THE AUSTRALASIAN

Radio World

FEB. 1, 1937
VOL. 1—NO. 10
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...istered at the G.P.O., ... for transmission ... a periodical.

—See page 8.

- NEW SERIES OF ARTICLES ON AMATEUR RADIO: BUILDING A
- CODE PRACTICE OSCILLATOR: 5-METRE PUSH-PULL TRANSMITTER:
- FIDELITY BROADCAST FIVE: LATEST WORLD SHORTWAVE NEWS.

Editorial Notes....

It is interesting to note that in two of the latest books on television, the authors have not only acknowledged the valuable work already done by amateurs for radio, but also they both in effect predict that the sooner amateurs are enabled to take an active part in television, the faster will this new science develop.

In the foreword to his book, "Television Reception," Manfred von Ardenne, a noted German engineer and one of the world's leading authorities on television, states:— "The purpose of this publication is . . . . . to provide an impulse towards intensive activity on the part of amateurs in the newest and perhaps the most interesting branch of electrical engineering."

Across the Atlantic, George H. Eckhardt, in his recently-published "Electronic Television," devotes a page in his introduction to the part the amateur may be expected to play in television. He says:— "The amateur has been a pioneer in the field of radio communication. He explored wave bands that, at the time, had not been particularly useful for other purposes, and then, when other uses were found for those bands, he was forced into bands of shorter and shorter waves. He now stands on the threshold of having the ultra-short wave bands more or less snatched away from him for the advent of electronic television.

"For this reason, if for no other, Philo T. Farnsworth feels that the amateur should have a part in the further development of electronic television. . . . . Many of the present-day radio engineers have come from the ranks of the amateurs, and it does not seem too early to predict that electronic television will have to look to this source for many of the men who will be required in television work in the years ahead."

It is certainly a wonderful tribute to amateurs when men whose names will go down through history as pioneers of television, not only commend them on the valuable work they have already done, but also invite them to co-operate in further research on television. And it is a tribute that will be particularly appreciated by the amateur, who is far more accustomed to having his efforts rewarded by restrictions being placed on his activities than to receiving commendation for them.

THE AUSTRALASIAN RADIO WORLD

Incorporating the

ALL-WAVE ALL-WORLD DX NEWS.

Managing Editor:
A. EARL READ, B.Sc.

Vol. 1. FEBRUARY, 1937 No. 10.

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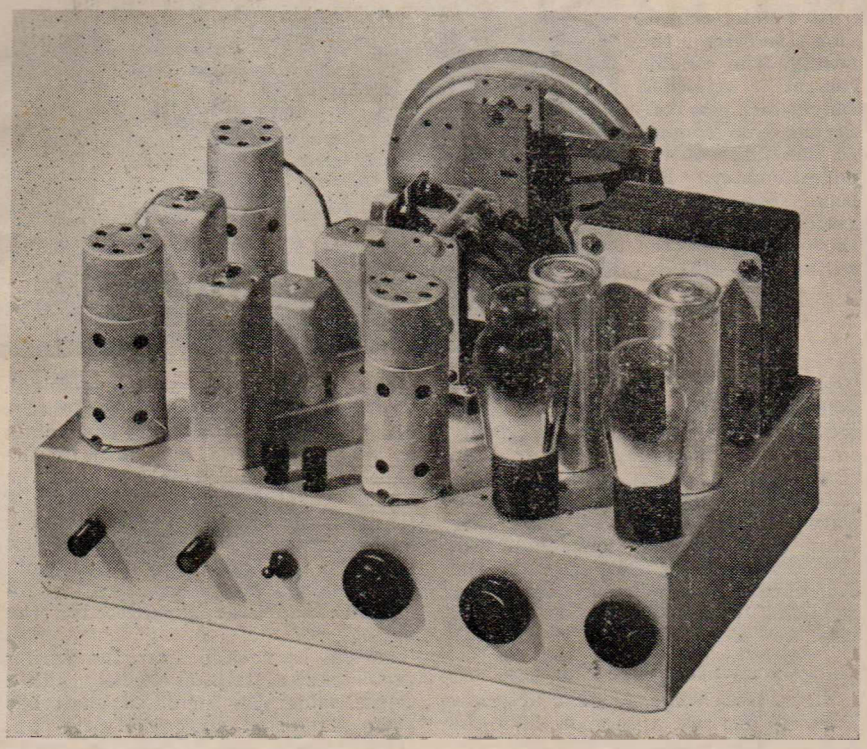
Assembling And Wiring The . . . . Fidelity B.C. Five

The concluding instalment of an article describing the construction of a broadcast superhet designed to give high quality reproduction at low cost



A rear view of the completed receiver, showing the well-spaced layout adopted.

THERE is nothing difficult about either the assembly or the wiring of the "Fidelity Broadcast Five" described in last month's issue. A well-spaced layout was chosen purposely so that there would be plenty of room to accommodate the under-chassis components and the wiring. As well, for those who find circuit diagrams difficult to follow, a sketch showing the complete under-chassis wiring is published this month.

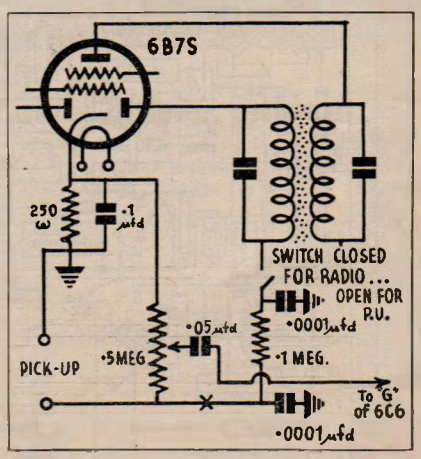
Commencing The Assembly.

The first components to mount are the valve sockets (with valve shield bases for the three screen-grid valves), and the power transformer. The heater and rectifier wiring can now be put in.

Two leads are run from the "425v." terminals on the power transformer panel to the rectifier plates, and two more from the "5v. 3a." terminals to the rectifier filaments. Another pair of leads is now run from the "6.3v. 2a." terminals to the heater terminals on the 6C6 socket, and two further leads are run on from these to corresponding terminals on the 6B7S socket. From thence two more are run to the 6A7 socket.

Next, another pair of leads is taken from the "2.5v. 3 amp." terminals to the filament terminals on the 2A3 socket. The "C.T." terminals of the 6.3-volt and high tension windings, together with the "E" terminal on the power transformer panel (connected to the electro-static shield) are taken to earth, while a 750 ohm 100 m.a. wirewound resistor, bypassed with a 25 mfd. dry electrolytic condenser, is connected between the centre tap of the 2.5-volt winding and earth. This provides bias for the 2A3.

Finally, a pair of twisted leads can be run from the mains socket on the rear wall of the chassis to the "C" and "240v." terminals on the power transformer panel.



This circuit shows how a pick-up can be fitted. Theoretically there would be a slight advantage in locating the switch at "X," but the position shown is the handiest for short leads.

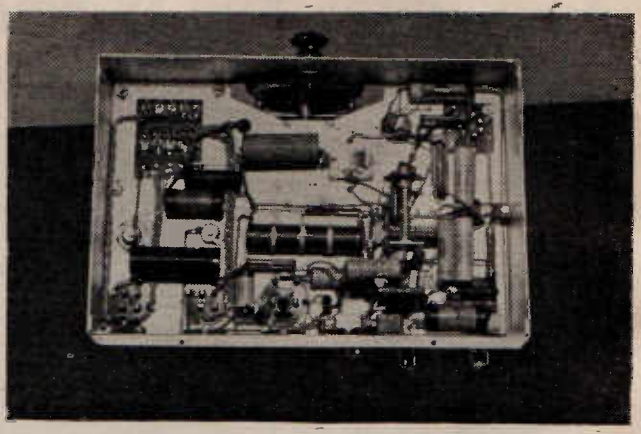
Mounting The Remaining Components

The remaining components can now be mounted. These comprise the aerial and oscillator coils and intermediates, the electrolytic condensers, condenser gang, 4 terminals, volume control, voltage divider, padder, pick-up switch and the three sockets along the rear of the chassis.

Of these components, the coils should be mounted so that the numbered lugs on them face in the directions shown in the under-chassis wiring diagram. Also, before the gang is mounted, a 6in. lead should be soldered to the terminal beneath each section. These leads pass through the chassis and connect to terminals "1" of the aerial and oscillator coils.

Mounting The Volume Control.

The volume control is mounted between the oscillator coil and second I.F. by means of the small right-angled bracket, dimensions of which were given in a sketch published last month. The coupler is attached to the end of the shaft, and from the other side of the coupler a 5in. length of ¼in. brass or bakelite rod is run through the front of the chassis. The voltage divider and padder are also mounted in the positions shown in the under-chassis wiring diagram. Referring to the illustration showing a rear view of the completed receiver, the socket on the rear wall of the chassis, and at the extreme left, is the mains socket.



An under-chassis view showing the wiring. The volume control extension rod, which is connected by a coupler to the shaft of the potentiometer, has been removed to avoid obstructing the view of the wiring beneath it.

Next to it is the 4-pin speaker socket, and next is another 4-pin socket provided to afford a handy outlet for obtaining heater and "B+" supplies for a shortwave converter, or perhaps for a separate shortwave set. To wire this, the two filament terminals are connected with the corresponding terminals on the 6C6 socket, one of the remaining terminals is taken to earth, and the other to "B+ max."

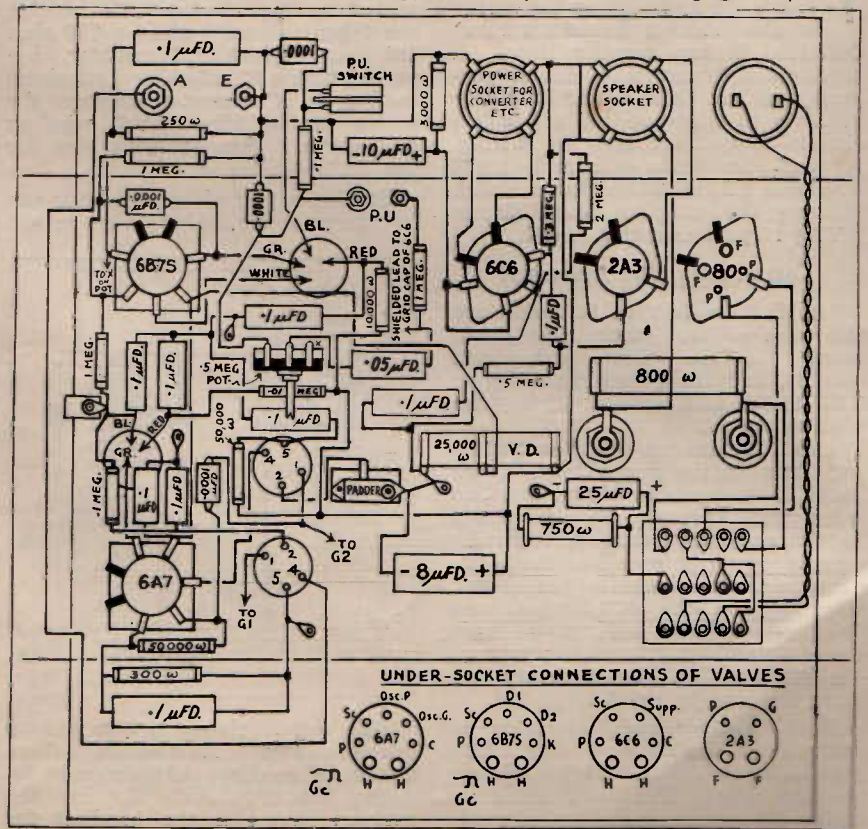
Commencing The Wiring.

The three valve shields are now fitted to act as a support for the chassis when inverted, and the wiring commenced.

This can be put in systematically, starting from the aerial terminal. The fixed resistors and condensers can be supported between the points to which they run, as shown in the diagram and photograph, or else the 17-lug terminal strip mentioned in the list of parts can be mounted underneath the chassis, parallel to the back wall and about 2¼ in. from it. The lugs can be used just where needed to act as supports for the wiring.

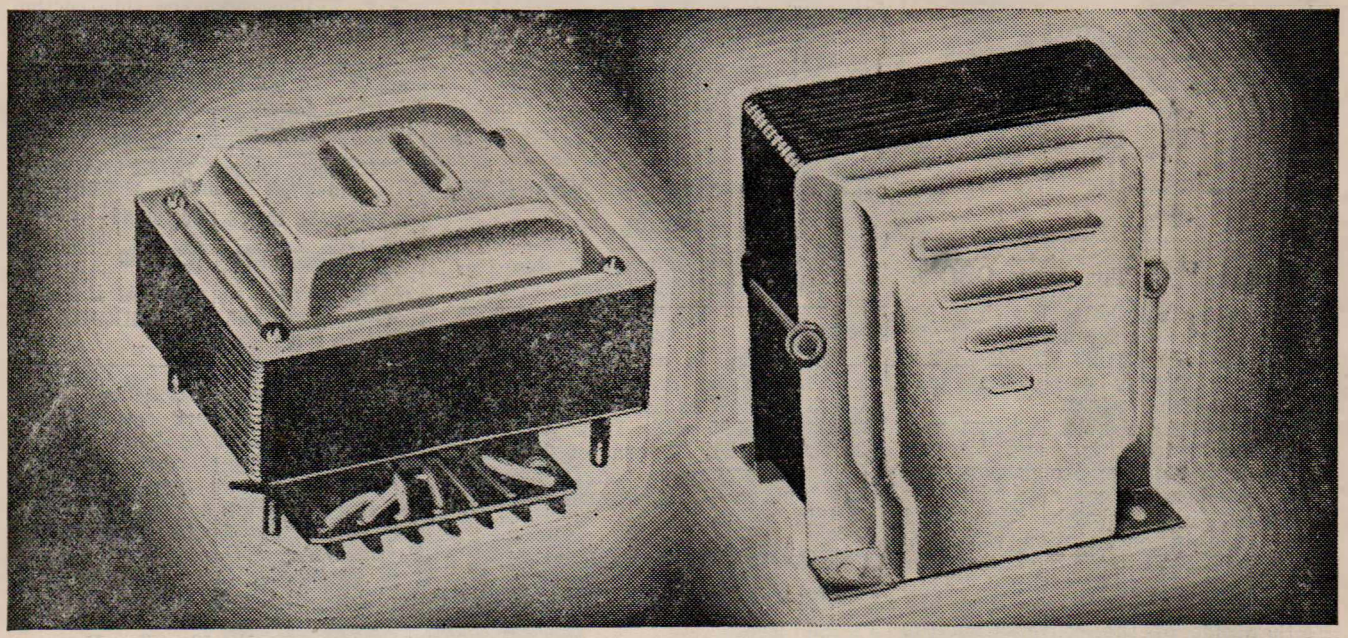
It will be noticed from the wiring sketch that a strip of bakelite with a single solder lug mounted on it has been supported near the first I.F. transformer, and about 1in. away from the chassis, by means of a

(continued on page 48)



The under-chassis wiring and socket connections are shown in this sketch.

Laboratory Tests Establish New Records of Excellence for the New RADIOKES Power Transformers



THE Radiokes releases for 1937 are the most sensationally NEW units ever designed—incomparably better than anything yet available in Australia.

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"L" TYPE
LEVEL POWER TRANSFORMERS

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" " 60 m.a.	385	"
" " 70 m.a.	381	"
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R.W. 2/37

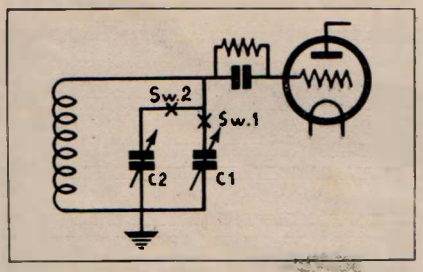
Radio Ramblings

A page for letters from readers. A prize of 2/6 will be awarded for every technical tip published.

★ ★ ★

Battery Two Gives Fine Results

I wish to join your Club, and enclose herewith postal note for 5/- to cover membership fee and cost of 50 report forms. I have just recently become interested in DX work, and have constructed the "All-Wave All-World Two," which certainly gives excellent results on both the broadcast and shortwave bands,—W. R. Parker (AW175DX), Bentleigh, Vic.



Picking Up Two-Way QSO's.

In writing this letter I wish to express my thanks for such a splendid publication as "Radio World"—it's a winner. Here is a tip that may interest other readers.

It is often desirable to listen to a two-way conversation, and by employing two tuning condensers and two switches this can easily be done as shown in the sketch. Close SW1 and tune in one station with C1; then open SW1, close SW2, and tune in the other station with C2. Then by merely throwing the switches, either side of the conversation can be listened to at any time.—C. R. Londrigan, Terang, Vic.

★

Space-Winding S.W. Coils.

An excellent twine to use for spacing turns of wire on an S.W. coil is that used by electricians in tying several insulated wires together. Cut the length of wire to be wound and run one end through the first hole in former, and solder to the pin in the usual way. Clamp the free end in a vise, hold former in both hands and wind towards the vise, keeping the wire taut. When all the turns are wound on (close-wound), put the free end of wire through the further hole and solder into pin.

Now take the waxed twine, pass it through the hole at the start of winding, and tie a knot in it so that it will not pull through, then clamp free end in vise and wind it between the turns of wire on former. This will force the wire apart, and when all the turns have been spaced the last turn will be in line with the further hole.

The twine can be fastened to any part of the former, holding it in place, until any other windings have been put on. When the coil is finished, the twine is carefully removed, and because the wire was wound on tightly with the turns close together, the twine in forcing them apart gives a still further tightening effect.—H. Whyte-Meach, (AW69DX), Artarmon, N S.W.

★

Tuned Antenna For Main S.W. Bands.

An excellent antenna system for 49, 31, 25 and 19 metre bands is illustrated in fig. 1. Details are as follows:—

The aerial is of 7/22 enamelled wire and from A to B is 75 feet. Earth is short as possible. C1, .00025 mfd.; C, .0005 mfd.; L, 20 turns of 20 D.C.C.,; L1, 10 turns of 20 D.C.C. Coils are wound on one former 1in. in diameter. Gap between windings is ¼in.

Operation And Explanation.

For 49-metre band. This requires an 80 ft. Hertzian antenna, which

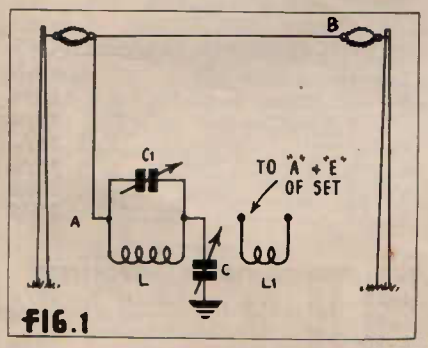


FIG.1

can be obtained by setting C to minimum capacity and by tuning L with C1.

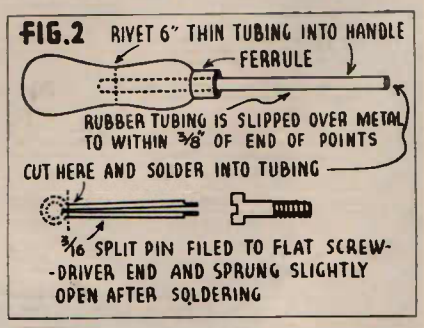
31-metre band. This functions as a ¾-wave Marconi antenna. Set C to half capacity and tune up with C1.

25-metre band. 60 ft. is the most efficient length for this band, and a ¾-wave Marconi system is used here also. Set C1 to a minimum and tune with C.

19-metre band. 75 ft. is necessary here. Set C1 to a minimum capacity and tune with C.

No Noise reduction features appear on the above, but as it is a tuned antenna the resulting higher signal strength improves the signal to noise ratio considerably.

Fig. 2 illustrates the construction of a gadget that is a wonderful time



and temper saver. It is of course, only used to extract screws after loosening and only to hold screws when entering—not for tightening. Inaccessible screws can be removed or placed without any trouble whatever—G. O. La Roche (AW155DX), Perth. W.A.

★

Amateur Radio To The Rescue.

I was interested in the description of old-timer Jack Pike (VK2JP) in "Thirty Years of Amateur Radio," in the current issue of your excellent monthly. "W.J.P.," however, could not have completely sifted the history, of VK2JP, for he missed an outstanding and classical episode in the story of this station.

In 1930, the writer was stationed at Wyndham, North West Australia, and established an amateur station under the call VK6NK. Early in April that year, an attempt was made on a flight record to England, and a Ryan monoplane piloted by the late Dave Smith, accompanied by Wally Shiers (of Vickers Vimy 1919 fame) made for Wyndham from Sydney, en route to England. The story is too long to recount here, but the plane carried a small battery-operated 5-watt transmitter working on 34 metres.

One hundred miles or so inland from Wyndham, the 'plane broke a camshaft, and was forced down in the bush. After three days, a rescue party found her, though but for radio it might have been a different story.

In between keeping watch on the signals from the 'plane, VK6NK handled distress traffic direct with Sydney through VK2JP. My log shows that somewhere around 20,000 words were handled, and on one occasion, VK6NK and VK2JP communicated uninterruptedly for 12 hours without a break. Jack Pike did a splendid job in showing how an amateur station can meet an emergency when needed, and was widely commended in the press at the time.

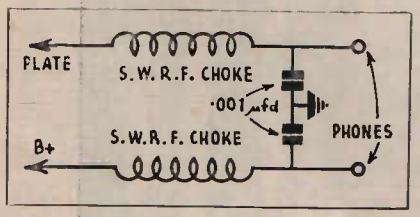
I think his story on this episode would make interesting reading, especially to the newer kind of amateur wedded entirely to a microphone, and with the misguided idea that telegraphic efficiency is of little or no account. VK2JP is a life member of the Wireless Institute of Australia, and in fact, he was primarily responsible for its formation. He has lost none of his keenness on amateur radio.—Don. B. Knock (VK2NO), Sydney.

★

Eliminating Hand Capacity Effects.

I received my first copy of "Radio World" in June, 1936, and found it just the paper that radio enthusiasts have been waiting for for a long time.

I am a shortwave enthusiast myself, and find excellent advice in your columns. My chief receiver is a three-valve T.R.F. job (1C4 R.F., 30



det., pen. output) with which I have done quite a fair amount of DX.

I am enclosing a hint which I have not seen published in your "Radio Ramblings" as yet. It is one which I have used with success on small S.W. receivers.

Often in a small S.W. receiver, although apparently well shielded, violent hand capacity is experienced on 31 and 20 metres. This is generally caused by r.f. in the headphone cords. If some type of filter is used, this can be eliminated. The filter shown in the circuit is identical with the line filter used on A.C. sets, with smaller corresponding values.

I also appreciate the 5-metre articles published, and there is certainly a large scope for development in this line. Mr. Knock's article in this month's issue is certainly of interest.—N. E. G. Talbot, Muckleford, Vic.

★

Lightning Charges Steel Masts.

Referring to your November and December issues re lightning and aerials, on December 23 last during an electrical storm (no rain), I heard at each flash a distinct crackling close by. This was caused by the lightning charging my steel poles, which are insulated from earth, and discharging over several of the egg type insulators with a dull red glow.

I then joined the aerial and earth leads of the aerial system and connected the joined wires to the "A" terminal on the set. The following was noted. On all bands up to 49 metres, but especially on the 19-metre band, I heard a rapid "motor boating" sound which gradually became slower after about two minutes. Towards the end of the "beating" it came through at about one beat each second until it died out. If a flash came before it died out, the sound would stop dead with the crackle of the flash, and after 30 seconds start rapidly again and repeat its dying out till the next flash.

As the masts are totally insulated from the ground, this had me puzzled till the next morning, when I discovered that each insulator had provided a home for spiders and the web-like nests they build. Evidently the mast had charged up with static electricity and this was jumping the insulator via the web, thus causing the flash on a heavy discharge and the slow and diminishing beating heard through the set.

I am now wondering how I can dislodge the spiders without dismantling the masts—I think I will have to let the spiders win the day, as it only causes leakage on heavy discharges. Another thing I will have to do is to fit an earthing switch on each pole, for if anyone happens to touch the masts during a similar storm, they would make an excellent return to earth.

Speaking of static electricity, no doubt you have noticed that at times when combing the hair, especially if a little long, that you can notice a discharge of static electricity at each stroke of the comb. Not always, but frequently I have tuned in my YF when she has been close to the lead-in. (Her frequency is about 15380 k/c's.!) This is really a fact, and it had me puzzled where the QRN was coming from when I first heard it, till I turned round and noticed the cause

Now back to the "R.W.," that magazine of yours is still up to its usual excellence. The first items I look for are the S.W. notes, and Mr. Graham is to be congratulated on his contributions, likewise Mr. Johns. Next come "Radio Ramblings," "Radio Step By Step," "DX News and Views," station information, television, etc. This is as I read the book.

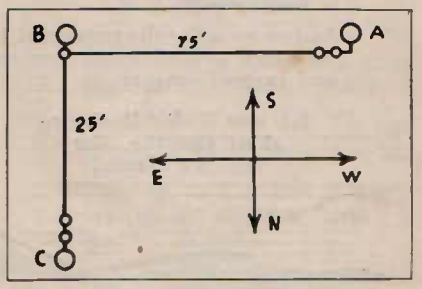
I don't mention the constructional details, which are very good, as I have my own commercial job in a Radiola 5v. A.C., but I am sure if at any time I wished to build my own set, I could do so by following your directions. I nearly forgot to mention the VK amateur list, which is excellent.—G. O. La Roche (AW155DX), Sth. Perth, W.A.

★

Right-Angled "L" Type Aerial.

I am enclosing a small sketch of my amended aerial system now in use.

A, B and C represent the masts; A and B are 30ft. high while C is 35 ft. The gauge of wire used is no. 12



copper wire, length being 100 ft. Between masts A and B a length of 75 ft. is run, the wire is passed through an egg insulator at mast B, and is then continued for 25 ft. to mast C. From this end the lead-in, which is 30 ft. long, is taken down to the receiver.

