

The

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# SHORT-WAVE MAGAZINE



No. 4

JUNE, 1937

*Photo (by courtesy of  
The Postmaster General)  
shows Rugby Radio, nerve  
centre of the overseas  
radio-telephone services.*



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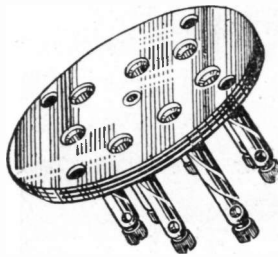
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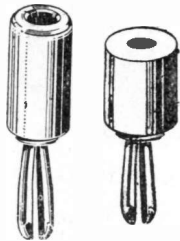
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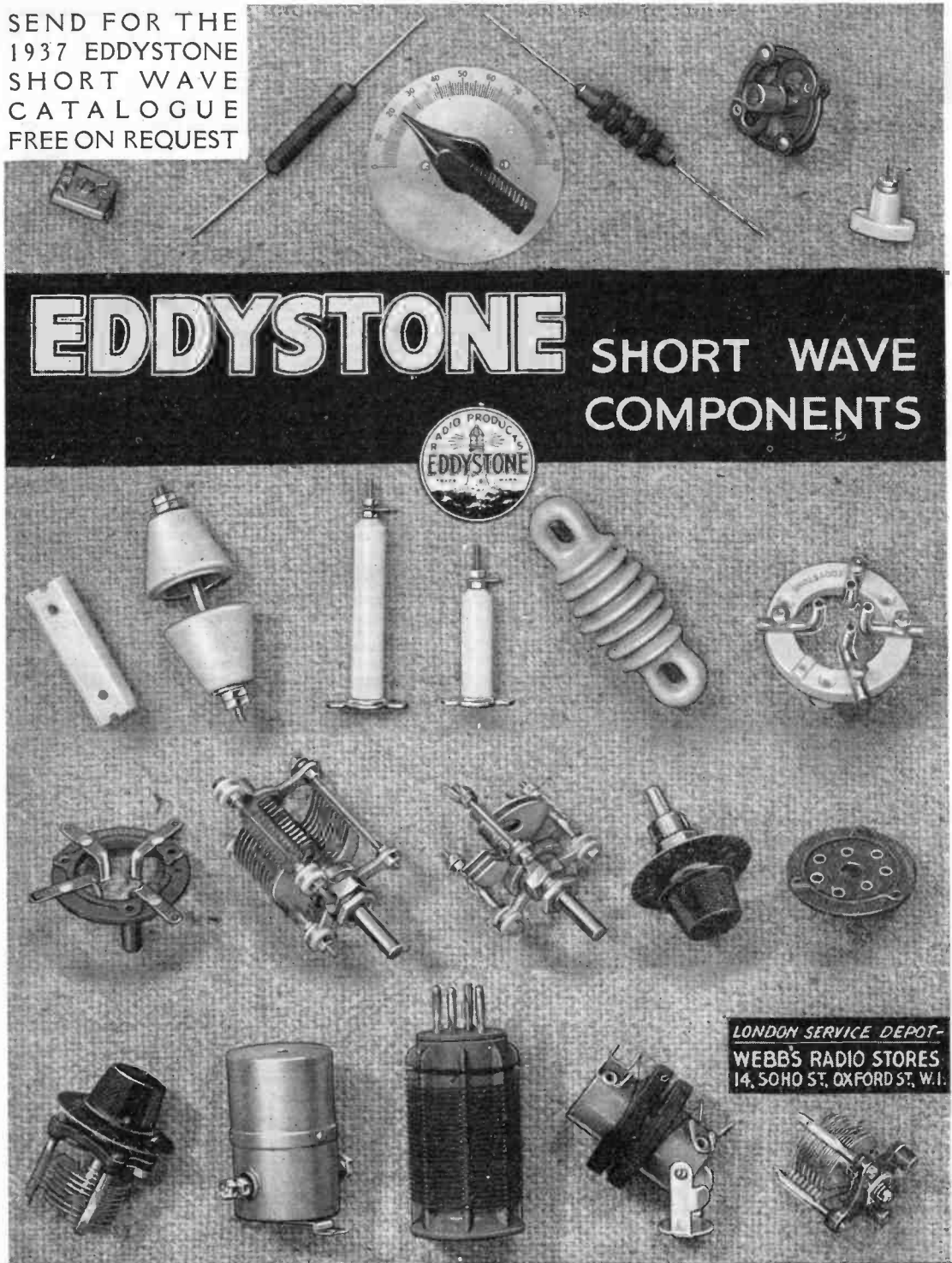
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# THE SHORT-WAVE MAGAZINE

Vol. 1

JUNE 1937

No. 4

Editor : BASIL WARDMAN (G5GQ)

Editorial Asst.: S. W. CLARK

Advertisement Manager : C. T. MILDENHALL

## SUMMER

With a sudden heat-wave summer burst upon us, bringing in its train the atmospheric which ruin medium and long-wave broadcast reception.

Accustomed to the difficulties which beset reception on broadcast bands during the summer, many owners of sets have come to the conclusion that radio is not a summer hobby.

Not so the possessor of a modern all-wave receiver. To him summer represents the one period of the year when reception conditions are constant. The atmospheric which ruin medium wave stations scarcely affect short waves, and he finds it easier to receive Schenectady on his all-wave receiver than others do Rome on their standard broadcast sets.

Five-metre equipment is installed in cars, enabling the occupants to speak to each other whilst travelling along the road, perhaps ten miles apart. The more enthusiastic take portable apparatus up mountains, or in aeroplanes, in attempts to create new records.

So, to the ardent short-wave enthusiast, summer brings not a cessation of activity, but rather an opportunity to obtain still more enjoyment from his hobby.

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Contributions for publication in our editorial pages will be given consideration and payment will be made for matter used. Only manuscript accompanied by a stamped, addressed envelope will be returned. Whilst we are willing to advise on suggested articles no guarantee of acceptance can be given.

The publisher does not necessarily agree with the views expressed by all correspondents and contributors, the aim being to open the columns to every phase of opinion.

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# “HULLO, BOMBAY”

## London, via Faraday Building and Rugby Wireless Station, Calls the World

IN 1791 Michael Faraday was born. Faraday was destined to become a great scientist, and it is to him we owe the discovery of the method of treating disease by the application of electrical currents. This method is known as Faradisation and the unit of electrical capacity is known as a Farad.

It is fitting therefore that the home of the London International Telephone Exchange should be Faraday Building, named after the man whose discoveries have done so much to make modern telephony possible. Faraday Building stands in the very heart of the City of London and was built in

1933, by the then Lord Mayor of London, Sir Percy Greenaway, when the new International Telephone Exchange became available for service.

### ● America and India

Look at a map of the world. One glance will be sufficient to show that London by reason of its geographical position is one of the most important telephone centres of the world, both for terminal and transit traffic. Calls, for instance, from North and Central America to Europe and from South Africa to India pass through the London International Exchange.

The first commercial Radio Telephone channel to be opened was between this country and the United States of America in January 1927, and traffic over the circuit became so considerable that further channels were opened in 1928 and 1929.

The world as we know it to-day makes continual demands for increasing speed on land, sea and in the air. In the same way it not only expects, but demands more and more speed in its communications.

### ● European Calls

For a long time the telegraph was the only means of electrical communication to the Continent, the reason being that speech fades quickly or becomes distorted over ordinary telephone circuits. Now full volume and clarity of speech can be maintained over long distances by means of repeater stations placed at intervals of approximately fifty miles. The tremendous increase in the number of calls to the Continent clearly shows how this invention has met a great public need.

The British Isles speak to Europe through the Continental Exchange, where 150 direct circuits to the Continent convey by underground and submarine cables the voices of Britain. Calls are put through to Berlin, Oslo, Vienna or Copenhagen with the same expedition as a trunk call to say Liverpool or Edinburgh.

Although each country does not require to be called in its own tongue, an international agreement exists whereby the greater part of the necessary speech between British and Continental operators is conducted in English, French or German. Fluency, however, is absolutely essential, therefore the operators must be skilled linguists. Occasionally these three languages are insufficient and of necessity Spanish and Italian are used.



(Photo by courtesy of The Postmaster General.)

**The world at their finger-tips. The overseas switchboard at Faraday Building.**

1890 on part of the former site of Doctors' Commons, twenty-three years after the death of Michael Faraday.

The building was first used for telephone purposes in 1902 when Central Exchange was opened, and two years later the long-distance exchange came into existence. With improvements in methods of transmitting speech over long distances it became necessary to make provision for wide expansion. This led to a new building, now known as the South Block, situated on the south side of Knightbridge Street, with a frontage to Queen Victoria Street.

The opening ceremony was performed on May 4th,

Each country concerned in a call, whether as a transit or a terminal country, shares in the revenue so derived. Therefore the duration of the call and the route over which it is effected is duly recorded in order that each administration concerned is credited with the appropriate amount.

### ● Rio de Janeiro—Sydney

The Radio Section deals with calls to places beyond the Continent of Europe and to ships at sea with the expedition and efficiency that is typical of Faraday Building. This section also acts as a transit centre for other countries and calls say, from New York to Bombay or Rio de Janeiro to Sydney, are connected through Faraday Building.

Faraday Building is extremely jealous of the secrecy it guarantees its subscribers and to ensure that no conversation shall be overheard by unauthorised persons, speech is deliberately "scrambled." The process is inverted when the speech again reaches London and is received by the answering subscriber as normal speech.

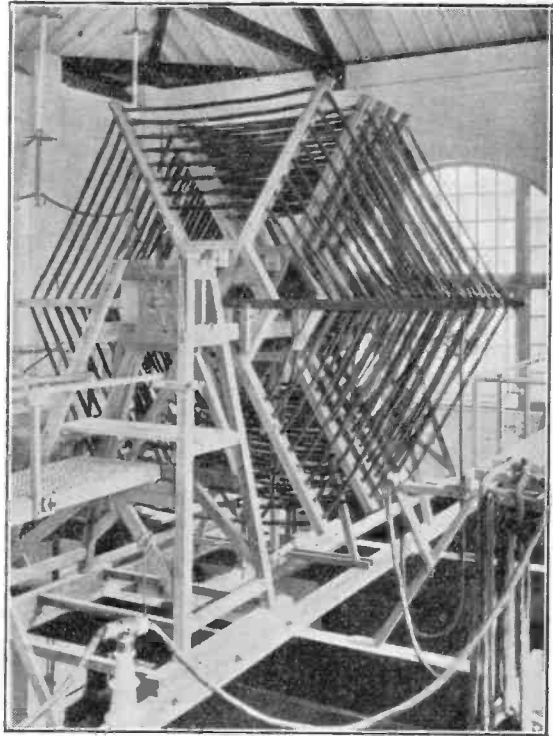
### ● Rugby

Although Faraday Building controls wireless telephone calls we must not overlook Rugby Wireless Station. Curiously enough the wireless station lies beside the famous Watling Street, built by the Roman Legions as the most up-to-date line of communication of their day.

Rugby Wireless Station occupies a site of 900 acres near the main line of the London, Midland and Scottish Railway, and is connected with Faraday Building by direct underground land lines.

Here are some interesting facts concerning Rugby. The long-wave masts, those graceful steel lattice structures—twelve in number—are 820 feet high; just imagine, four times as high as the Nelson Column in Trafalgar Square.

Set in granite bases and insulated with porcelain they look somewhat fragile, but in spite of this they are capable of withstanding a wind velocity of 140

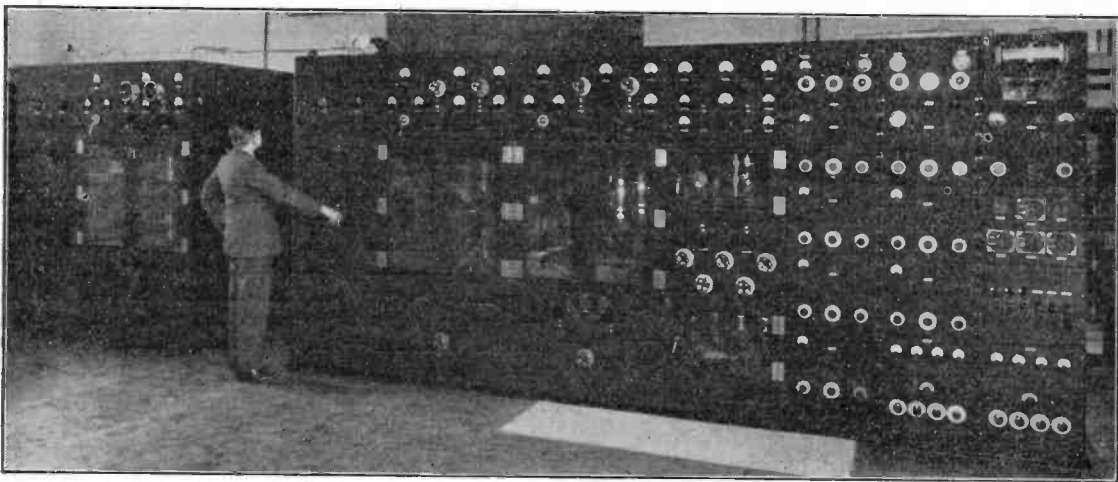


(Photo by courtesy of The Postmaster General.)

### Aerial tuning coil for one of the Rugby Transmitters.

miles per hour. In a wind of this description these masts would sway about 18 feet. Should you wish to do so it is possible to ascend the masts by means of lifts.

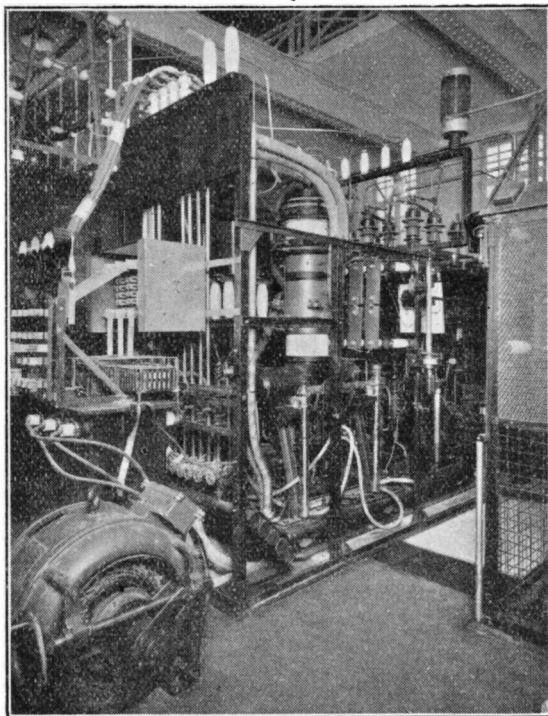
The short-wave aerial masts vary in height from 120 to 180 feet. The function of the short-wave aerials is to transmit messages in definite directions



(Photo by courtesy of The Postmaster General.)

### One of the short-wave transmitters at Rugby. Note the rack and panel construction.





(Photo by courtesy of The Postmaster General.)

**Valves which unscrew so that worn parts can be replaced A demountable valve at Rugby.**

at a specified wavelength. Rugby now has 27 directional aerials and the world is divided between them. It is at the Rugby Wireless Station that feeble speech-currents are magnified and changed by delicate processes until they are strong enough to travel any given distance. The local electricity undertaking supplies the electrical energy required for the operation of the Station, which calls for power to the extent of 5,000,000 units a year.

The next time you make or receive a long distance call, think of those highly skilled men who made wireless telephony possible—especially Michael Faraday.

that the Anglo-American Radio and Television Society, International Radio Society and World Friendship Society of Radio Amateurs will co-operate. Such co-operation does not mean that the clubs are in any way under the control of the N.R.S. It means that mutual co-operation will be given by each for each.

In co-operation with the Anglo-American Radio and Television Society the National Radio Society is holding a flannel dance and television demonstration at Denham Hall, Uxbridge, on July 12th, Saturday.

Various appointments have been made already and by next month a fighting force, as it were, will be going ahead with a membership drive. Details will appear in the July issue of THE SHORT-WAVE MAGAZINE.

## THE NATIONAL RADIO SOCIETY

by LESLIE W. ORTON

MANY READERS of THE SHORT-WAVE MAGAZINE have expressed a desire for the formation of a short-wave club in which Quality and not Quantity is the keynote.

Seeing the large number of letters which have arrived at the office expressing this desire, I had a long talk with the Editor and suggested to him that the Magazine form such a club for the benefit of its readers. He remarked, in reply, that any club formed by THE SHORT-WAVE MAGAZINE would be thought a publicity "stunt" for the benefit of the paper, and this was the very last thing he desired, as he wished to assist listeners, not to exploit them. However, if readers desired a club, and to run it themselves he was prepared to assist as much as possible and would put space in the Magazine at their disposal.

I have taken advantage of this offer and am proposing the formation of a club to be known as "The National Radio Society."

Such an organization would not rival existing clubs but would seek to co-operate with them so that listeners as a body would benefit. Although we (the few enthusiasts who have discussed it) propose that such a club be called the National Radio Society this does not mean that overseas readers are not desired. They are very welcome.

