shelves as unsuitable for public consumption. What has happened now? I called in at our local bazaar yesterday, and the gramophone on the music counter was blaring out one of the songs in question. When I switched on the radio at home, the band which was playing at the moment was also playing the same tune. During the evening I heard it more than five times. Does this mean that the song is so popular, or that plugging still takes place? Incidentally, the question of advertising in this particular series seems to have cropped up again, and although it is stated that no advertising is permitted I have noticed many infringements lately where blatant infringements of this rule have taken place—even to an artist being permitted to state the hotel at which he is going to stay when he comes to London.
Radio Alarms

In a recent issue some details were given concerning a new automatic call device to be introduced by the American shipping authorities, and these details seem to have raised the ire of a reader who sends the following epistle:

"Produced in America, a country always regarded as very 'go-ahead,' one is led to believe that this device is something new and remarkable. Mr. Pannell, President of the Radiomarine Corporation of America, also seems to think it something to shout about. A considerable portion of my life has been spent at sea as a Marine Operator, and for eight years of that period I have worked on ships fitted with just such a device as is described in your paper. In America, the Safety Device was not recognised, nor would they even consider it as an effective aid in British ships, and, in consequence, they compelled all foreign ships trading on their coasts to carry, in addition to the Wireless Operator, a 'watcher'; that is, a person capable of receiving the distress call only. Apparently they have now come to appreciate the efficiency of the British instrument they have for so long scorned.

"In closing, I would like to mention that the Marconi Automatic Device is a beautiful piece of work, as delicate as the finest wrist watch, and worthy of more publicity than it has ever received in the past."

Of course, it should be unnecessary to state that the information was not given to belittle the British product, but merely to acquaint readers with the latest development in this direction. The policy of this paper is to give readers all the information which comes to hand of radio developments, and this particular item was only released in April.

America Again!

I have called attention before to the way things are done "in the States" and in the latest news-sheet issued by a popular station I find the following: The announcer was giving a sound-demonstration, while the narrator was describing a bombing and gun battle between thugs and police. The sound effects included automobiles, trains, crashing buildings, fires, sirens, etc. No synthetic stuff was employed here, and to simulate the gun battle the announcer was using two revolvers, one in each hand. As he blazed away he suddenly felt a burning sensation in the calf of his left leg, and after the show he found that he had shot himself. At least, he had gone off so close to his calf that he was severely burned and had to visit a nearby doctor to have surgical treatment. When he returned to the studio for a repeat of the item in a later programme, he took good care to fire the revolvers farther away from his body."

Receiver Developments

I have often wondered what the radio set of the future will look like, and the various interesting cabinet designs which have been produced from time to time have given no indication of the ultimate trend. But a receiver is shortly to be put on the English market which may well be a welcome indication of the set which will eventually grace our homes—assuming that television takes on some new and simple form. This new receiver is built as a mantel clock and is, in fact, very little larger than the standard marble timepiece which our forebears used. It is, at any rate, sufficiently narrow to enable it to be stood comfortably upon the modern narrow fire surround. The entire front of the cabinet is in the form of a clock face, the centre portion acting as a speaker grille and the hands and chapters being arranged round the rectangular opening. Three controls are fitted just below this, and the receiver is an all-mains model with a novel built-in aerial and tuning system. Thus, where a power point is fitted by the builders in the centre of the mantel, this particular receiver may be placed in position and no wires of any description can be seen. The clock is mains operated and the makers guarantee 50 to 60 stations at full entertainment value.

Retaliation

An interesting Court case in Denmark recently gave me quite an amusing five minutes. The owner of a stationery shop was charged with an offence against the Danish Broadcasting Act by a receiver without a licence. He pleaded justification, and when asked for his reasons stated that the Post Office authorities were guilty of infringing another section of the same Act which forbids broadcast advertisements. He said that the Post Office, by continually using the radio to advertise their special "greetings" telegram, were undermining his business in birthday and similar cards, and as a protest he refused to take out a wireless licence. The magistrate was sufficiently impressed to inflict a relatively small penalty, and gave him permission to appeal to a higher court.
A Novel "Bug" Key

The accompanying illustration shows a method I have adopted for making a simple but efficient "Bug" type key. The movement is light and definite, and although some experimenters prefer the ordinary type of sender, speed may be improved since the length of the dots and dashes is more fully calculated, and consequently, when going back to the old key, more care is exercised when sending. Contact movement is adjusted by two screws with lock nuts, and correct air gaps must be maintained, otherwise impulses will vary. A piece of brass rod is filed down and made to fit the recess in the brass strip (X) after which soldering should be completed the finest. The ebonite finger control handle was procured from an old key switch, but numerous ways will suggest themselves to suit the conditions of operation.—L. R. Mortes (Leicester).

A Simple Counter

The easily constructed counter shown in the sketch can be made from odds and ends in a very short time. When winding coils or transformers it saves much wearisome counting and ensures accurate results. The four cogs are best cut from sheet brass or stout tin-plate with a pair of snips, and then filed up in the vice together. Note that one tooth on each is longer than the others, and should be bent up as shown. The cogs are then given a coat of white enamel and mounted on a piece of wood with a screw through the centres. Washers are placed underneath to prevent them fouling. The driving spindle is a piece of 4 B.A. studding with a soldering tag nutted on the end and arranged so as to drive the first cog one tooth per revolution. The numbering of the teeth is best left till last, when it is easier to see the direction of rotations. As shown, the device will count to 9999, but, of course, more or less wheels can be arranged as desired.—D. Bessant (Mitcham).

Anchoring Multiple Leads

The anchoring of a number of parallel leads in a receiver may be neatly accomplished by the aid of passe partout picture hangars, as shown in the accompanying sketch. That dodge of yours! I have found that losses in efficiency of S.W. Coils can be minimised by mounting them on the glass pinch of an old valve, which in its turn is mounted on a cork screwed to a baseboard. The pinch is pushed over the cork and mounted on a small ebonite square. The whole assembly looks very attractive. A slider can be fitted to the side of the ebonite to vary the coupling, and small holes are made through the ebonite for the connecting leads, as shown in the sketch.—A. T. Ward (Edgware).