The idea of this aerial system is to provide a better reception from all directions, and I can truthfully say that it has also increased the signal strength of those elusive DX stations—Cedric Marley (AW150DX), Brisbane, Q'land.

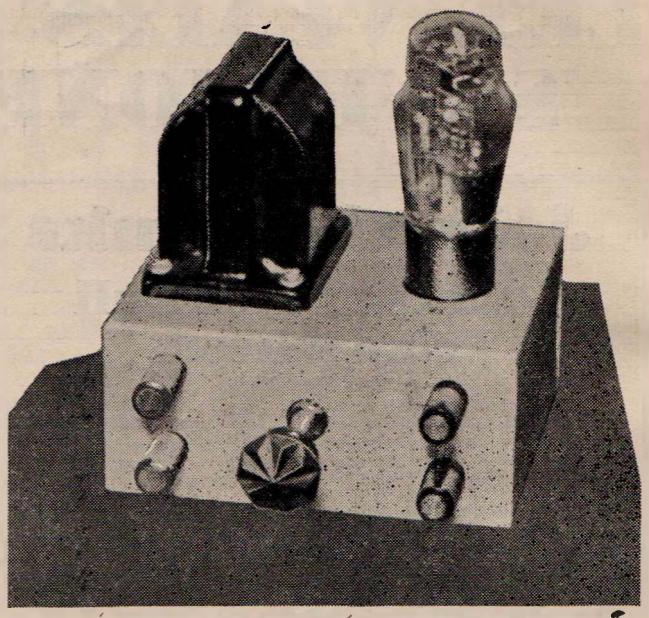
THE FRONT COVER

Illustrated on the front cover this month is Broadcasting House, the £500,000 home of British broadcasting, built by the B.B.C. in 1932.

In a central tower, built with brick walls over four feet thick to exclude extraneous noise, are located twenty-two studios, ranging in size from a small studio for intimate talks to a huge concert hall capable of accommodating a large symphony orchestra and an audience of over 700 people. Down in the basement huge machines pump 134 tons of fresh air every hour into the studios.

In accordance with tradition, when the foundation stone of Broadcasting House was being laid, various documents were buried under it. These include copies of agreements in regard to the building and site, B.B.C. documents of historical interest, and copies of B.B.C. publications.

Building a Code Practice Oscillator



Learning the Morse Code becomes a simple task if this audio oscillator is used.

ELSEWHERE this month is published the first of a series of articles on "Breaking Into The Amateur Game." In the introduction it is stated that one of the requirements of the P.M.G.'s exam. is a speed of 12 words per minute in sending and receiving in the morse code.

The simplest way of learning the code is to use an audio oscillator (or buzzer), a key, and a pair of 'phones. An oscillator such as that illustrated above can be built for next to nothing, as some, if not all, of the parts required will be found lying around the workshop. Apart from the valve, the audio transformer is the only other important part required. For this component, any old "tranny" will do—in fact, the older and cheaper it is the better, providing the windings are sound, because expensive makes rarely give as good a note as the cheaper types.

The Batteries Required.

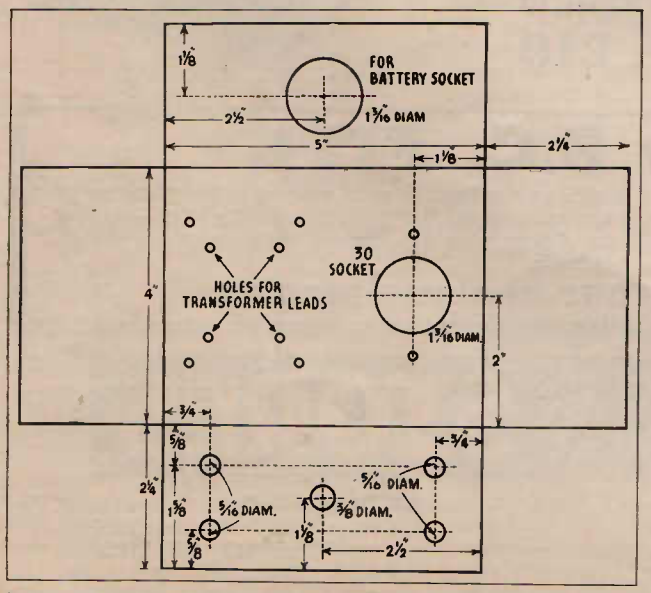
An "A" and "B" supply are needed to operate the oscillator. A suitable "B" supply is a 9-volt "C" battery, which will give months of service because the "B" drain is only a fraction of a mill.

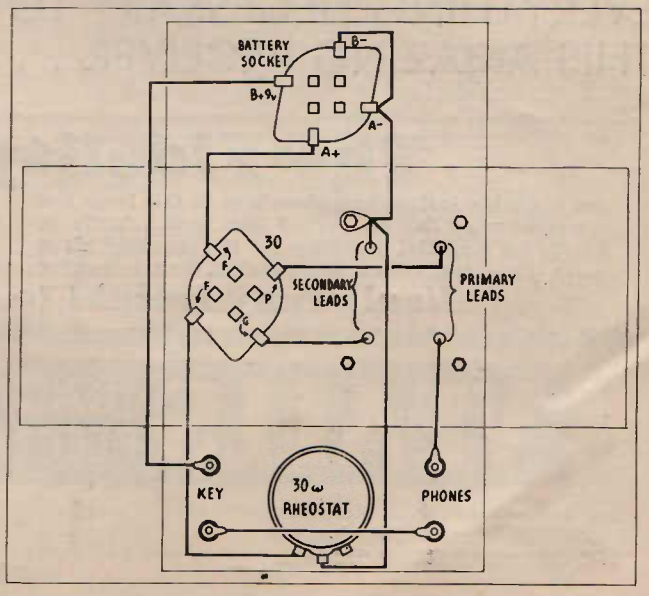
If a type 30 valve is used, the "A" drain is only .06 amp., which means that a couple of standard torch cells could be used. Alternatively, of course, a 2-volt accumulator can be employed. The rheostat has been provided for two reasons—firstly, to reduce the filament voltage from 3 volts to 2 when dry cells are used, and secondly to adjust the note of the oscillator to the most suitable pitch. The note is generally best with a low voltage on the filament—in fact, the oscillator shown will work well from a single dry cell.

Assembly Is Simple.

When the parts listed elsewhere have been obtained, the valve and battery sockets can be mounted on the aluminium chassis, together with the audio transformer, rheostat, and terminals.

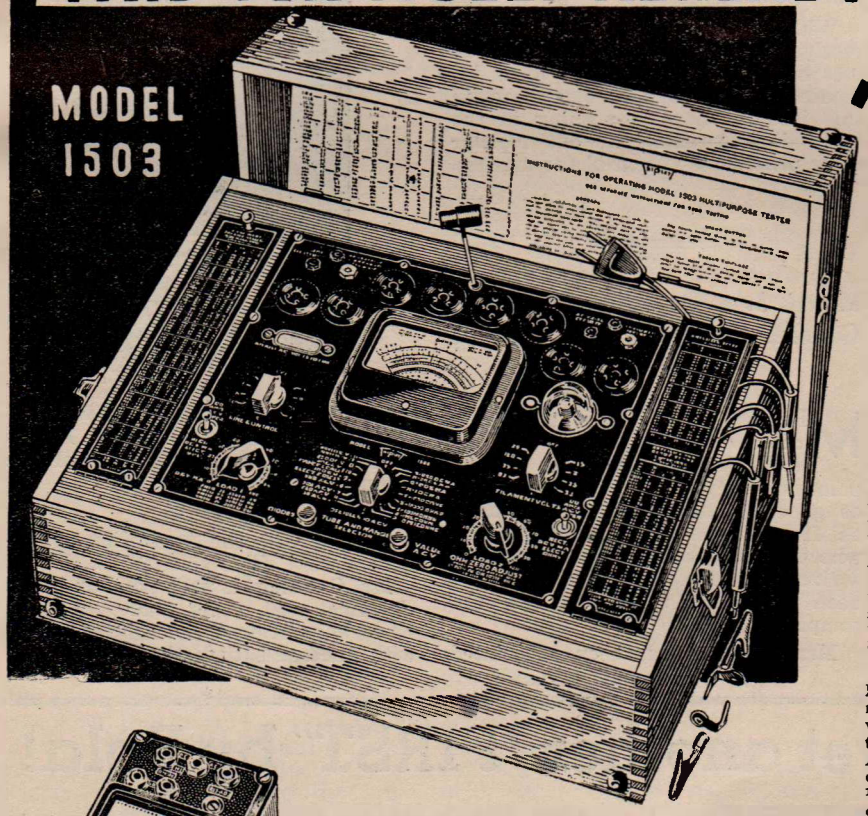
The wiring is very simple, and for those who cannot follow a circuit diagram, it is shown in detail in the wiring sketch. Finally the battery





Left: This sketch gives dimensions for preparing the 5in.x4in.x2¼in. chassis. Right: The under-chassis wiring.

MY NEW TRIPLETT TESTER HAS PAID FOR ITSELF ALREADY!



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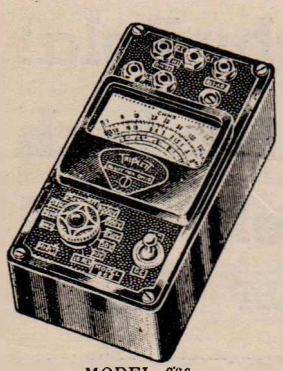


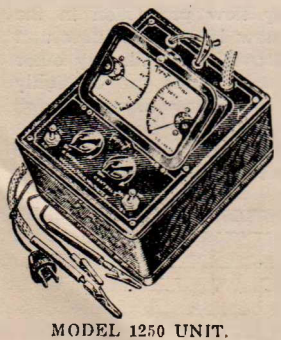
MODEL 666.

The up-to-date serviceman must be equipped with fast, accurate test equipment to service modern receivers efficiently. This latest addition to the Triplett range is a Multi-Purpose Tester combining in one instrument the equivalent of nine separate units. It checks any type valve for merit (including separate diode test). Neon inter-element short test (made while valve is hot), detects even the slightest leakages. Tests paper condensers for opens and shorts and electrolytics for leakages, D.C. voltmeter and milliammeter, ohmmeter, decibel meter. D.C. scale: 10-50-250-500-1,000 volts, 1,000 ohms per volt; 10-50-250 M.A.; .2 ohms to 10 megohms; 10-50-250-500-1,000 A.C. volts at 400 ohms per volt; down 10 and up 15 decibels. Shadowgraph line voltage indicator.

Price **£16/10/-**

Model 666 Universal Pocket Volt-Ohm-Milliammeter is indispensable for measuring A.C. or D.C. volts, ohms and mills. Scale length is same as that of Triplett 3-inch instruments. Ranges: A.C. and D.C. 10-50-250-500-1,000 volts at 1,000 ohms per volt; 1-10-50-250 D.C. M.A.; low ohms, ½ to 300; high ohms to 250,000. Provisions for external batteries for higher resistance measurements. Supplied complete with test leads and full instructions.

Price **£5/15/-**



MODEL 1250 UNIT.

Model 1250 is the first self-calibrating Vacuum Tube Voltmeter. Replacing a valve does not alter accuracy. Measures low A.C. and D.C. voltages without current drain. Has two separate D.C. movements in a tilting type case. One indicates when tube characteristics are stabilized with the circuit. The other is a three-range voltmeter with approximately linear scales reading in peak A.C. and D.C. volts. Ranges are 2.5, 10, and 50 volts. All accessories included.

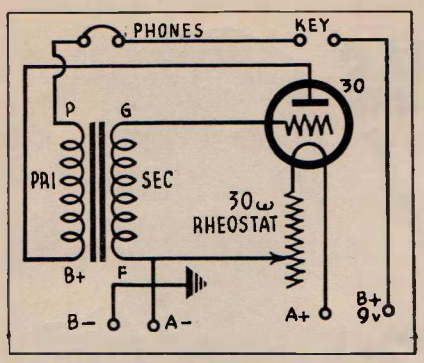
Price **£12/10/-**

Full details of these and other new instruments supplied free on request by the exclusive factory representatives for Australia and New Zealand.

TRIPLETT . . . THE MASTER TESTERS

W. G. WATSON & CO. LTD.

279 Clarence Street, Sydney. 398 Post Office Place, Melbourne. and at Perth, Hobart
31 Hunter Street, Newcastle. 91A Currie Street, Adelaide. and Launceston.



The circuit of the code practice oscillator.

plug is wired, and the batteries connected up.

Code Practice Oscillator—List of Parts

1—Aluminium chassis, 4in. x 5in. x 2½ins.
2—4-pin wafer sockets
1—Audio transformer.
1—30 ohm rheostat (Radiokes)
4—Terminals, 2 red, 2 black.
1—Small knob.
1—4-pin plug and 4-wire battery cable.
1—Type 30 valve (Mullard, Radiotron, Ken-Rad, Philips)
1—Pair headphones.
1—Morse key.
Hook-up wire, nuts and bolts, solder tags.
1—9v. "C" battery (Ever-Ready)
2—1½v. "A" cells (Ever-Ready) or
1—2v. accumulator (Clyde).

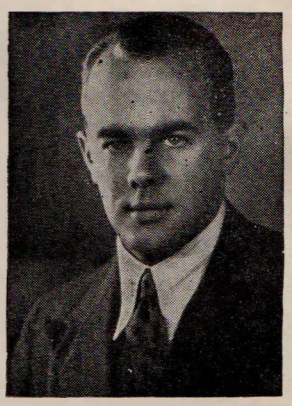
The leads from the 'phones and key are next hooked up, and the rheostat turned on until, with the key depressed, a loud clear note is heard in the 'phones. If nothing is heard, then try the effect of reversing the leads to either the primary OR secondary (not both) of the audio transformer.

With the oscillator operating correctly, the task of learning the code can be started, along the lines indicated in the article elsewhere in this issue. There is nothing in the least difficult about it, but regular daily practice is essential for success.

Mr. R. J. A. Overdiep Appointed General Manager Of Philips Lamps.

MR. A. den Hertog, managing director of Philips Lamps (A'sia.) Ltd., announces the appointment of Mr. R. J. A. Overdiep as general manager of the company as from January 1. Mr. Overdiep, who until the end of last year was assistant general manager, has also been appointed a director of the company.

Mr. Overdiep has been associated with the Philip's Company for many years. He spent two years in Holland and Czecho-Slovakia, and the following four years in British India, Ceylon, Burma, Siam, Java, and the Straits Settlements. He has been



Mr. R. J. A. Overdiep, now general manager of Philips Lamps (A'sia.) Ltd., and a director of the company.

connected with the Australian organisation of Philips since 1930.

Mr. Overdiep is very popular in the electrical and radio trade, and his new appointment will be received with general satisfaction.

Radio Book Reviews

A First Course In Wireless.

Published originally as a series of articles in the well-known B.B.C. weekly "World Radio," "A First Course In Wireless," by "Decibel," is an inexpensive text-book that can be recommended to beginners in radio.

Fundamental principles are explained very carefully and thoroughly, and the theory and design of radio receivers is dealt with step by step, starting with a simple crystal set and leading up to modern multi-valve receivers.

In clearness and simplicity, "A First Course In Wireless" marks an advance in elementary radio books, and forms an excellent introduction to the more technical books on the subject.

["A First Course in Wireless," by "Decibel." Our copy from Messrs. Angus & Robertson, 89 Castlereagh St., Sydney. Price, 5/6; postage 6d.]

★

1937 Radio Amateur's Handbook Now Available.

The new 1937 edition of The Radio Amateur's Handbook, the manual of amateur radio communication published by the American Radio Relay League, surpasses any of the previous editions both in size and quality of practical content. The new edition has a total of 21 chapters with an appendix of miscellaneous practical information, followed by an exceptionally comprehensive topical index which facilitates quick reference.

Many important technical developments during the past year and sweeping changes in operating technique and methods have called for enlargement of the book and rewriting of almost all chapters. Some idea of the extent of the revision may be had from the fact that two hundred new illustrations are included.

Special attention has been given to the new developments in noise silencers for short-wave receivers and o the new technical trends in the circuit design. A wealth of new material is added to the wide field of transmitter planning, construction and adjustment. The capabilities of the new valves are exploited to the full in the radiotelegraph and 'phone transmitter designs presented.

Extended space is also given to the ever-important subject of aerials, directional systems and the new ideas in coupling methods being treated in particular detail. The ultra-high frequencies come in for a big share of the space also, new and advanced equipment being detailed to illustrate the latest trends in this rapidly growing field.

As in previous editions, full attention has been given to charts and tables of information for the radio enthusiast, the valve tables, for example, occupying seventeen pages.

The basic purpose of The Radio Amateur's Handbook is to present a complete treatment of every phase of modern amateur radio communication from elementary theory through advanced practical application, with emphasis always on ideas and methods that have shown their worth in the field. This new edition fulfills this purpose even more effectively than any of its predecessors.

[The Radio Amateur's Handbook, Fourteenth (1937) Edition, by the A.R.R.L. Headquarters Staff. 544 pages (including a 112-page catalogue section), with approximately 564 illustrations; 74 charts and tables and 86 formulas. Obtainable from Messrs. Angus & Robertson, 89 Castlereagh St., Sydney. Price, 7/6; postage 9d.]

★

Official Radio Service Handibook.

Written by J. T. Bernsley, a noted American writer in the radio service field, the "Official Radio Service Handibook" is a book that servicemen will find invaluable. A 1,000-page volume, the book has been written from the practical angle throughout, and, as the author says in the preface, with the single objective always in view of aiding the serviceman in his efforts to perform all repairs as efficiently and quickly as possible.

About a third of the book is devoted to operating and design data on American sets, and of course a fair amount of this material is useless to servicemen in this country. At the same time, the operating notes on commonly-encountered faults in specific models make interesting reading, and some very useful hints can be picked up.

The remaining 600 pages or so are devoted to theory governing the functioning of circuits, test equipment fundamentals and how to best use each instrument, balancing and adjustment methods, and generally to servicing as it is practised today. Chapters on the cathode ray oscillograph, auto radio installation, and on noise interference elimination will be of intense interest to the progressive serviceman who realises that all three are rapidly assuming considerable importance in servicing to-day.

Altogether, this new service handbook can be recommended to every established serviceman who wants to keep himself in line with latest developments in his field, and to everyone just starting in the profession who wants to obtain a thorough groundwork in modern service procedure.

["Official Radio Service Handbook," by J. T. Bernsley. Published by Gernsback Publications, Inc., 99 Hudson St., New York, N.Y.; our copy from Radcraft Publications Inc. (same address).]

★

Radio Field Service Data.

Supplies of the second edition of Ghirardi's "Radio Field Service Data," reviewed in the "Radio World" for December last, are now available in Australia.

A modern, practical reference book containing many useful trouble-tracking charts and tables, servicemen will find it invaluable. Those specialising in auto-radio installations will find the book particularly useful, as no less than three sections are devoted to remedies for stubborn automobile ignition interference, electrical wiring diagrams of automobiles, and to battery polarity, breaker-point and spark-gaps, and auto-radio antenna data for American cars.

["Radio Field Service Data," Second Revised Edition, by Alfred A. Ghirardi, E.E., obtainable from Messrs. Angus & Robertson, 89 Castlereagh St., Sydney. Price, 16/-; postage 9d.]

★

Electronic Television.

The development of electronic television has progressed rapidly during the past few years, until today it is well past the laboratory stage and is now being tested in the field. Two experimental stations for electronic television transmissions are now operating in America, one in Philadelphia established by Farnsworth Television Incorporated, and the other in New York by the Radio Corporation of America. Two men stand out as pioneers in the new science—Philo T. Farnsworth, of the former company, and Dr. V. K. Zworykin, of the latter.

With the emergence of electronic television into the field, it became apparent that an authentic book on the subject was badly needed, and "Electronic Television," by George H. Eckhardt, provides the answer. Both companies mentioned above co-operated in its production, so that the information contained on the systems developed and operated by them was obtained at first-hand.

The book is written not for highly trained engineers, but for the average reader possessing perhaps only

(continued on page 15).

What's New In Radio

A monthly review of latest releases in sets, kit-sets, and components

New 10-Inch Rola P.M. Dynamic Speaker.

The latest release by the Rola Company (Aust.) Pty. Ltd., of Melbourne, is the model 10-21, a 10-inch permanent magnet speaker of the latest design.

Two outstanding features comprise a new magnet assembly with very high flux density (approx. 11,000 gauss), and a new moulded diaphragm, proofed against humidity and fitted with a 1-inch voice coil. Both result in very high efficiency, excellent overall response, and a power-handling capacity that can take care of outputs up to 8 watts.

The use of the patented method of Rola dust-proofing and a transformer sealed against moisture and battery fumes, combined with the above features make the 10-21 ideal for use with battery or vibrator-powered receivers, with public address systems, or for any application where high quality reproduction is required without the inconvenience of providing for speaker field excitation.

Speaker input transformers are provided for all standard output valves, for single, push-pull, or class B operation, or for any given impedance value.

★

New Readrite Multi-Meter Is Highly Portable.

Servicemen who have to cover a wide territory in the course of their service work must have equipment that is at once up-to-date and as compact as possible. The manufacturers of the well-known American Readrite test equipment have adequately filled this need with their new Ranger-Examiner line of test instruments. Precision-built, and using Triplett meters throughout, there is a complete range service equipment, all units being very compact, rugged, and easily portable.

The Model 735 D.C. Volt-Ohm-Milliammeter is so compact it can be carried easily in the coat pocket. Nevertheless it has ranges comparable to those of large multi-meters, and besides providing measurements for every requirement of the serviceman during home calls, it is suitable for extra utility use in the shop and laboratory.

The instrument is fitted with a Triplett D-Arsonval type precision instrument, with readings accurate within 2 per cent. There is a selector switch for all ranges, and individual zero adjustment is provided for resistance measurements. Ranges are 15-150-750 volts; 1.5-15-150 M.A.; ½-1,000 low ohms; 0-100,000 high ohms at 1.5 volts. External batteries may be used for higher resistance measurements.

This model 735 D.C. Volt-Ohm-Milliammeter is so compact that it can be slipped into a coat pocket.

The black moulded case measures 3 1/16in. x 5 7/8in x 2⅛in. high, and is provided with an attractive silver and black panel. Battery and test leads with alligator clips are included.

Messrs. W. G. Watson & Co. Ltd., 279 Clarence Street, Sydney, are agents for "Readrite" test equipment, and will be pleased to supply on request complete details on the range of instruments carried.

★

Micromatic All-Wave Unit Eliminates Alignment Troubles.

Realising that the alignment of home-built superheterodynes without the necessary equipment has always been a source of worry to set builders, Messrs. F. J. W. Fear & Co., of Wellington, N.Z., have solved the problem very neatly and effectively with the development of their new Micromatic All-Wave Tuning Unit.

Resembling the ordinary coil box assembly, with the condenser gang mounted on top of the box housing the different coil units in separate compartments, the Micromatic Unit differs from it in that the metal type valves used for the R.F. and mixer stages are mounted alongside the gang.

The entire assembly is wired, fitted to a test chassis, and accurately aligned before release, so that set-builders can fit the unit and wire the remainder of the set with every confidence that the alignment of the completed job will be as accurate as laboratory-built test equipment can make it.

The important feature is that as the unit is ready wired, there cannot be any small changes in the minimum capacities after assembly of the set, due to the addition of wiring, to upset the alignment. An added attraction is that the dial, which is manufactured specially for this unit, gives very accurate tracking over all three wave-bands.

Only Seven Connections.

Along one side of the unit is mounted a row of 7 solder lugs for the screens, A.V.C., oscillator plate, B+, 6A8 plate, and heater connections. When these lugs are wired the R.F. and mixer section of the set is complete.

The first kit-set built around this new assembly is the "1937 Metal Miracle 6," a six-valve superhet giving all-wave coverage and using the following valves:— 6K7 R.F., 6A8 mixer; 6K7 I.F.; 6Q7, diode detector, for A.V.C., and first audio amplifier; 6F6, output pentode; and 5Z4, rectifier.

The Micromatic All-Wave Unit is undoubtedly one of the most outstanding developments in modern kit-set design made in recent years. Full details both of this new unit and of the "All-Wave Miracle 6" will be supplied free on request by the manufacturers, Messrs. F. J. W. Fear & Co., 31 Willis St., Wellington, N.Z.

★

Latest Radiotron Map Folder Is Ideal For Dxers.

Every dxer should make a point of obtaining a copy of the Radiotron Aximuthal Map Folder just released by the Amalgamated Wireless Valve Company, Ltd., Sydney.

Beautifully printed in four colours, no effort or expense has been spared to make this new folder the most attractive and useful radio reference chart of its kind ever released in Australia. It is absolutely packed with just the kind of information that every radio enthusiast wants, but can rarely obtain.

World Distances And Compass Bearings.

The "star" feature of the folder is a map of the world, drawn on a projection that gives the appearance of the globe as seen from a point in space directly over Sydney. It enables the shortest distance from the centre of the map to any other point on the globe to be easily ascertained, together with the compass bearing.

The former feature is invaluable in calculating DX, while the latter should be of valuable assistance to experimenters putting up directional aerial systems of any sort. A time chart is also available to enable immediate comparison of world times.

New List Of World S.W. Stations.

An up-to-date and comprehensive list of world shortwave stations, showing call-signs, locations, and wavelengths is also included, the stations most frequently heard in Australia being marked with an asterisk. Australian and New Zealand broadcast stations are listed as well, being grouped by states.

Altogether, this Radiotron release is something that no radio fan should miss. Copies can be obtained free by enquiring at your local radio shop, or by writing the Amalgamated Wireless Valve Co., Ltd., Box 2516 BB, G.P.O., Sydney, enclosing a penny stamp for postage.

★

Philips Technical Communication On Transmitter Design.

"Transmitters—Some Observations On Their Design," is the title of a paper delivered by V. H. Dudman, M. Inst. R.E. (Aust.) before the institute of Radio Engineers (N.S.W. Division) and now released by Messrs. Philips Lamps (A'sia.) Ltd. as Technical Communication No. P3146.