The club would endeavour to cater for members' needs and also to bring members into personal contact through outings, field days, dances and other social and technical events.

QSL cards would be issued if the demand was sufficient. Organised short-wave contests and the supply of H.A.C. cards would be features. Membership papers would be issued and supplied members at a small charge.

No decision has yet been made with regard to membership fee. It is possible that our club might be satisfactorily run without fee, but if this were the case the society would require full support to enable it to function efficiently. In other words we would need to hold social events to raise funds and such events can readily reduce funds if not well supported.

Now will any reader interested in the formation of such a club kindly drop me a line telling me what his reactions are, at the same time putting forward any suggestions that occur to him.

Please address your communications to me at 11, Hawthorn Drive, Willowbank, Uxbridge. If you require a reply kindly enclose a stamp-addressed envelope.

### LATEST NEWS

I have discussed the formation of the society with a number of readers. The formation of the organization has been decided. Already we can announce

(Continued at foot of previous column).



# LISTEN FOR THESE COMMERCIALS

They offer a never-ending  
Variety of Thrills

BEFORE SHORT-WAVES were as popular as they are now and when broadcasting stations were few and far between, the commercial stations gave listeners many a thrill for, with their hundreds of kilowatts power, they came in well from all corners of the earth. And now, although there are hundreds of broadcasters operating upon the short-wave bands, the charm of the commercial station is as strong as ever.

Let us see what the commercial stations have to offer in the way of entertainment. Variety is endless, for they provide more thrills per minute than the average broadcaster does in an hour!

## ● Calling All Ships

Perhaps the most interesting transmissions are those made to ships plying the Atlantic. Transmissions to ships are made by various stations of which WOO at Ocean Gate, New Jersey, is probably the best known. Operating upon 17.52, 23.36, 37.02 and 63.13 metres he has been heard by most listeners.

Other stations which communicate with ships more or less regularly are GBC at Rugby which operates on 23.47 and 60.26 metres; CGA8, Drummondville, Canada (on 59.76 metres); DAF, Norddeich, Germany (24.2, and 35.42 metres); IAC, Coltano, Italy on 35.8 and 45.1 metres and ultra-short waves; ZFA, St. George's, Bermuda on 59.76 metres and lastly, but not least, TYA, Pontoise, France on 24.56 metres—quite a batch to search for!

## ● Musical Programmes

Commercial stations often broadcast musical programmes to ships. Actually such programmes are not intended for the listener but for one or other broadcasting organisation. Volume is wonderful on such occasions and generally the programme is of more than usual interest.

Whenever a special programme is to be relayed from America, or a well-known speaker to broadcast and you wish to hear them, I suggest that you pay special attention to WEL on 33.52 metres; WQP on 21.58 metres and WMA on 22.4 metres. The first two stations are located at Rocky Point—the Rugby of America,—the third at Lawrenceville, New Jersey.

## ● DX Telephones

A great number of countries are connected to England by radio-telephone. However small a country may be it seems to have its own telephone station. And, consequently there are some excellent catches awaiting the DX'er.

Have you heard Addis Ababa or Manchukuo yet? Both these countries may be picked up at decent strength through their telephone stations. Why not search for IUG, Addis Ababa on 19.42 metres? He

can be heard working with IAC, Coltano, Italy from 2.15 to 3.30 p.m. daily. If you fail to hear him try a higher wavelength and see whether you can pick up IUC, also in Addis Ababa, on 25 metres.

The best heard Manchukuo station is TDE at Shinkio. He operates on 29.9 metres. Then there is JDY at Dairen on 30.23 metres. Harder to receive and, consequently, a better catch!

## ● Japan Speaks

Japanese telephone stations are very active. Here are the principal stations to search for:—JVD, Nazaki on 18.91 metres; JVE on 19.15; JVF on 19.2; JVH on 20.55; JVV on 22.44; JVK on 24.96; JVL on 25.75; JVM on 27.93; JVN on 28.14; JIB, Taihoku, Taiwan on 28.49; JVO on 28.93; JYS, Tokyo on 30.4; JZG on 47.39 and lastly JIC, Taihoku, Taiwan on 50.93 metres. What a crowd!

## ● Russian Phones

Of course there are many other DX phone stations which are heard more or less regularly, but to give you details of them all would take up far too much space, so I will suggest that you search for ZLT, Wellington, New Zealand on 27.37 metres and VLK, Sydney on 28.51 metres.

And now for a few details of some of the most mystifying stations in existence—the Russians. You have doubtless heard two or three of these stations near the 20-metre amateur band. On 19.95 metres you may hear RKI, Moscow romping in on almost any occasion you tune to that wavelength. Slightly fainter, but almost as persistent is RIM at Tashkent on 19.68 metres.

If you are lucky you may even pick up RVU at Vladivostok, and RWJ at Alma-Ata often surprises listeners with its volume on 24.75 metres.

## ● Harbour Phones

Leaving the more usual type of commercial station I wish to tell you of the new ultra-short-wave commercial stations that are springing up. At Weston-super-Mare and in many other places ultra-short-wave links are employed to connect telephone services in preference to the less satisfactory and more expensive underwater cables.

But perhaps the most novel type of telephone service is that employed in New York harbour. The affair is the outcome of years of experimentation and enables any telephone subscriber to phone up ships in the harbour. A 400-watt transmitter has been installed at Staten Island and receivers aboard subscribers' ships are tuned to this station. When a call is put through to a ship it is rung up in the same way as the ordinary telephone. Replies are made with a 50-watt transmitter aboard the ship. The arrangement has proved highly satisfactory.

# THRILLS FROM THE AIR

By Charles Lawrence

PERHAPS YOU are one of those individuals who does not fancy taking a flight in an aeroplane. On the other hand you may prefer air to any other type of travel—as, I admit, do I! But, whichever you are I can assure you that endless enjoyment is obtained through listening to transmissions from the air.

The world's most famous air-station was probably DEKKA, aboard the giant "*Hindenburg*." I need hardly add that you will never again hear that station, although you are sure to hear DEENE—aboard the "*Graf Zeppelin*"—if you search the air wave-bands regularly.

Perhaps I had better add that these wave-bands are between 52 and 54; 94 and 97 and on 86 metres. Other wavelengths are used but the above are the regular bands.

## ● Police Airmen

Whilst on the subject of airships I must not forget to tell you of the latest American police stations.

If you have ever been up in an aeroplane you will realise that if it were stationary the movements of traffic and people below could readily be watched, particularly with a pair of powerful field glasses.

Our American friends found this out too and, as a consequence, they are at present conducting experiments from small airships. Known as "blimps" these affairs hover above town and control traffic (and criminals!) from directions radioed to land on 10 metres.

These transmissions are likely to be heard well in this country and offer a new source of entertainment.

## ● Trans-Atlantic Flights

Many transmissions from the air take place unexpectedly and it is a good idea to watch your newspaper. If you see that a record flight is about to come off you may get an unexpected thrill by paying particular attention to your receiver.

Can you imagine the thrill of hearing "800 miles west of Irish coast—everything going swell"? So wireless Dick Merrill from his Lockheed-Electra when crossing the "big ditch."

Amelia Earhart operates a transmitter on 48, 31, and approximately 80 metres from her plane. If you tune in a station with the call KHAQQ you will know that you are listening to her.

## ● R.A.F. Transmissions

Great activity is displayed by Royal Air Force stations on approximately 75 metres. If you are

comparatively near an air station, and practically everyone is with the new air expansion programme coming in force, you will hear many strange calls on the top end of your short-wave dials.

Sounding more like bookmakers at a race meeting the radio operators may be heard calling "Fire-fly" or "Yellow Hammer." The latter are aeroplanes (not racehorses!) and a little careful tuning will enable you to hear them at decent strength.

Often you can see the aeroplanes flying overhead at the same time as hear them. When formation flying is taking place the instructor can be heard talking to the rest of the planes.

## ● Overseas R.A.F.

On approximately 23 metres overseas R.A.F. stations may be heard. Some of the most interesting of these are GFX at Ismaila in Egypt; GFW, Ambala, India; GFV, Bagdad, and lastly, but not least GEO, Singapore—some excellent catches there.

Exciting though R.A.F. stations may be I find the American airlines far more so. To obtain full benefit from these transmissions a map of the United States is desired. With the aid of this and your radio set you can follow the journey of planes across the "States" and this, I assure you, is a good DX achievement as well as an interesting pastime.

Many of the air-ports and landing fields operate upon long as well as short wavelengths. Those you are most likely to hear are WEEA, Atlanta; WAJD, Jackson; KNBO, Kansas City; KNBQ and KSD at Albuquerque, New Mexico; KGTJ, Salt Lake City, Utah, and KAFH, Durban, California.

These stations operate on 80, 60 and 53 metres.

## ● Aiding Aviation

Before concluding I would like to tell you of what may lead to new transmissions for you to search for—ultra-short wave ones!

When you have heard an aeroplane flying overhead in a fog have you ever paused to think what a problem awaits the pilot when he endeavours to land?

Having been "up" in a fog I can assure you that it is a very trying moment when with barely a sight of the airfield below one rushes downwards at speed. A slight mis-judgment of position or direction and the consequence may be far from pleasant. Radio is altering all this. You have probably heard Croydon inform aeroplanes of their position (obtained by direction-finding stations) on 900 or 41 metres. But that does not help him land. However, a radio

*(Continued at foot of next page).*

## THE S.-W.M. 5m. RECEIVER

LOCALITY AND ALTITUDE affect ultra-short-wave reception considerably, therefore a true idea of results cannot be given without some idea of the ground covered being given at the same time.

At Uxbridge, some fifteen miles from Alexandra Palace, reception was particularly good, and in almost any part of the town I could be sure of good loud-speaker reception from the television station however carelessly the aerial was erected. Perhaps I should add that the aerial used throughout my tests was a 132-inch affair. You may have read details of it in the April issue of THE SHORT-WAVE MAGAZINE.

### ● At High Wycombe

On the road between Uxbridge and Oxford reception rose and fell in accordance with the locality. At High Wycombe audibility was fair despite the fact that the town is more or less in a valley. Further on, at the top of the renowned Dashwood test hill, reception was excellent. Here we were, of course, well out of the service area, being as a matter of fact approximately thirty-two miles from London.

At Stokenchurch, which is on a kind of plateau, reception was still good although considerably weaker. We were now about thirty-six miles from Alexandra Palace.

The miles slipped by and when the outskirts of Oxford were reached, reception proved poor. We were, however, in a hollow and some fifty-four miles from London. At this critical moment the television station closed down.

scheme is being evolved which, when completed, will make flying and landing in a fog as safe as in the full light of the sun.

This is roughly how it is accomplished. The Bureau of Air Commerce in America is now installing a station in Oakland, California, that will operate on 3.3 metres. It will be modulated with a 60-cycle tone. The aerial is being arranged so that an egg-shaped field is radiated into the air.

This all sounds very complicated but, skipping the technicalities it means that when an aeroplane equipped with a special receiver incorporating a neon indicator is tuned to the ground station it reacts to the transmissions.

When the plane nears an airport it picks up the 3.3 metre transmissions and according to the angle at which the plane arrives the fact is indicated on the neon indicator.

### ● Safe Landing

If the aeroplane arrives to the left, and above the proper landing path the indicator clearly shows it

### ● Across Country

Our way led on past Cheltenham and Gloucester, down the side of the Severn, through Lydney and Chepstow. Near Cardiff, on the high land overlooking the Bristol Channel, the carrier only was audible; apparently no transmission was taking place.

The Cardiff and District Short-Wave Club turned out in force to meet us on arrival. They were very interested and remarked upon the neatness and compactness of the set. For a moment I wondered whether I was going to lose it!

At Ely the television programme came through faintly. Reception, I should add, was on a hill (overlooking Cardiff).

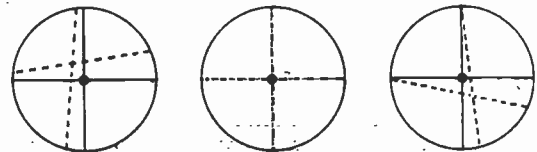
### ● Porthcawl and South Wales

At Porthcawl several faint carriers were heard on five metres, although that of Alexandra Palace could not be heard. Porthcawl is surrounded by hills inland; the Bristol Channel on the South is the only actual "free" side. At Newton (on a hill), about a mile from Porthcawl, Alexandra Palace signals were weak.

I gave the receiver a thorough test in South Wales and found reception quite decent on some of the mountains but nil in the valleys.

Generally speaking, the set showed off well for it was given a test that few sets would withstand. The mechanical side of the receiver was given a good test also for the journey was far from bumpless. Considering everything I say with certainty "O.K. for sound!"

(see Fig. 1). If it arrives to the right of the runway and below the proper landing path the effect is equally clear. It only remains for the pilot to manoeuvre his plane so that the indicator shows his



1. Plane to left of runway and above landing place.
2. Correct position.
3. To right of runway and below landing place.

position to be correct, and if he keeps it he will arrive on the field safely and without difficulty.

At present, as I said above, the system is in its infancy, but before long most airports will include their ultra-short-wave station—making interesting stations for the short-wave listener to search for.

# HOW TO UNDERSTAND A THEORETICAL CIRCUIT

FROM CORRESPONDENCE received it is evident that there are many readers who would construct their own receivers or take an interest in circuits published if it were possible for them to master the shorthand of wireless. To the newcomer these hieroglyphics appear so much beyond understanding that only those who have a very strong determination to master the starting point get through.

Efforts have been made to instruct the beginner by the use of illustrations showing the components in their respective positions and connected by lines representing the wiring. These (pictorial) circuits certainly will enable one to construct a piece of apparatus according to plan, but when this has been accomplished there is still to be read at some later date a theoretical circuit if it is intended to develop the hobby to that stage when every page of a radio magazine has some interest.

## ● What the "Theoretical" Shows

The man who can read a circuit scans through a book and sees at a glance the complete receiver or transmitter, is able to appreciate the designer's motives and of course immediately decide whether or no he is in a position to proceed with the construction. Perhaps the reader has certain components on hand and feels he would like to experiment by using them; he may see that a portion of say a three-valve receiver could be added to his existing one-valver; again, he may be inclined to incorporate features of several standard circuits into one of his own imagination.

No pictorial circuit will assist to the extent outlined above. There are many other reasons why only the theoretical form should be used; it must be used ultimately, so why not start now in the same way as did practically every hardened amateur?

## ● The Best School

The finest school of learning is still the old one—Determination. Remember that in the early days there were fewer opportunities of learning than to-day. Don't be afraid to ask questions: most radio clubs invite questions at their meetings, and if you feel that your problems would not be of general interest in open meeting there is always a member able and willing to advise.

Now the writer will endeavour to lead the prospective constructor through the apparent maze of curves and lines that in reality are a simple but efficient short-wave receiver, complete with valve,

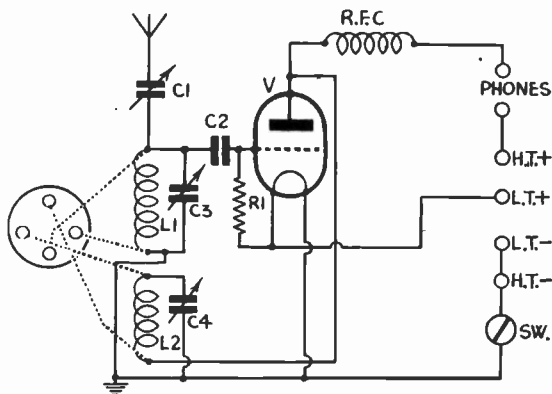
Many would like to make a start but cannot—Here's How!

headphones, H.T. battery and accumulator. The circuit you are shortly to understand is given below and a photograph of the completed receiver appears on the next page.

## ● Aerial and Earth

Before proceeding it should be pointed out that all straight lines represent connecting wires. Those lines must cross over one another at various points and to make this clear a half-circle is drawn. (There is one below C4.) If the lines crossed without this curve then a junction of the two wires would be indicated.

The two symbols representing aerial and earth are shown at the left side of the drawing. At the top, as would be expected, is to be found the aerial sign; the feed from aerial is connected to one side of the condenser C1, then straight down through coil L1 to



earth; the latter is represented by the short graduated horizontal lines.

In the photograph it will be seen that the top end of C1 is free. The aerial lead-in may be connected here, or if desired a short connecting wire could be taken from the condenser terminal to another terminal so that if it were intended to place the set in a box there would be no need to go inside to connect the aerial.

The same procedure applies to earth. In the original this connection was made at the terminal provided on the tuning condenser (C3): the lower point in the theoretical circuit or, referring to the photograph, the terminal at the centre of the lower left-hand condenser.

The preceding paragraph should make it clear that the earth may be connected to any point that touches the wires leading to the earth symbol; there are eight such positions. It will be well to pause here and try to locate these positions, remembering that after a wire has once reached a component (except the switch at lower right-hand corner) the earth line is ended. For instance, the small curve inside the valve (v) is apparently a continuation of earth, in fact it is the filament of the valve and the left connection is joined to the positive terminal of the accumulator.