Mounting S.W. Coils

I have found that losses in efficiency of S.W. Coils can be minimised by mounting them on the glass pinch of an old valve, which in its turn is mounted on a cork screwed to a baseboard. The pinch is pushed over the cork and mounted on a small ebonite square. The whole assembly looks very attractive. A slider can be fitted to the side of the ebonite to vary the coupling, and small holes are made through the ebonite for the connecting leads, as shown in the sketch.—A. T. Ward (Edgware).
THE return of the warmer weather and longer hours of daylight leads to a diminution of the hours of listening in the case of many listeners, but there is no reason why this should be so. Apart from the fact that it is possible to make use of any receiver out of doors just as easily as in the house, the B.B.C. have this year decided to cut out their original arrangements regarding the provision of summer-time programmes. In previous years the hours from 6 p.m. to 8 p.m. have been utilised to radiate only one programme from both National and Regional transmitters, but they have now realised that listeners require to make use of these hours just as much as at other times, and accordingly will this year provide the usual alternative programmes, thus giving to those who have not previously taken advantage of outdoor radio, an added incentive to do so. In many cases one requires to listen in the garden, and in this case there are two alternative schemes. Either the receiver may be left in its original position in the house and an extension loudspeaker connected for use in the garden, or the receiver may be taken out of doors. There are advantages and disadvantages in both.

In the former, one has to return to the house in order to make adjustments of volume or tuning, and in the latter the aerial and power supply leads may introduce some difficulty. It must, of course, be emphasised that when making use of the radio in the garden it is essential to keep the volume down to such a level that it is not audible in the next garden, otherwise, apart from the annoyance this may cause, you may be breaking a local by-law concerning the use of loudspeakers in such a manner that they cause a nuisance to other residents.

Separate Speaker or Set
When adjustments have to be made at the house end, it may be necessary for one listener to go into the garden and indicate to the operator in the house just when a suitable volume is reached. If the adjust-

A range of Portables described in past issues of "Practical and Amateur Wireless."

Thus a small portable will be found the ideal solution to this particular form of listening.

Car Radio and Hikers
The user of a car already has facilities for radio when, making journeys into the country, and the cyclist and hiker can build a very neat type of receiver which will provide entertainment with the simplest aerial system. It is, therefore, obvious that a good portable is an investment which returns one hundred per cent., as it may be utilised under so many different conditions. In our blueprint list will be found various types of receiver of the portable class: a small H.T. unit to operate a multi-valve receiver is of large dimensions. Many modern extension speakers are provided with a volume control and this will, of course, remove one of the drawbacks to an extension listening point in the garden. There still remains, however, the problem of changing from one station to another, and

A small portable will be found the ideal solution to this particular form of listening.

low-tension accumulator used for the car light or employment of the various voltages required for the radio receiver, the usual scheme being to employ a special type of rectifier which changes the accumulator supply to A.C. It is then stepped up by means of a transformer and rectified. This device can also be employed to build a small H.T. unit to operate a multi-valve set in the garden, or even when on a hike, provided that the separate sections are included in individual cabinets or cases for portability. A good 6-volt accumulator will be found lighter than a combined 2-volt battery and 120-volt H.T. battery and thus will enable much better results to be obtained from a receiver with only a very small aerial. A further important point is that the majority of modern receivers now include a short-wave band which will provide many alternative programmes, and a very small aerial will be found adequate for good reception of short-wave stations—providing the right time of day or night is chosen when selecting the stations.

Aerials and Earths
The all-important aerial may take many forms in the open air, and it is important to remember that it is unnecessary in many cases to erect any form of mast. A length of good flex may be thrown over the branch of a tree (using a stone tied to the end to act as a weight when casting the aerial, and which will enable the end to drop within reach when the aerial has to be taken down). Alternatively a wire fence will often be productive of splendid results. In certain parts of the country wire fences will be found in which three or four wires are supported on wood or wood and concrete posts, and if these are very dry it may be found that the lowest wire may be connected to the earth terminal of a receiver and the top wire to the aerial terminal in order to give much better results than are obtained when a proper earth connection is employed. Normally this latter connection may most easily be

Reference to Suitable Receivers - - - - By

The simplest circuit for a small portable—ideally suited for the hiker.
made by sticking a meat skewer or other metal object into the earth, pressing a piece of bare copper wire in with it, and attaching the other end of the wire to the earth terminal. If a small brook or stream is adjacent to the place where you decide to camp or picnic, then the earth wire may simply be dropped into the water. If the weather is at all stormy and atmos-
pheres are bad (due to the sensitivity control having to be turned up in order to reach out sufficiently far to obtain a strong signal), it will often be found desirable to ignore the customary earth and to use a small brook or stream, if available, as an earth terminal. A few feet of flex wire stuck into the earth and connected to the aerial terminal without any connection, the wire being insulated where it passes through the lid and connected to the aerial terminal by the mere process of treading on it, will often provide a splendid anti-static aerial. If no extension arrangement of this type is fitted, the simple filter circuit consisting of a 2 mfd. or 4 mfd. fixed condenser joined to the anode may be added. In this case the built-in speaker acts as an L.F. choke, and if a plug-in point is then to be silenced a switch of the ordinary on/off type must be inserted in one of the leads to the speech coil. If it is not thought desirable to modify the speaker in this way, then a good output choke should be obtained to replace the speaker transformer. If a pentode output valve is employed a pentode type choke should be obtained in order to provide the correct matching impedance. The ordinary loudspeaker switching panel will prove of great value if a permanent line into the garden is to be used, and to avoid difficulties due to dampness, such a line should be of the lead-covered type such as is now used for ordinary electric light wiring. The cable (rubber) cable is also suitable, and may be tacked along a fence, or run just beneath the soil. If a plug-in point is fitted as the distant end of the lead (in a garden shelter, for instance) some type of damp-proof cover should be arranged to prevent corrosion of the sockets, and a good tip is to obtain a spare plug, well smear with vaseline and insert this into the sockets when the speaker is not in use. Remember that a plug-in terminal will prove adequate.

A typical portable of the attaché case type. This has the advantage that controls are hidden when the set is not in use.

Additional Details

The above remarks cover the general principles of outdoor listening, and there remain only the incidental details which will, of course, vary in each individual case. The majority of commercial receivers now provide an extension loudspeaker panel or socket strip and this may be employed to supply a speaker used in the garden, for instance. If a switch is fitted in the receiver to silence the built-in speaker this should be operated in order to keep within the desired volume range necessary to avoid disturbing neighbours. If no extension arrangement of this type is fitted, the simple filter circuit consisting of a 2 mfd. or 4 mfd. fixed condenser joined to the anode may be added. In this case the built-in speaker acts as an L.F. choke, and if a plug-in point is then to be silenced a switch of the ordinary on/off type must be inserted in one of the leads to the speech coil. If it is not thought desirable to modify the speaker in this way, then a good output choke should be obtained to replace the speaker transformer. If a pentode output valve is employed a pentode type choke should be obtained in order to provide the correct matching impedance. The ordinary loudspeaker switching panel will prove of great value if a permanent line into the garden is to be used, and to avoid difficulties due to dampness, such a line should be of the lead-covered type such as is now used for ordinary electric light wiring. The cable (rubber) cable is also suitable, and may be tacked along a fence, or run just beneath the soil. If a plug-in point is fitted as the distant end of the lead (in a garden shelter, for instance) some type of damp-proof cover should be arranged to prevent corrosion of the sockets, and a good tip is to obtain a spare plug, well smear with vaseline and insert this into the sockets when the speaker is not in use. Remember that a plug-in terminal will prove adequate.