Of interest primarily to radio station engineers, the bulletin just released deals with the design of power supply systems, to obtain highest efficiency at lowest cost. Characteristics of rectifiers, valve, transformer and filter costs, and output regulation are discussed in detail.

A further Technical Communication will be devoted to a discussion of valve selection for the various stages of the transmitter proper.

Radio Book Reviews.

(continued from page 13)

a smattering of radio knowledge. The fundamentals of electronic television are clearly explained in the opening chapter, and then the Farnsworth and R.C.A. systems of transmission and reception are dealt with in turn, simply and comprehensively. An especially interesting and ingenious device is the Farnsworth cold cathode Multipactor tube, which not only provides the solution to a difficult problem in electronic television, but eventually may displace present-day receiving and transmitting valves.

["Electronic Television," by George H. Eckhardt; publishers, the Goodheart-Willcox Co., Inc., Chicago. Our copy from Messrs. Angus & Robertson, 89 Castlereagh St., Sydney. Price, 15/-; postage 9d.]

The . . . A.T.R.S. Bulletin

Conducted by the Secretary, 287 Clarence Street, Sydney, N.S.W.

★ ★ ★

From The Secretary's Pen.

LIVE energetic servicemen are reminded that there are still a few vacancies for membership of our organisation in the metropolitan area. There are also vacancies for country members.

With reference to inter-state membership, correspondence is to hand from all over Australia desiring membership. Here is an example of numerous letters received at our office.

"Dear Sir—Being in servicing profession I am very impressed with the idea of the A.T.R.S., which is much needed to build up the prestige that should be given to this profession. The status of the serviceman must be raised, but it never will be as long as unqualified meddlers and so-called super mechanics are dabbling in the profession, endeavouring to service radio sets with a seven and sixpenny voltmeter, a pair of pliers and a soldering iron. Yet they advertise that they have the most elaborate testing equipment under the sun, and quote a price beyond all reason, such as 1/6 or 2/6 per hour. Such a price as this cannot pay any legitimate business.

Some can get away with it and fool the unsuspecting public for a while, but they are eventually found out, and the receivers they are supposed to have serviced are then brought to the professional man, who discovers that they are in a shocking condition. Yet he is expected to undertake a thorough overhaul at a next-to-nothing price, through the previous influence of the meddler.

A well-trained, adequately equipped radio serviceman should be regarded as highly as a doctor, whose fees are an indication of his study, yet the radio serviceman who has studied for many years can rarely command equitable payment for his services.

If all reliable professional radio servicemen were to get together and join your organisation, I am sure these difficulties would eventually be overcome and there would be a profitable living in our chosen field in the future.

Therefore, I desire to become a member, and you can depend on my assistance if required. Wishing the organisation success,

Yours faithfully,
G. W. WILSCHEFSKI.
Express Radio Service.
MARYBOROUGH, QLD.

This is spirit which has made our organisation a success so far. We need your co-operation to gain our objective, so join now.

Licensing of Servicemen Urgently Needed

Assessing Service Charges

By TEST-PROD

THERE are many and varied schemes for assessing the value of a service call. It does not appear to be good business policy to prepare an elaborate card system on which is shown details of faults, component prices, so much per hour travelling expenses etc. Of course, these items must be taken into account, but one would not expect a grocer, for example, to fill in his bill complete with trade discounts, sales tax and shop rent!

Two Hypothetical Cases.

In arriving at a solution of this somewhat involved problem, a few hypothetical cases might assist. Serviceman "A" is called to a job in which the radio has gone "dead." Upon testing the receiver he discovers that an electrolytic condenser has developed a short, and as a result the 80 rectifier has joined its ancestors. He informs his client that the job will cost say 27/6. The client is anxious to know what it's all about, so the serviceman points to the offending "electro" and holds up the valve. The client then pleads financial embarrassment and promises to ring later.

That ring never comes. The client has a friend who fixes everything from door knobs to sewing machines for "experience." Asked for assistance, he buys an 80 and an electrolytic at cost, instals them, and everybody is happy, with the exception of Mr. "A."

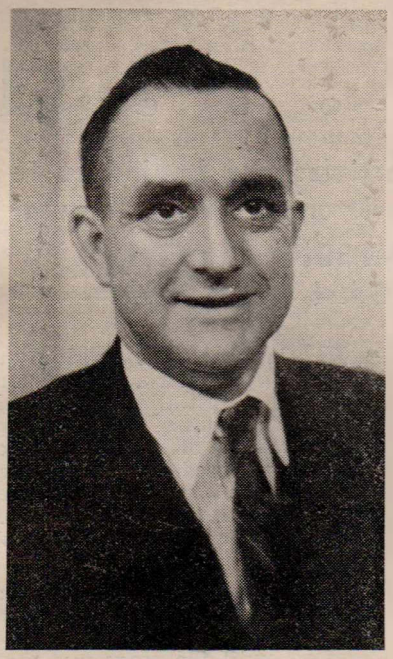
The moral is that this serviceman is not selling his time so much as his knowledge of radio, which is his main asset.

Now with regard to the system of charging so much per hour, we will consider the case of "X" and "Y," two mechanics who both charge the same rate. "X" is an experienced technican, "Y" is a "mug" who has hastily read the contents of "How to Become a Serviceman" and bought an analyser on T.P. They are called out on two sets with identical faults. "X" has his set right in half an hour; "Y" sweats and fumes for three hours, goes home to lunch, and has the receiver finished in time for tea. Assessing costs on a time basis, "Y's" bill is several times greater than "X's," which is obviously anything but fair to "Y's" unfortunate customer, or the genuine serviceman.

Licensing Of Servicemen Suggested

Now for a few remedies. I am in favour of a Government examination for servicemen on the lines of the A.O.P.C. or P.M.G. certificate. Those who passed would be issued a license. This would in time make radio servicing a recognised profession, and protect the public against unqualified men.

The next step is to boycott those firms who sell to the general public at trade prices.



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ABOUT THE AUTHORS

GEORGE THOMPSON (left), was educated at Wakefield Grammar School, England, and has been keenly interested in amateur radio ever since the war. He operates his own station (VK3TH) on 56 m.c. (5 metres) only, and assists as operator of VK3BY, Australia's crack amateur station. 3TH's chief interest these days lies on the educational side—he controls the student classes of the W.I.A. in Melbourne. These have proven very successful, and at the last Government exam., a 75% pass was obtained, constituting a record for Australia.

IVOR MORGAN (VK3DH) is a product of the Melbourne Grammar School and Melbourne University, and is a professional radio consultant as well as a director of Regent Radio Pty. Ltd. He holds a broadcast operator's ticket in addition to an experimental license. 3DH operates his own transmitters on 269, 80, 40, 20, 10, and 5 metres, and is noted for the very high standard of his transmissions. Is a member of the W.I.A., and has been in radio for ten years.

★ ★ ★

New Series Of Articles On Amateur Radio . . . . .

—An Introduction By The Authors

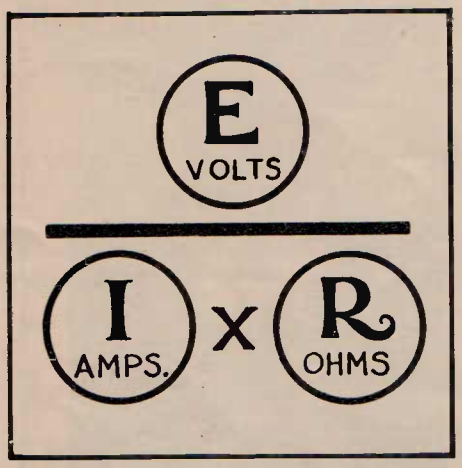
THE series of articles commencing this month in the "Radio World" under the title of "Breaking Into The Amateur Game" is not intended for the advanced amateur who will, or at least should, know the simple lessons as a school child knows its alphabet. Our objective is to supply those in whom the spark of radio has been lately kindled with simplified lessons which, if conscientiously studied, will provide sufficient knowledge of the propagation of wireless waves to enable them to pass the examination for the Amateur Operator's Certificate of Proficiency, or as it is known to "hams," the A.O.C.P.

Most people whom the radio bug attacks look forward to the time when they will possess a call-sign of their own, and the authors hope to do something to assist in the accomplishment of that worthy ambition. The most elementary principles of electricity as applied to wireless, the real fundamentals, will be dealt with in such manner as will afford their ready absorption by all who possess a reasonable standard of intelligence and who are prepared to devote the necessary time to the study of this very entertaining art.

In order to pass the government examination, it is necessary that the candidates obtain not less than 70% in each of the following subjects:— Sending and receiving in code (morse) at a speed of twelve words per minute, 5 letters to constitute a word; a series of questions on theory, usually 10 in number; and a thorough knowledge of the regulations governing amateur transmissions as appearing in the P.M.G.'s handbook. The latter cannot be taught, but the numbers of those necessary will be stated and may be learned leisurely at a convenient time.

It will be necessary that each student provide him or herself with a morse key and either an oscillator or buzzer arrangement for the purpose of practice. In all probability some of the advertisers in this journal have simple complete sets available at small cost, but they are simple of construction and are readily assembled.—The Authors.

Breaking Into The Amateur Game . . . (1)



The first of a series of articles* for beginners in amateur radio, specially written for "Radio World"

By GEORGE THOMPSON (VK3TH) and IVOR MORGAN (VK3DH)

To be thoroughly conversant with Ohm's Law is the first essential to a sound knowledge of radio. In the above, if the letter representing the unknown quantity is covered, the way to deal with the other two quantities will be revealed. Thus, by covering up E, I and R are left together and should be multiplied. If I is covered, it becomes obvious that that E should be divided by R.

DR. GILBERT in the year 1600 published his famous work "De Magnete" on the science of magnetism. A magnet may be termed a solid body possessing the property of attracting to a much greater extent than any other metal.

In dealing with any action on this principle, the phenomenon is known as magnetism. Copper and zinc are examples of non-magnetic substances, while nickel and cobalt are readily attracted by a magnet, and are therefore said to be magnetic.

Upon experiment it is found that a magnetised bar of iron when suspended to rotate freely in a horizontal plane will definitely come to rest with one end pointing to the earth's geographical North pole. This end is known as the North-seeking pole, the opposite extremity being the South-seeking pole.

Should a magnet in bar form be suspended horizontally at a point half its length from another magnet (fixed), the latter being placed with its South pole nearest to the movable magnet, it will be found that the suspended magnet will swing until its North pole comes to rest close to the South pole of the fixed magnet. From this we get the first law of magnetism:—

Unlike Poles Attract, And Like Poles Repel.

In the magnetising of a piece of iron or steel, the effect has a limited penetration; therefore by placing together a number of thin magnets, a compound or laminated magnet is formed. By this means we obtain in a limited weight and bulk a magnet greater in strength than one of similar dimensions that is solid.

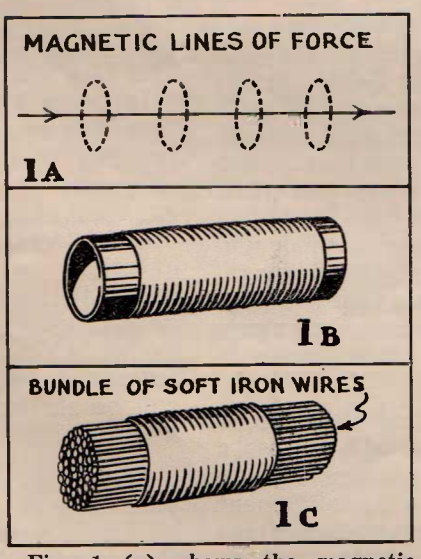


Fig. 1 (a) shows the magnetic lines force surrounding a wire carrying direct current. If the wire is wound in solenoid form as in 1 (b), the inductance in greatly increased, while if the coil is provided with a soft iron core as in 1 (c), the inductance becomes still higher.

An electro-magnet consists fundamentally of either a solid or laminated rod of soft iron, around which is wound a coil of insulated copper wire. When a direct current of electricity is passed through the wire, the iron core becomes an electro-magnet, the magnetic properties failing as soon as the current is interrupted.

Up to a certain point the strength of the magnet would increase as the current through the coil was increased, until the stage was reached when a further increase of current no longer increased the strength of the magnet. This is a condition known as magnetic saturation.

If three bar magnets are placed upon a table with their ends a quarter of an inch apart, in the form of a triangle, their North and South poles being adjacent, a closed magnetic chain is formed. Upon investigation with a compass we find that the magnetic forces are concentrated about the ends of the bars, and practically no field (magnetic) is detected externally. This is a condition known as a closed magnetic field.

Magnetic screens are sometimes used in the application of magnetism to radio. These take the form of a bar or sheet of magnetic iron or steel, so placed to change the pattern of a magnetic field. The most perfect form of magnetic screen is a sphere, with the object to be screened placed centrally inside.

A Definition Of Permeability.

Permeability may be defined as the property, possessed in varying degree by magnetic substances, of becoming magnetised when placed in a magnetic field. Electricity, or the evidence of activity of electrons as we know it, is the science upon which depends practically all our radio activities.

Atoms And Electrons.

Considering first the electron, we usually accept this as being, in conjunction with other electrons, part of the atom. Atoms are divided into classes dependent on the number of

[*Editor's Note.—To complete this series within reasonable time, it can be appreciated that the elementary fundamentals of radio cannot be dealt with at great length. At the same time, readers should realise that without a thorough grasp of the fundamentals it is hopeless for them to try for a ticket. Hence, for those not too sure of their groundwork, the series of articles "Radio Step By Step," at present running in the "Radio World" would make excellent supplementary reading. Those who wish to delve into the subject still further are invited to write in, and a list of suitable text-books will be supplied. Lastly, would readers please note that the authors of the accompanying series cannot answer queries by post.]

electrons that constitute them. Then we have positive and negative electrons going to make up the nucleus of the atom. The positive electrons are known as protons, and the negative, simply electrons.

Atoms make up molecules which in turn go to constitute common substances such as iron, copper, aluminium, etc. To clarify this electron theory we should visualise an atom as a nucleus consisting of protons (positive electrons) and electrons, surrounded by electrons (negative) which rotate around the nucleus in an elliptical fashion. The relative quantity of free electrons determines the conducting properties of the substance.

As an example, copper has a large number of free electrons, whereas glass could be said to have practically none. The atoms of most metals will, with very little resistance, part with an electron or two, which will drift in the direction of any positive electric strain. When there is a surplus of electrons at one point and a deficit at another (the two points being joined by a conductor) electric current flows from the former to the latter point, i.e., from negative to positive (— to +). This drift of electrons constitutes an electric current, and is actually the drift of electrons from atoms along a conductor.

As stated earlier, atoms are composed of a nucleus of protons and electrons surrounded by electrons. Normally the condition is a balance electrically, but when an electron is added to or subtracted from a neutral (balanced) atom, we have what is known as an "ion." Therefore ionisation is the process of adding or subtracting an electron from a neutral atom.

How A Valve Works.

Closely associated with this theory is conduction by thermionic emission of electrons in a vacuum tube. In the simplest form of vacuum tube, there is a metal plate supported close to a cathode, both being enclosed in a vacuum. The cathode consists of a metal filament not unlike that in a common electric lamp.

When the filament, or cathode as it should be termed, is heated, electrons are stimulated to fly off from its surface, and they are attracted to the plate when the latter is connected to an external battery. (Positive pole to the plate and negative to the cathode.) A cloud of electrons gathers near the cathode, and is known as the space charge.

Thus we have seen that an electron flow can take place within the vacuum tube, the direction being from cathode to plate. The function of the most complicated of multi-element tubes is dependent on this fundamental principle.

Electromotive Force, or E.M.F., is the term used to describe the electrical pressure created between the two poles of a battery by the excessive number of electrons at the negative pole.

Common practice in radio is to combine a large number of "dry cells" in series to make a battery. These dry cells usually have a terminal E.M.F. pressure, or voltage, of 1.5v. By connecting the positive terminal of one cell to the negative terminal of the next, and the positive terminal of this to the negative of a third cell, we are adding the voltages of each, and the connection is known as series. Three such cells connected in series would provide a battery of $1.5 \times 3 = 4.5$ volts.

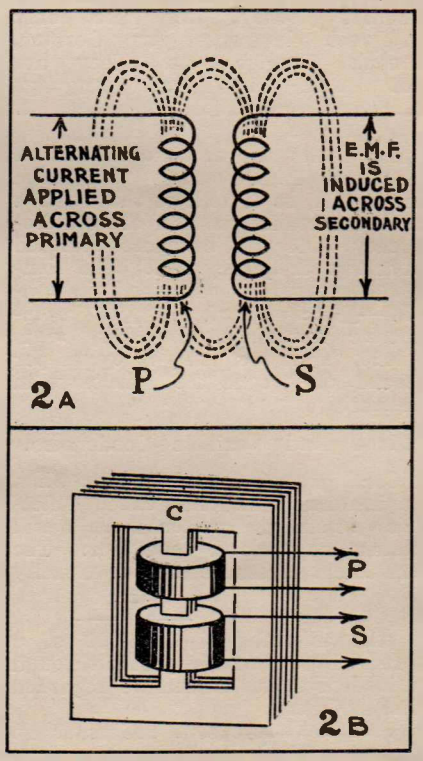


Fig. 2 (a) illustrates how an alternating current or e.m.f. can be transferred from one winding to another in close proximity by mutual induction. This effect is utilised in the transformer, illustrated in 2 (b).

Again, using our three 1.5v. cells, but this time connecting all the positive terminals together, then all the negatives, we have a battery the terminal voltage of which is still 1.5 volts as compared with 4.5v. of the first battery, but the second battery is capable of delivering three times the current of the first. This "hook-up" is termed a parallel connection.

Meters for use in these simple circuits would be:—a voltmeter connected in parallel with the supply of unknown voltage, and an ampere meter (ammeter) or milliampere meter (milliammeter) according to current, is connected in series with the circuit where we wish to measure current flowing in the circuit. A milliamp is 1/1,000th of an ampere.

Direct And Alternating Currents.

Thus far we have discussed only simple direct current circuits. The letters D.C. usually appear on any piece of apparatus which must function only on direct current. Should the D.C. in any circuit be interrupted either regularly or irregularly it is still D.C., since the direction of flow remains the same.

The type of current most commonly in use is known as alternating, or A.C. The fundamental difference between these two types—D.C. and A.C.—is that where the former flows in the same direction at all times, the latter reverses its direction of flow many times per second. The electron flow with alternating current first increases to a maximum, falls to zero, then reverses its direction and rises to maximum, again falls to zero, and so on.

In our usual power mains circuits the direction of current flow changes each 1/100th of a second. This means that the complete reversal, or cycle, occupies exactly 1/50th of a second. Hence there are 50 cycles per second, explaining the term 50 cycles A.C.

This theory may be applied to many aspects of radio. For instance in a circuit where we are dealing with voice frequencies, the frequency is constantly changing, and in the space of a split second may vary from 100 cycles to 5,000 cycles per second. Coming to frequencies used commonly by wireless transmitters, we have a range covering some 80,000 cycles or 80 kilocycles (a kilocycle being 1,000 cycles) and extending up to 60,000 k.c. or 60 megacycles (a megacycle is 1,000,000 cycles).

Unlike D.C., A.C. cannot be produced by batteries, and a rotating machine known as an alternator is used to generate commercial 50-cycle power. In the case of frequencies above 80 k.c., vacuum tubes in appropriate circuits are used to generate A.C. power.

Ohm's Law Formulae.

Before proceeding further it would be advisable to memorise Ohm's Law, this being the most widely used formula in radio. When R=the resistance in the circuit (measured in ohms), E=the E.M.F. (in volts), and I=the current (in amperes), then

Ohm's Law says:—$R=\frac{E}{I}$; $I=\frac{E}{R}$, and $E=I\times R$. The resistance in the circuit can therefore be found by dividing the voltage by the current, and so on.

Resistors are sometimes made

up of resistance wire wound on a former, or of some carbon compound in the case of very high values, where difficulties would arise in the manufacture, since the fineness of the wire would constitute a definite problem.

These resistors can be connected, like batteries, in series or parallel. Thus, should we connect a number of resistances of different values in series, the result from end to end would be the sum total of the individual values, but if connected in parallel the nett result in ohms is:—

$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$ .....where R is the resultant resistance, and R_1, R_2, and R_3 the individual resistances.

It can be stated here that the cause of heat produced by an overloaded copper wire or resistance wire is the flow of electricity producing molecular friction, resulting in heat.

Power Is Rate Of Working.

In addition to volts and ohms, we use another expression in simple electrical calculations, namely watts. "Power" is the rate at which work is done—one watt has been expended when one ampere flows between two points having a potential difference of one volt. We have the definition $P=E\times I$, where P is the power in watts, E is the voltage, and I is the current in amperes.

Moving electrons produce magnetic fields or lines of magnetic force around the conductor. When a conductor is wound in a coil, the field becomes stronger because there are more lines of force. With the addition of an iron core the magnetic force is increased, and the field is concentrated about the core.

Self-Inductance Explained.

This brings us to an explanation of "self-inductance." If an alternating current is passed through a coil, the field around the coil will increase and decrease, first in one direction and then the other. The varying field around the coil will induce a varying voltage in the coil, and the current produced by this induced voltage will be in the opposite direction to that of the current originally passed through the wire. Thus the coil tends to prevent any change in the current flowing through it and so limits the amount of A.C. flowing. This property is known as "self induction."

The unit of self-inductance is the "Henry"—obtained when a rate of current change of one ampere in one second causes an induced voltage of one volt. Inductances are dealt with in series and parallel in precisely the same way as with resistors.

We therefore know that an inductance limits the amount of current that an A.C. voltage can send through it, so it follows that with a fixed inductance the flow of high frequency A.C. will be more retarded than low frequency A.C. The combined effect is "reactance." Formula:—$X_L=2\pi fl$, where "X_L" is inductive reactance in ohms, π is 3.1416, "f" is frequency in cycles per second, and "l" is the inductance in henries.

Fixed And Variable Condensers.

Coming now to condensers, when an insulating medium (called dielectric) separates two or more metal plates, we have a condenser. The convenient reference unit of capacity is the microfarad ($\frac{1}{1{,}000{,}000}$ of a farad). D.C. cannot be passed through a condenser, but it can be regarded that A.C. can.

Variable condensers are made so that the relative area of plate material in mutual relationship can be changed, thus varying the capacity of the condenser.

A form of condenser slightly different to the fundamental design is the electrolytic condenser. A round pole of aluminium alloy is immersed in a liquid electrolyte. Aluminium oxide is formed on this anode, or positive pole, and an aluminium vessel suitable to hold the liquid becomes the negative pole.

Since the sheet of aluminium alloy has this very thin coating of oxide all over its surface in contact with the liquid, we obtain a relatively high capacity in a conveniently small space. The electrolyte, which forms the negative pole of the condenser, is in contact with the container, and so the negative connection is made to the latter.

Condensers in parallel are treated the same as resistors in series, that is, we simply add the various capacities to determine the total.

Condensers in series will be found by this formula:—

$\frac{1}{C} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}$ where C_1, C_2, and C_3 are the separate capacities, and C the resultant capacity.

Ohm's Law For Alternating Currents

Formula:—$I=\frac{E}{Z}$, $Z=\frac{E}{I}$, $E=IZ$, when "E" is the voltage and "I" the current in the circuit, and "Z" the symbol for impedance. If inductances had no resistance we could assume that the current in the coil would be equal to the voltage divided by the reactance, but the coil has resistance, which acts with the reactance in limiting the A.C. The combined effect of these is termed "impedance," (Z) and is found from the formula:— $Z=\sqrt{R^2+X^2}$ ("X" being reactance.)

Finally, to define the effective or "root mean square" (R.M.S.) value of A.C. This problem is simplified when we take an alternating current as having an effective value of one ampere when it produces heat at the same average rate as one ampere of D.C. in the same resistor. The usual alternating current ammeter or voltmeter gives a reading of the R.M.S. value of current or voltage.

Next month we will deal with "Valves and Radio Wave Fundamentals," but in the meantime, as well as studying the first lesson given above, readers should build the code practice oscillator described elsewhere in this issue, and make a start on learning the code by the method now to be outlined.

Learning The Code

Constant Practice Essential

THE Morse Code is a system of dots and dashes (known as dits and dahs) so arranged that communications can be transmitted in all European languages. The only method by which efficiency can be obtained in this most important branch of an amateur's knowledge is by constant study until the system becomes, like the written alphabet, second nature.

There are 26 letters in the English alphabet provided for, as well as seven further letters known as continental letters, for use only in such languages as German, French, Spanish, etc. They are not used in our language or in examinations by the P.M.G.'s Department for experimental licences, and may be disregarded by students for the time being.

How To Group Letters.

Definitely there is no short cut to acquiring a knowledge of code, but perhaps a few hints likely to be of help can be offered. Having learned the alphabet in signals, it will be found advantageous to remember certain groups of letters, each of which have an affinity with the others in the group.

First we will take the letters E, I, S and H. These are denoted by dits only, and are respectively,-, - -, - - -,

- - - -. Our next group of letters is **A, W and J.** These each commence with one dit and are followed by dahs, thus, - —, - — —, - — — —. These may be followed by **R, F and L** in that order, and again the dit is the commencing signal, but in this case their number varies whereas they each contain only one dah, thus, - — -, - - — -, - — - -.

There are three letters that are represented only by dahs, and they are **T**(—), **M**(— —) and **O**(— — —), while **N, D and B** commence with and contain one dah only in this manner, — -, — - -, — - - -. The letters **K, X, C and Y** comprise a group of letters that commence with a single dah, but are followed by a varying number of dits, and they appear thus, — - —, — - - —, — - — -, — - — —. Our next group contains the letters **G, Z and Q**, and these letters each commence with two dahs in this manner, — — -, — — - -, — — - —. Our remaining group of letters are **P, U and V**, and these commence with one, two and three dits respectively, - — — -, - - —, - - - —. The direct opposites are:— **A**(- —), **N**(— -); **D**(— - -), **U**(- - —); **F**(- - — -), **Q**(— — - —); **L**(- — - -), **Y**(— - — —).