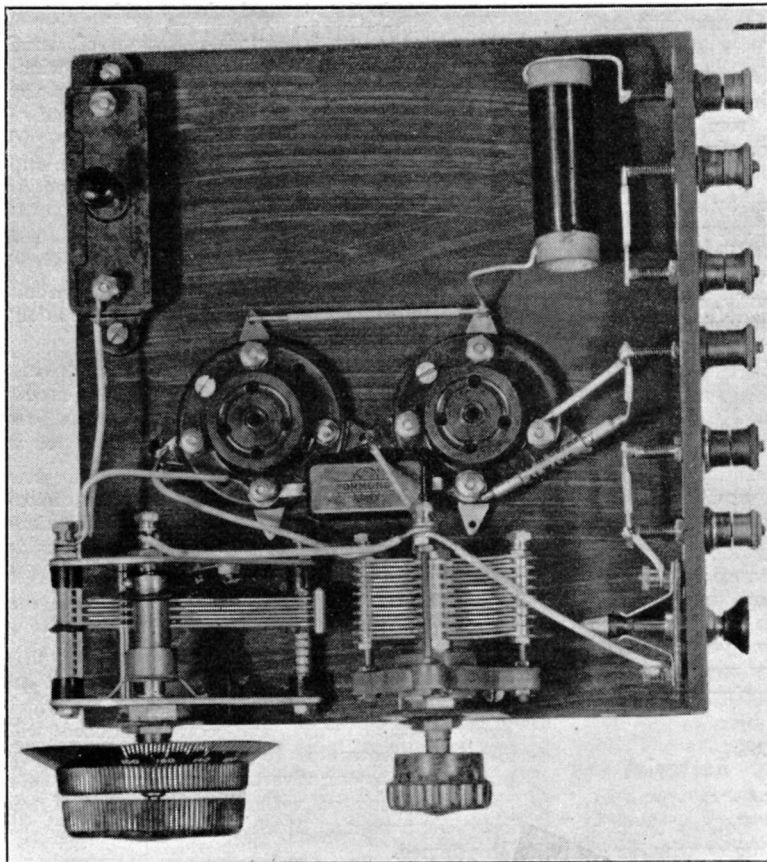
### ● Condensers (C) and Coils (L)

There are four condensers in this circuit, three with an arrow (which denotes that they are variable, for the purpose of tuning). C1 is termed an aerial pre-set, which without going into technicalities means that the aerial is tuned. Any type of variable condenser having a value approximating to .0001 microfarads will do, although the type shown at top left in photograph is generally employed for this purpose. There is a locking nut which holds the setting when the best position has been found.

Coil L1 (L stands for inductance coil and C signifies capacity or condenser) is not shown in the illustration but consists of a number of turns of wire on a former. On the same form is wound L2 which is the reaction winding. It will be apparent that there are four ends on these two coils which must be brought out for connection purposes. This is done in this instance by using a former with four pins arranged so that it may be plugged into a valve holder, seen just behind C3 in photo.

To the left of L1 and L2 in the theoretical circuit will be seen a circle representing the coil holder, which shows where connections are to be made. This is not usually given in circuits. It must be understood that the top of the grid coil (L1) is connected to aerial and the windings (both always in the same direction) follow the sequence as drawn here. However, often the reaction coil (L2) is drawn above L1.

Coming next to C3 and C4 you will have noticed that these two condensers perform the function of tuning the grid and reaction coils respectively. Both are known as air dielectrics: some form of insulation is necessary between the moving and fixed vanes of a condenser and in this case air is that insulating medium. Referring to the picture these condensers will be seen at the edge of the baseboard, side by



The variable condensers are mounted on brackets supplied with the kit of parts here illustrated and loaned by courtesy of A. L. Bacchus, 109 Hartington Road, London, S.W.8.

Priced at 12s. 6d. this kit offers an opportunity to the beginner to commence with small outlay. The components are all of high quality and full instructions are enclosed with each purchase. One coil and battery leads are included.

The terminal strip has been mounted at the side of the baseboard to assist in the production of a photograph that will show a resemblance to the placing of the components in the circuit.

A panel is generally made use of for mounting the condensers and switch, and the terminals mounted along the back of the baseboard.

side; C3 has a slow-motion device, but C4 is controlled by a straight drive.

C2 is a fixed condenser and the only one used in the circuit. It is known as the grid condenser and it usually has a mica dielectric. Metal foil is used for the plates and the value is in the region of .0001 to .0003; experiment will show variation of these figures to have a marked effect on reception.

This component will be seen between the coil and valve holder, and direct connection has been made to the terminals, thus avoiding the use of wire as seems necessary in the drawing. The reason for this is not economy, for all grid wires must be as short as possible. Yes, I am coming to this "grid" in a moment.

### ● The Valve

The centre circle with a V at the side is the valve. In our case we are concerned with one having four pins: two for the filament, which are connected to the two terminals of the accumulator, (it does not matter which way round); one pin each for the grid and plate or anode.

Choose a valve of the HL class for this simple detector circuit. An HL2 is designed for use with a 2-volt accumulator; note the significance of the figure 2 in the specification of the valve manufacturer. AC/HL is a similar valve for use with A.C. mains.

Referring again to the circle drawn at the side of L1, you will find the four pins are irregularly placed. The pin standing furthest away from the others is the anode connection, the grid pin is directly opposite, whilst the filaments are the two remaining.

Anode (or plate) is always shown by a horizontal short line inside the top of the valve symbol. The grid is the dotted line just below. The filament is represented by the half-circle. In A.C. valves the filament is shown somewhat differently, nevertheless it should now be obvious when studying an A.C. valve theoretical.

### ● R and RFC

Returning to C2 it will be seen that there is a further connection to the grid of the valve (R1). This is the grid leak and is a resistance of about 3 megohms, here again experiment provides interesting results, sometimes the value is ten megohms.

The 'phones are connected to anode via a component that appears as an inductance; this is so, but there are many turns of wire here, usually about a hundred of fine wire on a ½-inch former. Radio-frequency choke explains the letters over this inductance, although you may sometimes see it described as H.F. choke (HFC). If purchasing obtain one suitable for short waves.

### ● Method of Connecting up Batteries

Six points are shown on the right side of the circuit and the practical illustration defines them as terminals. It is left to the constructor whether or

no he uses terminals. It is much the best way to do so, thus saving straggling wires all over the inside of the set.

Should it be decided to connect up without terminals join the negative (—) side of the earphones to the free end of the choke, the other side (+) could be plugged into the HT + tapping (60 volts was used for this set).

The accumulator positive goes to the filament pin of the valve that is connected to the grid leak; the negative to the free side of the switch, which is simply a means of breaking the LT supply and even this is not necessary if you choose to remove a connection from the accumulator when normally you would have switched off. The HT battery negative is joined to LT--.

Negative is usually black and positive red, the symbols are plus for positive and minus for negative in battery connection. HT = high tension, LT = low tension.

### ● Series and Parallel

C1 and C4 are in series with the aerial and reaction coil respectively; C3 is in parallel or "across" the grid coil.

Sometimes the grid leak is placed across the grid condenser, this is then termed a leaky grid.

You may care to try another system of aerial coupling by removing C1 and adding another winding of about six turns above the grid coil, the top end is now the aerial terminal and the lower end of this coil is joined to earth. The top end of the grid coil is now only taken to the tuning condenser and grid leak. This form of coupling is known as aperiodic.

### ● Points to Remember

Always make wires connected in the grid circuit short, with this object in view the components should be placed to make this possible.

Variable condensers should have their moving plate terminals connected to earth, or if the circuit does not show a direct connection to earth then join the moving plates to whichever of the two wires is at lowest potential.

As an illustration, imagine that C1 is an air dielectric condenser for a moment. You would therefore connect the spindle to the top of L1; HT plus is the highest potential, earth is the lowest.

Phones become demagnetised if connected the wrong way round.

It is hoped that readers will write regarding this article if they have any comments to offer on its presentation. It is our desire to assist the beginner in every possible way, and correspondence will decide if the feature is to be continued. In the meantime write to our advertisers for their catalogues to become acquainted with the appearance of the various components. Much useful knowledge is thereby gained,

# ULTRA-SHORT WAVES FOR RAILWAYS

By B. K. COOPER

BRITISH main-line railways have recently been testing telephony equipment with a view to its adoption for various operating purposes. One company tried it out for issuing instructions to engine drivers in a large shunting yard; another experimented with the exchange of messages between signalmen and moving trains; a third is considering the use of radio for providing ordinary telephone facilities for passengers on crack expresses, who could thus be placed in touch, as they travel, with any telephone subscriber in the country.

## ● Ultra-Short Waves

These trials have been conducted between five and two metres, as wavelengths in this range are unaffected by fading when trains pass through tunnels, cuttings, and bridges; nor is reception marred by interference from electrical machinery—an important point in view of the spread of main-line electrification.

The instruments used have been of a simple, light-weight type, in which the same valves act for transmission or reception. When receiving, the circuit comprises a detector and pentode output. To transmit, the change-over switch alters the circuit so that the detector valve becomes the oscillator, and the pentode serves as modulator. Power is taken from a 180-volt H.T. supply and a 2-volt accumulator.

A guaranteed transmission range of 30 miles is given. Much greater distances have, of course, been covered when conditions are favourable, and during laboratory tests the instruments have picked up signals from police cars in the U.S.A.

## ● Overseas Tests

A portable type of this combined receiving and transmitting equipment was recently demonstrated on Epsom Downs to the London representatives of important Indian, African, and South American railways. In India, it has already been decided to equip the Vice-Royal train with ultra-short-wave telephony sets of similar pattern.

Other uses for which overseas railways are now considering the use of radio are to call for assistance and instructions when trains break down in lonely country; and to allow permanent-way gangs working in isolated districts to keep in touch with headquarters. Light, portable radio sets would also be of great service to surveying and construction parties. Such equipment is compact enough to be carried on the back, so that in bridge building much time and possible danger could be saved by the engineer in charge speaking to his foremen by radio,

instead of sending a messenger scrambling over a dizzy network of girders.

## ● Likely Uses

In this country, the most extensive use of radio for railway working would probably be in goods yards and other places where much shunting takes place. Ultimately, its application to train operating is already envisaged, for at present a very elaborate telegraphic network has to be maintained for the exchange of messages between district traffic controllers and signalmen; and for the reporting of train movements from strategic observation points.

A radio-equipped train could, of course, itself report its progress from time to time, and so relieve signalmen and stationmasters of an addition to their already arduous responsibilities. In the United States certain trains on one important railway were equipped with transmitters even before the days of broadcasting, but, messages being sent in Morse, trained operators had to be carried, and the scheme was abandoned. It will be interesting to see whether the availability of simple short-wave telephony equipment will cause its revival there and elsewhere.

## CHEMICAL EARTHS

PERHAPS you have noticed that by some strange mental aberration, the man who will give the greatest care to the design of his aerial is often guilty of remaining content with an earth system which has been given little or no attention for years. An efficient earth is a very definite asset when squeezing the last ounce from a receiver and a reminder is not out of place to those using a direct lead to ground that the season, by the calendar at least, is upon us when dry soil may cause a loss in earth efficiency.

After so many months of rain one might well be forgiven for temporarily forgetting the value of chemical earths. Almost any chemical having moisture-attracting (hygroscopic) quality may be used; the one danger to bear in mind is the possibility of the chemical causing corrosion. This can usually be avoided by careful choice or proper precaution in the arrangement of the earth system. Most of the sodium crystals can be used with advantage—sodium sulphite is cheap and readily procurable, and the homely rock salt or ordinary table salt can be employed with equally good effect.

Copper sulphate is also useful to provide a metallic element in the surrounding earth, but copper filings make an excellent substitute with less risk of harming the metal.



# Reflected Waves and Side-splash

in other words—All Sorts of Things

THERE IS MUCH spadework still to be done in educating the general public to the real significance of short-wave listening. Astonishing as it may seem there are undoubtedly a vast number of broadcast listeners who fail to realise that a new world of radio entertainment awaits them on the short-wave "broadcast bands, apart from the frequent thrills of hearing big liners, aircraft, trawlers, police cars, amateur transmitters, etc. Even for the radio-man hardened by years of short-wave listening there is still a thrill in logging a midget-powered transmission from the other side of the globe. With the simplest receiver, by choosing the right wavelengths at the right times, you can be certain of "something different" to absorb your interests at any hour of the day or night. Those who have built the *SHORT-WAVE MAGAZINE* one-valve can well testify to this, and there is now an abundance of good commercial all-wave receivers. But the general public are not yet fully short-wave conscious.

Maybe your experience in attempting to introduce short-wave listening to others has been similar to my own. Often when I have asked visitors to listen to a particularly good catch and carefully explained the distance and low power in terms I expect them to appreciate, I have taken note of their reactions. Either they get the impression that a neat conjuring trick has been worked or they seem to mentally explain it away—"He's been at it for years and ought to be pretty expert by now." Perhaps my most mortifying experience in this connection happened some years ago, when any DX transmission was considered rather unusual, a bright young thing said, "Uncle Tom worked that one on us at our Christmas party; he got someone to do it from one of the bedrooms."

## ● An Exhibition Suggestion

A large proportion of short-wave fans, like myself, graduated from broadcast set construction. Perhaps for the benefit of youthful readers I should remind them that thirteen or fourteen years ago we got a very real kick out of building sets that would actually get "foreigners," which was no mean feat in those days. However, as I was saying, we graduated from early broadcast set construction which might possibly explain the false impression still persisting in some quarters that radio is a winter hobby only. Whilst that may be true of ordinary listening it certainly does not apply to short-wave work. Actually it is one of the few interests which enjoy a round-the-calendar season. Maybe the Radio Exhibition, carefully timed each year to be staged at the threshold of the fire-side season heightened that impression.

Mention of the Radio Exhibition (Southerners are inclined to think of Olympia only) reminds me that

what was once the Great Event for the amateur seems annually to push his interest further in the background. A special annexe to the Exhibition (an extra sixpence for admission perhaps) would not come amiss, where receivers, especially the long-awaited British communication type, and apparatus solely for amateurs would be on view. Mr. Everyman and his wife and family could then choose their broadcast receiver (with the nice dial and cabinet to match the new suite) in peace, and the harassed salesman, usually with an amazing lack of technical knowledge, would be spared the embarrassment of being unable to answer the questions of the too inquisitive amateur. The amateur, in turn, instead of becoming entangled with the families and mere sightseers only to find that the things of interest to him are dotted all over the place, would be able to examine them without a crowd of non-technical people standing around and wondering what that queer thing is and upon being told, saying, "Oh!" and passing on. It certainly sounds an idea, separating the amateur from the ordinary listener, and may seem strange coming from one who, in the first few lines, advocated making the latter short-wave conscious. Which only goes to prove that the division between amateur and broadcast listener is not quite so wide after all. Just as the amateur for many years led in broadcast set construction so has he paved the way in the short-wave field.

## ● Circuit Reading

In some quarters a certain amount of opprobrium attaches to the terms B.C.L.—it depends quite how it is used. The other day I heard a very original definition: "A B.C.L. is a chap who can't read a circuit diagram." I thought of this when the Editor told me he has received quite a number of letters from readers asking for pictorial diagrams and I have met scores of people who tell me that when they run up against a circuit they give up in despair. Let me first admit that I get positively infuriated at the sight of a pictorial diagram, and many amateurs I meet assure me that they feel the same way about it. To the technically minded a mass of drawings linked up by wires disappearing behind this and re-appearing disconcertingly behind that, and then criss-crossing like a wire fence, has to be translated to a circuit before it can be understood. The art of circuit reading is easily learned, and once acquired, one soon learns not merely to understand the circuit but actually to read it. Like shorthand, it may seem a little bewildering at first, but once the idea that the lines are wires linking up certain symbols representing valves and components the rest comes easy. Surprisingly enough, I have often noted that those who want everything explained

pictorially are the most irritated by the picture diagrams once they become circuit-minded.

I learned circuit reading in the very early days when it was a matter of Hobson's choice, but I cannot recall letting it puzzle me for very long. Electrical circuits were depicted that way long before broadcasting was thought of. In the early days there was no easy way of acquiring technical knowledge and amateurs were few and far between. You had to find out things for yourself (the "expert" knew precious little more than you did) and a mighty expensive way it was too. After an "apprenticeship" of that nature perhaps I may be forgiven for being just a little contemptuous of the pictorial form of circuit description, but believe me, you will find it quite easy when you really get down to it. Like the dive off the top-board, once accomplished you wonder why you were so scared before you started. I hope you will interpret all this as encouragement, it is intended to be so. Once learned, it will be of permanent value to you and if you have ever found anyone who can read a circuit quickly from a picture, write and let me know!

### ● Join a Club

It is astonishing how quickly the veriest novice absorbs radio craft by mixing with radio-minded people such as one finds in a progressive radio club. There is a very real freemasonry in the radio world and should you have any difficulty in understanding circuits or the other little perplexities confronting the not-very-advanced amateur, you will usually

find your fellow members only too willing to assist. Of course, if you are unfortunate enough not to be served by a local club, or if you run up against a really knotty problem, the technical staff of this magazine is at your service.