Here is our Cameo receiver chassis, showing how a neat receiver may be constructed for portable use.
Short Wave Section

MAINS WORKING ON SHORT WAVES

Methods of Avoiding Mains Hum and Induced Interference: Precautions Which Should Be Taken: Extra Decoupling: Mains Filters.

ALTHOUGH it is by now no means unusual to build mains-operated short-wave receivers, there are several points which should be watched when designing such a set. One reason for this is that electrical interference and mains hum are far more likely to be troublesome than is the case with a normal broadcast receiver. That such trouble can be entirely overcome is well proved by the receivers which have previously been described in these pages, and also by the many commercial sets which are designed for all-wave working.

Valves and Circuit

When the constructor proposes to make a receiver to other than a complete, published design, however, he must be prepared for difficulties which might possibly be encountered. With regard to the general form of the circuit, it is generally found that immunity from hum is most easily ensured by using a fair number of valves, each working well within its capacity. If maximum sensitivity is demanded from every valve in the set there is far more likelihood of interference troubles presenting themselves. Some readers may feel inclined to disagree with the statement that a well-designed superhet, even of very simple pattern, is more likely to be free from "mains" troubles than is a Det.-Pen. two-valver.

If the constructor does not feel disposed to go to the expense of a superhet, he would be well advised to include an H.F. stage—e.g., a pentode output valve. Tuning is carried out by means of the single 0.0016 mfd. condenser. An intermediate-frequency of 465 kc/s should be used for preference, and the "oscillator" coil might be one of the normal type designed for aerial tuning, the reaction winding being included in the anode circuit of the oscillator portion.

If greater output were required it could be obtained by using two L.F. stages or by replacing the triode output valve by a pentode. The latter method is satisfactory if reasonable precautions are taken to decouple the screening grid by means of a 2,000-ohm resistor and a 2 mfd. fixed condenser. The same advice applies when using a pentode in a "straight" circuit, but a good deal of care must then be taken with regard to the layout.

The Aerial Circuit

When designing any kind of set with tuned aerial circuit for mains operation, it is found worth while to employ an inductively coupled aerial winding, for this tends to minimize mains interference picked up by the aerial system. It is better still, of course, to employ a dipole aerial system, the two aerial wires being connected to the ends of the inductively-coupled winding. With this arrangement, any interference picked up by the aerial lead-in (which might run comparatively near to mains leads in the walls of the house) tends to be cancelled out due to the capacity existing between the two twisted leads. For the benefit of those readers who are not conversant with the dipole aerial system it might be mentioned that an article on this subject appeared in the issue of PRACTICAL AND AMATEUR WIRELESS dated September 19th, 1936.

Heater Connections

In the case of an A.C.-operated receiver a good deal of potential interference from the mains can be eliminated by connecting a fixed condenser between each heater terminal of the detector valve-holder and the earth-line, as shown in Fig. 2. The condensers may each have a capacity of about .002 mfd., and they should be placed as near as possible to the valve-holder. It is sometimes worth while to repeat this arrangement with the L.F. valve, using condensers of about .005 mfd. capacity. These condensers balance out the A.C. potential developed across the heater winding.

With the same object, it is often better to disregard the centre tapping on the 4-volt A.C. winding, used to supply the heater current, and to fit a "humdinger" 20-ohm pre-amplimeter, so that the exact "electrical" centre can be found by experiment. The idea is illustrated in Fig. 4. When the set is of the A.C./D.C. type it is usually wise to arrange the heater connections so that the detector heater is...
SHORT WAVE SECTION
(Continued from previous page)

returned to the earth-line, as in Fig. 5. If
the detector heater is not at earth potential
it frequently happens that pronounced
hum is noticed, and that this cannot be
eliminated by the usual means. Modula-
tion hum, in particular, is likely to be
troublesome. This manifests itself in the
form of a pronounced, and often com-
paratively high-pitched, hum which is
present only when the receiver is tuned to
a fairly powerful signal. In many cases it
has been found that a re-arrangement of
the heater circuit has cured troublesome
hum which could not otherwise be obviated.

Adequate Screening
Screening is always important in a
sensitive receiver, but it is more usual
so in a mains-operated short-waver.
In many instances it is found that it is
insufficient simply to use screened coils
and chokes, and to isolate the mains-supply
portion of the set. Apparently-trivial
things like unscreened anode connections
can cause a considerable amount of trouble.
To guard against this it is worth while to
use valve anode connectors for H.F.-type
valves which are provided with a small
copper or aluminium cap designed to
close both the connector and the portion
of the valve which is not metal-coated.

Although decoupling is not usually con-
considered essential in connection with mains
supply, it does play an important part in this
respect. Thus, if the detector valve is inadequately
decoupled, interference is likely to be far
more pronounced. Moreover, when reception is
employed, any tendency to instability
and interference is increased. In most
cases it is sufficient simply to include a
decoupling resistance of between 25,000
and 50,000 ohms, along with a 1 to 2-mfd.
fixed condenser, but in exceptional cases
it is better to have two decoupling resis-
tances in series, connecting a fixed condenser
between each and earth. This double-
decoupling also provides additional smooth-
ing for the detector valve, which is most
susceptible to the effects of mains irregu-
larities.

Impaired Low-note Response

Another "trick" which has often been
found useful is to reduce the efficiency of
the L.F. amplifier at very low frequencies.
This does not introduce any undesirable
effects in most cases, because the quality
of reproduction is rarely so good that the
difference in tone can be recognised. One
method of doing this when using R.C. or
charlotted filament coupling is to reduce the
capacity of the coupling con-
denser to about .001 mfd. It might even
prove worth while to experiment with a
few different condenser capacitances.

Another method is to connect a condenser of between .0003 mfd.
and .001 mfd. between the grid of the L.F. valve and earth.