These groups and opposites when mastered will be a great help to the student, and after a time will become as legible to the ear as the finest copper plate caligraphy is to the eye. One other suggestion which may prove of assistance is to cultivate the habit of substituting the code symbols for A, B, C and so on, when reading street signs or even the morning paper.

Oscillator Or Buzzer Necessary.

For the purpose of practice, it is advisable that students work together in pairs or more. A good key (not a cheap or ill-made instrument) with either an oscillator or buzzer is a necessity.

Practice should commence at a speed of not less than four words per minute, a word to consist of five letters. It is better to arrange groups of five letters containing opposites, as this system demands strict concentration, whereas by sending ordinary reading matter a fair chance of filling in lost letters presents itself, which is not helpful.

During the initial stages the key points should be allowed a reasonably wide clearance, which can be reduced as speed is attained. There is no cut and dried length for a dit (dot), but whatever length or period occupied by a dot, the dah (dash) is twice its length. Between letters a period equal to a dah is allowed, and at the end of a word, twice that period.

How To Hold The Key.

The manner in which the key is grasped is to place the index and middle fingers on the top of the knob, with the thumb and third finger on either side of it. The grip must be very light, and the necessary movement must come from the wrist only—not the hand. For this reason the key should be so placed that no part of the arm is touching the table or bench upon which the key rests during operation. For a while this position will be uncomfortable and cause a distinct ache, but this will soon disappear as the limb becomes accustomed to it.

Do not attempt to speed up your sending too soon, as this is the chief cause of bad formation. Make your first objective good formation of letters, ensured by care in making them and by observing correct periods as between letters and words. One of the worst features of the self-taught operator is due to a desire to attain speed too quickly, whereas by making correctness the first consideration it will be found that when the necessary speed is attained, formation does not suffer.

Slow Morse Sessions.

A simple shortwave receiver or a dual-wave superhet that embodies a beat oscillator for the purpose of listening to morse transmissions by amateurs, will be found of great assistance, as there is usually slow morse on the air for the benefit of beginners. An application to the Hon. Secretary of the State branch of the Wireless Institute of Australia can be made for the purpose of obtaining particulars of these transmissions in the various states of the Commonwealth.

There is nothing at all terrifying or difficult about learning the morse code. Devote a few minutes regularly each day to the subject, and with reasonable application and concentration a speed of the required 12 words per minute should easily be attained within three months.

INTERNATIONAL MORSE CODE SIGNALS.

Letters :

a ▪ ▬
ä ▪ ▬ ▪ ▬
á or å ▪ ▬ ▬ ▪ ▬
b ▬ ▪ ▪ ▪
c ▬ ▪ ▬ ▪
ch ▬ ▬ ▬ ▬
d ▬ ▪ ▪
e ▪
é ▪ ▪ ▬ ▪ ▪
f ▪ ▪ ▬ ▪
g ▬ ▬ ▪
h ▪ ▪ ▪ ▪
i ▪ ▪
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0 ▬ ▬ ▬ ▬ ▬

Home-Made Shortwave R.F. Choke

An effective r.f. shortwave choke can be easily made up by winding on 75 to 100 turns of 34 or 36 gauge enamelled or d.s.c. copper wire on a 2-inch length of tubing, one inch in diameter. Each end of the winding can be soldered to a solder lug mounted by a bolt and nut at the end of the former.

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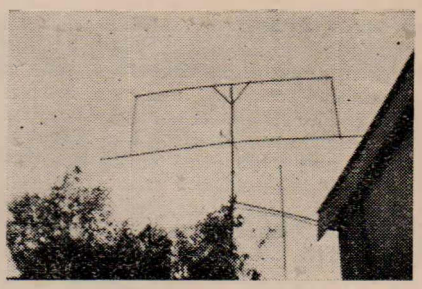
When reaction in a home-built t.r.f. set proves too fierce, the necessity for removing turns from the reaction winding can be avoided by connecting a small fixed condenser of .00005 mfd. upwards from the plate of the detector to earth. Use a value that gives smooth control of regeneration over the whole waveband.

"Getting Out" On Five Metres

Bruce Directional Aerial System Is Highly Successful On The Ultra-high Frequencies.



The Bruce 5-metre beam array now in use at VK2AZ.

By DON. B. KNOCK (VK2NO)

Vice President W.I.A. (N.S.W. Division): Radio Editor, "The Bulletin."

THE writer's retrospective discourse on five metres generally in last month's "Radio World," included a reference to the Bruce directive antenna array as being worth attention from amateurs striving for the utmost in distance and directivity on this most useful of communication channels.

Since the article was written, a considerable amount of investigation work has been done with this particular array, and the results obtained will doubtless be valuable to interested readers.

From the first, the possibilities of this design of aerial attracted the writer, mainly by virtue of the excellent results obtained on 14 m.c. by John Kraus, of W8JK. During last year, everybody equipped with an amateur receiver covering the 20-metre band must have been impressed by the consistently powerful 'phone signal from W8JK, with his familiar "Ann Arbor, Michigan" call. Conversation with Kraus centred around antenna systems, and the Bruce array was strongly supported by him over the more elaborate and space-eating Diamond or rhombic system.

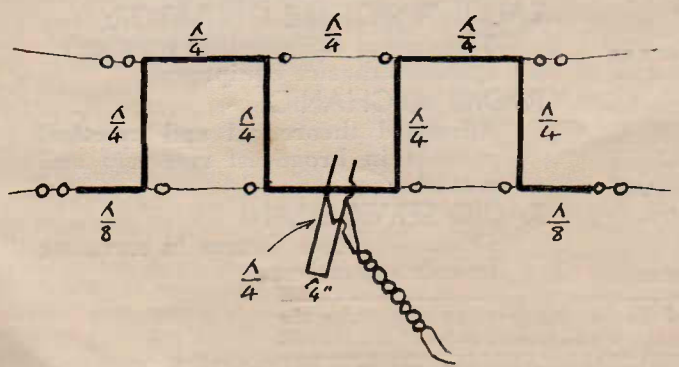
W8JK has written articles on the Bruce and Chireix-Mesny systems in "Radio" (U.S.A.) and more recently in the excellent "Antenna Handbook" published by "Radio." It appeared to the writer that these systems should have big advantages at ultra-high frequencies, and no time was lost in making tests.

Details Of The Array.

Of the two, the Bruce takes up less space, and in practice is the more efficient. The diagram shows the fundamentals. It will be seen that it is merely a length of wire corresponding to four half-waves, folded into the shape shown, and fed at the centre by a quarter-wave stub line or "trombone." The effect of this folding, plus the stub, is to put the four half-waves in phase.

Although the system is erected horizontally as shown, the polarisation is vertical. The stub connects at the centre quarter-wave section on one side only, and one feeder connects here also, with the other on the other side of the stub at a corresponding distance from the closed end. Feeding can be done either by a twisted pair (72-ohm line) or a spaced line (600 ohms).

There will naturally be a difference in the position of feeder attachment according to the type of line, and this must be determined by test with the transmitter coupled and radiating. In the writer's case, a twisted pair line is used and found to be very effective.



This sketch shows the fundamental details of the Bruce array, which is erected horizontally.

In his initial experiments, Kraus found that the Bruce method of folding a long wire seems under certain conditions actually to increase the natural frequency, making a longer length necessary for a given frequency. This is found to be the case also at 5 metres, therefore all quarter-wave and eighth-wave sections should be 5 per cent. longer than the accepted chart lengths. For general purposes, the quarter-waves are 4 feet 3 inches long and the eighth-waves 2 feet 1½ inches. This puts the system resonant around 57 m.c.

As may be seen from the diagram, the array can be easily slung in the sky with ropes and insulators, and better still, can be made rigidly on a light wooden frame.

Some Practical Tests.

Now for some of the results obtained. The two Sydney stations at present using these arrays are VK2NO and VK2AZ. The two stations are 9 miles airline apart and by no means in visible range. This provided a good test of directive properties.

The beam at VK2AZ was arranged on a frame to swing through an arc of 180 degrees. With one beam trained correctly on the distant station, and the other one placed even at right angles (i.e., right off the station) signal strength is R9 plus under all conditions. The effect of swinging the beam is very noticeable, and has the effect of a searchlight. The carrier decreases rapidly as the useful radiation angle is passed. With both beams full on, the signal strength is absolutely maximum, just as if the two stations were situated a foot or so apart instead of nine miles.

Such results were not obtainable

between these two stations with all previous aerials. As VK2AZ is using crystal control on 5 metres, with a superhet receiver, and VK2NO is using the stable M.O.P.A. described in the previous article, the two stations are able to work uninterruptedly with all the ease of an 80-metre 'phone contact, but minus the QRN and interference. The only snag with the supers so far is car ignition QRM, but noise silencers are planned to overcome this.

Tests with a field meter at VK2NO reveal that the Bruce array has a beam angle of only 10 degrees at 56 m.c. This is very sharp, but the gain in db. at the exact centre is remarkable.

Special Bruce Array Planned.

At present a special Bruce array is under construction for the writer's station. This will be rotatable through 360 degrees, on ball bearings, at a height of 30 feet, and will be controlled from the operating room by ropes and pulleys with a hand-wheel. Thus it will be possible to "focus" on any station immediately.

The effect of the Bruce array on reception is startling. Distant signals rise from inaudibility to a good R7. In conjunction with the array, the writer uses a tuned aerial coupling to the receiver, which helps enormously.

Further proof of the efficiency of this array is shown by results obtained between Waverley and Darling Point, Sydney, where a new station, VK2EM, is located down on water level. This position is 4 miles distant, and completely screened off by intervening hills and buildings. The 10-watt signal from VK2EM is always R8/9 when receiving on the Bruce, and VK2NO can be received at Darling Point with no aerial whatsoever on a simple self-interrupter receiver at R6. The aerial at VK2EM is a simple twisted pair di-pole a few feet above water level.

Recently the writer has received reports of reception of VK2NO at Austinmer on the South Coast with R8 strength, where a casual listener has built a super-regenerator in the hopes of hearing Sydney stations. Reference to the contour map will show how badly this position is screened from Sydney.

With the fine results obtained with this form of array, it is anticipated that interested 5-metre men, both locally and interstate, will erect similar systems. If so, one can feel reasonably confident of some unusually good long distance results.

As this is written, our old friend Ferguson (VK2BP) has recommenced activity up in Hazelbrook, Blue Mountains. Using only a temporary aerial at this 60-mile range, badly screened between two houses, he was able to work with VK2NO on the night of January 3, reaching Waverley at R7/8, and reporting VK2NO at R9—this is with a Bruce at one end only! The effect can well be imagined when a similar system is placed in operation in the Mountains.

Sydney VK's On Five.

The list of stations active in Sydney is growing, and the following can be heard almost nightly. VK2NO, VK2AZ, VK2EM, VK2XK, VK2WJ, VK2HL, VK2IP, VK2LE, VK2RG, VK2IF, VK2IN, VK2MQ, and VK2BP.

Finally, it must be mentioned that the Bruce array is a bi-directional with broadside action. If a curtain similar to the aerial itself is erected behind the aerial at a distance of a little over a quarter-wave, considerable gain still will be obtained in the one direction. Unless rotation could be effected in all directions, however, this would be a handicap for general working.

First Radio Signal From U.S. Heard In 1923

Week-end jaunts to conduct portable tests are proving very popular with Lakemba Radio Club members this summer.

Week-end Portable Tests Popular: Five-Metre Reports Wanted : Lakemba Radio Club Notes And News . . .

By W.J.P.

Week-end Tests Popular.

Experimental portable tests are very popular with Lakemba Club members, especially during holiday week-ends. The photo illustrated shows interested spectators gathered around the operating table listening to "ham" contacts on telephony.

Tables and chairs were placed at our disposal, but what is more, the lady in the centre, Mrs. Lawrence of Fairfield, prepared an excellent lunch for the operators. A local dog can also be observed displaying his interest by pulling up our earth wire, but in so doing must have received a shock from the transmitter, because he gave vent to a loud yelp and disappeared across the paddock in a cloud of dust.

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Five Metre Reports.

On several occasions it has been reported that various inter-state signals have been heard on 5 metres. In the majority of cases reports are sent to these stations in order to verify reception, or else to ascertain whether they were operating on a higher wave-band. Complaints have come to hand from amateurs who operate on the ultra high frequencies, on the lack of co-operation and courtesy displayed by many other "hams." On hearing distant 5-metre signals, letters have been sent to the stations concerned requesting information as to the frequency on which they were working. Strange to say, many such reports have been totally ignored.

It is quite possible for distant harmonics to be heard on 5 metres, and one is often led to believe that he is hearing something worth while. Therefore, even if a certain station

(continued on page 27).

was not operating on the ultra-highs, it should not be too much trouble for him to forward advice to this effect.

Much has been said of late by short-wave listeners who forward reports and stamps for QSL cards, and never receive replies, but it is certainly reaching a sad state of affairs when "hams" will not co-operate with fellow "hams" in the all-important work on 5 metres, where reports are of exceedingly greater value than on the higher wave-bands.

★

Thirty Years In Amateur Radio

(by courtesy of J. Pike.)

(continued from last month)

With the declaration of war in 1914, all receiving and transmitting apparatus had to be dismantled and handed in to the nearest post office. It is well-known that during the war wireless men and materials were supplied in large quantities from Australia. Men were recruited from the commercial services and from the ranks of the experimenters, and were trained for service in the navy, army, transports and air services.

After the war it looked as though amateur radio was doomed for all time, as the authorities did not appear too keen to allow licences to be renewed. However, through the efforts of International Amateur bodies, including the early Wireless Institute of Australia, amateur radio continued with renewed vigor. Valves came into use, resulting in greater sensitivity of receivers.

In 1923 a world's record was broken in receiving. Mr. Pike, while tuning the dials of his receiver shown in last month's illustration, received the letters "M-O-T-T" in morse code. Mott was the name of a well-known experimenter in America who operated a transmitter. Contact was immediately established by telephone with other experimenters, to ascertain if they could also log this signal. They could; and thus in 1923 the first signal from America was received in Australia.

Before concluding these notes, we might just mention a few of the present day activities of Mr. J. Pike, VK2JP. He is employed by the Water Board and has conducted extensive experiments on their behalf on 5 and 8 metres, with a view to providing easy communication between headquarters and the various pipe-sinking works scattered throughout the metropolis. He also invented a radio apparatus which will indicate the exact position of underground pipes, thus saving a considerable amount of time in haphazard sinking before the pipe line is located.

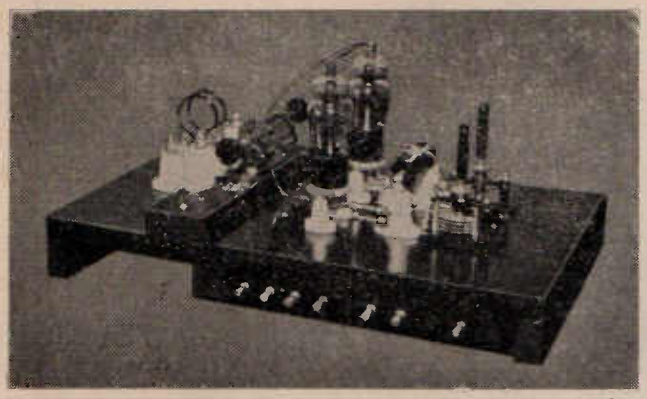
We finally departed from 2JP's "shack" after a most enjoyable and instructive evening, and as we drove home we were more or less filled with the desire to do something really useful in the way of radio experimenting. It might easily be argued that there is little more to be accomplished, but the answer can be given in three words, "Ultra-High Frequencies."

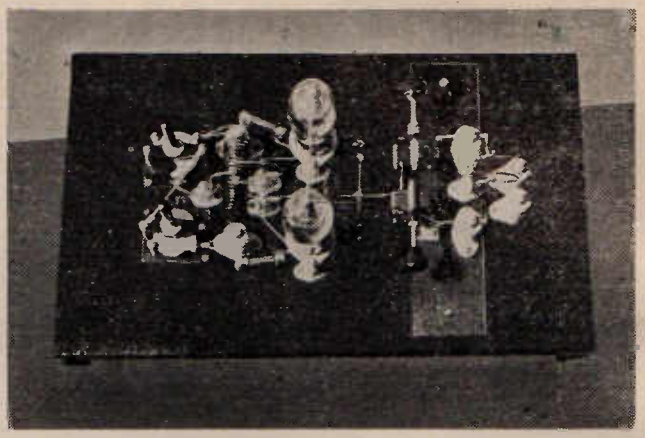
Among The Old Timers.

(Contributed by VK4DO.)

What has happened to old 2CM, Charlie Maclurcan, and 2DS, Jack Davis, early Sydney pioneers who established A2CDM for shortwave tests some years ago? And also to old 3GR (Marks) and 2JM (Marsden) whose 'phone used to romp into Rockhampton 12 years ago?

2RJ, Reg. Fagan, and 2HM, H. A.





Two views of 2OD's 5-metre transmitter, showing the neat and symmetrical layout adopted.

5-Metre Push-Pull Oscillator

The transmitter below can be used either as an exciter unit or as a self-excited electron-coupled oscillator feeding the antenna direct. Designed and described by

VK2OD

IN pursuance of the campaign for stability, consistent with useful power output, the exciter unit described below possesses stability far above the ordinary, while having a power output sufficient to operate a power amplifier.

Under present conditions the facility of being able to vary the frequency is of material advantage, while keeping in mind that frequency stability above the ordinary is equally important. Therefore in order to comply with those requirements, both electron-coupling and push-pull were combined with slight modifications.

The plates of the 6P6's can be operated either in series (push-pull) or parallel (push-push), depending on the output required. An improvement in stability and grid circuit efficiency will be observed if the grid circuit of the exciter unit is operated on 28 m.c. Under these circumstances the plate circuit operates push-push with sufficient drive for a power amplifier using valves such as the 802, 804 and 808.

For local communication, the unit can be employed as a self-excited electron-coupled oscillator feeding the antenna direct. In this case, the grid-cathode circuit would be operated on 56 m.c., and the plate circuit also on this frequency, with the plates in push-pull. Bearing in mind the fact that it is not the best practice to modulate a self-excited oscillator, nevertheless, in this case, electron-coupling and push-pull combined will provide a far greater degree of stability than is obtainable with the straight self-excited oscillator.

The 6P6, as previously shown, possesses characteristics most suitable for suppressor grid modulation. When used as an electron-coupled modulated oscillator, the suppressor bias and audio peak voltages must be reduced at least one-third below the values recommended for operation in a power amplifier.

Referring to the photograph, it will be observed that the plate tank circuit possesses good mechanical stability, and is out of the field of the grid circuit. Rigid assembly is also maintained by the use of porcelain stand-off insulators. Electrical balance of the electron-coupled portion of the circuit is of the utmost importance. Care should be taken to arrange that the leads supporting the grid leaks and the grid condensers, also cathode leads, are electrically balanced.

Sub-base wiring has been employed so as to remove the leads carrying screen, plate, and suppressor grid potentials from the field of the tank circuits. The portion of the circuit at earth potential must be kept as short as practicable. The condensers used for the grid-cathode tank circuit are of English manufacture, and can be locked in any position—a very desirable feature.

The amount of bias applied to the suppressor grids will depend upon the conditions under which the unit is being operated. A positive potential of +30v. maximum is recommended when the unit is being used as an exciter. As a modulated oscillator, a negative potential is required, this being determined by experiment, as much depends on the peak audio voltage of the modulator. Generally speaking a bias higher than —30v. should not be necessary.

A power supply having an output of 450 volts is required. It should have good regulation and good filtering, as a single pack is used for the entire unit.

The radio frequency choke is most important. For best results this must be experimented with, as there is a tendency for it to absorb the 56 m.c. harmonic if not of the correct

5-Metre Transmitter.

List of Parts

1—Wooden baseboard, 19ins. x 11ins. x 1in.
2—7 plate midgets (Radiokes Isolantite)
2—11 plate midgets (Radiokes Isolantite)
2—6-pin steatite sockets
8—Medium stand-off insulators (Isolantite)
6—Large stand-off insulators (Isolantite)

FIXED CONDENSERS

1—.0001 mfd. mica (T.C.C.)
1—.00025 mfd. mica (T.C.C.)
1—.001 mfd. mica (T.C.C.)
1—.002 mfd. mica (T.C.C.)

RESISTORS

2—50,000 ohm 1-watt resistors (Erie)

VALVES

2—6P6's (Radiotron)

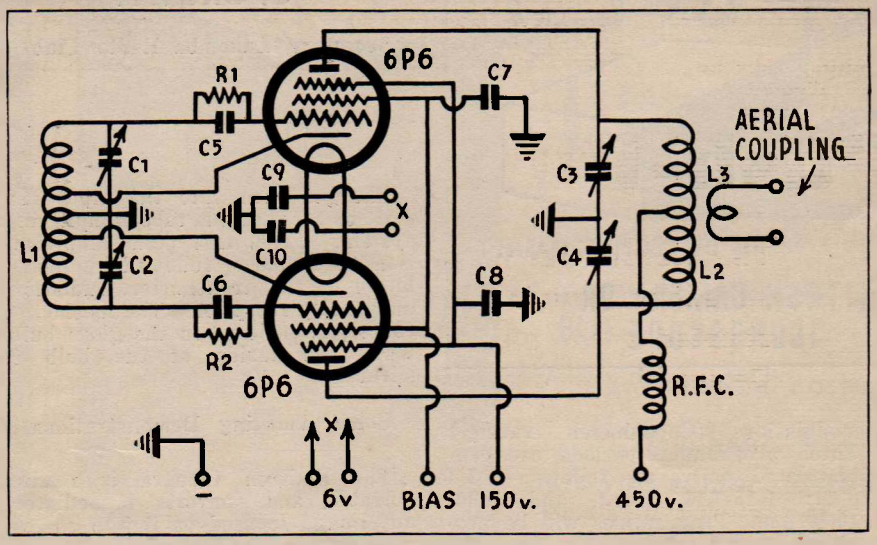
MISCELLANEOUS

Bakelite terminal strip 12in. x 1in. x 3in., with 7 terminals and 2 angle brackets for mounting; r.f. choke (see text); small quantity 14 gauge enamelled wire; sundry hook-up wire, screws, etc.; 2 grid clips; 2 small knobs.

value, the result being a loss of output. It is not possible to specify any definite value for a particular rig of this type; 50 turns of 28 gauge enamel on a 3/8in. dowel may be tried for a start, and when the transmitter has been put in operation, other sizes may be tried.

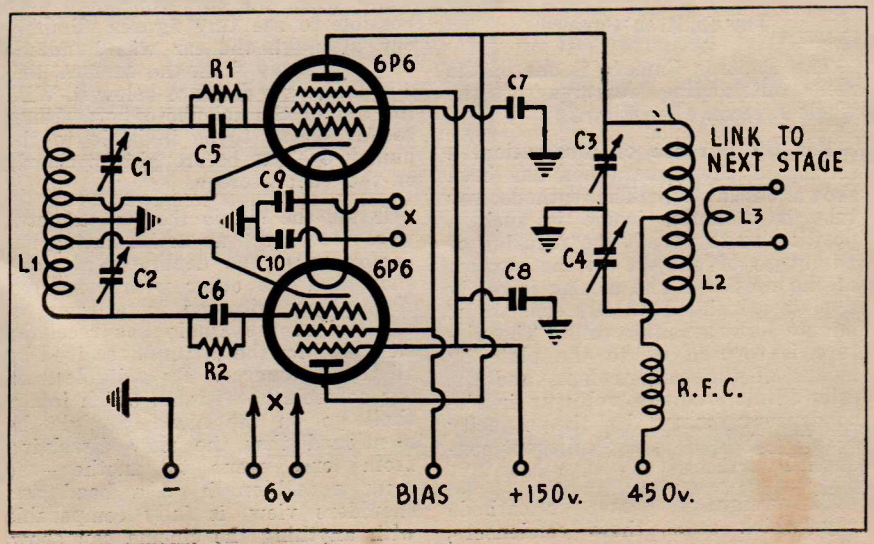
The photograph shows the unit wired as an exciter unit with the plates in parallel. For those who may not be acquainted with the 6P6 valves, it might be mentioned that the plate connection is taken from the top of the valve. The wiring may be altered in a few minutes for it to be worked with the plates in push-pull.

It will be observed that provision could have been made to use a plug-in type of grid coil, and the leads clipped on to both the grid and plate coils to render changing over more simple. However, this is not recommended as stability would undoubtedly suffer, and a good solid soldered joint is far more satisfactory for transmitters of the ultra-high frequency types.



Shown above is the circuit of 2OD's transmitter when used as a self-excited push-pull electron-coupled oscillator. The grid and plate circuits both operate on 5 metres. The circuit below is for exciter operation, with grid circuits on 10 metres and plate circuits on 5.

Values are as follows:— C1, C2, 7-plate midgets; C3, C4, 11-plate midgets; C5, C6, .0001 mfd. mica; C7, .002 mfd. mica; C8, .00025 mfd. mica; C9, C10, .001 mfd. mica; R1, R2, 50,000 ohms. L1, 19 turns 14 gauge enamel, ⅞in. diam., with cathode taps 2 turns from the centre (28 m.c.); L2, 2 turns 14 gauge enamel, 1¾in. diam.; L3, aerial coupling or link coil to suit; R.F.C., see text.



LAKEMBA RADIO CLUB NOTES.

(Readers are asked to note that the "continued" line at the foot of the first column on page 25 refers to the article "Among The Old Timers" in the third column.)

Among The Old Timers.

(continued from page 25.)

Marshall, then of Armidale, were always worth listening to in the good old 'phone days of 1924. Then there was Barlow, of Armidale, (2GQ) the first Aussie to work U.S.A. on a 5-watter, not to forget the great pioneering work of 3BQ, Max Howden, at Broken Hill, who now sells all the crystals I see.

5BG, Harry Kauper, of Adelaide, has not been heard for years. He was the man who invented the gun that shot through a revolving aeroplane propeller. Gone also is 2NS, the enthusiastic man who was responsible for the formation of the old Rag Chewers Club about 1925—and didn't the gang rag chew in those days! One had to for two hours to become a member.