The American manufacturer with a much greater market on his door-step holds a very definite advantage, and a few years ago amateurs in that country had a far wider range of apparatus available to him than the British experimenter. With the enormous increase in the popularity of short-wave work in this country in the last couple of years or so that difference is rapidly disappearing. A very fine range is now readily obtainable over here, but there are occasions when you need something you just can't get. Such an experience was mine very recently. I wanted a first-class slow-motion dial with scale engraved, but without numbers or station-names. A dial of this description, suitable for easy calibration, has so many obvious uses that it is rather strange that, as far as I can trace, there are none available. However, conditions for the amateur are definitely looking up. Radio shops which for some time past have carried little or nothing in the way of components, are doing good business in the short-wave lines, and coming events cast their shadows before them. This coming season will see even greater activity than ever in the short-wave world.

*Genere Yap.*

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# Summer Listening

A Summary of the  
Past Month's activity

By CHARLES WHEELER

DURING THE PAST MONTH conditions have been somewhat variable; however, the high spots have made amends for the dull ones.

## ● News in English

The increased use of English on the short waves has brought with it English news bulletins from all corners of the earth. RW59 was one of the first, and still calls upon the "Workers of the world." DJC, "next-door" on the 49-metre band, provides an amusing contrast, and by switching from one to the other it seems that Berlin is contradicting everything Moscow says.

Latest amongst the Europeans is Prague (OLR3A) on 9,550 kc., whose English news is given at 21.00. As might be expected with 30 kw. he is a sure R9 + .

To go farther afield, the Japanese stations give English news daily at 19.30; and HS8PJ, a rather more difficult catch, does so at about 14.00, when he is on.

Of the W's, by far the best is WIXAL, 11,790 kc., who relays a really good bulletin from the offices of the CHRISTIAN SCIENCE MONITOR at 21.30. The news from most other U.S.A. sources is rather amusing but not very enlightening. The showmanship is good, but the news value doubtful.

## ● Spain

At the outbreak of war, every radio transmitter in Spain was brought into use as a means of spreading propaganda of an appropriate hue. As time went on they were sorted out a little, and can now be relied on to some extent.

All the more powerful stations are in the hands of the Government. Those belonging to the insurgents operate mainly on the 40-metre band.

UGT (Madrid), also heard through EAQ, gives a varied musical programme with frequent news, but the quality is very poor.

EAQ2 is a newcomer on 9,485 kc. The slogan is "La Voz España," or, during English programmes, "The Voice of Spain."

An unknown station was heard here a few weeks ago on about 5.9 mc. His sympathies however were plain, as he closed down with "Viva España. Viva Franco!"

## ● Round the World

A world-tour sounds an expensive form of entertainment, but you can go for one any day.

Starting about 08.00, our first call is Australia. VK3LR or 2MF if it is a Sunday—both are well

heard. The next part of the journey is not until 18.00, when we visit Africa to hear the almost B.B.C. tones of the announcer at 7LO, Nairobi. By this time W2XAD or 3XAL will be putting in strong signals, and we have visited three continents. The present Japanese stations JZJ and JVM have made Asia easy to hear. South America does not offer much choice in the early evening, but LRU can sometimes be heard; and then back to London to hear Big Ben.

## ● U.S.A.

The loudest and most consistent U.S.A. station is still W2XAD who has recently increased his hours on the air, and is now on until 11 p.m. This station is almost always R9—R9 + all his transmission.

W3XAL is a close rival and can be heard very well on 17.780 kc. during the afternoon. W9XAA is not often received well, but "The Voice of Labor" has been heard on both 25- and 49-metre bands comparatively early in the evening.

W2XE is now coming in quite well during his 16-m. hour, and has been heard on 13 m. The 19-m. transmission is greatly improved, and although W2XE uses only 10 kw., compared with W8XK's 40, he is frequently received better than that station. Broadcasts also take place on 25 m.

W1XK is seldom a good signal before 22.00, although heard much earlier. W3XAU has been very weak for some time, and W2XAF has fallen off. All the W's on 49 m. except WXB and 9XAA can be heard fairly easily. W8XAL (Cincinnati) and W9XF (Chicago) remain until 07.00, when they are heard quite well.

There seems to be considerable activity below 10 m., particularly on 31.6 mc., where no less than five W's are operating, now that W3XES (Baltimore) has moved there from 36.6 mc. However, the very high frequencies have been extremely quiet lately in my QRA.

## ● South Americans

The Venezuelan stations have proved very confusing lately, for hearing new calls I naturally concluded there were several new stations on the air. Actually, the Venezuelan government has adopted a system of six districts for their calls, and changed the old ones.

Some of the more familiar are YX3RC-5RD, 6RV-4RB and 7RMO-1RD. YV5RP is a fresh station on 6,270 kc. relaying YV5RQ. Owned by Radio Philco, he verifies promptly.

Colombia has been heard best through HJ1ABP on 9,600 kc. This station makes English announcements and sends a very attractive card in return for reports.

PRF5 (Rio de Janeiro) gives transmissions in English and French between 22.00 and 23.00, which are well heard here.

LRU (Buenos Aires) has moved to 9,660 kc., and "Radio El Mundo" (LR1YLRU) can be heard by 21.00. This is not LRX, who is listed on that frequency.

I only heard Peru once last month; OAX41 at Lima, working on 9,520 kc., is the station. The States are having better luck and report hearing OAX4D, 5,780 kc.; -4J, 9,340 kc.; -5A, 11,800 kc.

The latest Mexican—XEUZ, 6,120 kc.—has proved the easiest way of hearing Mexico. "Radio Nacional" continues until quite late in the morning.

Cubans have been active as usual, COCH, COCQ and COCX, all receivable before 21.00, COCO a little later. Each Sunday from 06.00 to 08.00 a special DX programme in English is radiated from COCD (6,130 kc.). The power is 250 w., but reception is extremely good.

A really difficult Central American to log—TGWA (Guatemala City)—has been heard giving the call in English at 06.00, Sunday; and a card verification has been received here.

Both VP3BG (6,130 kc.) and VP3MR (6,010 kc.) in Georgetown, B.G., give interesting programmes, when QRM and QRN permit their reception.

### ● New Australians

VK2ME is not deserving its name—the "Voice of Australia"—for he has been coming in at lower strength than 3LR. The latter has been particularly good of late. 3ME has still avoided my log however.

VK6ME (Perth, W.A.) has been heard testing on 9,590 kc. Six new stations are planned by the Australian Government, and it is proposed to increase the power of their existing station—VK3LR.

### ● Amateurs to the Rescue

Very often it is difficult to hear any broadcast from a certain country. Then turn to the 20-metre "ham" band. For instance, only one Peruvian broadcaster has found its way into my log, yet there are several OA hams. One of these—OA4AI—gave quite a good programme of records on April 3 at about 08.00 G.M.T.

When VK2ME has been R6 there have been literally dozens of VK's on 20 m. VK2XU and 3MR are perhaps the most consistent. The former uses 22 w.!

Although CRCX has been the only Canadian B.C. received well, amateurs in the Eastern Provinces can be heard at any time.

Among hams in countries not possessing short-wave broadcasting stations are VO6L (Labrador), YR5AA (Roumania), VP6YB (Barbados) and SUIKG (Egypt), but you'd think Manchester!

I shall be glad to hear what your fortunes have been, and wish you good DX until next month.

## THE "HAM" BANDS

by a Listener

DURING THE last year the number of "hams" has increased tremendously, and the ranks of S.W.L.'s have swollen even more rapidly. As one of the latter I wander from broadcast to ships, from police to aeroplanes, but in the end I usually find myself on one of the "ham" bands.

Variety, they say, is the spice of life, and the amateurs certainly give it to us. Often you are listening to a weak local when a terrific heterodyne jams your station; ten chances to one it is thousands of miles away. The unexpected is always cropping up, and one can often make a fine DX catch when the whole band has seemed dead for hours; my only two Mozambique stations were heard on such occasions.

During the recent floods in U.S.A., I heard W9—call "QST, QRT, QRR," which when translated means: "All American stations should close down except those operating emergency traffic." This left the band comparatively clear, and messages from the Ohio and Mississippi valleys were heard as clearly here as in New York.

It is very pleasant to see on one's wall a card from a broadcasting station using only a few kilowatts, but very much better is one from a station using as many watts. The hams provide these, that is, if you are lucky enough to get one at all. Not so long ago I had from VU2AU a "veri" giving his power as 10 watts, and another from VS6AX with 20 watts. Except for W6's and 7's no amateurs use more than 1 kw., and these do not officially; the most QRP of all seem to be the Asiatics—VS's and VU's, while South Africans rarely use above 50 w.

The informality which regular broadcasting lost years ago is still preserved. The system of using words to prevent ambiguity in giving a call can sometimes be very amusing, and the W's make the best of it. As a result one hears: "5 eat better peanuts," "4 dark lean horses," and "one dam quick kid." What PAOX1JZ would call himself I don't know!

The question of obtaining QSL cards is always cropping up. Why didn't I get a card from XYZ? How it is so-and-so heard from ABC, and I didn't? A little thought will save some disappointment, if not all. Naturally a station only a few miles away doesn't care if you did hear his 20-metre phone: then again a DX station who has contacted your district many times is not interested to hear he has got out once more.

There is nearly always something doing on 20 m., but a fine summer morning is the best time of all. Australians, S. Africans, Pacific Coasters all come in together, and on phone. However, a knowledge of C.W. is very helpful, and will make your log much more interesting. In the winter 80 m. provides some good DX at times: VK's and ZL's have been heard there, but more usual are East Coast U.S.A. stations. As for 40 m., everything is there if you can get at it beneath the locals.

## BROADCAST PROGRAMMES FOR JUNE

(a) W2XE (Wayne)	21,520 kc,	13.9 m.	(h) 2RO (Rome) ...	11,810 kc,	25.40 m.
(b) " " " "	17,760 kc,	16.8 m.	(i) " " " "	9,635 kc,	31.13 m.
(c) " " " "	15,270 kc,	19.6 m.	(j) TPA2 (Paris) ...	15,243 kc,	19.68 m.
(d) W3XAU (Philadelphia)	9,590 kc,	31.2 m.	(k) TPA3 ...	11,885 kc,	25.27 m.
(e) " " " "	6,060 kc,	49.5 m.	(l) TPA4 ...	11,720 kc,	25.60 m.
(f) W3XAL (Bound Book)	17,780 kc,	16.8 m.	(m) W1XAL (Boston)	11,790 kc,	25.45 m.
(g) " " " "	6,100 kc,	49.2 m.	(n) " " " "	6,040 kc,	49.67 m.

### SUNDAY

- a.m.
- 9.00 Gramophone Records (daily) (k)
  - 9.15 News in French, English and Italian (daily) (k)
  - 11.00 Concert—relayed (daily) (j)
  - 11.43 Various Programmes from Italian Stations (daily) (h)
- p.m.
- 12.00 News in English (daily) (j)
  - 12.15 Concert—relayed (daily) (j)
  - 1.00 Organ Reveille (a)
  - 1.20 Mediterranean Hour (daily) (h)
  - 1.30 Lyric Serenade (a)
  - 1.45 Radio Spotlight—The Week in Preview and News of the Stars (a)
  - 2.00 "Coast to Coast on a Bus"—programme for Children with Milton Cross (f)
  - 2.00 "Sunday at Aunt Susan's"—Children's Programme (a)
  - 2.20 Gramophone Records (daily) (j)
  - 2.30 Concert—relayed (daily) (j)
  - 2.55 Press Radio News (a)
  - 3.00 Church of the Air (a)
  - 3.00 Russian Melodies, directed by Alexander Kiriloff (f)
  - 3.30 Children's Hour (a)
  - 3.30 "Give us the Funnies"—Variety Programme (f)
  - 4.00 Press Radio News (f)
  - 4.20 Varied Programme for Italian East Africa (h)
  - 4.30 Major Bowes' Capitol Family—Dalton Brothers, Helen Alexander (Coloratura Soprano), Nicholas Cosentino (Opera Tenor), Edward Matthews (Baritone), Charles Magnante (accordionist), Sam Herman (Xylophonist) and Waldo Mayo's Orchestra (a)



**Jimmy Donnelly and Janice Gilbert, of N.B.C.'s popular dramatic sketch programme, "The O'Neills."**

- 5.00 Concert—relayed (daily) (k)
  - 5.30 Radio City Music Hall (f)
  - 5.30 Salt Lake City Tabernacle Choir and Organ (b and d)
  - 6.00 Church of the Air (c)
  - 6.20 Varied Programme from Italian Stations (i)
  - 6.30 News Report (f)
  - 6.40 Our Neighbours—Jerry Belcher interviewing families in their own homes (f)
  - 7.00 Magic Key Symphony Orchestra, directed by Frank Black (f)
  - 8.10 News in English (daily) (k)
  - 8.30 International Broadcast from B.B.C. (f)
  - 9.30 Variety with Jerry Sears and his Orchestra (f)
  - 9.30 Devotional Period (m)
  - 10.30 Guy Lombardo and his Orchestra (c and d)
  - 11.00 Joe Penner (Comedian) with Gene Austin (Radio and Screen Recording Artist) and Coco and Malt (Harmony Team) with Jimmy Grier's Orchestra (d)
  - 11.00 The World's Week (m)
  - 11.00 Echoes of New York Town (f)
  - 11.15 Concert from Radio Paris (l)
  - 11.30 Rubinoff, Jan Peerce, Virginia Rea and Orchestra (d)
  - 12.00 Columbia Workshop (d)
- p.m.
- 12.30 Phil Baker : Oscar Bradley's Orchestra (d)
  - 1.00 "1937 Edition of Twin Stars," Victor Moore & Helen Broderick (e)
  - 1.30 Eddie Cantor with Bobby Breen, Deanna Durbin, Jimmy Wallington and Jacques Renard's Orchestra (from Hollywood) (e)

- 3.00 Gold Medal Feature Time—"Betty and Bob" (dramatic sketch); "Modern Cinderella" (dramatic sketch); Betty Crocker (Cooking Expert); Hymns of all Churches; and John K. Watkins—News (daily, except Saturday and Sunday) (a)
- 3.15 "Ma Perkins"—dramatic sketch (f)
- 4.00 Magazine of the Air (a)
- 4.00 "The O'Neill's"—dramatic sketch (daily, except Sunday and Wednesday) (f)
- 4.15 Personal Column of the Air, featuring Inez Lopez) (daily, except Sunday) (f)
- 4.20 Italian East Africa—News in Italian; Orchestral and Vocal Concert (daily, except Sunday) (h)



**Col. Major Jack, one man variety show. A C.B.S. Monday feature.**

### MONDAY

- p.m.
- 12.30 Organ Reveille (daily except Sunday) (a)
  - 1.00 Morning Almanack (daily except Sunday) (a)
  - 2.00 Metropolitan Parade (a)
  - 2.10 French Women's Chronicle—by Mrs. Decaris (j)
  - 2.00 Near and Far East—News in English and Italian, and Concert of Music (daily, except Sunday) (h or i)
  - 2.30 Richard Maxwell—Songs of Comfort and Cheer (daily, except Sunday) (a)
  - 2.40 Press Radio News (a)
  - 2.45 Bachelors' Children (daily, except Sunday) (a)
  - 2.55 Press Radio News (daily, except Sunday) (f)
  - 3.00 Tim Healy—News Commentator (daily, except Sunday) (f)

- 4.30 "Vic and Sade"—Comedy Sketch with Art Van Harvey, Billy Idelson and Bernardine Flynn (f)
- 4.30 "Big Sister"—Dramatic Sketch (daily, except Sunday) (a)
- 4.45 Dr. Alan Roy Dafoe (a)
- 4.45 Edward McHugh — the Gospel Singer (f)
- 5.00 "The Gumps"—Dramatic Sketch (daily, except Sunday) (b and d)
- 5.15 Your News Parade (daily, except Sunday) (b and d)
- 5.30 "Romance of Helen Trent"—Dramatic Sketch (daily, except Sunday) (b and d)
- 5.30 Arabian Hour—News in Arabic; Concert of Arabic Music (daily, except Sunday) (h)



**Miss Patti Chapin, songstress.  
Heard over C.B.S. 11 p.m. Thursday.**

- 5.45 "Our Gal Sunday" — Dramatic Sketch (daily, except Sunday) (b and d)
- 6.00 Five Star Revue—Variety Programme : Morton Bowe (Tenor), Meri Bell (Popular Songstress), Ray Sinatra's Orchestra, and Bill Johnstone (Hollywood Reporter) (c and d)
- 6.30 "The Wife Saver"—Allen Prescott (c and d)
- 6.40 News in German (daily, except Sunday) (h)
- 6.45 Aunt Jenny's Real Life Stories (daily, except Sunday) (c and d)
- 6.55 News in French (daily, except Sunday) (h)
- 7.00 News Through a Woman's Eyes (c and d)
- 7.05 Varied Programme from Italian Stations (daily, except Sunday) (i)
- 7.15 Jack and Loretta—Songs and Pattern. Daily except Sunday (c and d)
- 7.45 "Myrt and May"—Dramatic Sketch (daily, except Sunday) (c and d)
- 8.00 Colonel Jack Major's Variety Show (c and d)
- 8.30 Relay (k)
- 8.30 "Pop" Concert, directed by Howard Barlow (c and d)
- 9.00 Club Matinee. Orchestra directed by Harry Kogen; Ransom Sherman, Master of Ceremonies. Sair Lee and Robert Getely, Cadets Quartette (f)
- 9.15 The Dictators (c and d)
- 9.30 Chicago Variety Hour (c and d)
- 10.30 The Singing Lady — Nursery Jingles, Songs and Stories (f)
- 11.00 News Reporter (daily, except Sunday) (f)
- 11.00 American Hour—News in Italian and English; Opera; 2RO Mail Bag (i)
- 11.05 U.S. Army Band—Capt. Thomas F. Darcy, Conductor (f)
- 11.15 Gramophone Records (l)
- 11.15 Four Stars, Girls Vocal Quartette (d)