With regard to the component layout-out,
one of the most important points to watch
is that the aerial and/or grid leads do not
run close to the output valve or to the
heater connections. Similarly, the speaker
leads should be isolated from the mains
and H.T. leads. Again, if the components
are placed fairly close together, it is generally
desirable to use twin, screened connecting
wires for the 4-volt A.C. (heater) supply.
The metal-braid covering should be curved
at a number of points, care being taken
that the earthing wires are well soldered
to the braid.

H.F. Pick-up

It might appear unimportant, but it is
not so, that the wires from the rectifier
to the various H.T. points should not be any
longer than necessary. Those have a
tendency to act as a miniature "aerial," and
so to pick up high-frequency currents,
with the result that the set shows signs of
instability. If the leads must be long it
might be well to "break" them at intervals
by inserting 250-ohm resistances, taking
care that a good by-pass condenser is
placed between the "set" end of these and
the main lead.

Should hum be troublesome after taking
the above-mentioned precautions it might be
necessary to include a filter in the supply
leads from the mains. Generally, a double
or four-pole filter will give good results,
and interference is increased. In most
cases it is sufficient simply to include a
decoupling resistance of between 25,000
and 50,000 ohms, along with a 1 to 2-mfd.
fixed condenser, but in exceptional cases
it is better to have two decoupling resis-
tances in series, connecting a fixed condenser
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LEAVES FROM A SHORT-WAVE LOG

Radio Servicio Santiago

The broadcasts from CEB, Santiago (Chile) on 24.34 m. (12.581 mc/s), recently reported in these columns, are now very well heard in the United Kingdom. The call given out at frequent intervals in both Spanish and English makes the identification an easy one. The studio, as an interval signal, appears to be using four chimes.

An Unpleasant Interference

During the past few days the W2XAF, Schemecadty, transmissions have been marred occasionally by a background of a South American broadcast. It is stated that the trouble is due to the change made by HJ4ADB (Columbia), which moving from 31.51 m. or 10 k/s above G.S.B. to 31.47 m. (9.532 mc/s) is now moving from 31.51 m. or 10 k/s above G.S.B. to 31.47 m. (9.532 mc/s) is now marred occasionally by a background of a South American broadcast.

CONSTRUCTIONAL DETAILS OF "PRACTICAL WIRELESS" RECEIVERS.

(Continued from page 176)

disconnect this condenser from that lead. Thus the condenser will still be joined to the lead passing through hole No. 11 and the other end of this condenser must be joined to terminal No. 3 on the coil farthest from the panel — again another hole being drilled for the purpose. An examination of the blueprint, in conjunction with the coil wiring diagram reproduced herewith will enable the reader to see clearly seen and no difficulty should be found in putting this receiver from the modern components specified.

Diagram of connections for the new coils required for the Faw Four.
A FEW UNUSUAL DEFECTS DESCRIBED AND EXPLAINED: AERIAL FAULTS:

Damaged Coils: Condenser Drive: Speaker Distortion: Pick-up Trouble: No Reaction

By FRANK PRESTON

Receiver Service

A reader sent in his receiver to the Practical and Amateur Wireless laboratories. The set had been made to a design published in these pages, and was a superhet. A screened gang tuning condenser was employed, and although there was a very slight background noise no signals could be heard on medium waves, and only a very faint background of music on long waves. Furthermore, the faint signals which could be heard were at equal strength over the whole of the tuning scale.

The sender of this set was rather indignant, because he explained that he had followed the published design implicitly; he had checked all the components, and had had the set in the hands of a "reliable" service engineer; the latter gentleman had been unable to find any fault, or to obtain any reception.

Would you believe it? The condenser drive had not been properly tightened on the condenser spindle, with the result that the condenser vanes did not move a fraction of an inch, despite the repeated turning of the knob on the tuning control.

The matter was made more difficult of solution due to the fact that the spindle of the slow-motion drive was rubbing against the panel, so that there was a normal amount of resistance to turning; additionally, the rotor of the tuning condenser was fairly stiff, due to the end adjuster being tighter than usual.

Anyhow, the application of a small screwdriver to two small grub screws mentioned the receiver into very satisfactory working order.

Another similar kind of fault was experienced by a constructor who had been less careful in following the published design. A metalised baseboard was specified, but this constructor had used a plain plywood chassis. In the original design the frame of the tuning condenser was automatically earthed through the metalising; but when using a wooden chassis no such connection was obtained, or provided for. In consequence, the condenser might just as well have been continued.

Earth-lead peculiarity

Another fault which frequently puzzles readers is indicated by the fact that signal strength is greater when the earth lead is not connected to the chassis, due to the occurrence of a slight amount of instability, resulting in "automatic reaction" when the earth lead is removed.

In that event, a certain amount of distortion

Fig. 2.—A faulty bias resistor caused gram reproduction to be weak and distorted whilst a defect in the H.F. choke made the reaction circuit inoperative.

Jan 18th, 1937

E.W.T.A. July 1937

Fig. 3.—Bad connection in H.F. choke caused no reaction to reaction.
UNSUSPECTED CAUSES OF TROUBLE

(Continued from previous page)

is generally present when the earth lead is unused. The proper remedy is to pay more attention to screening, and perhaps to re-arrange a few of the components in the H.F. circuits. On the other hand, the fault can be caused by a slight leakage between the aerial lead-in and earth. This in turn can be because a bare portion of the lead-in wire touches the window frame or masonry.

Distortion

A case of distortion, especially on loud signals, recently gave a fair amount of trouble. Grid-bias voltages, anode currents and anode voltages were tested and found correct; the output valve was tried in another receiver; another output valve was tried in the set which gave trouble; tuning was checked and found to be normally sharp. Not until another speaker was tried did it become evident that the fault was in this component. Even then it was not due to incorrect matching, as faulty transformer or a defect in the magnetic system, but to the speech coil touching the magnets when a strong signal was applied. In order to overcome the trouble a reaction coil was inserted on the plate circuit of the valve, and this reduced the distortion appreciably. The coil was made from a strong iron rod, 6-inch long and 1-inch diameter. In this case there was no provision for gram. Reception of the local station could not be very good. Not only was the record disappointing; they had previously been on radio, but results on gram, were distinctly disappointing: they had previously been very good. Not only was the record reproduced of low volume level, but it was badly distorted. A new pickup was tried without there being any change, and then a measurement was taken of the anode current passed by the detector—which was acting as an L.F. amplifier on gram. This showed that the valve was passing only 1 mA, whereas the current should have been almost three times this figure. That gave a clue. The bias resistance was defective, so that the valve was considerably over-biased, when the pick-up was in use. On test, the resistance was found to have developed a partial open-circuit, although it was not "disc." Thus, the H.T. was being applied to the valve, although the voltage was a good deal lower than it should have been, whilst the bias voltage was so high that the handling capacity of the valve was considerably reduced.