One of the early pioneers always glad to work anyone was 2DG (Campbell) who ten years ago lived in Kyogle but has since passed on. Coming back to my own sunny state, most of the old gang have given up the game.

4AN, is with Philips Ltd., 4RB does talkie work, while 4CM has a station in the observatory tower but is seldom heard. He is with Magna-Coustian Sound equipment in Brisbane, and is giving television the "once over."

4BB, in charge of Chandler's station at Maryborough, is as keen as ever and always after DX still, likewise 4GK, at the Wynnum Fire Station. 4CG, Gold at Toowoomba, seems to have done well for himself through the "ham" years, now has a fine radio business to look after. Of 4NW (Starkie), 4GO (Oxlade) and the other VK4 pioneers, I have lost trace.

Of broadcasting, I remember well when 2BL and 2FC first came on the air. Up here we needed four and five valves to hear them well. Then the Pacific was conquered, and reception of KDKA and KGO, San Francisco became almost commonplace. I used to hear the latter well in 1924 on one valve.

Amateur radio in those days was well worth listening to, all except the notes. Most of us had slop jars, 4CM, a 500-cycle alternator, 2HM, some I.C.W. contraptions, VLS (Air Force Point Cook), a 1000-volt dynamtor, and Phil Nolan of 2YL, a generator that was the admiration of all.

The Story Of Television . . 3

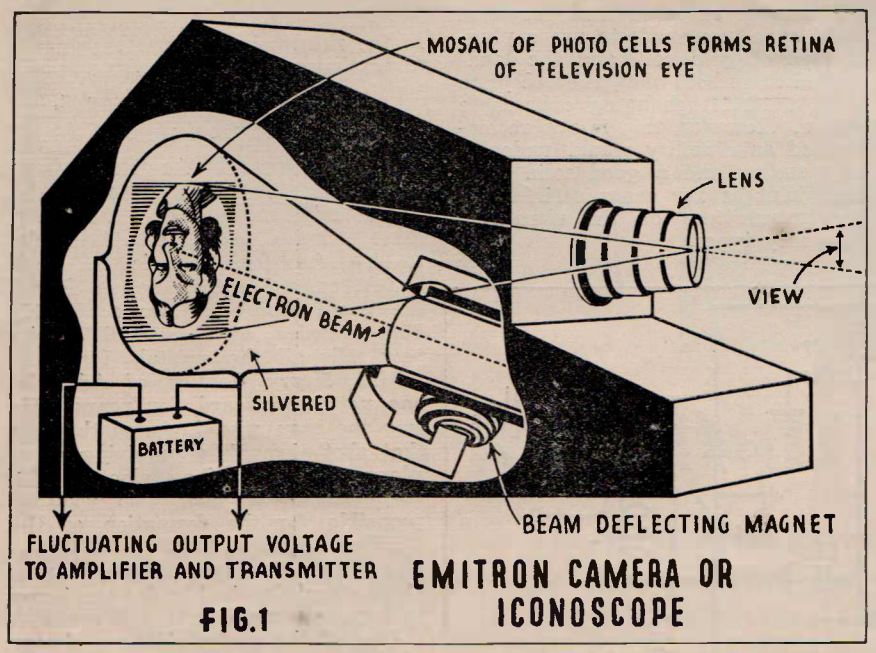


FIG.1 EMITRON CAMERA OR ICONOSCOPE

The third instalment of a series of articles, specially written for the "Radio World" by

G. BROWN

Secretary Lakemba Radio Club.

RECENTLY, by invitation of the British Broadcasting Corporation, a number of persons were permitted to visit the Alexandra Palace, London, and had the opportunity of viewing and comparing the two systems of television transmission that are being used there.

The Palace station, from all points of view, is a very fine piece of work. Although the equipment is necessarily experimental, yet it is finished as a first-class commercial job. Amazing precautions have been taken in the designs to protect the operators and workmen from the high voltage apparatus. In one section, the bays subject to high voltage are locked by means of a special key. This key is normally kept in a rack from which it cannot be removed until a release lever is depressed, restoring all the equipment to earth potential.

Two Systems Compared.

Two systems of transmission are being utilised by the B.B.C., namely, the Baird System and the Marconi—E.M.I. System. The vision signals with either system will be radiated on a frequency of 45 m.c. (6.7 metres), and the associated sound signals on a frequency of 41.5 m.c. (7.2 metres).

The power of the vision transmitters will be 17-kilowatts peak during periods of maximum modulation, while the sound transmitter will have a power of 3 kilowatts, 90% modulation (Copenhagen rating.) Three programme periods are contemplated daily, as follows:— 3-4 p.m.; 6.15-7.15 p.m.; and 9.30-10.30 p.m. Programmes will be provided by one system at a time, the two systems working alternatively week by week.

Direct television will be given by the Baird System by means of the Intermediate Film and the Image-Dissector, while the Marconi—E.M.I. Company will use the Iconoscope Camera (Emitron). Film transmissions will also be given, the Baird Company using mechanical scanning, and Marconi—E.M.I., the Emitron.

The Emitron Camera.

The Emitron Camera is one of the most outstanding features of the whole system. (See Fig. 1.)

For the purpose of illustration, a section of the camera box has been shown cut away. The cathode ray tube is mounted inside in such a position as to permit the focusing of an image or subject on the surface of the mosiac. The mosiac is really a plate which essentially consists of minute light sensitive cells. The picture is focused on to the plate by means of the camera lens, and the cells develop minute voltages in the condensers formed by the capacity between these cells and adjacent conductive surfaces.

The weightless beam or cathode ray which scans these condensers, discharges them into the input circuit of a vacuum tube amplifying system. From this point amplification takes place, followed by modulation of the transmitter, radiation, and finally reception. The mosiac, of course, is enclosed in the glass bulb, while the inside of the bulb is silvered.

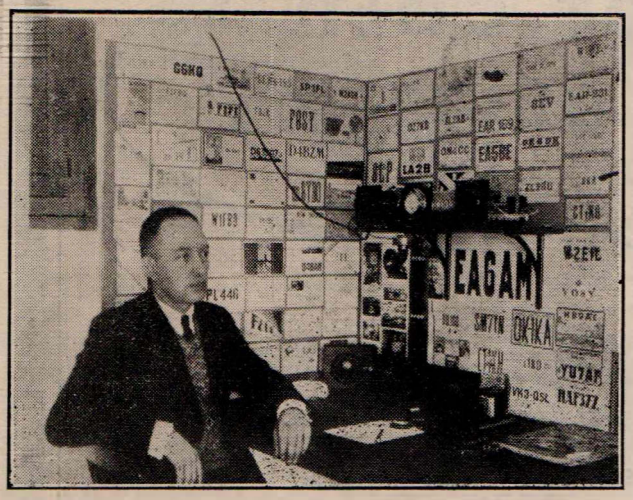
Some Amazing Demonstrations.

The Emitron Camera is readily portable, and converts immediately any image focused on it into corresponding electrical impulses. The detail possible with its aid is astounding. An engineer, stationed on the balcony of the B.B.C. studios, slowly swept the grounds of the palace with the camera, while people inside the building watched the changing panorama on the screen.

A car moved up the drive, its progress being followed by the camera. So clear was the image that the make of the car was easily observable, while when the car stopped, it was possible to see tiny figures climbing out, although the car was hundreds of yards away from the camera, and a considerable distance below it. With the aid of the telephoto lens, scenes so far off as to be invisible to the human eye can be brought up clearly on the vision screen.

Inside the studio the two cameras were "covering" an artist during her performance, one dealing with long shots and the other with close-ups. A producer situated in a room at one end of the studio has receivers showing him the pictures received by all these cameras. By suitable mixing controls he dictates which image shall go on the air. It might be mentioned that the slow dissolving from one scene to another—say from a full-length to a head and shoulders view, is fully comparable with anything the cinema can show.

Hints and Tips For DX Beginners



EA6AM is the call of this Spanish amateur, whose home is at Palma de Mallorca, in the Balearic Islands, Spain. He speaks excellent English, and has been heard often on telephony in this part of the world.

The simplest way of ensuring replies from stations reported to is to make the reports as concise and informative as possible. In the article below, some valuable hints are given on the correct methods of keeping a log and of preparing a DX report.

By "VIC HAM"

ANY dxer's first necessity is a good log-book—one that is designed by experts who know just what is wanted. The old penny exercise, like most cheap things, is but a poor substitute, and holds the same relationship to a good log-book as the ordinary sheet of notepayer has to an official report form. In addition, experienced dxers always provide themselves with a scribbling block and pencil for the purpose of jotting down scraps of information heard during a session at the receiver—and it cannot be stressed too strongly that nothing is unimportant.

As soon as a station is tuned in, jot down the time, date, strength and clarity of the received signals. Then take down details of the transmission, which might consist of music (band, organ, etc.), speech, singing (tenor, basso, etc.). Note fading carefully, both as regards depth and period; also any interference by heterodynes, local electrical disturbances, or static. It often happens that owing to fades or interference, some considerable time will elapse before sufficient data can be obtained to identify a station, or to obtain information as a basis for a report.

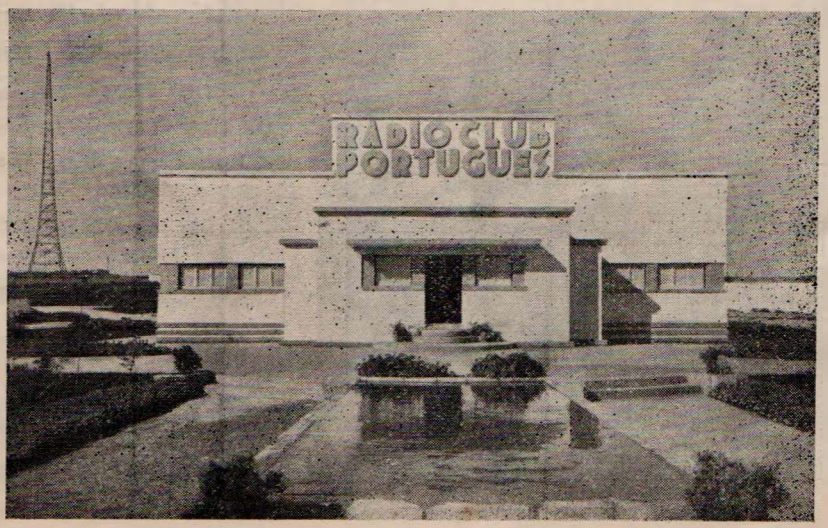
The most important item of all, the station's call-sign, has a positively annoying habit of being given just as the worst fade is happening, but providing sufficient information is obtained for the body of the report, the dxer can afford to be patient, and wait. As soon as identification is assured, again make a note of the exact time.

In cases where an uninterrupted signal has been received, the fullest information as to time, strengths and quality should be noted for each individual item and announcement. This method should be adopted right through the listening session, after which the information gained may be neatly entered in the log-book for reference. All good log-books are provided with columns for the correct entering of received signals, and no difficulty will be found.

Generally speaking, the advertising stations are particularly keen on specific announcements for proof of reception, and "ads." should be particularly noted. Amateur stations prefer some definite observation such as depth of modulation, or the presence of frequency modulation (mostly beyond the average dxer). In the case of National or Government-owned stations, it will be sufficient, in a general way, if a definite item or two are given, but as the programmes of these stations are usually obtainable in the press, it is a good idea to await some special announcement to assure verification.

Overseas stations are often transmitting on chain, and in such cases they will not verify dxers' reports unless a special announcement from the station is quoted. The reason for this is obvious.

The method used in reporting to stations has a definite bearing on the results obtained, and it is in this



This building houses the broadcast and shortwave transmitters of stations operated by members of the Portuguese Radio Club.

direction that particular care should be taken to create a feeling of confidence in your sincerity. In the past, before dxing was the popular pastime it has become to-day, and prior to the efficiency of present day receivers, almost any report was considered good enough by broadcasting stations, and seldom was even the scantiest of reports refused a verification. That time has passed away, and to-day it is necessary to offer very definite proof of reception, and also to give practical proof of a desire to earn the verification in a practical manner.

In commencing your report, the first necessity is to head the form with your name and address, which should in all cases be PRINTED, not written. The reason for this is that our names, both as regards our surnames, streets and towns, are foreign to people who are not very familiar with the nomenclature of Australian and New Zealand natives. As an instance, how would Wàipukurau, Pipiriki, Woolloomooloo or Birreuurra look to our Spanish friends if written in a sprawling backhand?

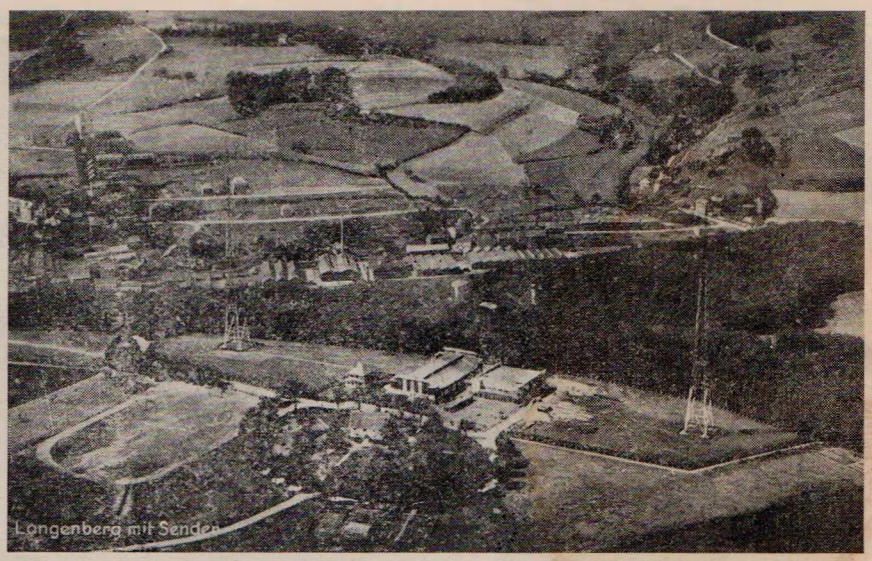
Concise Information is Wanted

The body of the report containing particulars of the actual matter received should be as full as possible, but at the same time should be concise. Always give the times of reception both in your country and that in which the broadcast originated. You will have more time to ascertain this information, and it will save the receiving station much work and earn their appreciation. Give your report on the strength, clarity, modulation, fading, and other data truthfully; err rather on the side of a conservative estimate than otherwise.

Do not expect a verification per return of post—try to remember that individuals operating or conducting wireless stations will in all probability receive thousands of reports from dxers, and could not possibly reply as quickly as one would wish.

Some dxers commit the unpardonable error of writing impertinent letters to stations whose reply is not as prompt as they expect. This is a feature of the game that does much greater harm than is realised, and if persisted in, will surely kill the hobby. Should your verification be unduly delayed, a courteous note, enclosing a copy of the report, is the sensible method to employ which, if still not attaining the desired result, will not be misunderstood.

Owing to the high cost of postages on the many reports that are received, some stations insist on return postage being enclosed, either in the form of stamps or other accepted means. In a few isolated cases a fixed sum is demanded, but this happily is the exception and not the rule. Always enclose an addressed envelope (post-card size) but do not affix the stamps.



An aerial view of the German station at Langenburg.

The Lure of DX Listening

Always Something New

By S. Robson*

DURING the past few years many new words have gradually become part of the everyday speech of all countries, and especially does this apply to some radio terms. Among the many new words that have become common, more especially in Australia, New Zealand, and the United States, are DX and dxing. There are, however, many people who do not know what dxing is, and this article will provide an explanation.

"DX" is a ham abbreviation that stands for long distance, and the word dxing as it is now commonly used, stands for the logging of long distance stations.

Dxing, though a babe in arms compared to the venerable pastime of Isaac Walton, has now firmly established itself as one of the most popular hobbies. There is one thing about dxing that appeals to many people, and that is that it is an all-the-year-round hobby. Another is that, no matter how experienced a dxer may be, there is always something in the way of new stations to try for.

Special Receiver Not Necessary

Contrary to general opinion, it is not necessary to have special equipment for dxing, for while receiver equipment must be good, that does not necessarily mean that one must have a set with ten or more valves. In fact, most sets with four or five valves are so powerful nowadays that stations in all parts of the world can be picked up at suitable hours without difficulty. By that I do not mean on shortwave receivers, but on sets which bring in stations only on the broadcast or medium wave-band.

Another point is that a technical knowledge of radio is not necessary; in fact, I doubt very much whether many dxers have more than a very slight knowledge of the technical side of radio. What is more important is for one to have patience, for without it results cannot be expected.

While one may have an up-to-date set and an efficient aerial, this does not mean that a person will just have to switch the set on and turn the dial in order to bring foreign stations tumbling in. This may be done in certain cases, but there is an important factor that explains why some persons can get real DX results while others, with possibly better sets, meet with little or no success. The cause of this is locality, which plays such an important part in dxing that it often means the difference between being able to hear foreign stations and not being able to hear them.

In other words, locality can mean that your neighbour next door can get results that you cannot.

* President N.Z. DX Club.

Some S.W. Identification Signals

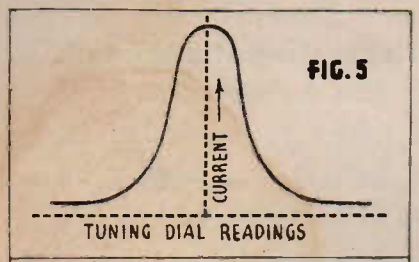
FIQA — The announcement is "Radio Tananarive"; station opens with "Ramona" and ends with "Marsellaise."

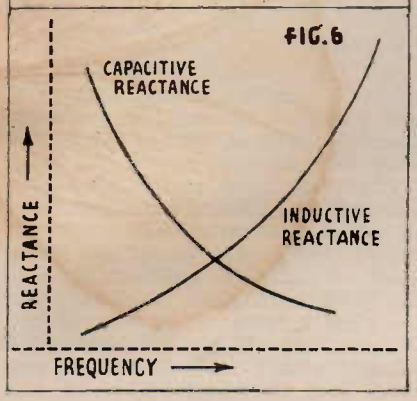
DFB—The identifying signal for this station is a three-tone whistle at beginning of transmission—D, C, G.

COCO—The announcement given out from this station is as follows: "Seh-O-seh-O, Habana, Cooba"; call is also given out in English.

COCH is known as "Estacion de onda Corta Seh-O-seh-acha." Announcements are in both English and Spanish.

Radio Step By Step 6





About The Tuned Circuit

This month the way a simple oscillatory circuit works is explained, together with the meaning of resonance.

WHEN an inductance and capacitance, represented by a coil and condenser, are connected as shown in fig. 1, what is technically known as an oscillatory circuit is formed.

If a battery, with a resistance in series to limit the current, is connected across the coil as shown in fig. 2, and the switch closed, the resultant current in passing through the coil will set up a magnetic field around the latter. The action will not be instantaneous, due to the inductive reactance of the coil impeding the current flow.

As long as the key remains closed, the magnetic field surrounding the winding will remain constant. At the instant it is opened, however, the field will commence to collapse, thus returning the energy stored in it back to the circuit.

The field, in collapsing back on the coil, tends to maintain through "L" a current in the same direction as that originally applied (see article 4 of this series). Thus current flows into the condenser "C," which then becomes charged as shown in fig. 3. At this stage there is no magnetic field, energy that was entirely stored by the latter being transferred in the form of charge to the plates of the condenser "C."

This is obviously not a stable condition, and the condenser discharges through "L," the resultant current through the winding again setting up the magnetic field as before. But because the current is now in the opposite direction, the original north pole of the winding now becomes the south, and the original south pole the north (see fig. 4).

Entire Process Repeated

When the condenser is completely discharged, thus fully establishing the field, the latter again commences to collapse, until it disappears altogether, leaving "C" charged once again, but in opposite polarity to that shown in fig. 3.

If it were not for the fact that a circuit always contains resistance in one form or another, this process would continue for ever. The current would never cease surging in and out of the condenser, travelling backwards and forwards through the coil all the time. As it is, the resistance present dissipates as heat, some of the energy transferred during each cycle, and the process finally stops as there is no longer energy to sustain it. In practical circuits, energy to overcome this damping, as it is called, is supplied, in a manner to be explained later.

It follows logically that the larger the coil (the greater its inductance) the longer time it will take for the condenser to discharge through it. Similarly, the larger the condenser, the longer it takes to charge and discharge. Hence, the smaller the coil and condenser, the higher will be the frequency of oscillation.

The Meaning of Resonance

The resonant frequency is the natural frequency of oscillation of any oscillatory system. An excellent mechanical analogy to illustrate this point is afforded by the tuning fork. If this is struck and then held near a piano, the string in the piano which is tuned to the same frequency as that of the fork will vibrate in sympathy with the latter, obtaining the energy to do so from the air waves set up by the vibration of the fork.

A similar effect occurs in the tuning circuits of a receiver when the dial is rotated to bring in a particular programme. Every radio station operates on a different frequency, and this frequency is picked out from all the rest by adjusting the variable tuning circuits in the receiver until their natural

(continued on page 45)

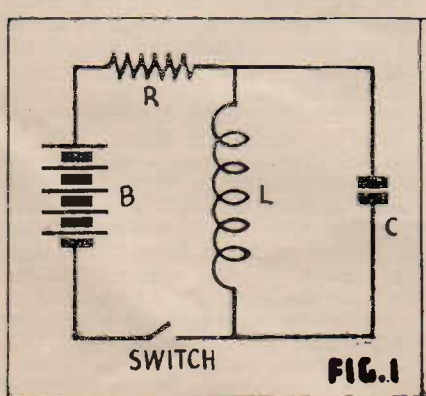


FIG. 1

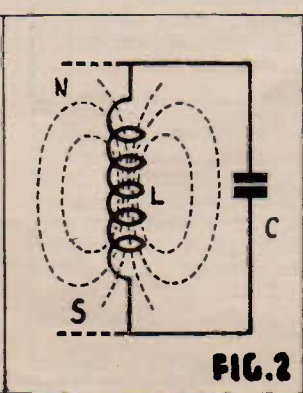


FIG. 2

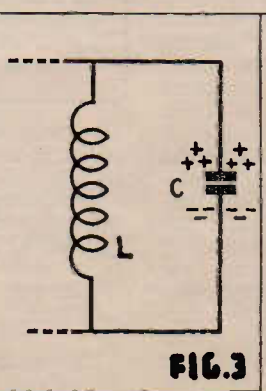


FIG. 3

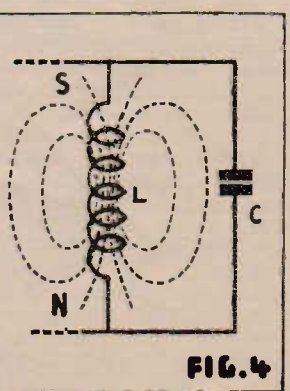


FIG. 4

Background Hiss In Superhets

In highly sensitive receivers operating at maximum sensitivity, background hiss can be objectional if precautions have not been taken to minimise it. How this effect arises, and how it can largely be overcome is explained in the article below.

By The Technical Department, Mullard Radio Co. (Aust.) Ltd., Sydney.

BEFORE describing the causes of "background hiss" it is important to distinguish between the type of noise dealt with here and the sundry other noises with which it might be confused. The hiss or noise with which we are at present concerned is the steady rushing sound which usually accompanies the reception of weak stations, and which is generated within the receiver. It does not include:—

(1) The slight background hiss of the studio microphone.
(2) The needle-scratch or surface noise of transmitted gramophone recordings.
(3) Noises caused by electrical interference and atmospheric disturbances (usually more irregular than a hiss).
(4) Whistles caused by heterodyning between stations on neighbouring frequencies or by heterodynes within the receiver.
(5) Irregular scratching or sizzling noise caused by defective contacts, corroding connections, noisy resistors, noisy "B" batteries, etc.

In a few receivers (mostly old types) with very high audio gain a background hiss is present at all times, irrespective of whether a signal is present or not—this will not be considered here.

General Causes Of Background Hiss.

Having defined the particular noise for the purpose of this discussion, let us investigate its causes. It can be said that practically all the hiss in a normal receiver originates in:—

(a) The first tuned circuit of the receiver, which is usually the aerial coil with its tuning condenser.
(b) The plate current of the R.F. valve, if used.
(c) The plate current of the superhet frequency converter valve.

Thermal Noise.

The noise emanating from tuned circuits (a) is called "thermal noise," and is believed to be caused by the agitation of the electrons within the substance of the wires, etc., of which the circuit is composed.

The higher the temperature the the greater the agitation, and therefore the greater the voltage fluctuations across the circuit. Also, the greater the effective resistance or impedance of the circuit, the greater the fluctuating voltage produced. The minute voltage fluctuations are of course amplified, and are reproduced as a hissing noise by the loud speaker. Actually, any high resistance exhibits thermal agitation which can be heard as noise if sufficiently amplified, and a tuned circuit is equivalent to a very high resistance. The reason why the first tuned circuit is the chief source of noise is simply that it is followed by all the amplification of the receiver. All other tuned circuits and high resistances in the signal circuits also generate some thermal noise, but usually the succeeding amplification is not sufficient to bring up the minute noise voltages to the point of audibility.

1937 Amateur Radio Show.

Exhibition Executives Appointed.

At a meeting of the council of the W.I.A., N.S.W. Division, held on January 12 last to discuss arrangements for the 1937 Amateur and Shortwave Radio Exhibition, the following exhibition executives were appointed:—

Treasurer: F. Coyen (VK2UX).
Organiser of Working Exhibits: W. J. Ryan (VK2TI).
Trade Exhibit Organisers: D. B. Knock (VK2NO) and J. Moyle (VK2JU).
Organiser of Amateur (Club etc.) Exhibits: H. F. Peterson (VK2HP).
Organiser of Lectures: P. Adams (VK2JX).

"Radio World" readers will be interested to learn that this year it has been decided to give more encouragement to the shortwave DX listener to enter for competitions, etc. The date of the Exhibition has been fixed tentatively from May 3 to 8, but the location has yet to be decided upon.

Shot Effect Explained.