- 11.15 News in English (daily, except Sunday) (h)
- 11.30 Press Radio News (daily, except Sunday) (f)
- 11.35 Sports Resume—Paul Douglas (daily, except Sunday) (d)
- 11.45 Lowell Thomas—News (daily, except Sunday) (f)
- a.m.
- 12.00 Poetic Melodies (daily, except Sunday) (d)
- 12.30 Modern Radio Course (n)

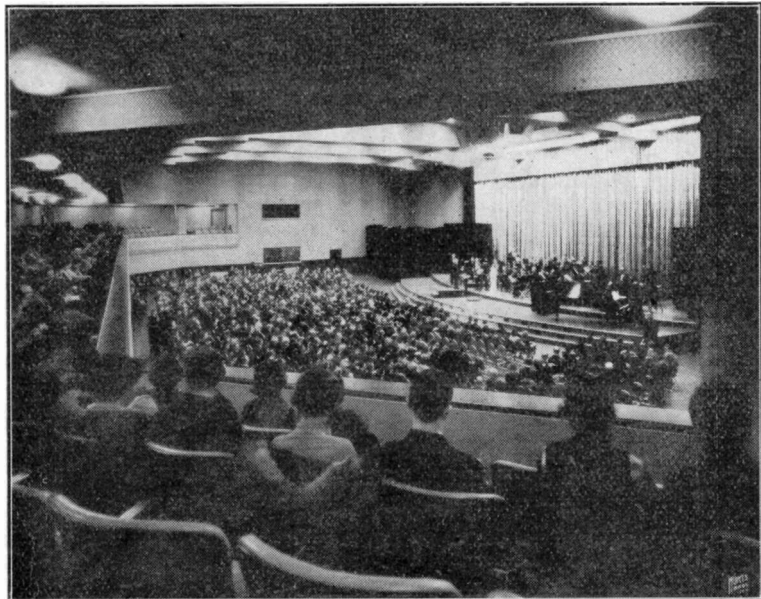
## TUESDAY

- p.m.
- 2.00 "Dear Columbia" — Fan Mail Dramatization (a)
- 2.10 Social Topics, by Mr. Rives (j)
- 2.40 Press Radio News (a)
- 4.15 The Quality Twins—Ed East and Ralph Dumke (a)
- 4.45 Eleanor Howe's "Homemakers' Exchange" (a)
- 6.00 Jack Berch and His Boys (c and d)
- 6.30 The Merry-makers (c and d)
- 7.30 N.B.C. Music Guild (f)
- 8.00 Bill Wright, Vice-President (c and d)
- 8.45 Have You Heard?—Dramatization of Interesting Facts (f)
- 9.30 Dog Heroes—Dramatization with Harry Swan (Author) and Charles Sorce (Tenor) (f)
- 10.00 Del Casino (c and d)
- 10.30 St. Louis Syncopators (c and d)
- 11.00 Patti Chapin—Songs (c and d)
- 11.00 News in English for North American Listeners (i)
- 11.05 Meredith Willson and His Orchestra (f)
- 11.20 Latin American Hour (i)
- a.m.
- 12.00 Harvard Glee Club Concert (n)

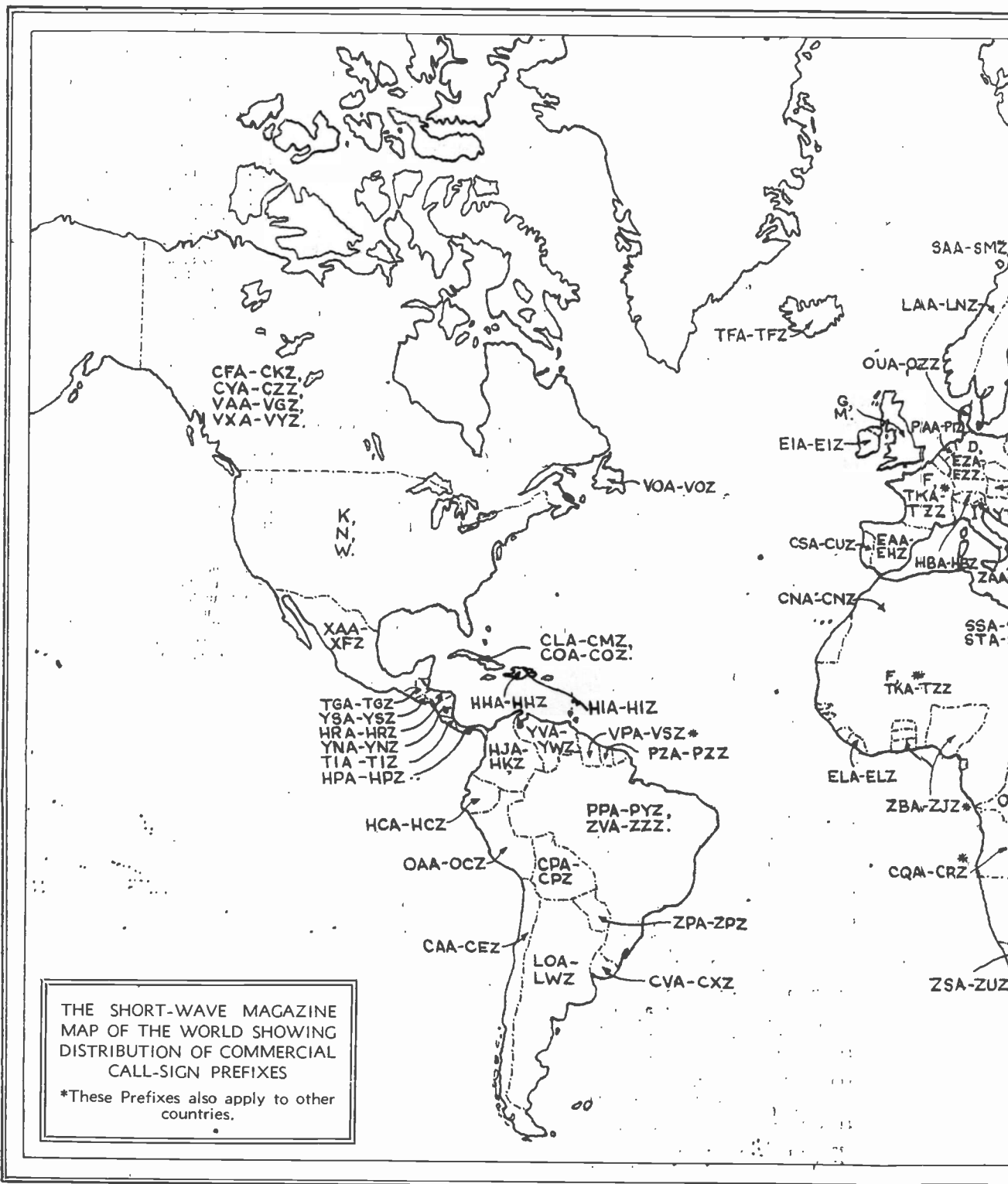
- 1.30 Al Jolson Show—with Martha Raye, Parkyakarkus, and Victor Young's Orchestra (from Hollywood) (e)
- 2.30 Jack Oakie's College—with Benny Goodman's Band, Collegiate Talent and Guest Stars (from Hollywood) (e)

## WEDNESDAY

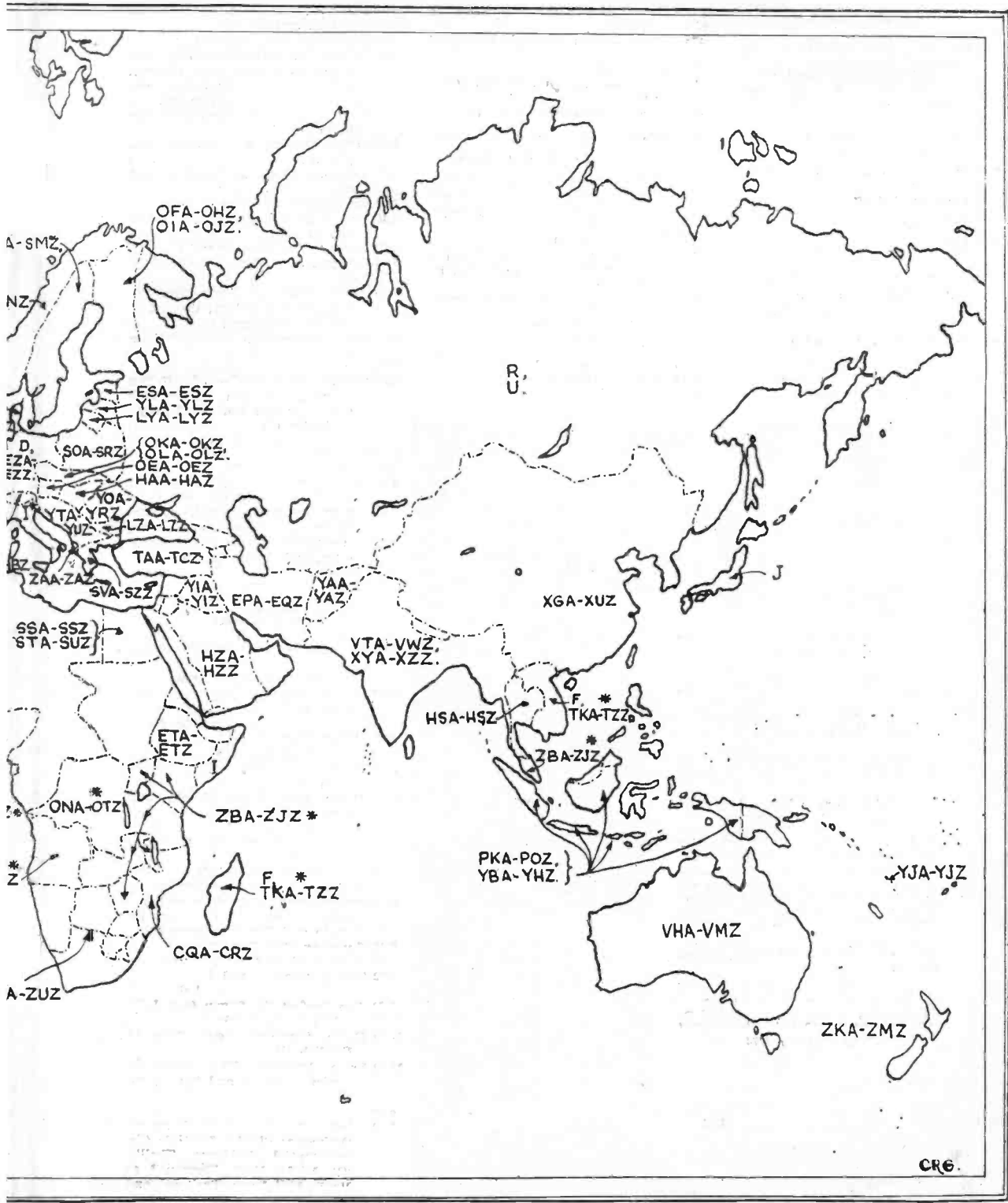
- p.m.
- 2.00 Music in the Air (a)
- 4.00 Magazine of the Air (a)
- 4.45 Dr. Allan Roy Rafoe (a)
- 6.00 Five Star Revue—Variety Programme : Morton Bowe (Tenor), Meri Bell (Popular Songstress), Ray Sinatra's Orchestra, and Bill Johnstone (Hollywood Reporter) (c)
- 7.00 News Through a Woman's Eyes (c and d)
- 8.00 Manhattan Matinee—Variety Programme (c and d)
- 8.15 Continental Varieties with Celia Branz (Contralto) (f)
- 8.30 Current Questions Before the House (c and d)
- 9.45 Academy of Medicine (c and d)
- 10.00 Re-Broadcast for Europe (m)
- 10.15 "Four Stars"—Mixed Quartet (c and d)
- 11.00 North American Hour—News in English (i)
- 11.00 Del Casino—Songs (d)
- 11.05 Harry Kogen and His Orchestra (f)
- a.m.
- 12.30 Time for Buddy Clark (d)
- 12.45 Boake Carter (d)
- 1.30 "Laugh with Ken Murray"—Ken Murray (Comedian), "Oswald" Shirley Rosee (Vocalist), Marlyn Stuart, and Sud Gluskin's Orchestra (e)



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## THURSDAY

- p.m.  
 2.00 As You Like It—Variety Programme (a)  
 2.30 Greenfield Village Chapel (a)  
 2.10 Life in Paris, by Mr. Henri Bellamy (j)  
 2.40 Press Radio News (a)  
 4.15 The Quality Twins—Ed Haste and Ralph Dumke (a)  
 6.00 Jack Berch and His Boys (c and d)  
 7.00 Ramble in Rhythm (d)  
 7.45 Piano Recital (f)  
 8.00 N.B.C. Light Opera Company; Harold Sanford, Conductor (f)  
 8.00 Bill Wright, Vice-President (c and d)  
 8.30 "Do You Remember"—Old Favourite Melodies (c and d)  
 9.00 Bob Byron—Piano and Patter (c and d)  
 9.30 U.S. Army Band (c and d)  
 10.00 Re-Broadcast for Europe (m)  
 10.15 All Hands on Deck (c and d)  
 11.00 Patti Chapin—Songs (d)

- 11.00 North American Hour—News in English (i)  
 11.05 Harry Kogan and His Orchestra (f)  
 11.20 Latin American Hour—News in Italian, Spanish and Portuguese (i)  
 11.35 Chuchu Martinez—Tenor (f)  
 a.m.  
 12.00 "Easy Aces"—Comedy Sketch, featuring Jane and Goodman Ace (f)  
 12.00 Poetic Melodies—Jack Fulton (Tenor), Franklyn MacCormack (Reader), and Carlton Kelsey's Orchestra (d)  
 12.45 Boake Carter (d)  
 1.00 A. and P. Bandwagon—starring Kate Smith, with Jack Miller's Orchestra (e)  
 2.00 Major's Bowes' Amateur Hour (e)

## FRIDAY

- p.m.  
 2.00 Metropolitan Parade (a)  
 2.10 Events of the Moment (j)  
 2.40 Press Radio News (a)

- 4.00 Magazine of the Air—Gretta Palmer and Guest (a)  
 4.45 Dr. Allan Roy Dafeo (a)  
 6.00 "Five Star Revue"—Variety Programme: Morton Bowe (Tenor), Meri Bell (Popular Songstress), Ray Sinatra's Orchestra and Bill Johnstone (Hollywood Reporter) (c and d)  
 7.00 News Through a Woman's Eyes (c and d)  
 9.00 Salvation Army Staff Band (c and d)  
 9.30 Among our Souvenirs (c and d)  
 9.45 Funny Things—Nora Stirling (c and d)  
 10.30 Doris Kerr—Songs (c and d)  
 11.05 Harry Kogan and His Orchestra (g)  
 11.05 North American Hour—News in English and Italian; Concert of Request Numbers (i)  
 11.15 Four Stars—Girl's Vocal Quartette (d)  
 a.m.  
 12.00 "Poetic Memories"—Jack Fulton (Tenor), Franklyn MacCormack (Reader), and Carlton Kelsey's Orchestra (d)  
 12.00 Mary Small—Songs (f)  
 12.30 HOLLACE SHAW—Songs (d)  
 12.45 "The Little Theatre" (n)  
 1.00 "Broadway Varieties"—Oscar Shaw (Baritone), Master of Ceremonies, Camela Ponselle (Mezzo Soprano), Elizabeth Lennox (Contralto), Victor Arden's Orchestra, and Guest Stars (e)

## SATURDAY

- p.m.  
 2.00 Summary of N.B.C. Programmes (f)  
 2.00 Ray Block at the Piano (a)  
 2.10 Judicial Talk by Mr. Henri Delmont (j)  
 2.15 Dalton Brothers—Male trio (a)  
 2.30 Mellow Moment (a)  
 2.55 Press Radio News (a)  
 3.00 Your Home and Mine—Bryson Rash (a)  
 3.30 "Let's Pretend"—Children's Programme (a)  
 5.15 Orientale (b and d)  
 5.30 George Hall and His Orchestra (b and d)  
 6.15 Bob and Vera (c and d)  
 7.15 Ann Leaf at the Organ (b and d)  
 8.00 "Down by Herman's" (c and d)  
 8.00 Teddy Hall and His Orchestra (f)  
 8.30 Ricardo and His Caballeros (f)  
 8.45 European Post Box (m)  
 9.00 Monitor Views the News (m)  
 9.00 The Dictators (c and d)  
 9.30 The Dancepatrons (c and d)  
 9.30 Ann Leaf at the Organ (c and d)  
 10.00 World's Youth Speaks (m)  
 11.00 North American Hour—News in English (i)  
 11.20 Latin American Hour—News in Italian, Spanish and Portuguese (i)  
 a.m.  
 1.30 Johnny Presents—Russ Morgan's Orchestra; Charles Martin's Circumstantial Evidence Thrills, "It Might Have Happened to You"; Phil Ducey (Baritone) and Mixed Ensemble (e)

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# WORKING DX WITH THE BATTERY TRANSMITTER

## Three Continents on Three Watts

MUCH TO THE amusement of our high-power friends we have, during the month, been putting the low-power battery transmitter through its paces. What a change coming down from 3,000 volts H.T. to battery supply!