A Reaction Fault

A fault of somewhat similar nature was observed in a Det.-L.F. battery set, but in this case there was no provision for gram. Reception of the local station could not be called poor, despite the fact that signal strength was below normal, and reaction condenser had practically no effect. In this case it was found that there was a poor connection inside the H.E. transformer or a defect in the detector anode circuit. In consequence, the voltage being applied to the anode was less than 10 volts. The valve was therefore practically over-biased, reaction to be effective.

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LOCAL STATION QUALITY SETS  
(Concluded from last week's issue)  

HIGH impedance detector valve has been chosen with values for the grid leak and condenser to give a good compromise between sensitivity, selectivity and quality. This was done in consultation with a chief cathode which is returned to earth via a biasing resistance shunted by a 50 mfd. electrolytic. Coarse condenser arrangements provide the necessary grid bias when the valve is used as an amplifier for gramaphone purposes.  

With regard to the coil a suitable one would be the Bulgin type C7.  

Why certain values have been given to the various components will be approached from the points discussed last week. In practice such a receiver will give exceptionally good quality from the local station and, with careful handling, should receive one or two of the more powerful forgeries, although, of course, it is not intended for the latter.  

From our discussion of a quality receiver, it is apparent that a large set is necessary for faithful reproduction, but this does not necessarily mean that a battery user, or a constructor with A.C. mains at his disposal, cannot obtain quality above the average, without being very perfect. Perfect quality means a set similar to that given in Fig. 1, but the two-valve mains receiver, with its one-valve self-bias circuit, as shown in Fig. 2, will meet the user's needs and satisfy his fantasies of quality enthusiasts. Its fidelity curve would be equal to that of the larger set but, of course, it would not have the power-handling capacity, and would not be able to reproduce transmissions at the same strength as they would appear to a listener were he in the actual concert hall. It must, therefore, fall short of our ideal, but it would certainly give a quality of reproduction which would be approached by any set with a selective H.T. stage.  

A Set for Battery Users  

Battery set users are limited at the outset by the H.T. supply necessary for valves capable of giving a reasonable undistorted output. In Fig. 3, however, is shown a receiver suitable for use with H.T. accumulators, a Milnes Unit or an eliminator. Dry battery operation is not permissible, but one of the more usual H.T. Vibriator Generator Rectifiers would enable the set to be worked entirely from a six-volt accumulator, and dispense with H.T. batteries, in which case it would have the power-handling capacity and would not be able to reproduce transmissions at the same strength as they would appear to a listener were he in the actual concert hall. It must, therefore, fall short of our ideal, but it would certainly give a quality of reproduction which would be approached by any set with a selective H.T. stage.  

A HIGH impedance detector valve has been chosen with values for the grid leak and condenser to give a good compromise between sensitivity, selectivity and quality. This was done in consultation with a chief cathode which is returned to earth via a biasing resistance shunted by a 50 mfd. electrolytic. Coarse condenser arrangements provide the necessary grid bias when the valve is used as an amplifier for gramaphone purposes.  

With regard to the coil a suitable one would be the Bulgin type C7.  

Why certain values have been given to the various components will be approached from the points discussed last week. In practice such a receiver will give exceptionally good quality from the local station and, with careful handling, should receive one or two of the more powerful forgeries, although, of course, it is not intended for the latter.  

From our discussion of a quality receiver, it is apparent that a large set is necessary for faithful reproduction, but this does not necessarily mean that a battery user, or a constructor with A.C. mains at his disposal, cannot obtain quality above the average, without being very perfect. Perfect quality means a set similar to that given in Fig. 1, but the two-valve mains receiver, with its one-valve self-bias circuit, as shown in Fig. 2, will meet the user's needs and satisfy his fantasies of quality enthusiasts. Its fidelity curve would be equal to that of the larger set but, of course, it would not have the power-handling capacity, and would not be able to reproduce transmissions at the same strength as they would appear to a listener were he in the actual concert hall. It must, therefore, fall short of our ideal, but it would certainly give a quality of reproduction which would be approached by any set with a selective H.T. stage.  

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INTERNATIONAL CORRESPONDENCE SCHOOLS LTD.


RADIO SOCIETY OF NORTHERN IRELAND

The above society's new H.Q. are now the City of Belfast Y.M.C.A. Radio Club (GI6YM), and meetings are held on the first Wednesday of the month at 8 p.m., when new members are also welcome. The society held a very successful dance recently, and over 200 members and their friends attended. Two of the club's members have recently obtained their full licenses and may be heard on the air with the call-signs GI6LF and GI6MI. Great enthusiasm is shown by the members at the morse class, which is held every Wednesday night in the club room, and the club now possesses 12 operators. Many of the members have also obtained their A.I. licenses. Some of the transmitting members hold a QSO party every Saturday night at 24.00 G.M.T., on 20 metres, and the following call-signs may be heard on telephony: GLOX, GI6SK, GI6Y, GI6FK, GI6GK, and GI6MI; reports on these transmissions will be very much appreciated.

Two of the club's transmitting members have obtained their W.A.C. telephony and await their QSL cards; also, the club's station transmitter will be in operation within the next few days after being completely overhauled. The B.S.I.N. Leonard Trophy contest is to be held during the week-ends in May, and the club's receiving contest is in full swing. A large entry is expected. New members are gladly welcomed and full particulars may be had from the Hon. Secretary: F. A. Robb (GI6TK), 46, Victoria Avenue, Sydenham, Belfast, N.I.

KNOTSFORD AMATEUR RADIO CLUB

MEETINGS of this newly formed club are held at Room 4, The Liberal Club, Brook Street, Knutsford, every Monday at 8 p.m. There is a Morse class, and the G.P.O. have accepted our application for an A.A. Licence. The Hon. Sec. is J. McDermott (2AHH), Shaw Heath Cottages, Mobberley Road, Knutsford.

PETTERBOROUGH AND DISTRICT SHORT-WAVE RADIO SOCIETY

At a meeting of the above society, held at the "Bird in Hand" on April 20th, the second result of the Boyce Cup DX receiving competition was announced, the winner being W. S. Cornwell (total distance 26,070 miles), with J. W. Parmer, of Whitley, (9,060 miles), runner up. Each received replicas given by Mrs. H. Lyon and the donor Mr. C. Boyce.