The noise from the plate current of valves is mostly due to "shot effect," but as the plate-cathode space of a valve is a high resistance and partly at a high temperature, thermal noise may also be present to some extent.

Shot effect is easily visualised. Imagine the electrons being emitted by the cathode or filament and being drawn over to the plate; the movement of electrons continues around the plate circuit and is actually the the plate current. It is obvious that the electrons will not be emitted absolutely evenly from the cathode, any more than the steam bubbles do not rise with perfect regularity at the surface of boiling water.

The electron stream (plate current) made up of an immense number of individual electrons, will likewise fluctuate slightly, resulting in hiss when amplified sufficiently. This effect is present in all the valves, but only in the case of valves followed by high amplification, such as the first valve and possibly the second, does it become troublesome.

Noise Ratio Important.

In considering the amount of noise present, it is essential to take into account also such things as the strength of the signal with which the noise is associated.

It is obvious that a two-valve set will not be noisy (in the way we are at present considering), because it has not sufficient amplification to bring up the minute voltage and current fluctuations to the point of audibility. For the same reason, it will not reproduce audibly any of the weak distant stations which would be easily received with a more sensitive set (i.e., one having more amplification).

On the other hand, the highly sensitive set might mix a good deal of hiss with the programme of the weak station; yet when it is receiving the same stations as could be heard on the two-valve set it would probably make not a scrap more noise than the latter, for the reason that its full capabilities of amplification would then be held back by means of the volume control or the A.V.C. action of the set.

It will be clear therefore that a highly sensitive set will have a ten-

dency to exhibit hiss when it is working at full sensitivity—i.e., when receiving a weak signal. We do not compare receivers according to the amount of noise they produce, but by the ratio of programme to noise when receiving a signal of a certain strength.

General Methods Of Noise Reduction

Unfortunately radio receiver development has not reached the point where background hiss can be eliminated, nor does it seem possible that this will ever be accomplished. However, there are certain fundamental design factors, attention to which will bring the noise down close to the minimum.

There are four general ways in which the signal/noise ratio may be improved.

1. By reducing the high note response of the audio system.
2. By increasing the selectivity of the I.F. and R.F. system.
3. By reducing the noise itself at its source.
4. By providing a higher level of signal strength at the point in the receiver where the noise fluctuations originate.

Since the hiss is of the same nature as the high audio frequencies of the programme, any "tone control" or other circuit arrangement tending to limit high note response will have a marked effect on the severity of the hiss. This is done to some extent in nearly all commercial receivers, but naturally this method cannot be carried too far without serious effect on the quality of reproduction. In the better class receivers this method cannot be applied to the same extent as in less pretentious sets, where extreme fidelity is not the chief aim.

Increasing the selectivity reduces the hiss, because it reduces the width of the frequency band through which the interfering fluctuations must pass. This method is, however, of little practical value, because for one thing a receiver is usually made as selective as practicable in any case, and if the selectivity is greatly increased the high note reproduction will suffer in much the same way as in the case of "tone control" of the audio system.

Reducing Noise At Its Source.

Reduction of the noise at its source is the obvious thing, but is not very often possible. In a well designed receiver, as will be shown later, most of the noise is due to thermal agitation in the grid circuit of the first valve.

The thermal noise depends on the square-root of the absolute temperature (degrees Centigrade plus 273), and the square-root of the effective resistance of the circuit. Even if the circuit were somehow cooled to the freezing point of water the reduction of thermal noise would be negligible, so this possibility can be eliminated. Reducing the dynamic resistance of the first tuned grid circuit—lowering its "Q"—will reduce the thermal noise, but this reduction is worse than useless because the wanted signal voltage would be reduced much more than the noise voltage. It will be recalled that it is not the amount of noise which matters, but the ratio of signal to noise.

The plate current fluctuation of valves, particularly of the first valve, is mostly a matter for the valve designer, although a good deal depends on the choice of the right valve for the purpose. It was mentioned above that this noise was largely due to shot effect, but also may include noise from a variety of other causes, such as thermal agitation in the plate-cathode space, ionization of residual gas, secondary emission effects, etc.

In every normal amplifying valve there is a reservoir of electrons close to the cathode, known as the space charge. This acts as a cushion to smooth out the irregularities of the cathode or filament emission, and so greatly reduces the shot effect. So long as the emission is adequate, the plate current is almost independent

of minor irregularities of emission, but should the filament or heater be operated greatly below normal the emission and hence the space charge will be weakened, and the shot effect will be more evident.

Choosing The Right Valve.

Naturally the amount of shot noise depends on the magnitude of the plate current, other things remaining constant. We therefore choose a valve having a low plate current for the first position in the receiver, but bearing in mind again that a favourable noise ratio is the aim, the valve must also have high amplification capabilities so that the signal in the plate circuit will be as strong as possible. Modern R.F. pentodes are distinctly better in this respect than the older valves used for the same purpose. A non-variable mu valve has a slightly more favourable noise ratio than the corresponding variable mu type, but usually the latter is required for reasons of satisfactory gain control.

The frequency changer of superheterodyne receivers is often a source of considerable shot noise, mainly because of its comparatively low amplifying efficiency for its plate current. Recent developments, notably the octode, have increased the conversion amplification of the frequency changer and reduced its plate current, with the result that when used under proper conditions the plate current noise is small compared with the thermal noise from its tuned grid circuit.

Investigation has shown that when receiving short waves with pentagrid and octode frequency changers, an undesirable coupling exists between the oscillator grid and the signal grid through the medium of the pulsating outer space charge, and that this has the effect of reducing the sensitivity and increasing the noise in relation to the signal. In some frequency converters a small neutralising capacity is built-in, while in some receivers it is added externally, thus neutralising the spurious voltage on the signal grid and avoiding the effect mentioned above.

Increasing The Signal/Noise Ratio.

We now come to the possibility of improving the noise ratio by providing a higher level of signal strength at the point where the noise is introduced into the signal circuits.

This is where the receiver designer, parts designer, and user all can help a great deal. Remember that no matter what is done, the noise voltage in the grid circuit of the first valve amounts to at least a few micro-volts, and that anything tending to increase efficiency before this point must directly improve the noise ratio. Amplification after this point will increase both signal and thermal noise in the same proportion.

It was pointed out before that a first valve giving high amplification tends to improve the noise ratio when considering only the plate current noise of that valve and any noise introduced after that point. That is quite true, but when the noise ratio has reached the practical limit by attention to such details—as is often the case—the thermal noise from the first grid circuit still remains, and in any case an improvement in efficiency before the first grid helps, no matter what the source of the noise.

(To be concluded next month.)

Five-Metre Enthusiasts Asked To Use Superhets

Super-Regenerators Create Interference.

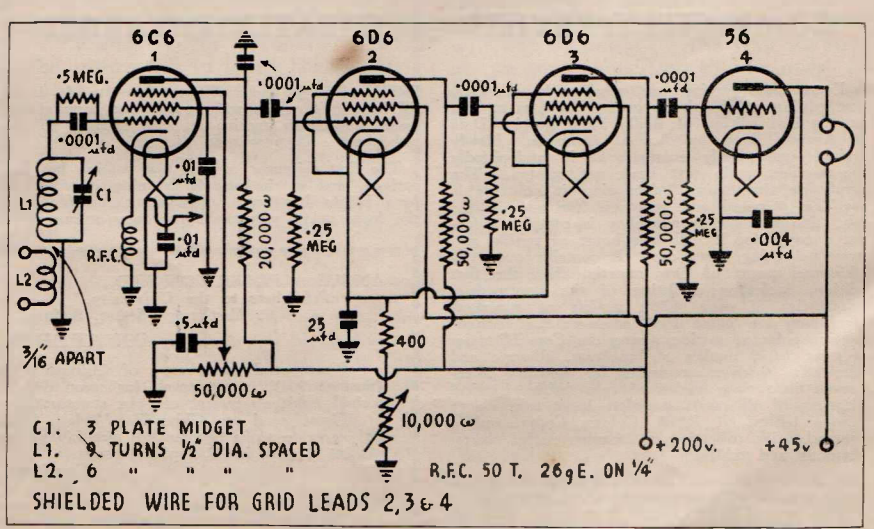
By VK3TH

THE keen interest manifest in the 56 m.c. (5-metre) band by listeners to these ultra-high frequency transmissions by amateurs is causing considerable difficulty to the experimenters.

Unfortunately the popularity of these experimental transmissions has caused listeners to construct receivers of the super-regenerative type, which although simple of construction are prone to severe reradiation of spurious frequencies.

The greater the inefficiency of this type of receiver, the greater the interference. This is explained by the fact that an inefficient detector requires a much greater plate potential in order to produce super-regeneration, with the result that the receiver becomes, in effect, an illegal transmitter.

The construction of a comparatively simple superheterodyne receiver for use at these ultra-high frequencies does not present any insuperable difficulties, will give better reception, and will eliminate all the interference. The circuit published herewith has been thoroughly tested, is easy of construction and in every way efficient.



Using resistance coupling throughout, this five-metre superhet is cheap to build and simple to operate. Unlike a super-regenerative receiver without an r.f. stage, it will not create heterodyne interference.

The All-Wave All-World DX News

Official Organ of the All-Wave All-World DX Club

★ ★ ★

DX Contest: Suggestions Wanted.

So far entries for the All-Wave DZ contest have proved disappointing, and from correspondence received it seems evident that this is due mainly to the fact that the contest has been held a little too soon after the formation of the All-Wave All-World DX Club.

Members have written in pointing out that the Contest was announced on July 1, two months after the Club was formed. One of the rules stated that verifications had to be dated on or after August 1, 1936, which meant that those who joined the Club immediately it was formed, and who managed to get a batch of reports away just after the Contest was announced, would have an appreciable advantage over members who joined later.

For this reason it has been suggested that the closing date of the Contest be extended a few months, but this will depend solely on members themselves. Those interested in competing are invited to write in, giving their views on the suggested postponement.

North Suburban Radio Club Notes.

A.O.C.P. Classes Commencing.

By "CB—GU"

The North Suburban Radio Club is commencing the New Year with a very comprehensive set of lectures covering the theory and regulations necessary for A.O.C.P. The series of lectures, which will occupy three months, have been arranged by VK2NN, and will be given by VK's 2NN, 2GV, 2VG, 2CB and the President, 2BJ.

Code Classes are conducted each meeting night by VK2VG from 7.30 to 8.30 p.m.

Intending hams or anyone interested in radio, residing on the North Shore, are invited to come along to the Club room next Tuesday night at 7.30 p.m. or Saturday afternoon at 3 p.m., and they will be made welcome.

The Club room is situated at the corner of Brown St. and Pacific Highway, Chatswood, on the second floor (Brown St. is the first street north of Victoria Avenue.)

"T" Tone Reports

T1—Very bad 25-60 cycle A.C. note.

T2—Rough 60 cycle A.C. note.

T3—Poor rough. A.C. note; sounds like no filter.

T4—Fair R.A.C., small filter.

T5—Nearly D.C. note, good filter, but has key thumps, or back-wave, etc.

T6—Nearly D.C. Tone, very good filter.

T7—P.D.C. note, but has key thumps or back-wave, etc.

T8—P.D.C., not equal to T9.

T9—Best, steady, Pure D.C. note.

T9x—Steady D.C., crystal controlled note.

—Contributed by Eric Webb, (Mitcham Vic.)

ALL-WAVE ALL-WORLD DX CLUB

Application for Membership

The Secretary,
All-Wave All-World DX Club,
214 George Street,
Sydney, N.S.W.

Dear Sir,

I am very interested in dxing, and am keen to join your Club. The details you require are given below:

Name.....

Address.....

[Please print both plainly.] .....

.....

My set is a.....

.....

[Give make or type, number of valves, and state whether battery or mains operated.] .....

.....

I enclose herewith the Life Membership fee of 3/6 [Postal Notes or Money Order], for which I will receive, post free, a Club badge and a Membership Certificate showing my Official Club Number.

(Signed).....

[Note: Readers who do not want to mutilate their copies of the "Radio World" by cutting out this form can write out the details required.]

DX Report Forms Save Time and Ensure Replies

When reports to DX stations are being prepared, hours of laborious writing can be avoided if the special QSL forms provided for the use of Club members are used. Also, the fact that an official form is used identifies the sender with an established DX organisation, which helps to ensure a prompt reply.

THE official report form of the All-Wave All-World DX Club is designed in such a way that after it has been filled in, all the information the station engineers could possibly require is set out clearly and precisely.

The illustration on this page shows the layout of the form, which is of foolscap size, and printed on high quality paper.

Full Addresses Wanted

At the head, spaces are provided for the full addresses of the station and sender. Next, the station frequency is filled in (in kilocycles for broadcast band stations and megacycles for shortwave), followed by the wavelength (in metres). If the frequency in kilocycles only is known, or the wavelength in metres, then the unknown figure can be found by dividing the known into 300,000. For example, a station on 300 metres has a frequency of 1,000 k.c.; one on 20 megacycles (20,000 k.c.) has a wavelength of 15 metres.

Receiver, Aerial And Earth

Next, details of the receiver and aerial and earth system should be given. The make, model, and type of the set—whether A.C. or battery-operated, superhet or t.r.f.—is wanted here. Also state the number of valves used. An example would be:—"My receiver is a six-valve a.c. Melotone superhet, 1935 model."

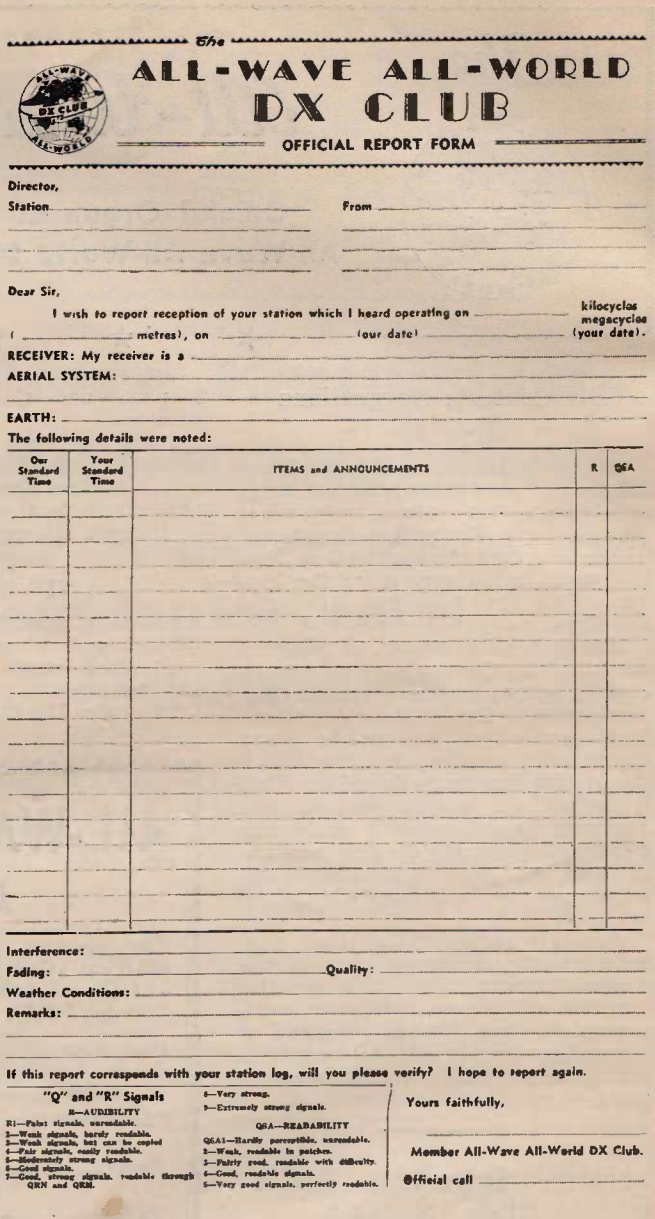
The length, height, and direction of the aerial should be quoted, and a brief description given of the earth system, such as—"Earth: 6-foot length of iron piping driven into moist soil, with 10-foot earth lead soldered to it."

Items and Announcements

The next space is provided for the items and announcements heard, with separate columns for times, audibility, and readability. These will be dealt with later. The names of items should be given wherever possible. In cases where they are not known, or the announcement was missed, then a description will do instead. For example, a "soprano solo with piano accompaniment" might be heard, or a "foxtrot by orchestra, with vocal refrain."

Any announcement heard should also be given, and in the case of American and Australian "B" stations, any advertisement quoted. In the case of broadcasts by foreign stations, then descriptions of what is heard should be given as fully as possible, together with times.

The exact times items are heard is an important detail. Space is provided for them to be filled in, together with a separate column for equivalent times of the country in which the station is located.



The ALL-WAVE ALL-WORLD DX CLUB

OFFICIAL REPORT FORM

Director,

Station ..... From .....

Dear Sir,

I wish to report reception of your station which I heard operating on ..... kilocycles / megacycles

(..... metres), on ..... (our date) ..... (your date).

RECEIVER: My receiver is a .....

AERIAL SYSTEM: .....

EARTH: .....

The following details were noted:

Our Standard Time	Your Standard Time	ITEMS and ANNOUNCEMENTS	R	QSA

Interference: .....

Fading: ..... Quality: .....

Weather Conditions: .....

Remarks: .....

If this report corresponds with your station log, will you please verify? I hope to report again.

"Q" and "R" Signals

R—AUDIBILITY

R1—Faint signals, unreadable.
2—Weak signals, barely readable.
3—Weak signals, but can be copied
4—Fair signals, easily readable.
5—Moderately strong signals.
6—Good signals.
7—Good, strong signals, readable through QRN and QRM.
8—Very strong.
9—Extremely strong signals.

QSA—READABILITY

QSA1—Hardly perceptible, unreadable.
2—Weak, readable in patches.
3—Fairly good, readable with difficulty.
4—Good, readable signals.
5—Very good signals, perfectly readable.

Yours faithfully,

.....

Member All-Wave All-World DX Club.

Official call .....

Differences between Australian or New Zealand Standard Time and standard times of countries most regularly heard here can be simply obtained from the Time Conversion Indicator presented to readers as a free Supplement to the August "Radio World."

Q and R Signals

The strength and readability of a transmission is indicated by the "Q" and "R" system. A table showing the interpretation of the symbols used is included at the foot of the form. The "R," or "strength of reception" signals come first. "R1" means "faint signals, unreadable," while "R9" means "extremely strong signals," which can be taken as equivalent to the greatest undistorted volume the set will handle from a powerful local.

Intermediate numbers indicate signal strengths between these two extremes.

The "Q" (QSA), or "readability" signals, which follow next, should not be confused with the "R" signals. The latter are concerned entirely with the strength of the actual signal, and not with any extraneous noises arising from static or power interference which may accompany it. Readability is indicated by placing the appropriate figure (1 to 5) after the letters "QSA." For example, "QSA4" means "good readable signals."

Other Information Needed

"Interference" applies to static, which might be light or heavy, continuous or intermittent, etc., and to power interference, described similarly to static. "Fading" might be rapid, or long, slow, etc., while "quality" is described as very good, harsh, etc.

The next line is for a brief description of the weather conditions prevailing at the time of reception. A typical example would be, "Sky overcast, light S.E. wind." The final space is provided for remarks—on any little peculiarity that might be noticed about the programme or transmission, or perhaps about an announcement.

Then the form is signed, the sender's Club number filled in, and the report is complete. Provided the details shown are given, a verification is bound to follow—or at least it will in 99 cases out of a 100, which is a high enough percentage to satisfy any dxer.

The Official Report Forms of the All-Wave All-World DX Club are available (to members only) from the Club Headquarters, 214 George Street, Sydney, N.S.W., at a price of 1/6 for 50, post free.

Preparing Reports In German And Italian

By DAVID E. EVANS (AW 83DX)

WHEN reporting to foreign stations, it is a good idea wherever possible to use the language of the country concerned. Here are specimen reports for German and Italian stations. In each case the first portion states that the station has been heard, and asks for a verification to be sent to the sender.

Request for Verification from German Station

Full Postal Address
Datum.....

Harrn Haupt-Ingenieur des Kurzwellensenders,
Station, City and Country.

Ich habe gerade das grosse Vergnuegen gehabt, Ihre w. Station einzuholen und ich erlaude mir Ihnen hierunten eisne Liste einiger Stueeke, die ich gehoert habe, anzugeben.

Ich waere Ihnen sehr verbunden, ween Sie mir das Gefallen tun wuerden, die Richtigkeit meiner Liste nachzupruefen und mir davon Bestaetigung zu senden.

INSERT LOG OF GERMAN TRANSMITTER HERE

Indem eh Ihnen zum voraus bestens dauke, ziechne ich.
hochachtungsvoll,
Signature.....

DESCRIPTION OF ITEMS AND RECEPTION

1. Orchestral Selection—Orchestra—stueck.
2. Piano Selection—Piano.
3. Violin Selection—Violine.
4. Organ Selection—Orgel.
5. Marimba Selection—Jylophon.
6. Accordeon Selection—Zichharmonika.
7. Man Singing — Solo-Stimme, Manne.
8. Lady Singing — Solo-Stimme, Dame.
9. Vocal Chorus—Chor.
10. Classical Music — Klassische Musik.
11. Popular Music—Volkstuemliche.
12. Native Music — Volksmusik (Music).
13. Dance Music—Tanzmusik.
14. Fox Trot—Fox Trot.
15. March—Marsch.
16. Waltz—Waltz.
17. Talking—Gerede.
18. Station Announcement—Berichte der station.
19. Faint Volume — Tonstaerke-schlecht.
20. Good Volume—Tonstaerke-gut.
21. Great Volume — Tonstaerke-vertrefflich.
22. Tone Quality—Poor—Tonqualitaet-schlecht.
23. Tone Quality — Good — Tonqualitaet-gut.
24. Atmospheric Conditions Good — Atmosphaerische umstaende-gut.
25. Atmospheric Conditions Bad — Atmosphaerische umstaende-schlecht.

USE THE "Q" AND "R" METHOD ALWAYS

Request for Verification from Italian Station

(Full Postal Address)
Data.....

Capo Ing. della, Stazione Radiodiffondtrice.....
City and Country.

Egregio Signore,

Or' ora ho avuto il piacere di udire la vostra stazione e mi permetto d'indicarvi nella presente lettera pareechia selezioni che ho potuto ascoitaire.

Sarei lieto se vi sarebbe possibile di vericare la mira ricezione col'e vostre radiodiffusioni ed inviarmi la conferma dell' esattezza della mia ricezione.

(INSERT LOG OF ITALIAN TRANSMITTER HERE.)

Ringraziandovi in anticipo, vi caluto con perfetta stima.
Signature.....

DESCRIPTION OF ITEMS AND RECEPTION

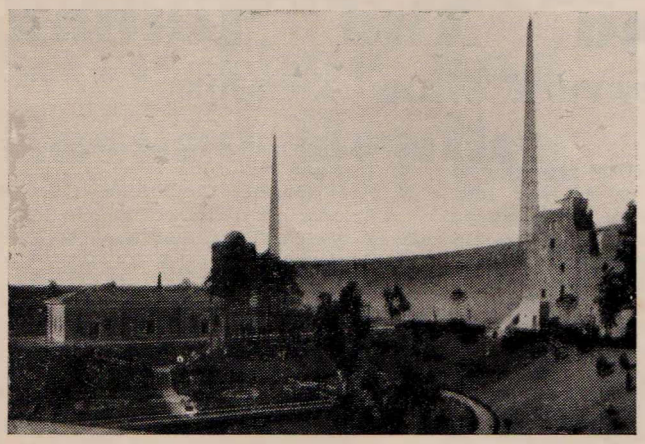
1. Orchestral Selection—Orchestra.
2. Piano Selection—Piano.
3. Violin Selection—Violino.
4. Organ Selection—Organo.
5. Marimba Selection—Silufono.
6. Accordeon Selection—Armonica.
7. Man Singing—Solo vocale, signore.
8. Lady Singing—Solo vocale, donna.
9. Vocal Chorus—Coro.
10. Classical Music—Musica Classica.
11. Popular Music—Musica Classica.
12. Native Music—Musica Nazionale.
13. Dance Music—Musica da Danza.
14. Fox Trot—Fox Trot.
15. March—Marcia.
16. Waltz—Valzer.
17. Talking—Conversazione, discourse.
18. Station Announcement—Annuncio della stazione.
19. Faint Volume—Volume-debole.
20. Good Volume—Volume-buone.
21. Great Volume—Volume-forte.
22. Tone Quality—poor — Qualita del suono-cattiva.
23. Tone Quality—good — Qualita del suono-buona.
24. Atmospheric Conditions good — Condizioni atmosferiche-buone.
25. Atmospheric Conditions bad—Condizioni atmosferiche-cattive.

ALWAYS USE THE "Q" AND "R" METHOD

Times To Listen For . . . . . World Shortwave Stations

The main shortwave stations of the world, together with the best times to listen for them, are given below.

By H. I. JOHNS



A view of the aerial masts used by the well-known Vatican shortwave station HVJ.

THE following hints on what wavebands to listen on for the various types of shortwave transmissions will perhaps be interesting, especially to beginners. First of all, the amateur transmitters can be picked up on 21, 40, 75 and 160 metres. The last two bands are only worth listening on at night.

The telephony stations which are usually to be found between 13 and 70 metres, are heard better at night during the summer months, and in the day during the winter months. The broadcast stations are also between 13 and 75 metres and are usually heard on one of the following bands:—16, 19, 25, 31 and 49 metres.

Some listeners are not interested in short waves, because they are doubtful of whether they will be able to operate a shortwave receiver. It must be admitted that a few years ago an efficient shortwave set invariably had an imposing array of controls, and needed considerable skill to operate successfully, but today with modern circuits, a shortwave receiver is practically as easy to operate as a broadcast band set.

There are four ways of receiving the short waves—by means of an adaptor, a converter, a special shortwave receiver, or a dual or all-wave set.