I suppose most of those who have constructed this little transmitter would first like to know whether any DX was raised. Yes, it has now got three continents to its credit: Europe, Africa, and America. Not bad for three watts!

### ● Madagascar

The best contact so far has been with FB8AD (Madagascar), the best part of 7,000 miles, on an input of just over three watts, on 14,378 kc.! Pretty good going! FB8AD was raised by direct call, there being no question of first raising him with high power and then changing over, for the simple reason that it is the only transmitter working in the shack just now. And signals? Were they just readable or good? FB8AD reported them QSA5 R5 T9, so that's good enough.

The American worked was WIKAD, also on 14,378 kc., and this was at midday one Sunday. Our assistant editor had just called on me and was laughing at the rig so I said "Watch me raise a Yank with a test call." Of course he laughed more than ever at that, but you should have seen the expression of surprise on his face when WIKAD answered our very first test call!

Considering the poor conditions which have prevailed during most of the month, I do not think this performance is at all bad.

### ● Aerial

Many of the stations worked asked the type of aerial used. No, it's not one of those super, mile long arrays—we just haven't got room here. It was the new DX aerial described in our March issue. Incidentally we only know of one transmitter interested in it, and he is one of our best DX men. Apparently it looks too simple for most hams to try.

The aerial was connected three turns from the anode end of the coil on both 7 and 14 mc., this being found to give the greatest output. Output was estimated by touching a neon bulb on the aerial lead about three feet from the transmitter and lit up a standard "Osglim" 200 volt neon bulb. By standard I mean that it was complete with resistance—many of these bulbs are supplied without a resistance and so are more sensitive than those

with it. A thermo-milliammeter could be used, but not many of us can afford them. My smallest thermo reads  $1\frac{1}{2}$  amps so it is too large for use with this power.

Next month we are going to erect a doublet on 7 and 14 mc. and see what difference in results are obtained.

### ● 7 mc. Work

On 7 mc. many excellent QSO's were had with stations all round Europe, but readers are probably more interested in British stations so we will confine reports to home.

One of the best contacts was with G5RI, on Whit Monday, and in spite of the terrific QRM we had a two-hour solid chat, at the end of which my arm was nearly broken through pounding the bug at 30-odd w.p.m.

Other good contacts made were with G2RF, G8DR, G8FA, G6GSP, G6BIP, G2UP, G6ZN, G8IQ and G2VD. The usual crowd of Europeans including OH were easily worked, so it appears to be just the transmitter for the amateur of limited means.

### ● Valves

For all this work a HIVAC PP220 valve was used. The H.T. volts were 220, and the bias required by the valve amounted to minus ten volts. The rectified grid current was around 5 mils. on both frequencies.

An even more suitable valve would appear to be the HIVAC PX230SW, as its curve shows that it will handle rather more power than the PP220. One of these has been obtained and is at present being put through its paces. Rather more bias is required, the figure being in the region of twenty volts. This valve has the grid brought out to a top cap, and as the construction of the transmitter does not permit of advantage being taken of this feature, a lead was run from the terminal down to the usual grid socket of the valve holder. However, from preliminary tests it looks like giving even better results than the PP220.

### ● Power Supply

It was decided that the drain on ordinary dry batteries might be too heavy for the pockets of many amateurs, so a Milnes H.T. unit was obtained. As readers know, this can be charged up nightly from  
(Continued on page 25).

# On the Amateur Bands

## "Ham" News by G5GQ

WAY BACK before short-wave international DX began we used to have good fun with local 200-metre phone. If we were lucky we could get contacts a couple of hundred miles away, and although there was not the thrill of distance consistent working with a number of stations did, at any rate, create a feeling of close acquaintance.

### ● Phoney Phone

Transmission then wasn't a complicated business, loop or grid modulation being the average equipment. But the thing I liked about those old-time contacts was the lack of "mike fright," so prevalent to-day. We used to enjoy our chats, and operation was far snappier and more interesting than it is now. Operation was on the lines of "G2— replying to G5—" followed by the conversation and ending with "G2— over."

What a change there is in modern operation. No simple "G2— over" but "Take it back, old timer," "Passing it over to you," "K," and a heap more jargon, which, for the life of me I can't see the use of.

And then there is that expression "Hi." "Blew up two valves last week. Hi! Also two condensers. Hi! Hi!" and so on, ad lib. If we want to laugh why shouldn't we? The G.P.O. won't take away our licences, and if a joke is so poor that it needs a "Hi" to show that it is one, for heaven's sake don't let us inflict it on the poor unfortunates listening!

Let's forget all these absurdities and make our phone transmissions interesting. Anybody talking at the office the way some of the lads do "on the air" would be considered scatty, and that's just what listeners think of many of us.

### ● Key Consciousness

Key consciousness is another complaint, particularly with the new ham. Get the most garrulous acquaintance, put him at the key, and all he can say is "RST 559 WX FB QRU 73 VA." Why not treat the ham at the other end as if you were actually talking to him? Let rip with "What do you know?" or some other time-honoured opening, and nine times out of ten he will open up. Spend a few hours listening to W7AMX, VK2NO, or VK3EG, and you'll get the idea.

Talking about key consciousness, I was amused at the experience of a certain G station, noted for the duration of his contacts. Thinking that no one would bother to listen to his C.W. he was busy with an African station, discussing the latest additions to the chorus of a London theatre. After an hour or so of this, he signed off with the African and, on looking round the band, found an Aussie calling him.

Replying to the Australian he was informed that his previous conversation had been followed with great interest, and that, although it could hardly be considered radio, there were certain points which they would like him to explain at length!

And the moral? Always take the weights off the bug when the conversation warms up.

### ● Modulated Notes

Listening on 20 metres reveals that increasing use of modulated notes is being made. There is an excuse for ripple in the transmission of a newcomer, but none at all for the seasoned ham, and, unfortunately, it is these seasoned hams who are mainly guilty. Seems that they think modulation makes their notes distinctive and better for DX. Apart from the fact that such intentional modulation is strictly forbidden by the G.P.O., anyone with the slightest experience of crystal-gate supers knows that modulation reduces signal strength considerably. Modulated notes on this band take up far too many precious kilocycles and the noisy users of them are similar to the youths in crash helmets who drive sports cars flat out in second and yet would be scared to death if they were at the wheel of an honest-to-goodness racer with the rev. counter at fifty-five hundred in top. Colney Heath interceptor station would earn the gratitude of most transmitters if it reported these offenders.

### ● Money in Amateur Radio

Contact with manufacturers over a period of years had given me the impression that there was no money in amateur radio. Hams begged, borrowed, or built their gear, but rarely bought it, and so, from the manufacturing point of view were a valueless market.

This illusion of mine was shattered recently when a well-known ham supplier told me of some transmitters he was marketing at a figure of between £30 and £40. I remarked that he would never sell them to hams at that price and was most astonished when he informed me that he had sold dozens, and that his trouble was not selling them but in getting supplies to fulfil orders! Enquiry at other suppliers provided the same answer.

The amateur has the money and is willing to buy suitable apparatus. Why don't British manufacturers satisfy his demands for valves and receivers? Many British commercial receivers are as good, if not better, than American,—the addition of a beat-oscillator would make them equally suitable for amateur needs, and would divert good money from going to America to our own workmen's pockets. A perusal of the Board of Trade figures would surprise many of our big manufacturers. Meanwhile,

good luck to Eddystones and the other British manufacturers of ham apparatus who have the pluck to use their own judgment.

### ● J5CC

Last month I asked what had happened to J5CC. Hardly had we gone to press than G6HB strolled in and told me that he was busy down at Tokio and therefore not on the air as much as last year. Many readers will remember G6HB better as VU2FB and VU2BX. He tells me that he has settled down in England more or less permanently.

Within a few days I heard J5CC back on the air and he has been coming through pretty well around 17.00 G.M.T. I called him several times with the battery transmitter but couldn't raise him. Still, perhaps one day I'll be lucky!

G8DR also gave me a call over the air and told me that he was hearing J5CC. Thanks for your trouble, DR. He said that he too hadn't raised him, but with the signal he is putting out I am sure he soon will.

### ● Unusual Reception

Searching round 14 mc. about midnight I was surprised to hear VS2AK coming through when Yanks were simply rocking in. His phone was QSA5 R7, with no sign of fading. I hope he contacted the Argentine he was calling. Just my luck to have the big transmitter off the air when conditions are good!

It's not often that signals from this part of the globe are heard at midnight. I have had reports from VK at this time, but have always found recep-

tion of Australian stations very weak then. Another peculiar piece of reception was hearing a ZE early one morning in the middle of a bunch of W6's.

### ● Transmitter Design

Had a long QSO with G5RI the other day on 7 mc. We were discussing transmitter design, and the problem of switching coils. The whole thing boils down to a transmitter in which, by means of a panel lever it is possible to turn from 7 mc. to 14 mc. or 28 mc. at will. It can be done by shorting turns, but that always spoils either the L.C. ratio or efficiency. What is required is a sort of turret arrangement with which one coil is removed and another inserted mechanically. It has been done in receivers and only wants some mechanically-minded person to adapt it for transmission. Will somebody oblige, please?

G5RI said that the only method he had struck was by using separate transmitters for each band. He uses a T61D on 14 mc. and a HF100 on 7 mc. However not many of us can afford separate outfits of this size.

Incidentally he tells me that ZU6L is coming over here next month, so let's hope we see something of him. Which remind me that ZU1E was over last year and visited my station quite a lot. The first night I handed the transmitter over to him while I went out to get some components for him. When I returned I found him saying a few sweet nothings to himself and enquired what was the trouble. He said that he had called CQ and a W had come back and chewed him up! However, when I explained that English stations are not allowed to use CQ he saw the funny side of it.

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"BATTERY TRANSMITTER"—(continued from page 23).

the L.T. accumulator, and the makers recommend this to be done. For test purposes this was not done, and although it has been in use for over three weeks it shows no sign of losing volts, so it seems to be the ideal unit for use with this type of transmitter.

### ● Modulation

Many amateurs have written asking if the transmitter can be modulated. Of course it can, provided you have the power to modulate it. Grid modulation can be used but Heising is the only really satisfactory way of modulating low power. In its normal form this system takes far too much power for battery use, but we are experimenting with a modification which we hope will overcome this trouble, and as soon as it proves satisfactory in use details will be published.

### ● Efficiency

Please don't think that because of the results obtained we are in an ideal location. Far from it, the aerial is overhung by trees, and to cut the efficiency down, was made up of various odd lengths of enamelled wire, twisted together and not

soldered! About as poor an arrangement as it is possible to get.

### ● Hear It on the Air

Readers who would like to hear it working can do so because it is in constant use at G5GQ, on both 7 and 14 mc. If any stations would care to arrange schedules we shall be glad to fix up if they will write in.

### ● Keying

One comment made was regarding the keying arrangement, it being suggested that key clicks would cause trouble with broadcast receivers. Of course a key filter should be used, and here a 2 mfd. condenser across the key followed by a 50-henry choke prevented any trace of interference on nearby broadcast receivers.

### ● Ten Metres

Ten metres has let us down again this month, so we have nothing to report there yet, but as soon as conditions permit, we shall see what it will do.

Well, that's the report on this rig in actual operation so let's see who can first get W.A.C. on it.

# Getting the Maximum from the Transmitter

Besides explaining HOW this article, in simple language, tells you WHY

THERE SEEM to be two types of amateur transmitter: those who with the minimum of power and apparatus work all the DX going, and others who in spite of all they do seem unable to reach out very far.

The answer in most cases is efficiency, that term of which we hear so much and see so little: It is so easy to follow a diagram and build a transmitter, but so difficult to get real efficiency from it unless it is realised exactly how the equipment works. For example, most books describing the tuning up of a power amplifier tell the owner to turn the tuning condenser until the valve consumes minimum anode current. Unfortunately they do not tell him why he should do this or what this minimum current should be, and so the unfortunate amateur turns dials, hopes for the best, and generally ends up by having everything out of adjustment.

So this month, instead of writing about one particular subject, I am going to talk about some of the problems encountered by the beginner with his first transmitter, questions which have been asked at various radio clubs at which I have spoken.

## ● The Final Amplifier

The most important stage in the transmitter is that supplying power to the aerial. No matter how well built or how efficient the preceding stages are, unless this final stage is working efficiently results will be poor, so we will only consider this stage.

First of all there is the valve to examine. There is no real difference between the power amplifier of a transmitter and the ordinary L.F. amplifier in our receivers. In both cases we apply A.C. volts to the grid, R.F. volts in the transmitter, and L.F. volts in the receiver, with the object of obtaining more volts or power from the anode circuit. In the receiver we examine the valve manufacturer's list and ascertain the optimum impedance and arrange our output circuit accordingly. In the case of the R.F. valve we do the same thing by placing in the anode circuit a high impedance at the frequency at which we are working. The highest impedance possible is that of a coil and condenser tuned to resonance, so we tune our anode circuit to that frequency.

Thus it can be seen that the difference between the R.F. amplifier and the L.F. amplifier is that the R.F. amplifier is designed with an output cir-

cuit working on one frequency, whilst the L.F. amplifier is supposed to work equally well over a band of frequencies.

## ● Grid Current

With the normal type of L.F. amplifier every care is taken to avoid distortion, and one of the main causes of distortion is grid current, so every precaution is taken to prevent it. The valve is biased half way up its curve so that it always takes anode current, and so that the grid can never become positive.

This same system can be used with R.F. amplifiers, but the efficiency under these conditions cannot exceed 50%. If the grid becomes positive greater efficiency can be obtained but distortion arises. This distortion is not as important as in the case of the L.F. amplifier, merely resulting in distortion of the emitted wave form; in other words harmonics are produced, and provided these are not allowed to radiate, do no harm. So for efficient operation the P.A. should be arranged so that the grid becomes very positive and runs into current. To accomplish this the P.A. is biased to double cut-off voltage, the cut-off voltage being determined by applying anode volts to the valve with no drive applied, and varying the grid bias until no anode current is taken. If it is found that minus 100 volts grid bias is necessary to do this, then the correct bias (double cut-off) is minus 200 volts, and the valve is then known as operating as a class C amplifier.

## ● Positive Drive

Let's see what happens when the drive is applied. We will suppose that the voltage of this drive is 400, the frequency being 7 mc. This voltage is A.C. so it will alternate between 400 positive and 400 negative. Starting at the negative part of the cycle we have our 200 negative bias on the valve plus 400 negative from the drive, a total of 600 volts. As 100 volts prevents the valve taking any anode current, 600 volts certainly will prevent it even more so. Thus on the negative part of the cycle of the drive, the volts from it serve as extra bias preventing the valve from taking power.

As the cycle progresses the drive volts gradually decrease (if we can say gradually about a cycle recurring seven million times a second) until they

reach zero and then begin to increase again, only this time they are positive. When they reach the point at which they are 100 volts positive the effective bias on the valve is 200 volts negative plus 100 volts positive, resulting in 100 volts negative. As we have decided that the valve will take no anode current with 100 volts negative bias, we have reached this condition and no power will be taken. To complete the cycle the drive volts have got to rise to 400 positive, so between this point and the 400 volts positive the valve will take power, i.e., when the drive volts are between plus 100 volts and plus 400 volts. Now from this it is obvious that the valve only takes power when the drive volts are between 100 and 400 volts positive, that is for a small part of the cycle only, and because of this we only get power from the anode circuit for a part of the cycle. Actually owing to a sort of flywheel effect we do get a complete wave from the output circuit.

This all sounds technical and not of much help in getting the utmost from the transmitter, but unless these principles are understood efficient operation cannot be expected.

Now we come to the practical side. We can now see that the valve only takes current during a portion of a cycle, so how about our anode current meter? It registers, say 100 mils., but this is only the average over a complete cycle, because the meter cannot respond at over seven million times a second. The maximum current the valve takes during the cycle peaks at over three times this figure, i.e., 300 mils., a vastly different figure to the 100 mils. recorded by our meter, and here is the important part, the valve filament must be capable of supplying this high current. If it can't, then the peak of the output wave will be cut off and output drops down.