As the winter session is now drawing to a close the last meeting will be held at 7.30 p.m. on Tuesday, May 4th, when a supper will be given at the "Bird in Hand." Anyone wishing to attend is asked to advise the Hon. Secretary.

During the summer, meetings will be held at the "Bird in Hand" the first Tuesday in the month at 7.30 p.m. and a prize will be given each month for the best QSL received. Results will be judged by the distance divided by the square of the wattage, and this will give all members an equal chance as G stations will be excluded.

It is expected of members, that when reporting G stations for this competition, that postage is included, and also that the report will be of genuine use to the station concerned. W. S. Cornwell (2ACP), Jr. Hon. Sec., 80, Elmfield Road, Peterboro.

THE LIVERPOOL S.W. RADIO AND TRANSMITTING CLUB

This first meeting of this club was held recently at the premises of the chairman, Mr. J. E. Crabtree, at 11, Wavertree Road, Liverpool, 7, when various matters relating to the future of the club were...
discussed. Any person who is interested should write to the Hon. Secretary, Mr. C. E. Cumliffe, 368, Stanley Road, Boole, Liverpool.

The Kingston and District Amateur Radio Society

A MEETING of the 5-metre group of the Kingston Amateur Radio Society was held at Ashford, Middlesex, on Tuesday, April 14th. The meeting was very well supported, and after a brief business meeting, their individual fortnightly reports, a most instructive talk was given by Mr. J. Stuart Williams on "The Design of 5-metre Receivers." During this talk Mr. Stuart Williams explored the popular notion that in a super-regenerative receiver a large amount of quench noise is unavoidable.

Hon. Sec.: R. K. Sherpold, "Receiver," Manor Lane, Sunbury-on-Thames.

Bideford and District Short-wave Society

In view of the interest being shown in short-wave transmission, it has recently been decided that alternate meetings of this society, which are held fortnightly, should be devoted to this subject. A large attendance of members witnessed the first transmitting demonstration by the chairman, but, when a transportable, low-power mains set produced satisfactory contacts with four amateur stations on the 1.7 Mc. band. Interested prospective members are invited to apply to the Secretary, Mr. E. K. Jensen, 5, Pinfable Terrace, East-the-Water, Bideford, for particulars. The subscription has now been fixed at 1s. per fortnight.

Clackmannanshire Short-wave Club

The annual general meeting was held on Sunday, April 18th, and proved very interesting. The date has now been fixed for the annual field day, which will be held on Sunday, June 13th. The members will be divided into three sections, each one having its particular site, and the contest will be run on a competitive basis, points being allowed at the rate of one per thousand miles. A big membership is expected, and all members are given first call on the club's open day on Sunday, October 3rd, and an interesting programme is promised. Prospective members can contact the Hon. Secretary, David McIntosh, 10, Cobblecroft Gardens, Alva, or from the Chairman (GM0TP), 12a, Erskine Street, Alloa.

The Golders Green and Hendon Radio and Scientific Society

MEmBERS of this society recently visited the television demonstration theatre of the Marconi Co., at Wembley.

Six stages of T.R.F. are used having a gain between 400,000 and 100,000 times, rectified to produce a voltage between 0.1/0 and 1 volt D.C. Unfortunately the various circuits used were only briefly dealt with, and this rather limited the scope of the discussion.

The meeting closed with a full programme demonstration on three different models all working at the same time. The pictures were remarkably bright, steady, and clear, and it was noted that the apparatus required very little attention, and that local interference was much more noticeable on the sound side than in the pictures. Full details of the society will be sent on application to the Secretary, 60, Pattison Road, N.W.2.

REPLIES IN BRIEF

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


E. H. (Ossett). We regret that we could not insert your request in the paper. Your panel, if you desired, could take a small advertisement in our advertisement columns for the purpose.

I. S. (N.I.). We regret that there is no blueprint of a unit of the type mentioned, and the only issue in which these units were described are now out of print.

E. L. R. (Bromley). It is impossible to guarantee reception of the countries mentioned on a two-valve set. Under good conditions, it is possible, but local conditions vary and no guarantee can be given even with a more powerful receiver.

A. G. S. (Edinburgh). In most cases it is only necessary to enclose postage. An international reply coupon, obtainable from your local post office, will overcome the difficulty of sending the remittance.

R. P. (S.W.19). As the receiver is a commercial model the reaction arrangements must have been correctly dealt with in the first case, and therefore we suggest that the trouble is due to some fault. It would be desirable to have the receiver overhauled by a local service agent of the makers.

A. R. (E.15). The issue is still available (5.12.36), and the complete essence can be obtained from Messrs. Britton, price 6s.

E. A. P. (Southend-on-Sea). The unit should be suitable, but some difficulty may be experienced due to hum. A circuit of your receiver would be desirable to advise definitely.

T. V. B. (Fishponds). Messrs. Emett, Radio, whose advertisement appears in this issue, can supply the granules. The price varies according to the grade.

W. M. (Heidelberg). The chemical mentioned is suitable and is dropped into the vessel until the desired degree of jellification has taken place.

B. M. C. (Montrouge). This is the peculiar action of the ultra-short radiation. Reflection and absorption also enter into the problem. The medium-waves cannot be received by the earth, and the apparatus has employed is such that the whole of the medium-wave band would be occupied and interference would result.

R. C. S. (Hove). The device consists of induction, resonant, transformer, and is employed to an aerial, and is used to provide an artificial feed to prevent signals from being radiated during experiments.

J. P. R. (Rugby). We regret that the issue in question is now out of print.

E. R. (Liverpool, 10). We have not described a receiver of the type mentioned by you. The co-axial converter would probably not suit your requirements, it is not tried at this particular unit, and there may be insufficient current available.

M. B. (Leeds, 7). The S.W. Converter, blueprint P.W.66, would be suitable for your requirements. It would be desirable to use this as a converter, connected in front of the set, rather than as an adaptor to the detector, as the current required would be excessive.

J. N. (Leeds). The books in question are now out of print.

S. W. (Beckenham). We do not recommend the procedure indicated, as it is not accurately repeated during the circuit now employed. This will, of course, govern the output current independently.

J. L. (E.4). We regret that the issue and the blueprint are no longer available.

D. F. (Hunslet). We regret that we are not familiar with the servicing difficulties of individual commercial receivers and suggest that you have the set examined by the makers.

D. S. (Bromley). The coil in question is no longer on the market, and we suggest you use a Wiresite Unipol coil in its place. A shield of copper sheet will be welded with the coil.