So far as short waves are concerned, the best times to listen in for European stations during the winter are as follows:—

7.30 to 9.00 a.m. for the 25-metre band
6.00 to 8.00 a.m. for the 31-metre band
5.00 to 7.30 a.m. for the 49-metre band
4.00 to 6.30 a.m. for the 31-metre band

In the summer, morning reception from Europe is very unreliable and so it is the night reception that we have to depend on . The best times are as follows:—

9.00 p.m. to 1.00 a.m. for the 16-metre band.
11.30 p.m. to 3.00 a.m. for the 25-metre band
10.30 p.m. to 4.00 a.m. for the 31-metre band
2.00 a.m. to 7 a.m. for the 49-metre band

(All times given are A.E.S.T.)

It must be remembered that reception can be had at other times not mentioned above, but it is at the times stated that the signals are at their best.

Perhaps a few of the main s.w. stations with best times to listen for them, would be of use to listeners who have just installed receivers.

RVL5, 70.2 m., is an excellent station for those who wish to hear an interesting musical programme consisting in the main of orchestral and vocal items. The station opens round 6.30 p.m., but is best heard from 8 p.m. onwards, and is looked upon as one of the best evening stations.

The Dutch East Indies Stations, better known as the "N.I.R.O.M." group, operate on Sunday evenings from 8.30 p.m. The five stations concerned are **YDB**, 31.2 m.; **PMN**, 29.24 m.; **PLP**, 27.27 m.; **YDC**, 19.8 m.; and **PMH**, 44.6 m. The four first-named stations all transmit the same musical programme, while PMH has a programme of native music.

Japan has a number of stations operating, but the most consistent one during the evening is **JVN**, 28.14 m., which opens round 7 p.m. The programmes consist mainly of native music and talks in Japanese; though sometimes modern music may be heard. On 44.44 m., **JVT** will be heard from 7 p.m. onwards. Volume of both stations is good.

The German stations **DJN**, 31.45 m.; **DJA**, 31.38 m.; **DJB**, 19.74 m. and **DJE**, 16.89 m., provide excellent entertainment from 3 p.m. daily until 8.15 p.m.; DJE being the best station. The above stations are very well received both in Australia and New Zealand, excellent music being transmitted in these programmes.

RNE, 25 m., Russia, can be heard on Sundays and Wednesdays from 9 to 10 p.m. with talks in English. The station opens up with the playing of the "International." Our Empire stations, **GSB**. 31.5 m. and **GSO**. 19.76 m., are now heard from 6 till 8.15 p.m.; GSO being the better station.

VK2ME, 31.28 m., the experimental station of A.W.A. Ltd., Sydney, operates from 2 till 4 p.m. and 7.30 till 9.30 p.m. on Sundays. The sister station **VK3ME**. 31.5 m., at Melbourne, Vic., operates from Monday to Saturday (inclusive) from 7 till 10 p.m. It may be as well for listeners to watch out for schedules of above stations, as times may be changed at intervals. The programmes trans-

mitted by these stations are of first class quality, and very interesting talks on Australia are also given.

To anyone who wishes to tune in a foreign station, LZA, 20.04 m., provides an excellent musical programme on Sundays, and can be heard round 3.30 p.m. Sometimes a lady announcer will be heard.

PCJ, 19.71 m., Holland, is another good station worth listening to, and can be heard on Tuesday nights from 6 till 9 p.m. Mr. Startz announces in six different languages, and alone is well worth hearing.

The American stations W2XAF, 31.48 m., and W1XK, 31.35 m., are heard during the afternoons from 2 p.m. onwards, closing round 3.30 p.m. The programmes consist of dance music. As the time in America is then advancing into the late hours of the night, the 48 and 49-metre stations such as W8XK, W9XF, W3XAL and W8XAL can also all be heard during the afternoons from 2 p.m. They close round 4 p.m. (W8XK closing somewhat earlier than the others).

South American stations such as XEBT, 50 m., HJ1ABP, 31.20 m., and HJ2ABE, 31.58 m. are all heard round 1.30 p.m.

The Cuban station XEWI, 25.2 m., heard on Wednesdays and Saturdays, 1 to 3 p.m., and Sunday noon till 1 p.m., has just recently come on the air. The programmes that have been heard have been of a very high order.

COCQ, 30.7 m., Cuba, is another interesting station, and is heard daily from 2 till 4 p.m. This station has several different interval signals. (Nothing similar has ever been heard before from any other s.w. station). The programmes consist mainly of native music and talks in Spanish.

COCH, 31.82 m., Cuba, is also heard daily, with native music from midday till 3 p.m. The same may be said of COCD, 48.94 m., and COKG, 48.78 metres.

THE MONTH ON SHORTWAVE

General Conditions Fairly Good: P C J Excellent On 19 Metres: W2XAF Best Of 31-Metre Americans.

By ALAN H. GRAHAM

Some Frequency Changes.

VPD2 has moved from the crowded 31m. band to 8,719 k.c., or 34.4m. where its signals are not so good.

CSW has also shifted from 30.3m. to just below the D.E.I. station PLP (approx. 27.1m.). CSW is heard best in the early mornings calling the Portuguese colonies.

OLR, Prague, has moved up to 31.41m.

A New Station.

Another Dutch station has recently been reported—PGA, Kootwijk on 38.15m.

Some African Schedules.

A recent report indicates that a new South African s.w. transmitter has lately commenced a series of test transmissions on 5,900 k.c. (50.48m.), using the call-sign ZNB. The station is located in Mafeking, and is operated by the British Bechuanaland Government. Hours of transmission are not entirely regular, but the station is usually on the air on week-days from 4-5 a.m.; and on Sundays from 5-8 p.m. Because of the high noise level on this frequency, and general conditions of reception, ZNB will be hard to log.

The Rhodesian stations ZEB, Bulanayo, 48.8m.; and ZEC, Salisbury, 50m., have now begun transmissions on regular schedules—Sundays 6.30-8 p.m.; Tuesdays 2-3 a.m.; Wednesdays 4.15-6 a.m.; Fridays 1-1.45 a.m. 2-3 a.m.; Saturdays 4.15-6.15 a.m.

New Madagascan Station.

FIU, operating on 49.92m. should be heard at any time now, for this rather less well-known station was occasionally reported at this period last year. Schedule is 12.45 p.m.—1.30 a.m. daily.

General Conditions Fairly Good.

Reception continues on much the same level as in the last weeks of 1936. The high summer noise-level is always troublesome at this time, as it renders the identification of not-so-good signals on the lower frequencies a far from easy matter. However, despite this obstacle, listeners will find there are a considerable number of stations audible on all the bands between 10 and 31m.; and above 31m. there are still a few stations which manage to break through the barrage of noise.

PCJ Excellent On 19.7 Metres.

19m. is perhaps the most satisfactory band on which to concentrate, for here signals are strong and steady, and not so liable to annoying fading as there is on 13 and 16m. A very old friend in PCJ on 19.7m. has shown a welcome return to form, and its signals now approach something like the strength of those heard in its halcyon days of 1928 and 1929.

Very strong signals are heard from Zeesen on this band, through DJB and DJR; while TPA2 is gradually working up to its best strength. YDC continues steady.

Many listeners have not yet logged the Argentine LRU, Buenos Aires, on 19.62m. Perhaps they will be luckier in the future, as this station can occasionally be "caught" now.

DX On 25 Metres.

For a time the Czecho-Slovakian station in Prague, was one of the best transmitters on the 25m. band, but as mentioned elsewhere, it has now removed to 31.4m.

The Mexican, XEWI was heard occasionally towards the end of December, but now seems to have disappeared. Saigon has been heard on both 25 and 31m.; but its best signals come in on 25.7m. PHI is now of course on its summer wavelength of 25.5m., and is to be heard well at 11 p.m.

On The 31-Metre Band.

On 31m., PRFS has again been reported. Several months back this station was one of the best and most consistent South Americans on the air. ZBW3, Hong Kong, is putting out a strong signal, as is I2RO in the early mornings. PCJ, RAN and JZI may also be heard.

Plenty Of Cubans Audible.

The Cuban stations at present on the air make quite a formidable list. Most of the following are audible at good strength:— COCH (31.82), COCQ (30.7), COCX (26.2), COCD (48.9), COCO (49.9), COKG (48.7) and CO9WR (47.7).

W2XAF Best Of 31M. Americans.

Of late the Americans have been a trifle disappointing; and certainly their signals have not been up to the level of recent years. W2XAF is the best of the 31m. trio W1XK and W3XAU being not so good. W8XK on 19.7m. is better than most of the others, but this station is not too good on 25m. W1XAL and W2XE are fairly good on this band, however; while very early risers will find W3XAL on 16.87m.

Some DX For S.W. Fans.

Listen for the following, which are off the more regular frequencies.

Barcelona (call letters obscure ECNI? EDN2?) on approximately 41.5m.

Teneriffe, on 28.7m.

HS8PJ, Bangkok, Siam on Mondays and Thursdays on 32.09m.

PMH, another D.E.I. transmitter on 44.6m. (near JVI 44.4m.)

XGOX on 43.89m.

Colombo on 49.6m.

TIPG after 10.15 p.m. on 46.1m.

ORK in the early morning (4.30-6 a.m.) on 29 m.

DX News Flashes

All-Continents Hook-Up

By D. E. EVANS

Call And Location Of Prague, Czecho-Slovakia.

Conflicting reports have appeared in the magazine from time to time regarding this station, particularly in respect of the call and location. From a verification received recently I am able to give the following information:— Call is RADIO PRAGUE (pronounced "prak") and the location is Czecho-Slovak Shortwave station, C/o. Radiojournal, Czechoslovenske Zpravodajstvi Radiotelefonicke, Spolecnost S.R.O., Praha, Czecho-Slovakia.

The verification is a most attractive photograph, and one worth making an attempt for. The transmission I checked was on 19.698 metres at 7.00 a.m. on August 13, and as the card was received at Sydney on December 10, the station wastes no time in replying.

Lisbon, Portugal. In spite of statements to the contrary CT1AA is still verifying by card. Card received here on December 24 indicates a schedule on 31.09 metres on Tuesdays, Thursdays and Saturdays from 21.00 to 24.00 G.M.T. with an output of 2 k.w. Requests further reports. Address, Estacao Radio CT1AA, Avenue Augusto d'Aguiar, 144, Lisbon, Portugal.

Budapest, Hungary... Recent veri. from this station gives the QRA of HAS3 as Radiolabor, Magyar Kiralyi Posta, Budapest, Hungary. A very attractive card in three colours, with a centre picture of the bridge which spans the Danube.

Berlin, Germany. An interesting test for the selectivity of any receiver is the reporting of the various groups of transmitters working on adjacent frequencies. Reports to DJR, 19.56 metres, DJQ, 19.63 metres, DJB, 19.74 metres and DJL, 19.85 metres brought a card for each. DJA and DJN on 31.38 and 31.45 metres respectively also verified.

Pittsburgh, U.S.A. Verifications are no longer issued by W1XK or by W8XK. In a letter covering my last report on W1XK, the Westinghouse Mfg. Co. state—"As we are furnishing a daily, reliable, worldwide service, we have decided to discontinue the practice of verifying short-wave reports."

Moscow, U.S.S.R. Intensive propaganda will be indulged in by the Moscow station this year. Any listener who reports may ask for a copy of the radio talk given by the station, and the writer of every tenth letter opened will receive a copy of the illustrated journal "U.S.S.R. in Construction." The latter is a prize well worth any trouble.

Additionally, every reporter will receive a photograph of a well-known Soviet leader, postcard views of Moscow and the U.S.S.R. or some of the latest issue of Soviet stamps.

A New Amateur Record.

Happened to drop in on Frank Nolan of VK4LO, at Brisbane, and found him glued to his rig conducting an All Continent Round Table Hook-up. Enquiry elicited the information that this was no "fluke," but the fourth of a series of QSO's between VK4LO, Brisbane, W4DLH, Gould, Florida, VU2CQ, Bombay, India, SU1CH, Cairo, Egypt, G5ML, Kenilworth, England and HK1Z, Colombia, South America.

A glance through his log showed excellent reports from all stations concerned on December 19, 25, and 28, and as I was present on the 29th, I was able to take their reports myself. Unfortunately VU2CQ suffered a breakdown and dropped out of the QSO, but he was heard working again about an hour after the Round Table had concluded, so it would be certain he would be "in on the game" on the sked arranged for the 30th.

Great interest was shown in this "hook-up" by a number of American radio magazines, who lost no time in requesting photographs of all operators and details of their stations. Apparently the new record is to be preserved, as W2IXY at New York is attempting to make a recording of each "over" as a physical check on the authenticity of the undertaking.

The reports at midnight E.A.S.T. were:—

From VK4LO. W4DLH Q5-R8, SU1CH Q5-R5, HK1Z Q5-R5, G5ML Q5-R5/6.

Reports on VK4LO. W4DLH Q5-R7, SU1CH Q3-R3, HK1Z Q4-R5, G5ML Q4-R4.

RADIO CENTRE, MOSCOW

Schedule Of Broadcasts.

Day	Time (G.M.T.)	Call Sign	Wave Length Metres
Sunday	11 a.m.—12 noon	RNE	25
	3 p.m.—4 p.m.	RNE	25
	9 p.m.—10 p.m.	Com. & RNE	1744 & 50
	12 mdt.—1 a.m.	RAN	31.25
Monday	9 p.m.—10 p.m.	Com. & RNE	1744 & 50
	12 mdt.—1 a.m.	RAN	31.25
Tuesday	12 mdt.—1 a.m.	RNE	31.25
Wednesday	11 a.m.—12 noon	RNE	25
	9 p.m.—10 p.m.	Com. & RNE	1744 & 50
	12 mdt.—1 a.m.	RAN	31.25
Thursday	12 mdt.—1 a.m.	RAN	31.25
Friday	9 p.m.—10 p.m.	Com. & RNE	1744 & 50
	12 mdt.—1 a.m.	RAN	31.25
Saturday	12 mdt.—1 a.m.	RAN	31.25

DX News and Views

A page for letters from DX readers

★ ★ ★

Congratulations From An Old Timer.

Being a member of the old brigade when radio enthusiasts were regarded as cranks, I wish to convey my congratulations to you for your splendid effort—the "Radio World." It is a very much needed magazine in Australia, and I am enclosing my membership fee to the All-Wave All-World DX Club.—P. G. Mitchell (AW173DX), Moonah, Tas.

An Improved "L" Type Aerial

I am enclosing a list of stations logged from December 1, 1936. GSG, 16.86; DJE, 16.89; DJR, 19.56; GSP, 19.60; DJQ, 19.63; GSE, 25.29; W2XE, 25.36; DJD, 25.49; GSD, 25.35; COCX, 26.25; COCQ, 30.77; YDB, 31.10; 2ME, 31.23; 3LR, 31.32; DJA, 31.38; DJN, 31.45; GSB, 31.55; PMH, 44.60.

I have altered the aerial system since my last letter, and it is indeed a great improvement towards better reception.

The system now consists of a total length of 95 feet, 75 feet of which is supported by two 30-foot masts. The main span runs in an East to West direction, and is then bent at right angles at the Eastern end. The remaining 20 feet runs in a northerly direction up to a 35-foot mast.—Cedric W. Marley (AW150-DX), Brisbane, Q'land.

Has A Nine-Valve S.W. Super.

I have built a new receiver, a 9-valve shortwave superhet, and it is the goods. Dozens of people have come to listen to it, and without a doubt it is the best I have heard in my life.

Following are recent loggings:—VK2's, MH, TF, AZ, YW, DD, ABD, NO, RV, MD, UB, NQ, ME, TC, BB, GR, VB, RB, EC, ABS, AS, OB, BW, JA, DK, IQ, CG, EL, WJ, NM, UD, FY, OR, XX, AR, ZO, EZ, BN, QY, AP, VV, GC, MV, CE, CP, MV, SA, QK, XS. VK3's, ZZ, GS, XS, ZL, KX, LR, ME, OZ, WW, PL, DT, KR, RE, NA, GS, FB, KO, XM, LO, FE, GS, UZ, DE, VD, PK, CG, BS, CK, LW, GU, NO, FN, FB, CP. VK5's, AI, JC, RT, XJ, KG, DI, PN, DC, KL, SM, MD, FM, AW, FL and 8FC.

Foreign stations logged include:—W1's, GJX, GY, DCX, DJX, CHG, JZH. W2LHI, M2EDW, W3SI. W4's, BYY, CQG, AAH, CDY, LG. W5's, ACF, AHK, DEN, EAH, FMM, EUC. W6's, OLQ, BYW, JYH, LLQ, LTH, ITH, CQG, AM, LI, LLU, GAL, KMO, DNE, DTE, FQW. WFTU, WFDNT. W8MDU, W8MCD. W9's, RUK, ARA, IZY, CSU, IQ, EMI. K5RJ, K6CMC. KA1's, AK, ME, AP, ER, AN. LU1EX, PK1MX, HP9G, W4DLH, VU2CQ, W4DFY, ZNBG, VLZ, LU6KE, PK3SP, G2ZQ, LU7ET, CE1AH, HK1Z, 9MI, CE3BW, GSG, GSB, GSP, GSF, TPA3, DJA, DJB, DJD, W2XAL, W2XAD, W2XE, VE9DN, W2XAF, GSN, VE9CS and CRCX.—C. G. Arnold (AW9DX), Roma, Q'land.

Interesting Booklets From 2RO.

I am very pleased to note that the Club membership is climbing steadily, and that the "R.W." is still up to its usual high standard; if not better. I recently heard 2RO state that if anyone would like copies of four booklets, to send for them, including a report, of course. I received in reply the following:—"Roman Roads in Italy," "Sport in Italy," "Art in Italy," and a book on Statistics.

These are worth having, as they give one a wonderful insight to Italian works. The illustrations of the first mentioned are very interesting. I believe Moscow does something similar.—G. O. La Roche (AW155DX), Sth. Perth, W.A.

An enthusiastic dxer, Mr. K. G. Knight, of Christchurch, N.Z. has a fine collection of "veries." He has just joined the A.W. DX Club.

Americans Heard On B.C. Band.

Conditions here are fairly good now, XEPN, KMOX, KGMB, KGU and KFAB being heard with ease this week, and XENT, ZEAW being at full entertainment strength.

Though I have only been at the game for 10 months and not have much time for dxing, my log now stands at 93, consisting of the following:—

VK2's: DK, MQ, KS, RB, DL, AP and RO. Also 3RQ, ME, BH, WE; 4HA, BS; 5DC, GF; 7CK, JB; and G6XR, TI3AV, TPA4, DJN, W2XAF, SPW, HP5J, EAQ, PMN, AMBJ (Awatea), 9MI and VPD2.

On the broadcast band the following have been logged:— KGU, KFAC, KGMB, WCCO, KGA, XENT, KFI, KOMA, KNX, KPO, KOA, KWJJ and KSL. New Zealand verifications include 1ZM, 1ZB, 2ZO, 2ZF, 2ZH, 3ZR and 4ZM. Australian: 2KO, 2CA, 2TM, 2AD, 2WL, 2CH, 2MO, 2GB, 2HD, 2NR, 2UE, 2GZ, 2LV (first New Zealander to hear this station), 2GF, 2CO, 2BL, 2FC, 2SM, 2LM, 3KZ, 3GI, 3BO, 3AR, 3SH, 3UZ, 3BA, 3TR, 3HA, 3DB, 3LO, 4QG, 4MB, 4BU, 4BH, 4BC, 4BK, 4AK, 5CL, VK5DC, 5RM, 6WF, 7LA, 7ZL and 7NT.

Reports are out to 2KY (9 mths.), 5PI (9 mths.), HJ1ABE, St. Dennis, South Africa, LSX, TPA3, 7HO, JVM, ZBW, W2IRV, W1XK, RVI5, PCJ, KFSG, COCQ, TGWA, and VK's 5JW, 4BB, 5XR, 6RW, 4LO, 2YW, 2ME (5½ mths.), 2BQ (5½ mths.), and 2BW.

How do you chaps do over there for N.Z. stamps? If you have any difficulty in getting them, send me a P.O. and I will return its value in stamps.

Wishing the "R.W." long life and every success.—K. G. S. Wright (AW177DX), 466 Hereford Street, Christchurch, N.Z.

S.W. Veries And Reports.

I have been taking the "Australasian Radio World" for some months now, and it sure is the goods for any dxer. I have verifications from every Australian state and also from several W's, and recently from ZS1B, ZS5Z. HS1PJ and KZYL. I also have

reports out to PK1PU, ZE1JR, KA1ME, NY2AE, ZS2X, CE3DW, PK1JR, PK1ZZ, KA1GR, J3EN, KA1BH, K6JLV, KA1PY, V52AK.

Best of luck to the Club —Geo. A. Turner (AW183DX), Maryborough, Vic.

A Fine All-Wave Log.

I have just had my set converted from a dual-wave into an all-wave model, which gives me much greater scope, as I can go down to 10 metres. My chief object is to log as many amateurs as possible.

To date my log is as follows:—Broadcast, 3LO, 3AR, 3UZ, 3DB, 3KZ, 3AW, 3AK, 3XY, 3GL, 3GI, 2CO, 3TR, 7UV, 2QN, 7NT, 3BA, 3BO, 3HA, 2FC, 2BL, 4QG, 7BU, 4BC, 4RK, GWF, 5CL, 6ML, 3HS, 5CK, 1YA, 2YA, 2HD, 4AK, 2KY, 2GB, 5AD, 2CA, 2GZ, 2WG, 2UW. Shortwave, GSB, GSC, GSD, GSO, GSH, GSP, W1XAL, W2XAF, W8XK, DJA, DJN, DJO, DJL, PCJ, DHI, ZBW, VK2ME, VK3LR, W1XK, VPD2, JZI, PMA. JDA3. Amateurs, VK2's, XL, OJ, MW, VB, CE, JA, CP, JC, BK, HX, HB, XS, BN. VK3's, KE, RV, NM, AS, BA, XA, ZX, YW, AC, QR, AP, EP, ZB, AP, CA, RE, XD. 4LX. 4LO. VK5's, RL, FN, AW.—W. Faulkhead, (AW110-DX), Melbourne, Vic.

Verification From "Radio Nations."

My latest verification is from the League of Nations station, in the form of a roneod letter signed by S. T. Cross. "Radio Nations" broadcasts on 26.35 metres.

The verification was posted at Geneva on December 11. 1936, and I received it on January 11, the letter taking exactly a month to reach me. The envelope was marked "Exp. Lett." which I took to be "Express Letter." It is rather pleasing to get such prompt service, which tends to show the value of dxing. I have reports out to U.S.A. stations—the shipping strike is evidently holding up replies.

I have sent some copies of the "Radio World" to some keen N.Z. dxers, hoping they will join the Club.—Gilbert Hayman (AW109DZ), Bronte, N.S.W.

Want To Exchange QSL's.

Three enthusiastic dxers who have cards they would like to swop with other Club members are Messrs. A. Green, 16 Chester St., Mt. Eden, S.2., Auckland, N.Z. (AW181DX): W. T. Choppen. 4 Marston Road. Timaru, N.Z. (AW61DX); and Bill Plant, cnr. Union and McQuarie Sts., Junction, Newcastle, N.S.W. (AW152DX).

Excellent Broadcast Band DX.

Just after midnight on January 8. I decided to do some broadcast band dxing, and was agreeably surprised with the results. India came in like a local and many new Americans came through that I had not previously heard. I give hereunder the principal ones; these should be worth trying for.

At 12.50 a.m. KNX, Los Angeles, U.S.A., broadcasting on 1,050 k.c., with a power of 50 k.w. was heard at R5, QSA4, until 2 a.m.

At 1 a.m., KGO, 790 k.c., 7.5 k.w., San Francisco, U.S.A., was tuned in, its fine programme coming in at R5, QSA4.

KROW, Oakland, U.S.A., which broadcasts on 930 k.c., 1 k.w., was tuned in at 1.15 a.m. During news items it was stated that terrific falls of snow were being experienced. Reception was R5, QSA4.

On 830 k.c., 50 k.w., KOA, Denver, U.S.A., was heard at 12.20 a m. with music and announcements, coming through at R6, QSA4.

KFI, 640 k.c., 50 k.w., Los Angeles, U.S.A. was heard at 12.45 a.m. at R7, QSA5. At times reception was excellent, but a powerful unrecognised station interfered.

At 2 a.m., VUD, Delhi, India, which broadcasts on 882 k.c., 20 k.w., was received at R8, QSA5. Reception was like a local and he gave news of the world, even the complete results of the Third Test at Melbourne, Vic. The news service closed at 2.15, nothing being missed.

Besides the above I logged WLW, 700 k.c.; KZRM, Manila; XMHA, XGOA and MTCY. By the way, I forgot to include KSL, Salt Lake City in the list above. I hear this station so regularly that I overlooked it. I always tune in to him at 11.30 p.m. on 1,130 k.c. (50 k.w. Last night he was very good at R8, QSA5, with a little QRN and slight QRM, caused I think by a Chinese station and 6ML. However, he usually gets the better of all opposition and holds on well once there. This is a very fine station—it gives news of the world at midnight, A.E.S.T.—A. R. Jurd (AW166DX), Ingham, Q'land.

Stamps For Return Postage.

I appreciated details of VK2CP's "mike" very much, and your fine mag. is certainly living up to standard. I have four copies and wouldn't give one away for double the price.

I am sure there are many listeners who send DX reports and enclose return postage or coupons, which I think are dear. Well here's a cheaper and better way. Go to stamp dealers, who are sure to have some unused foreign stamps, and ask for stamp of right value for return postage.

Here are some I have. New Zealand, ½d.; England, 1½d.;

America (U.S.A.), 5 cents; Haiti, 5 cents; Canada, 5 cents; India, 2 annas; Lithuania, 10 centi; Japan 10 sen. I also have obtained stamps for sending to Russia Switzerland, and Austria.

I find some of the hints on the "Radio Ramblings" page very good.

Wishing the Club all the best,—Keith Craig, Stockton, N.S.W.

Radio Step By Step.

(continued from page 33.)

frequency of oscillation coincides with the frequency on which the wanted transmission is being made. When the tuning adjustment is correct, the voltages across each tuning circuit reach their maximum values for the particular programme being received.