### ● Choice of Valve

So make certain that the P.A. valve will really work under the conditions you expect it to. If the anode meter reads 100 mils. the valve must be capable of handling 300 mils. Some makers give a figure for maximum current operating class C, but in cases where this figure is not given, the total emission is shown. Given this figure the peak current should not exceed one-third of it, and the meter reading one-ninth of it.

The next consideration in the valve is what is known as the "grid base." If a valve takes a lot of negative bias before it cuts off, it is said to have a "long grid base," and if it only takes a few volts, "short grid base." The more bias it requires, the more power we have got to find from the drive stage, so always try to get a valve with a short base.

Many amateurs reading this will think that they have already got the ideal valve, because it has a short grid base. Maybe, but it may also be an audio valve as opposed to an R.F. one. In most audio valves the grid input capacity is high, because it is

immaterial for audio purposes, but used for R.F. working this high input capacity passes the R.F. volts from the drive down to earth, and so the drive appears to be insufficient. Valves designed for R.F. work have low input capacity and a large valve of this type takes far less driving than a much smaller audio valve. Another point to consider is that R.F. valves are intended to run into grid current. This tends to heat the grid and precautions are taken in the construction of R.F. valves to prevent this heating causing grid emission. Audio valves are not intended to run into grid current and so there is no need to take precautions to prevent grid emission due to heating, but if an audio valve is used for R.F. work for which it was not designed in the first place, there is every chance of grid emission taking place, and then you might just as well put your power to earth as put it into the valve!

### ● Tuning Up

Right, we've got our valve correct now, bias adjusted, neutralised O.K., and the power turned on. The anode current meter shoots up to 300 mils., so we hurriedly turn the anode tuning condenser and down they drop to about 10 mils. Why do they drop suddenly? Because the anode circuit is in resonance, and, as we have seen, the highest impedance we can obtain is with a resonant circuit. When the valve works into a high impedance the anode current will be minimum; when the current is out of tune the impedance will drop and up go the mils. So the higher the impedance the lower will the current be, and so we can judge the efficiency of our transmitter by the minimum anode current without the aerial load. The outside, maximum figure with an anode voltage of 500 should not exceed 10 mils., and if this figure can be reduced so much the better. Try different values of coil and condenser, re-arrange components, and peg away until you have got the absolute minimum reading possible. This figure represents dead loss, so the lower it is, the lower will be the losses and the greater the efficiency.

When the anode circuit is out of tune the current rises to a very high figure, which, under the conditions as above, may be as high as 300 mils. This figure gives us some idea of the maximum current the valve may be allowed to take when loaded with the aerial. Generally speaking the maximum mils. taken by the valve when tuned to resonance and with the aerial load on should not exceed one half the value of current consumed when the valve is off tune. So even if it is possible to obtain a low reading with the valve in resonance, if this current does not rise to a considerably higher value with the circuit detuned then there is something wrong with things. The valve itself may be suffering from lack of emission or softness, or else the grid drive is not big enough. However, do not allow the valve to be out of tune for more than a few seconds as this high current is very destructive and will shorten the life of the valve. A quick glance at the meter as the tuning is varied will soon show up faults in the transmitter.



## ● Dissipation

Many amateurs are hazy about the meaning of the dissipation of a valve. This figure does not mean the maximum allowable input to the valve, but the amount of power that can be safely wasted in the valve. If with an input of 100 watts an efficiency of 80% is obtained, then 20% of the power is wasted, and this 20% or 20 watts has to be dissipated by the valve, and in this case the valve will have to have a dissipation rating of at least 20 watts, although 100 watts input is used.

It is very difficult for the amateur to measure the actual loss, but it must always be remembered that the power taken by the valve without the aerial connected is dead loss and this gives us a basis on which to estimate our losses. When the aerial is connected the power taken by the valve increases, and under ideal conditions all this excess power would be taken by the aerial. Unfortunately we cannot always be certain that this power is taken by the aerial—often it is wasted owing to mismatch between the aerial and the transmitter.

## ● The Grid Meter

Another indication of the behaviour of the P.A. stage is the grid meter. As explained last month this is used during the process of neutralising, but apart from this it also shows us certain things about

the P.A. When the valve is being neutralised no H.T. volts are applied, and a certain reading is recorded by the grid meter. When H.T. is applied this reading often changes, according to the physical structure of the valve. If it doesn't vary more than about 10% there is no need for concern, but if it drops back a lot or increases considerably it is a sign of incomplete neutralisation, caused perhaps by feed back from the aerial coupling unit. More often than not this is shown by a very big increase in current.

If the grid reading drops back considerably when power is applied and the aerial connected it is an indication of insufficient emission or even softness. I remember having a valve once which used to work perfectly when first started up but gradually, as it heated up the aerial current, anode and grid current would fall back. What was happening was that under power it was heating up, gas was being given off by the electrodes and the valve became soft. If it was turned off for a few hours the gas would be re-absorbed by the electrodes, and it would start up giving full power once again! There was no sign of colour about the anode to show the heating and if it hadn't been for the meters it would have been impossible to locate the trouble.

Watch your meters, interpret their readings correctly and you will be well on the road to high efficiency.

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The 22-range D.C. Avometer - - 9 gns.  
Leather Carrying Case - - - £1.

DEFERRED TERMS IF DESIRED

# LISTENERS' DX CORNER

H.A.C. (continued)

IRELAND, Scotland, and Wales have soon taken up the challenge of England in being able to lay claim to H.A.C.

First of all comes a very interesting letter from Mostyn Mowbray, Newport. He says, "I experienced a curious phenomenon with D4FND. I definitely heard him on 20 metres, yet on his QSL card he assured me that at the time he was sending on ten metres. Can you explain the occurrence?"

## ● 10 or 20?

Well, there has been a lot of talk recently on this particular phenomenon, and there have been suggestions that it is due to "overtones" (the reverse to harmonics). No definite proof of this has been forthcoming as yet, but there are certain causes to which this phenomenon may be due. Many amateurs are using their 20-metre transmitters on 10 metres, the final valve being used as a doubler. This means that the grid circuit is tuned to 20 metres, and the anode circuit to 10 metres. The valve is over-biased so that most of the output is on 10 metres, but with this arrangement quite a lot of power is radiated on 20, and this is the explanation for much of this type of reception.

A second solution in cases where this system is not used is that the aerial, or a part of it, naturally resonates on 20, radiating signals on this wave.

At the receiving end there is a possibility of the second harmonic of the oscillator valve (in super-hets) beating with a .10-metre signal, giving it the appearance of being on 20. This is most probable in superes without pre-selectors.

Now for DX. Mostyn Mowbray, as well as hearing all continents has received HI7G, HI5X, VE3HC, PY8LS, FI8GT and W2XGB. These two latter are exceptionally good, especially FI8GT, located in French Indo-China. I don't think many will be able to claim hearing this station.

## ● Northern Ireland

Next, from Ireland, comes a report from W. E. Davey, Belfast, who says that the least number of verifications he has received from each continent is 10. He has 10 from Asia, 17 from Australia, and 21 from Africa, only two of which are from above the Equator! From North and South America he has too many to count, and altogether has verifications from 65 different countries, all on phone.

I think one paragraph of his letter is worth quoting. Here it is: "The best catches, I think, are VE2AW (12 watts), W9NMU (50 watts), VK2AJ and VK2VA (10 watts each), VPD1,2, VS6RA (20

watts), PKIZZ (24 watts), ZS6A and ZUIT (24 watts each), HC2CW and TI8WS." (Who can boast of veris from these two, particularly the former?)

This is first-class reception, not merely of high-power broadcasters with 50,000 watts, but of stations with under 50. It means a really selective and sensitive receiver plus handling ability to pull DX of this sort through. Unfortunately he gives no details of his receiver, but I am sure we would all like to know details of it. Anyhow, come along England, what have you to say about it?

## ● Irish Free State

Further south, from Dublin, comes a claim from W. N. Watts, 1R-62, who has 21 verifications from Central and South America, 95 from North America including 10 from W6 and 3 from W7, one each from Ceylon and Java, 6 from Australia, and one from K6KKP in Honolulu, this latter being a fine effort. He has been unlucky with South Africans so far, the only station in that continent being an FT4.

## ● Scotland

Turning to Scotland, a report from Lerwick says. "I am the possessor of an all-wave receiver and although my time for listening is limited, it is seldom that when I switch on I do not switch on to the short-wave band first. I can get the long and medium wave stations any old time whereas on the short waves one never knows what may be picked up." And that is the real attraction of short-wave listening.

He is another claimant for the H.A.C., and as well as having accomplished this feat tells of many unusual finds, such as hearing a conversation between a speaker in New York and Dr. Van Bruckman on the "Hindenburg's" first trip. After this he heard the piano being played on board. An amusing experience was listening to the Coronation relay from W8XK, ending up with an interview with the patrons in a Stepney public house! Incidentally he is double H.A.C., having got this with both amateurs and broadcasters.

## ● England

Lastly, England. From Bexhill comes a claim of hearing all six continents twice in 48 hours during the period of May 8th-9th, and of hearing since the beginning of the year 72 Europeans, 10 Asiatics, 107 North Americans, 36 South Americans, 25 Africans, and 7 Australians!

Jolly good, England, and with this fine report I will leave you until next month.

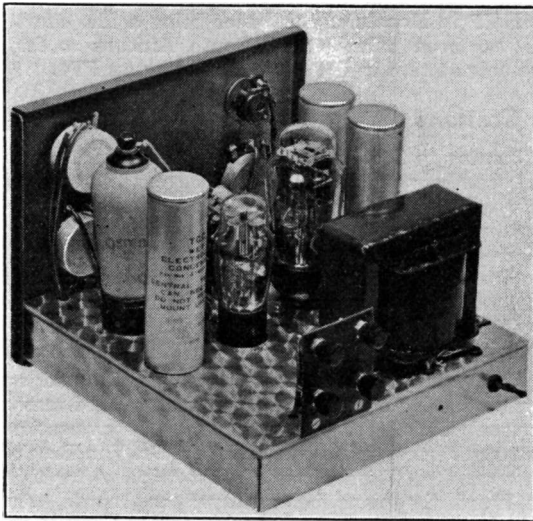
# TIME BASE FOR THE S.-W.M. OSCILLOSCOPE

BY S. J. LOBB

TO EXPLAIN the functions of the time base used with the oscilloscope, one must first understand how a simple neon tube time base works. The circuit of this is given below (*Fig. 1*).

## ● How the Time Base works

The action of the circuit is such that when voltage is applied the condenser C charges, but not instantaneously because the current is limited by R. After a certain period of time, determined by the size of C, the voltage reaches the "firing" value of the neon N which glows and so discharges the condenser, until the voltage drops below the "extinction" value of N. This cycle of operations now begins again, with the condenser charging slowly and then discharging suddenly.



When the time base is connected to the cathode ray tube, the voltage as it charges the condenser C, causes the spot to move across the screen, the speed depending on the time taken to charge the condenser and therefore the size of it—a small condenser charging more rapidly than a large one.

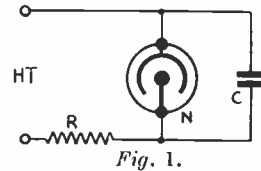
When the neon reaches the firing value and the voltage on the condenser falls suddenly the spot returns quickly to its zero position. The speed of the traverse is chosen so that the time base speed is a multiple of the vertical scan or work to be examined so that each trace is superimposed, giving a steady picture. If the time base speed is not a multiple, the picture will move across the screen.

the speed of the movement depending on the amount the two traces are out of phase. When the time base is used to examine work of various frequencies the condenser C is made variable (S2).

There are two main disadvantages with the simple neon time base. The first is the comparatively small difference of voltage between the "firing" and extinction voltages of the neon. The average neon "fires" at 200 and extinguishes about 160-170, giving a 30-40 volt sweep, which, unless the tube is very sensitive, gives a deflection too small to be of use. Secondly, the sweep is not truly linear, caused by the charging rate of the condenser, slowing up as it becomes fully charged, this causes the spot to move slower at the end of the traverse and so causing the wave forms to appear crowded at the end of the screen.

## ● Gas-filled Triodes

In order to overcome these difficulties a thyratron or gas discharge triode was introduced. These valves consist of a heater, cathode, central grid and an anode and are filled with either helium, neon, or a small quantity of mercury which vaporizes when the valve is operated. The principle with these valves is that when the anode voltage reaches a certain value the gas filling becomes conductive, and



*Fig. 1.*

the valve will pass a comparatively heavy current until the anode volts are either removed or fall to a low value because up to the firing point of the valve the grid has control over the current, but when the gas ionizes the grid loses its control until the extinction period, which is controlled mainly by the charging condensers connected in parallel with the thyratron.

There still remained the trouble of the non-linear scan, and this was overcome by replacing the charging resistance R (in *Fig. 1*) first by a diode, worked at saturation point, and then later by an H.F. pentode, which proved more satisfactory. The main principle of replacing the resistance R by a valve is that with a saturated diode or H.F. pentode, after the anode volts have reached a certain value, any increase in volts does not bring about an increase in anode current, and so can be regarded as constant current device.

This value then is connected in series with the thyatron, and keeps the charging rate of the condenser (C) constant. It will also be appreciated that if the pentode is biased negatively the constant current will be lower, therefore the time taken to charge the condenser will be longer. You will notice in the final circuit (Fig. 2) R7 is used to bias the pentode VMP4 and is used as an adjustment for speeds of scanning in between the steps of condensers C1 to C6.

The amplitude or length of the scanning is determined by the amount of H.T. available and is adjusted by variable resistance R2.

### ● Synchronising

With every type of time base the conditions of the circuit and therefore the speeds of scanning do not remain constant, unless there is some form of automatic supervision. This supervision is known as synchronising. What happens is that a portion of the voltage, i.e., "work," to be examined is fed either through resistance, transformer or through a valve on to the grid of the thyatron, and has the effect of pulling or "locking" the scanning speed into phase with that of the work. This synchronising will only be effective when the time base is working at approximately the correct speed.

### ● Operation

The operation of the unit is quite simple. The controls are as follows:—R2, Amplitude control; S1, Coarse adjustment for frequency; R7, Fine adjustment for frequency; R8, Resistance regulating amount of synchronising input.

First of all the unit is connected to the horizontal deflector plates of the oscilloscope, then R2 is adjusted until a sufficiently long scan is obtained. The work to be measured is connected to the vertical plates and S1 is rotated until a speed is found which is approximately a low multiple of the frequency to be measured. Afterwards R7 is adjusted till the wave forms on the screen remain steady, then if the picture will not "lock" the synchronising input (R8) is increased.

The range of condensers C1 to C5 will be found adequate for general use. There is no actual condenser for switch position 6, the capacities across the valve, valve holder, switch, etc., being sufficient for high frequencies.

Those who are building the time base for use in conjunction with the oscilloscope already described in the April issue, must remember to disconnect the 230 volt, 50 cycle supply which is connected to the horizontal deflector plates. It will also be noticed that the time base HT+ is earthed in the same manner as in the oscilloscope.

### COMPONENTS REQUIRED.

Transformer (Partridge):

Primary: 0—200, 220, 240 v.

Secondary: 2.5 v., 1.5 a.

2-0-2 v., 2.5 a.

2-0-2 v., 1 a.

350-0-350 v., 1 a.

Switches—Sw. 1, Burne-Jones, 6 position 6 contact; Sw. 2, Bulgin on-off (S.91).

Rectifier—Osram MU12.

Gas-filled triode—R.C.A. 885.

Pentode—Osram VMP4.

Valveholders—4-pin Bulgin VH34; 7-pin Bulgin VH35; 5-pin American type Eves Radio.

Synchronising Transformer—Bulgin LF45.

4 Knobs, Bulgin K10 and 1 Bulgin K18..

4 Terminals, Belling-Lee.

4 Bulgin Insulating Bushes.

Condensers—T.C.C.:

C1, .1; C2, .025; C3, .0025; C4, .001; C5, .0001; C6, .1; 3 electrolytics, 8mfd. at 450 v. working.

Resistors—Bulgin:

R1, 5,000, 2w.; R3, 50,000, 1w.; R4, 5,000, ½w.; R5, 300,000, ½w.; R6, 1,000, ½w.; R9, 10 megohms; R10, 1,000, ½w.

Potentiometers—Bulgin:

R2, 5,000; R7, 25,000; R8, 50,000.

Screening Box—Burne-Jones. (S.W.M.).

Chassis—E. Paroussi.