J. L. (S.E.17). List of the type you mentioned is to be found in the "Wireless Constructor's Encyclopedia." We believe a condenser of the type you mention to be found in this book.

S. R. C. (St. Ives). The trouble may be due to a minor inaccurate adjustment, best rectified by the makers.

D. C. M. (Southend-on-Sea). We regret that the trouble is due to some fault in the receiver. A circuit of your receiver would be desirable to advise definitely.

J. L. (S.E.17). A list of the type you mention is to be found in the "Wireless Constructor's Encyclopedia." We believe a condenser of the type you mention to be found in this book.

G. F. W. (Fulham). We believe a condenser of the type referred to may be obtained from Messrs. Britton, 41, Saffron Walden, Croydon Works, Cambridge Artillery Road, Enfield.

S. F. (Walthamstow). We believe a condenser of the type referred to may be obtained from Messrs. Britton, 41, Saffron Walden, Croydon Works, Cambridge Artillery Road, Enfield.

Ideal for the Beginner. The Telegraph Condenser Co. Ltd., Wales Farm Road, N. Acton, W.3.

ALL-BRITISH CONDENSERS

The Telegraph Condenser Co. Ltd., Wales Farm Road, N. Acton, W.3.
The Editor does not necessarily agree with the opinions expressed by his correspondents, and address of the sender (not necessarily for publication).

Advanced Radio Theory

SIR,—I have been an ardent supporter of your valuable paper since the publication of your 2-valve superhet, at which time I knew absolutely nothing about radio, and consequently your "Beginner's Supplement" was most valuable. I constructed such sets as the "Monitor," and have, during the past five months, designed a self-contained four-valve superhet portable, and have also had five "Wrinkles" published. Surely any average beginner could now do the same, as I am only 16. I think, therefore, that many readers would welcome a section on more advanced work, such things as more complicated formula, to find inductances of coils, etc., and articles in the latest developments of this very progressive science.

There has been much comment on the delivery of components lately. Actually, I never have any trouble dealing direct with manufacturers. It is the shop which disappoints me. I have to spend at least 9d. on fares to reach Liverpool, where I can obtain out-of-date components, as there are no good firms stock in a good range of modern components. I have a solution which I hope comes to the notice of the RMA. If someone living close to the RMA could lend or share by post, the components required are still delivered by the manufacturers according to sales. Instead of four or five smooth-tongued, incompetent men, two or three skilled assistant would suffice, with obvious advantage to both constructor and manufacturer.—A. M. Wearling (Walsall). Can you or your readers think of the suggestion concerning articles of the type mentioned in this reader's letter?—Ed.

Back Numbers Wanted

SIR,—Any readers let us have a copy of Amateur Wireless, dated October 27th, 1934, in which details of the station one-valve receiver were given? We have several requests from readers for this particular issue. We also have a request for a copy of the Wireless Magazine, dated February, 1934.

Band Spreading

SIR,—Referring to the article in the April 24th issue of Practical and Amateur Wireless on Band Spreading and how a bandspreader can be made out of a metal .001 condenser, I would like to state that I made a similar bandspreader, using two fixed and two moving plates, the spacing being four washers between the moving plates, and likewise for the fixed. Tuning from 0 to 180 degrees on this spreader gives a spread of between 5 to 7 degrees on the setter, which is a .00016. I have had this in use for about a fortnight, obtaining good results.

Further, I enclosed a log of stations received, as I have not seen one from this district. My receiver is an 0-1, and antenna 40ft. long and 25ft. high. Incidently, could you give me the QRA of SW5MK, as there are no SV stations given in my call-book.

Thanking you for the very fine articles, and wishing Practical and Amateur Wireless every success.—C. plcKley (Mansfield, Notte)."}

"The "Simplest Short-waver"

SIR,—Having made the "Simplest Short-waver," I decided to add another valve. I was astonished at the reception. The set was ready only a day or two ago, having been taken out of a scrap heap. I have been adding valves to it. I cannot identify them.

I am sending Practical and Amateur Wireless every success.—H. E. Chamberlain (Shoreham-by-Sea).

A Good Log from Cambridge: Back Numbers Available

SIR,—May I add my log to those you have been publishing on this past year? I started listening on the short waves nearly three years ago with an adapter made from junk parts, and now have a three-valve (o-v-2, r-a, and Trans.), which receives below 10 metres. Since June, 1934, I have received over 2,000 amateurs as well as broadcast stations, all on 'phones, 569 of them W stations on 10, 20, and 50 metres. I have heard 37 countries altogether. During the last month I have also logged the following stations: G3WDY, CN8MB, CN8AG, COZKL, CO2EM, CO2WZ, CO2OM, CO2AB, GY CO, PT141, RA6NS, RE1K, HK5AJ, K4UG, K4ENY, K3MD, KAIKY, L75DK, L58KE, L58AW, L51DA, 1X1 to a three-valve, QSPME, SU1RO, SU5NK, SU31AH, PY2AC, PY2ER, PY2CK, SW1NK, SU6KG, VO2Z, VO4A, VO9L, W25ER, WBG, WSP, W25ER, VE2AK, YN5NS, YV1AD, YR5AA, and ZP2AC, besides numerous American and European stations. I have just received programme sheets from Radio Podebrady for May, and they state that they will send them to anyone who can present six international reply coupons or six months for three coupons.

I have all numbers of Practical and Amateur Wireless from No. 60, and will be pleased to send any one the numbers they require if they send a stamp for postage. Congratulations you on the excellence of your paper, which gets better every week. I hope you will publish more on Amateur Spreading, but don't cut "Thermion's" space down, as his pages are always interesting and amusing.—B. A. Lansdell (Clock House, Balham, Cambridges).
May 8th, 1937

PRACTICAL AND AMATEUR WIRELESS

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The Westector

"Could you please let me know the makers of the Westector Type W6?" — F. N. B.

We presume that you refer to the Westector, which is a high-frequency rectifier manufactured by the Westinghouse Brake and Signal Company, Ltd., of 82, York Road, London, N.1. The Type W6 is a half-wave unit suitable for use on frequencies from 100 to 200, and is therefore most applicable to superhet in which an I.F. of 110 kc/s is employed.

Converting a Battery Set

"Please let me kno the how I can convert my battery set into a D.C. mains set and this discard my L.T. and H.T. batteries. What valves must I use if the supply is 230 volts?" — S. T. (Londonderry).