Fig. 5 illustrates the process graphically. As the natural frequency of the tuned circuit approaches that of the wanted transmission, the current in the circuit increases as shown, reaching a maximum when resonance is obtained. If the tuning dial is rotated still further, the current decreases rapidly as illustrated.

Inductive and Capacitive Reactance

Earlier in the series it was mentioned that the formula for inductive reactance is $2\pi fL$, while that for capacitive reactance is $\frac{1}{2\pi fC}$ (where $\pi = 3.1416$, f is the frequency in cycles per second, L the inductance in henries, and C the condenser capacity in farads).

From these formulae it can be seen that the impedance offered by a coil (i.e., inductive reactance) to an alternating current, increases with the frequency of oscillation. For a condenser the opposite holds, or in other words, capacitive reactance decreases as the frequency of the oscillatory current increases.

It is thus apparent from the above that in any coil and condenser combination there must be a point at which the inductive and capacitive reactances are equal. Since they oppose each other, they cancel, leaving only the resistance in the circuit to impede the flow of current. (See Fig. 6).

At the resonant frequency, then, $2\pi fL$, the inductive reactance, must equal $\frac{1}{2\pi fC}$, the capacitive reactance.

Hence:—

$$f = \frac{1}{2\pi \sqrt{LC}}$$

and so if L and C are known, the frequency at which they will resonate can be calculated.

Thus another way of explaining what happens when a receiving circuit is tuned is this. By varying the capacity in the circuit by means of the variable condenser, the circuit is adjusted so that its total reactance is at a minimum for the incoming frequency. In this way, the natural frequency of oscillation of the receiving circuit is made to coincide with the frequency of the wanted signal, and there is resonance.

VK AMATEUR STATIONS . . . Additions and Amendments

CALL SIGN. NAME. ADDRESS.

Additions.

5YL—Geisel, B. A., Charles St., Murray Bridge, S.A.
2AEN—Joyce, V. S., 50 Clements St., Five Dock, N.S.W.
4RH—Howe, R., Perry St., Bundaberg, Qld.
3QK—Jenkins, E. H., 415 St. Kilda St., Elwood, S3, Vic.
2ID—Brinkman, S. J. F., Bougainville St., Griffith, F.C.T.
6FR—Wright, F. H., 18 Palmerston St., Buckland Hill. W.A.
2AEQ—Lever Amateur Radio Club—C/o Lever Bros. Ltd., Reynolds St., Balmain, N.S.W.
2AEZ—Marstella, E. A., 49 Mackie Avenue, New Lambton, Newcastle, N.S.W.
3TS—Speer, T. P., Corop, Vic.
2AES—Wilson, D. D., "Esplanade," Speers Point, N.S.W.
2AET—Havyatt, A., 6 Telcpea St., Wollstonecraft, N.S.W.
6LL—Bishop, C. E., Carew St., Katanning, W.A.
6BF—Burrows, F. H., Queen St., Beverley, W.A.
6CN—Canavan, J., 196 Bulwer St., Perth, W.A.
2AEV—McMurray A., 26 North St., Auburn, N.S.W.
2AEW—Moss N., 19 Fremont St., Concord West, N.S.W.
7LC—Chappell, L. A., Church St., Ross, Tas.
4AX—Denby, H. R., Goulburn St., Kedron, N3, Qld.
2EM—Sutton, A. F., "Warrani" Thornton St., Darling Point, N.S.W.
2AEX—Reddacliff, L.A., 78 Ryde Rd., Gladesville, N.S.W.
2AEY—Eagling, R. W., 149 High Street, Taree. N.S.W.
3CF—Rich-Phillips, J., "Peri," Murraydale, Vic.
2AFA—Gray, H. R., Awaba St., Teralba. N.S.W.
2OI—Bower, G. G., 346 Homer St., Earlwood, N.S.W.
2AFB—Dickson, F. P., 6 Balmain Crescent, Acton, F.C.T.
2AFK—Kenny, F. H., 13 Fullers Avenue, Canterbury, N.S.W.
7CM—Miller, C. H., "Carnac," Douglas St., Bellerive, Tasmania.
4SD—Sharland, A. H.—Boondall, N.E.6, Sandgate Line, Qld.

Alterations to Call Signs.

2ADJ—Nestrom, O. L., 419 Morgan St., Broken Hill, N.S.W. Now VK5RZ. (See also Changes of Address).
6LR—Reading, L. W., 36 Charles St., Northam, W.A. Now VK3TQ. (See also Changes of Address).
2IH—Millen, D. R., 22 Hume St., Wollstonecraft, N.S.W. Now VK2LQ.
2BO—Crowley, C., Cecile St., Parkes. Now VK2AED. (See also Changes of Address).
3MK—Vale. L. H., 90 Orange Avenue, Mildura, Vic. Now VK2AER. (See also Changes of Address).
5MB—Brown, H. M., C/o Station 5PI, Crystal Brook, S.A. Now VK2YM. (See also Changes of Address).
6BR—Randell, B. F. H., 15 Lawley Crescent, Mt. Lawley, W.A. Now VK3FT. (See also Changes of Address).

SIGN. CALL NAME. ADDRESS.

2UN—Magee, K. W. M., Royal Military College, Duntroon Wing, Victoria Barracks, Paddington, N.S.W. Now VK3UN.

Changes of Address.

2WJ—Peell, W. J., 48 Robey St., Maroubra, N.S.W.
2QK—Preston-Smith, C., "Winchcombe," Violet St., Balgowlah, N.S.W.
2IW—Wallace, R. I. G., "Craigielea," Campbell St., Hunters Hill, N.S.W.
2DJ—Nestrom, O. L., 11 Ninth Avenue, St. Peters, S.A. (See also Alterations to Call Signs).
5LA—Atkins, L. M., 16 Lockwood Rd., Erindale, S.A.
6LR—Reading, L. W., 9A Agg St., Newport, W.15, Vic. (See also Alterations to Call Signs).
2ADL—Kinscher, E. W. D., Cobor St., Nyngan, N.S.W.
6JE—Elsbury, C. R., 24 Addis St., Kalgoorlie, W.A.
2BO—Crowley, C., Chapple St., Broken Hill, N.S.W. (See also Alterations to Call Signs).
3MK—Vale, L. H., Darling St., Wentworth, N.S.W. (See also Alterations to Call Signs).
3GP—Shields, A. J. E., 22 Ash Grove, East Malvern, S.E.5, Vic
4AG—Greenham, A. J., C/o National Bank of A/asia Ltd., Innisfail, Qld.
2TO—Ansell, L. C., 24 Attunga St., Woollahra, N.S.W.
3BK—Baker, S. C., 157 Greville St., Prahran, S.1, Vic.
3DH—Morgan, I., C/o 3WR, High St., Shepparton, Vic.
5MB—Brown, H. M., C/o 2BH Broken Hill, N.S.W. (See also Alterations to Call Signs).
6BR—Randell, B. F. H., C/o R.A.A.F., Laverton, Vic. (See also Alterations to Call Signs).
4RJ—Delbridge, Rev. R. J. R., Glebe Rd., Booval. Ipswich, Qld.
2HH—Sandel, O., 248c Oxford St., Woollahra, N.S.W.
2DG—Rudkin, K., Lismore St., Abermain. N.S.W.
5YK—Eastern District Radio Club, 56 Statenborough St., Burnside, S.A.
5BY—Whitburn, D. R., 77 Wattle St,, Fullarton, S.A.
2UN—Magee, K. W. M., 17 Mason St., Hawthorn, E.2, Vic. (See also Alterations to Call Signs).

Amendments.

2ADE—Miller, C. A., C/o Mrs. Olive, Simpson's Lane, Casino, N.S.W.
4UL—Hubsher, L. P., 98 Commercial Rd., N.1, Old.
6AL—Lathwell, A. G., 60 Spencer St., Bunbury, W.A.

Cancellations.

4KA—Dahl, O. S., Graham St., Ayr, Old.
4MF—Winterford, D. C., C/o J. Williams, Shakespeare Street, Mackay. Qld.
4TN—Tunny, T. G., 29 Maryborough St., Bundaberg, Qld.
6LA—Jamieson, J. E., C/o Musgraves Ltd., Hannan St., Kalgoorlie, W.A.
6RD—Dick, I. R., 403 Hay St., Subiaco, W.A.

NEW RANGE OF RADIOKES POWER TRANSFORMERS . . .

Many Attractive Features

New "L" Type Level Power Transformers

For 1937 Radiokes engineers have designed new type power transformers for practically every radio purpose. In designing and producing new transformers, every possible feature is included to make the units entirely trouble-free. There are so many factors which go to make a good power transformer, that considerable laboratory work is necessary before new types are released.

The new transformers include the following outstanding features:—

1. Power transformers are wound with the finest grade materials obtainable. All wire is heavily insulated with enamel and the insulation used between layers is the finest high test insulating paper. Windings are accurately made on the latest type machines, ensuring perfect layer winding and no crossed turns. Secondaries are wound in two sections, which ensures accurate voltages each side of the centre tap and least likelihood of breakdown.

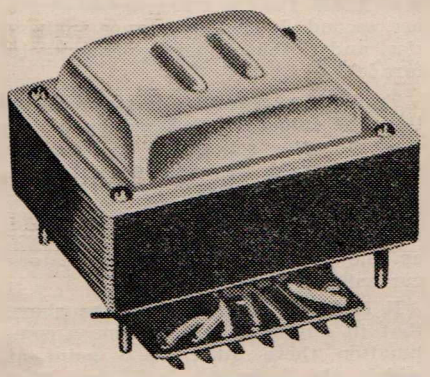
2. Core laminations are made from the finest silicon steel. High permeability material and the shape of the stamping is such as to ensure excellent regulation with a minimum of eddy current loss and flux leakage. The use of this core material enables the transformer to run at a 75% overload for long periods, without ill effects.

3. The use of heavily insulated wire and finest non-hygroscopic insulation make Radiokes transformers satisfactory for use in any climate no matter how humid.

4. All transformers are fitted with new type covers, ribbed along all faces, contacting with the core and designed to increase the mechanical strength of these faces and so clamp the laminations very tightly. All trouble from loose core laminations is therefore, eliminated.

5. Type "L" power transformers are now entirely universal, having five primary tappings as well as both 6.3 and 2.5 volt filament windings. This feature will eliminate many special types and widen the application of any particular transformer. All transformers are fitted with electrostatic shields.

6. An elaborate system of test ensures uniform quality of Radiokes transformers. Each transformer is tested at various stages of its manufacture, which eliminates the possibility of faulty units leaving the factory. Each winding is checked for voltage at its full load, with precision meters.



One of the new Radiokes type "L" level power transformers.

Finally, the transformer is subjected to heavy load and given a 2,000 volt A.C. insulation test.

7. Every effort is made to keep appearance up to a very high standard. Cores are lacquered black and covers are bright silver finish.

8. Actual figures taken on a 60 m.a. Radiokes transformer demonstrate its remarkable regulation and power handling qualities:—

Lines per square inch	60,000
Magnetising current	35 m.a.
Full load current	280 m.a.
Regulation at 40 m.a.	388 volts.
„ „ 50 m.a.	386 „
„ „ 60 m.a.	385 „
„ „ 70 m.a.	381 „
„ „ 80 m.a.	370 „

New "V" Type — Vertical Power Transformers

New upright type power transformers have also been designed for the 1937 season. Particular attention has been paid to the design of these upright units to ensure that they maintain a low temperature even on high loads.

The same high standard of quality is maintained in all the materials which go to make the upright units. The same elaborate system of testing ensures absolutely uniform quality and great reliability.

Radiokes upright transformers are finished in black and silver which gives them an excellent appearance.

Specifications of "L" Type Universal Transformers

TYPE	PRIMARY	Secondary	FILAMENTS	M.A.
L-60	200/220/230/240/250	385/385	5 volt 2 amp. 6.3 volt 2 amp. 2.5 volt 6 amp. CT	60
L-80	200/220/230/240/250	385/385	5 volt 2 amp. 2.5 volt 2 amp. 6.3 volt 3 amp.	80
L-100	200/220/230/240/250	385/385	5 volt 3 amp. 2.5 volt 8 amp. 6.3 volt 3 amp.	100
L-125	200/220/230/240/250	385/385	5 volt 3 amp. 2.5 volt 8 amp. 6.3 volt 3 amp.	125

Specifications of "V" Type Universal Transformers.

TYPE	PRIMARY	SECONDARY	FILAMENTS	M.A.
MV-50	220/240/260	385/385	5 volt 2 amp. 6.3 volt 2 amp. 2.5 volt 4 amp. CT	50
MV-60	220/240/260	385/385	5 volt 2 amp. 6.3 volt 2 amp. 2.5 volt 4 amp CT	60
LV-60	220/240/260	385/385	5 volt 2 amp. 6.3 volt 2 amp. 2.5 volt 4 amp. CT	60
V-80	220/240/260	385/385	5 volt 2 amp. 6.3 volt 2 amp . 2.5 volt 6 amp. CT	80
V-100	220/240/260	385/385	5 volt 2 amp. 6.3 volt 3 amp. 2.5 volt 6 amp. CT	100
V-125	220/240/260	385/385	5 volt 3 amp. 6.3 volt 3 amp. 2.5 volt 8 amp. CT	125

Shortwave Stations Of The World 6

This card, sent in by the author, is from amateur station LU4DQ, located at Bahia Blanca, Argentine. It is owned by M. Tapiero, who replies to every report with a card and station photo.

European Shortwave Stations - (Part 2)

The sixth of a series of articles on world shortwave stations, written for the "Radio World" by . . . .

ALAN H. GRAHAM

Italy

The stations of the E.I.A.R. (Ente Italiano Audizioni Radiofonicke), **I2RO3** and **I2RO4** have always been well received in Australia.

12RO4 (11,810 k.c., 25.4m.) and **12RO3** (9,635 k.c., 31.13m.) maintain practically a 24-hour service, except for a break between 1.30 and 3.30 a.m. Regular news services in English are given several times daily.

HVJ, the short-wave transmitter of the Vatican City, transmits on two wavelengths; 50.26m. and 19.84 (5,969 k.c.) and 19.84 (15,121 k.c.). Transmissions are very limited in duration —as follow:—

19m.—1.30—1.45 a.m. daily except Mondays; and Sundays 1—1.45 a.m.

50m.—5—5.15 a.m. daily except Mondays: 8—8.30 p.m. on Sundays.

Six languages are used—Italian, Spanish, German, English, French and Dutch.

1AC, Radio Coltano, Pisa, calls Italian ship stations on the following wavelengths—23.45, 35.8 and 45.11m.

Belgium

ORK, Radio Ruysselede, West Flanders, is the regular Belgian S.W. transmitter, heard so well in the early hours of the morning (4.30—6 a.m.). Frequency, 10,330 k.c. (29.04m.)—power, 20 kilowatts.

It is reported that a new 85-kilowatt transmitter is in course of construction at Ruysselede.

Another station which may possibly be heard in Australia is **ORG** (15.62m.), which 'phones **OPL**, Leopoldville, Belgian Congo, in the evenings.

Holland

At Hilversum is located the **PHOHI**-station (call-letters PHI) of Philips' Radio, which transmits on 17,775 k.c. (16.88m.) or 11,730 k.c. (25.57m.) according to the season. The power used is 20 k.w. PHI's schedules are—

25m. (Summer): Daily except Tuesdays and Wednesdays, 11 p.m.—1 a.m. Saturday and Sunday, 11 p.m.—2 a.m.

19m. (Winter): Daily except Tuesdays and Wednesdays, 10.30 p.m.—12.30 a.m. Mondays, 4—5 a.m.

The other Philips' station **PCJ**, Eindhoven, also operates on two frequencies: namely, 15,220 k.c. (19.7m.) and 9,590 k.c. (31.28m.). Relaying the programmes of PHI, PCJ carries out the following experimental transmissions—

19m: 7—9 p.m., Tuesdays; 10 p.m.—2 a.m., Wednesdays.

31m.: 10 a.m.—1 p.m., Thursdays.

Several Dutch 'phone stations are heard regularly in Australia The best of these are **PDK** (28.8m.), **PCV** (16.84m.), and **PDV** (24.88m.). These transmitters are located at Kootwijk, and are used for communication with the Dutch East Indies.

Norway

For some time past Norway's sole short-wave station has been **LKJ1**, Jeloy, operating on 9,525 k.c. (31.49m.), with a daily schedule from 2—9 a.m. and from 8—11 p.m.

However, Norway has recently taken steps to follow the example of other nations in keeping in touch with their subjects abroad. In the near future the following transmitters will be on the air:—**LKZ** (13.95m.), **LKX** (16.87 m.), **LKW** (16.9m.), **LKV** (19.78m.), **LKU** (25.36m.), **LKQ** (25.56m.), **LKE** (31.34m.), **LKD** (31.41m.), **LKJ** (31.45m.), **LKC** (31.48m.) and **LKL** (48.94m.).

Switzerland.

The League of Nations station at Geneva transmits on a number of wavelengths. The regular weekly broadcast is through **HBL** (9595 k.c.; 31.27m.) and **HBP** (7799 k.c.; 38.47-m.). The session, which extends from 8.30-9.15 a.m. every Sunday, is given in three languages (including English and French).

During the course of last year the weekly transmission to Australia through station **HBO** was a feature of Radio Nations' work. These sessions were heard late every Monday afternoon on 26.3m. (11,400 k.c.)

In addition to the above regular frequencies, Geneva has also been heard occasionally testing on 14535 k.c. (20.64m.) and on approx. 18,500 k.c. (16.25m.) using the calls **HBJ** and **HBH** respectively.

Austria

Regular shortwave broadcasts from the city of the waltz are heard through station **OER2** on 6,072 k.c. or 49.41m. Power used is 1.5 k.w.

This station is on the air from midnight to 8 a.m., and is usually heard best between 7-8 a.m. Address your reports to **OER2**, Johannesgasse 4b, Vienna. If the writer's experience can be taken as typical, readers should give all times in G.M.T.—for when a report was forwarded with times in A.E.S.T. a reply was received regretting the stations inability to verify. Yet the same report with times in G.M.T. met with better success in the shape of the station card.

About a year ago tests were conducted through a sister station **OER3** on approx. 25.3m. apparently with the object of commencing regular transmissions on this wavelength. However, nothing came of this.

Czecho-Slovakia.

Probably the latest European station on the air is the Czecho-

Slovak shortwave station in Prague, which has been making itself heard on the regular s.w. b.c. bands, using the call **OLR.**

Its earliest transmissions were on 19.698m. (15,230 k.c.) and 49.06m. (6,115 k.c.); later it was heard most often on 25.51m. (11,760 k.c.), and finally it appears to have moved to the 31m. band, where it is being heard on 31.41m. (9,550 k.c.)

In addition to these frequencies, OLR, "Radio Podebrady," has been allocated the following:— 21,590 k.c. (13.89m.) 15.380 k.c. (19.5m,), 11,870 k.c. (25.26m.), 11,740 k.c. (25.54 m.), 9,505 k.c. (31.57m.) and 6,010 k.c. (49.92m.)

The station appreciates reports on its reception as well as suggestions and criticisms of its programmes. Reports are verified with a most attractive card.

Hungary.

There are two regular transmitters in Budapest—on 19 and 32 metres respectively. The former is **HAS3** (15,370 k.c., 19.52m.) which is on the air for only one hour per week; from Sunday midnight till Monday 1 a.m. The other station is **HAT4**, "Radiolabor" (9,125 k.c., 32.88m.); also on the air only one hour per week, this transmitter may be heard from 9-10 a.m. on Mondays. Its address is Gyali-ut 22, Budapest.

Yugo-Slavia.

Another fairly recent arrival on the air is Radio Belgrade (call letters YTC?), being heard at present on 6,100 k.c. (49.18m.). Power is only 1 kilowatt; and the latest schedule to hand gives the hours of transmission as being 4-8 a.m. daily.

Bulgaria.

The Sofia station, **LZA**, caused quite a flutter of excitement among s.w. fans some months ago, when it appeared on 14,970 k.c. (20.04m.) It has been heard at irregular intervals since, and does not appear to have a definite schedule; however it is usually on the air around 6 p.m. on weekdays; and also at 5 a.m. on Mondays.

The Fidelity B.C. Five.

(continued from page 4)

1¼ in. bolt and three nuts. To this lug is soldered the black lead from the first I.F. transformer, and also the two A.V.C. resistors and .1 mfd. bypass condenser that should be connected to it.

The 800-ohm 150 m.a. wirewound resistor in the power supply filter connects directly to the lugs on the two wet electrolytics.

When the under-chassis wiring has been completed and checked, the chassis can be inverted and grid clips fitted to the leads going to the caps of the three screen-grid valves. That running up through the chassis to the grid of the 6C6 should be shielded, and the shielding earthed.

The dial can be fitted last of all, to avoid any risk of damaging it when the chassis is inverted to put in the wiring. Next, plug in the valves and speaker, set the pick-up switch to the "off" position, hook up the aerial and earth leads, and switch on. While doing so watch the rectifier closely for any sign of flash or of a blue glow, both of which denote a serious overload. If either occurs, switch off immediately and trace over the wiring until the fault is found.

Aligning The Set.

If possible, the set should be aligned on a calibrated signal generator, and if one is not available it is well worth a few shillings to have this done by a serviceman.

To align the set by ear, set the trimmers on top of the gang and the padder about half way out. Then tune in a station around 215 metres and, keeping the volume down so that slight changes in output can be more readily noted, adjust the trimmer on the aerial section section of the gang for best results. Now swing over to the other end of the dial, tune in a station, and adjust the padder. While the padder screw is being rotated, rock the dial backwards and forwards over the station till the point where volume is loudest is found.

After this operation has been repeated the I.F's. can be given a slight adjustment, but before this is done the positions of the trimmers should be marked so that they can be returned to their original settings if necessary.

The "Fidelity Broadcast Five," if correctly built and aligned will outperform most commercial sets on the market as far as DX reception is concerned. Best of all, as regards both volume and quality of reproduction, this receiver is far superior to any other using pentode output.

W.I.A. Field Day

Variety Of Contests Held.

(By the Secretary, Clare Radio Club)

A FIELD day sponsored by the S.A. Division of the Wireless Institute of Australia was held in December at Christison Park, Clare, 80 miles from Adelaide.

About 80 people made the trip from the city, and approximately 55 licensed amateurs were present, coming from Adelaide and suburbs, Port Pirie, Narracoorte, Bute, Crystal Brock, Tanunda, Murray Bridge, Wilmington, Kadina and Broken Hill, including the State's first and only YL ham, VK5YL, Miss B. Geisel, of Murray Bridge. Apart from the informal social side of the day, the chief events were a hidden transmitter hunt and code championship contests. A good number of trophies had been presented by amateurs and city firms, and credit must be given Frank Brandon, VK5FX, for the organising work done by him.

Two or three of the Adelaide cars and one of the buses were fitted with 5-metre transceivers, and contact was established on the home run.

Six or seven parties with a variety of directional receivers searched for the hidden transmitter, but only G. Barbour, VK5MV, traced the signals to their source about a mile away. Apparently due to the geographical character of the locality, signal strength at times was misleading, and one searcher who went in the opposite direction found the signals stronger at twice the distance!

Competition Results.

The code contests attracted a fair number of entries. A tape machine was used for the sending tests, and judging was done by the Radio Inspector. Results were as follows:— **First.** M. B. Anderson, 5FA, Tanunda.

Other events resulted as follows:— **Married Men's Race,** L. Catford (5LC) 1; W. Govan,2; G. Luxon, 3. **Single Men's Race,** J. Weddell (5BJ), 1; Finn (5SP), 2; Ring (5KH), 3. **Single Ladies Race,** Misses Malthouse, 1; Excell, 2; Hughes, 3. **Men's 3-legged Race,** J. Weddell and R. Bruce (5BJ and 5ZL), 1; A. Heath and W. Burford (5ZX and 5PB), 2. **Men's Ball Throw,** W. Juttner, 4th operator 5FA. **Best D.F. Equipment,** Don Reimann. **Best 5-metre Equipment,** Max Farmer (5GF).

Teleradio For Lonely Island.

In Bass Strait lies Cape Barren Island, the home of 30 white Australians and 120 half castes, remnants of the Tasmanian aborigines. To relieve their sense of isolation, the Tasmanian Government has arranged with Amalgamated Wireless to provide a tele-radio station to receive from and send messages to Flinders Island Radio Station, which is in touch with the mainland. The apparatus is small and compact, and is specially designed to derive its power from accumulator batteries charged by wind power.

Printed by the Bridge Printery, 214 George Street, Sydney, N.S.W., for the proprietors of the "Australasian Radio World," 214 George Street, Sydney

The "SYMPHONY" Vibrator 4 Justifies All Claims . . . In Economy and Performance

The "Symphony" Vibrator (Batteryless) Four is a product of the Listener In Laboratory . . . read the reports in recent issues. Learn just how amazing this new set is in economy, performance, tone. Completely operated by one 6 volt 110 amp. accumulator. Current consumption only 1.25 amp. No "B" Batteries required.

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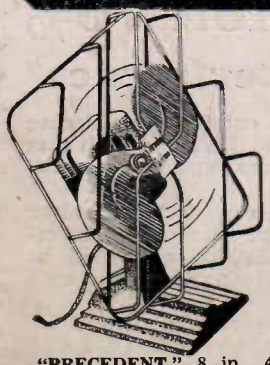

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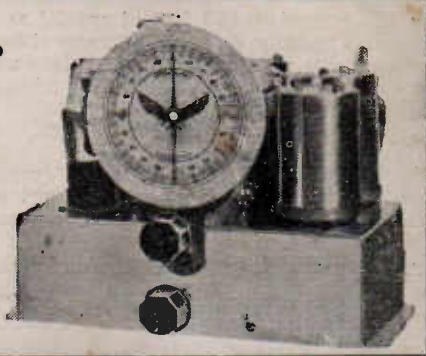

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The S431 Analyser illustrated checks all types of valves. Meter reads 10, 50, 250, 1250 D.C. Volts. 1, 5, 25 100 M.A. 0-20,000, 0-200,000 Ohms. £8/5/- Cash or £2 Deposit, £1 monthly.

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