Although you could replace the direct valve there may be some difficulty on the score of instability, as the mains type of valve is more efficient than the battery valve. The H.T. could be supplied direct from the mains, using a series resistor to drop the 230 volt supply to 120 or so, according to the previous voltage which was employed. For the heater supply, the valves should be wired in series and a special resistance (obtainable from Messrs. Boulton) connected between the mains and the heaters. The resistances are supplied according to the current taken by the valves, and these may take 1.15 to 3 amperes.

A Simple One-valve Set

"I am only a beginner, and in your issue I saw two sets, the All-Wave Unipen, PW31A and the H.C. One-valve, AW327. Which set would be the cheapest and easiest to construct? I have only just commenced taking your paper." — P. L. (East Barnet).

The first set employs a pentode valve and a special all-metal detector. The second employs a home-made tuning coil (covering the broadcast wave-lengths only) and a simple triode detector valve, and is consequently cheaper to build. The first set has the advantage that broadcast waves may be tuned in, in addition to the standard broadcast stations. Unfortunately, both the issues describing construction are now out of print.

Repairing a Speaker

"My loudspeaker vibrates on the outer edges, where it is crinkled, when I put my volume on to full strength. This causes a rattling, buzzing sound. Could this be stiftened by painting with any remedy, or is there any other means of preventing the trouble? There is also a crackling sound in my set which is very slight on short waves, louder on the I.F. of 110 kc/s, and that accounts for the plus and minus sign. You will find that the component is red and black end caps to enable this. Can you suggest a remedy, please?" — C. M. O'H. (Moascar).

If the speaker cone is cracked at the corrugated spot it could be repaired by using some cellulose cement. This material is now marketed for loudspeaker repairs, together with a special thinning medium. It may be obtained from Messrs. Meadows, Holiday and Hemmerdinger, of Dolefield, Manchester, at 2s. 6d. for the two, or 1s. 6d. for the company's and 1s. for the thinner.

The cause of the crackling noises is, in our opinion, something outside of the receiver, and may be confirmed by removing aerial and earth. If the noise then ceases you will know that the set is not responsible and probably find some electrical apparatus in the vicinity which is causing the trouble.

Trickle Charging

"I have in my possession a mains unit which gives an output up to 120 volts. Would it be possible, either by resistance or an automatic step-down transformer, to charge a 2-volt accumulator from this? If this is not possible, have there been an A.C. trickle charger described in your paper or is there a blueprint available?" — N. R. (Stockport).

The current delivered by your mains unit is probably 90 mA at the most. This is too amperage to charge an accumulator you would have to leave the cell on for weeks to replace the drained current. The average trickle charger delivers 0.5 amp, and therefore your present unit, if not used for charging purposes, may be obtained from this office, price £6d., and the number is AW462. It was fully described in the issue of Amateur Wireless dated January 5th, 1936.

An All-wave One-valve

"In a recent issue you replied in the Briefs column to W. J. A. C. regarding the ranges of a one-valve set. I would like to know the name of this set and in what issue of the paper the constrictional details were given. Is it possible to obtain a blueprint for it?" — J. H. W. (Ash Vale).

This receiver, in question was the All-wave Unipen, blueprint number PW31A. It was described in the issue dated October 14th, 1933, but this is now out of print.

The Westector for A.V.C.

"Referring to a back number of one of your magazines I found an A.V.C. unit which can be built into an ordinary battery set. I wish to incorporate this in a set I am building, but I am puzzled by one thing. What valves must I use if the supply is 230 volts?" — R. J. C. (Wimbledon).

Although you could replace the direct valve there may be some difficulty on the score of instability, as the mains type of valve is more efficient than the battery valve. The H.T. could be supplied direct from the mains, using a series resistor to drop the 230 volt supply to 120 or so, according to the previous voltage which was employed. For the heater supply, the valves should be wired in series and a special resistance (obtainable from Messrs. Boulton) connected between the mains and the heaters. These resistances are supplied according to the current taken by the valves, and these may take 1.15 to 3 amperes.

I.H. and D.H. Valves

"I have a directly-heated pentode which I require to use in conjunction with an indirectly-heated detector in a two-valve straight set. I have a mains transformer which has only two four-volt heater windings, and I wish to use a valve rectifier. I understand that it is possible to run both I.H. and D.H. valves off the same winding and be glad to know how." — A. C. (Wimbledon).

As the detector is indirectly heated the cathode will be joined direct to earth, and therefore an automatic bias resistor must be inserted between the anode of the heater winding and the H.T. negative line to bias the output valve. Even if the detector is used for a.c. only it must be biased, the necessary resistor may be inserted in the cathode lead of that valve and no difficulty will therefore arise.

The coupon on page 184 must be attached to every query.
A wireless constructional chapie who always notoriously smokt
Untill he made bubbles
Of all of his troubles,
With FLUXITE...he's now
nick-named
"Happy."

See that FLUXITE is always by you—in the house—garage—workshop—wherever speedy soldering is needed. Used for 30 years in government works and by leading engineers and manufacturers. Of ironmongers—in tins, 4d., 6d., 1/4 and 2/8.

Ask to see the FLUXITE SMALL SPACE SOLDERING SET—compact but substantial—complete with full instructions. 1/6.

Write for Free Book on the art of "soft" soldering and ask for Leaflet on CASE-HARDENING STEEL and TEMPERING TOOLS with FLUXITE.

TO CYCLISTS! Year whole will not
keep round and true, unless the spokes are tied with the fine wire at the crossings AND SOLDERED. This makes a much stronger wheel. It's simple—with FLUXITE—but

THE FLUXITE GUN
is always ready to put FLUXITE on the right job instantly. A little pressure places the right quantity on the right spot and on charging lasts for ages.

Price 1/6.

ALL MECHANICS WILL HAVE

FLUXITE
IT SIMPLIFIES ALL SOLDERING
FLUXITE LTD., Dept. W.P.4, BRITON WALKS, BERMONDY STREET, S.E.1.

ENGINEERS! ARE YOU EARNING LESS THAN £10 PER WEEK?

If so, you cannot afford to carry on without reading our 208-page
little pressure places getting job instantly. A
the right spot and one
the right quantity on

THE FLUXITE ENGINEER POCKET BOOK
Some of the Contents:

- ACCUMULATORS
- AC. THEORIES
- BATTERY CHARGING
- TABLES
- FUNDAMENTALS
- LIGHTING
- MAGNETISM
- TRANSFORMERS, AC
- MOTORS
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- WATER HEATING
- WIRING TABLES

An essential everyday reference book— handy, practical, and up-to-date.

Illustrations:
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