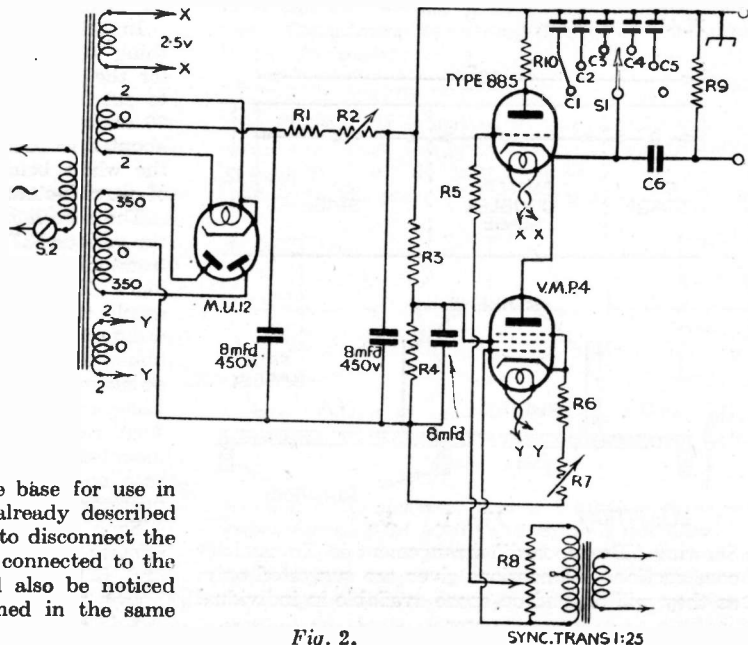


Fig. 2.

# AMATEUR TRANSMITTER CONSTRUCTION

Two Popular Methods of Building Surveyed

By AUSTIN FORSYTH (G6FO)

THE NEWCOMER to amateur transmitting has a wide choice in the form of construction he can adopt for his apparatus; a choice so wide, in fact, that it is sometimes confusing and a little difficult to decide what is going to be the best arrangement.

Setting aside the case where a published design is followed meticulously and in which the form of construction is laid down, there are several methods the beginner can choose.

## ● "Breadboard" Construction

There is no doubt whatever that for the beginner who has the average amount of space available, breadboard construction is the best method he can adopt; it is also worth mentioning here that any type of transmitter circuit, whether high or low power, can be effectively built up in this form. In explanation, breadboard construction consists essentially in laying out all the parts on a flat baseboard, such that they are easily accessible for alteration and adjustment and can be kept under constant observation. For beginner and experienced amateur alike, these points are the great advantages of this method of building up the gear, apart

from the fact that high R.F. efficiency is more easily obtained with this than with any other arrangement. The disadvantages are the space required—usually about 36 in. by 12 in. for a 3-stage transmitter—while dust is more troublesome than where some sort of closed-in assembly is adopted.

However, both these disadvantages can be minimised to a great extent by raising the baseboard on runners so that minor components can be mounted underneath, thus saving space, and the dust nuisance can be counteracted by having a wooden or glass cover to go over the whole transmitter when it is not in use.

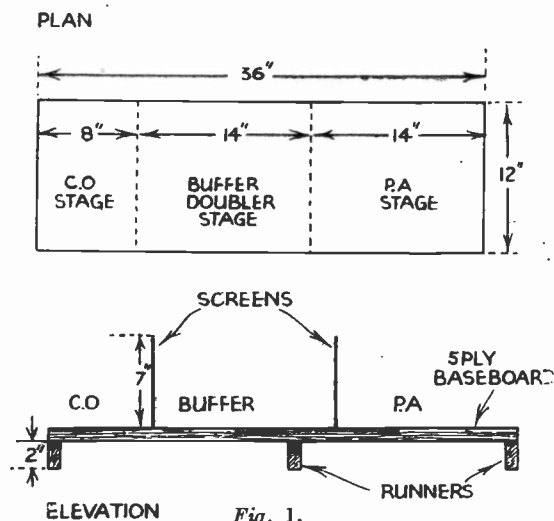
## ● Scope for Experiment

As has already been mentioned, breadboard construction is most strongly advised for the beginner, because for him there are all sorts of experiments and adjustments which will be necessary before he can arrive at, say, the best crystal-oscillator arrangement to suit his own particular purpose with the valves and other components he may have available. Further, by building the first transmitter on a baseboard, room can be left for further doubling and amplifying stages, and these additions can be made quickly and easily.

In adopting breadboard construction, the best thing to do is to decide what space can be allowed for the R.F. section of the transmitter, and then to cut a 5-ply baseboard to these dimensions, say 36 in. by 12 in. This should be raised on runners about 2 in. deep by 12 in. long, the appearance of the whole being considerably improved by a coat of varnish-stain.

The sketch in *Fig. 1* shows all this quite clearly, the various R.F. stages in the circuit being separated from one another by aluminium or zinc screens 7 in. high. The dimensions given will be found to allow ample room for any type of 3- or 4-stage circuit arrangement up to 50-watt operation. Further to minimise interaction between stages, coils should be mounted such that their fields are at right angles. The various tuning condensers can be arranged on small panels on the front edge of the baseboard, or mounted on midget stand-off insulators, in which case no panel is required though pointers will be necessary for logging dial readings.

Such components as resistors and by-pass condensers can go underneath, together with the H.T. and L.T. wiring. All R.F. wiring should be kept above the baseboard and is best carried out in No. 18 enamelled (except tank circuits, which should



*Fig. 1.*

Showing "Breadboard" arrangement in Transmitter construction. Dimensions given are suggested only, as they will depend on space available in individual cases.

be connected with leads at least as heavy as the wire used in the coil), while coupling condensers and R.F. chokes should also be mounted above.

With a form of construction such as this, it will be evident that each stage can be treated as a separate unit, which is as it should be, with the accompanying very important advantages of easy accessibility and adjustment.

### ● Rack Mounting

Rack-and-panel construction consists of arranging the apparatus on shelves one above the other, each unit or stage being on one shelf. In its most advanced form, the whole thing is built of metal—angle-iron uprights and steel panels—and the shelves are made “plug-in”; that is, withdrawing a shelf brings out a complete stage or unit and also disconnects it entirely from the rest of the circuit.

The advantages of rack-and-panel are a particularly neat appearance, easier dust-proofing than baseboard construction, and the fact that space is used vertically instead of horizontally. The main disadvantage is the obvious one of a lack of accessibility, while even if wood is used for construction (it is quite suitable), the shell for the apparatus becomes more expensive than is the case with baseboard construction.

Fig. 2 shows a rack-and-panel assembly recently devised by the writer for a 2-stage transmitter designed and built for demonstration purposes. As this framework was found to be strong, neat, cheap to build and easy to work on—a most important point when one comes to construction of the transmitter—all necessary details are given in the drawings, which show a shell having three panels each 19 in. by 5 in., with three corresponding baseboards 19 in. by 6 in., the overall length being 21 in. by 20 in. high.

### ● Adding Stages

These dimensions allow ample space for a power pack on the bottom shelf, a two-stage speech-amplifier section on the next shelf and a two-unit R.F. section on the top. It is obviously quite a simple matter to increase the number of panels by using longer uprights, but if as many as six were wanted, the feet would have to be made correspondingly wider to ensure a steady base. The whole framework should be put together with countersunk-head screws and stained before construction of the transmitter proper is started. To ensure steadiness, it is important to get the feet and uprights properly in square. Having the bottom baseboard flush with the feet helps this, particularly if the lower shelf carries the heaviest items of the equipment—the chokes and transformers of the power supply.

As the power pack, modulator and speech amplifier stages are always heavier than the R.F. sections, they should go down below, with R.F. stages on the upper shelves; this is, in fact, the obvious plan to follow, as one naturally wants to build from the power supply towards the aerial. Plywood panels are suggested, as they are cheap and quite effective, but to make certain of the insulation on the R.F. side, tuning condensers should be mounted

on pieces of ebonite 1½ in. square. Where required, the panels have “windows” about 1 in. square cut in them, and the ebonite pieces are fixed over these “windows.” This ensures the best possible insulation and preserves the symmetry of the panels.

### ● Screening and Earthing

A further point worth noting as calculated to improve R.F. efficiency—as well as ease of wiring on the audio side—is to cover the baseboard with thin aluminium sheeting. This applies equally to “bread-board” and “rack-and-panel” construction. In the former case, with the dimensions already given, the aluminium sheet should be 36 in. long by 9 in. wide, thus leaving an uncovered wood space 1½ in. deep along the front and back edges; terminal strips, sub-panels for meters and jacks, and similar items can then be mounted in these spaces without it being necessary to “work” the aluminium.

The baseboards used in the assembly shown in Fig. 2 can be treated in the same way, thus improving screening between stages. On the audio side, this sheeting can be used for earth returns where convenient, but in the R.F. section of the transmitter—particularly if it is to work on the H.F. bands—each earth lead should be taken separately to a common earthing point.

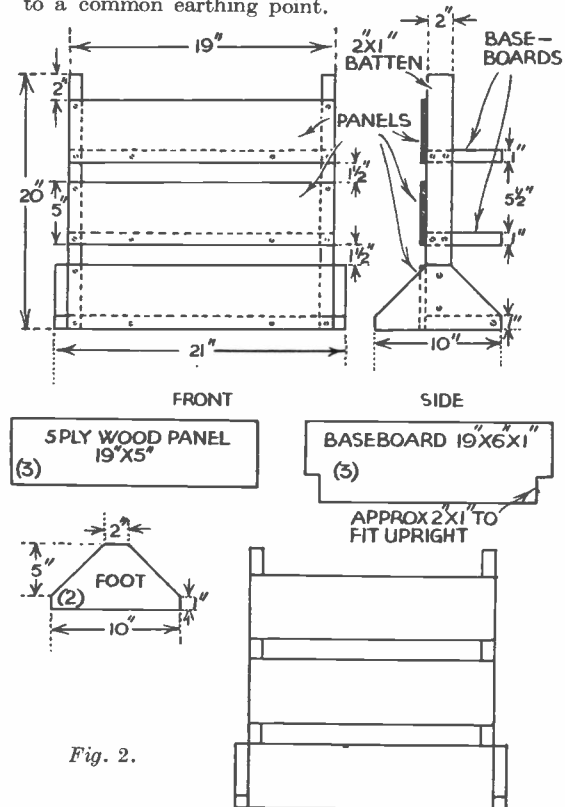


Fig. 2.

#### DETAILS OF RACK-AND-PANEL.

2-inch by 1-inch batten is used for uprights, 5-ply wood for panels, and 1-inch board for feet and baseboards. Sketch at right shows finished appearance.

# H.A.C. IN HALF-AN-HOUR

## With the S.-W.M. Receiver under Test

IN RESPONSE to our invitation to radio societies offering to loan the receiver described in our March issue numerous applications were received. Wellingborough were first in taking the offer, consequently the receiver was despatched forthwith.

We did not send the actual receiver constructed by the magazine staff as we felt the impression would be gained that the sample was a specially hotted up affair. A commercial model was accordingly despatched.

Two reports are printed; readers will appreciate these unbiassed expressions of the receiver's capabilities speak for themselves; no comments from ourselves are necessary.

### From the secretary, Wellingborough Society

It was with interest that I noticed the description and constructional details in the first issue of THE SHORT-WAVE MAGAZINE of a one-valve receiver designed around the use of a Class B valve and utilising one triode section of the valve as a normal leaky grid detector and the other triode part of the same valve as an L.F. amplifier.

Such a scheme appears to be perfectly straightforward upon examination of the theoretical circuit, but I wondered at the time the design was published whether the amount of amplification obtainable from the second triode section would be equal to that obtainable were the constructor to use two separate triodes. It was therefore with much pleasure that I accepted the invitation of the editor to test the receiver in my own home for a short period.

Upon unpacking the chassis it was evident at first sight that the set sent to me was not a true copy of the original in that the Eddystone bandspreading outfit was replaced by the usual type of condensers used for this purpose and as no calibration points were provided I saw at once that it would first of all be necessary to achieve some measure of calibration. As this was easily done with the help of the transmitter harmonics in use in my shack it was not the snag it might have proved to be in the case of a listener who had not a wavemeter or oscillating crystal to check the coils with.

The receiver was soon connected up to my short-wave receiving aerial, which is 66 feet long and forty feet high, no earth connection was available and this terminal was therefore left blank.

The first coil tried out was the one covering the 7 mcs. amateur band and I had quite a surprise.

The volume was greater than that which I get from my own receiver, which uses three valves in an untuned buffer, detector and transformer coupled L.F. sequence and which I thought was quite good, but the one valver was definitely pushing out a louder signal than my own three. To check this, I arranged the one valver alongside my three, connected each set up to separate batteries and arranged to switch the aerial from one set to the other, I then tuned each receiver into a fone station and by changing over the aerial switch and the fone jack was able to obtain an immediate check upon signal strength, and I had to admit after one or two tests in this fashion the one valver was slightly the better of the two receivers. After this, I shall certainly have to give my own three a complete overhaul.

The next point of interest was the smooth reaction control. I have paid a good deal of attention to the reaction control in my own receiver and have arrived at a point where I do not think it can be improved upon; friends of mine who sometimes handle my own receiver always remark upon the sweet control of reaction provided thereon and I was therefore again surprised when I soon discovered that the reaction control on the one valver was quite as smooth and free from overlap as that on my own receiver. Owing to the fact that the aerial is connected via a small fixed condenser directly into the grid circuit of the valve, the one valver had to have its reaction increased or decreased continuously as the wavelength to which the grid circuit was tuned was varied, but at no point on any of the coils was it impossible to obtain reaction.

I do not think any useful purpose can be served by enclosing a list of all the stations heard upon the one valver, as with good conditions practically any decent short-wave receiver could duplicate the performance, but for the guidance of those who are interested in this little job I will say that during the afternoon it was possible to receive at least six stations at moderate volume upon the loud speaker and an American station in the 19-metre band could be followed with ease upon the loudspeaker using 150 volts H.T. The anode current was as low as 3 milliamperes and I am of the opinion that the circuit used is a definite improvement over the normal detector and one L.F. receiver using two separate triodes.

The lowest wavelength to which the receiver would tune with the smallest coil in circuit could not be ascertained owing to the fact that my wavemeter



does not go below nine metres but the one valver went down well below this point and even at the bottom of the scale reaction was still delightfully smooth.

Another excellent point was the dead silent background of the receiver. With the aerial off it was quite difficult to hear the set slide into oscillation, so quiet was the background and this point alone ensures successful results.

In conclusion I should like to congratulate the Editor of THE SHORT-WAVE MAGAZINE for producing a receiver that is cheap to buy, easy to construct and capable of such good results, and I feel sure that the receiver will find its way into many hands, both beginners who desire something cheap and simple and also for the hardened "ham" whose tastes run to multi-valvers but who must sometimes find it a treat to listen to a set that will produce an R9 signal against an R1 background instead of the R9 + signal superimposed upon the R9 background that is so common with the big receivers of to-day.

With best wishes to the staff of SHORT-WAVE MAGAZINE and special thanks to the editor.—I am, Hamfully yours,

L. F. S. PARKER, G5LP, BSWL54.

#### From W. Bigley (BSWL122)

The one-valve receiver was handed to me by the secretary of our local society for test purposes but owing to pressure of time I was only given two days in which to try it out.

The receiver was tested on an inverted "L" aerial with a 33-ft. top and 33-ft. down lead, the top being 35 feet high with the lead-in pointing S.W. High tension was 120 volts from a Milnes Unit and 3 volts bias was found to be correct for the L.F. section of the Class B valve in use.

Unlike my own short-wave receiver, I soon found that an earth connection was an improvement, resulting in increased signal strength, freedom from hand capacity and 'phone lead capacity.

After two short listening periods, one in the early morning and one in the early evening, I have nothing but praise for this really fb little set and I soon logged all continents. My best DX was VK2ME and Tokio on broadcast, and amongst the amateurs received were: SV, SP, CT2, SU, HI, FT4, OA, all W districts, VE, VK and a host of W6's, all fone. HAC was completed in half an hour in the early morning, and in the evening 7 mcs. fone came through at terrific strength and quite strong enough to work a loud speaker.

The reaction control was really excellent and as smooth as could be desired and made the tuning in of DX as easy as it is possible to make it.

A better slow motion dial on the band spreader would be an improvement and also the band setting control was too rough and accurate calibrations impossible with the pointer system supplied, an Eddy-stone band spreading outfit as described in the original would turn the receiver into a really tip-top little set.

My thanks to the SHORT-WAVE MAGAZINE for allowing me the privilege of testing the receiver.—Yours sincerely,

WALTER BIGLEY, BSWL122.

The offer is still open but there is a waiting list which makes early application necessary.

The question of an extra LF stage has been gone into and our honest opinion is that this addition is not necessary. Simplicity would be spoilt and battery consumption increased. However, if readers really insist, the best method was found to be the addition of a power or pentode valve, transformer coupling proved suitable. Class B and QPP stages were tried but the complications arising leave no doubt as to the unsuitability of these methods.

## HEADPHONES

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**THE SECOND ARTICLE** in this informative series appears in the May issue of the T. & R. Bulletin. Frequency Meters, Methods of Calibrating receivers, monitoring devices, are among the many subjects dealt with.

In addition authoritative contributions dealing with 28 and 56 Mc experiments, appear from D. W. Heightman, G6DH, P. Pennell, G2PL and J. N. Walker, G5JU.

### - The May issue of the - T. & R. BULLETIN

contains numerous illustrations in its 64 pages of technical and General Information written by Amateurs for Amateurs,

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# STRAIGHT OR SUPERHET ?

## A SUMMARY OF "IDEAL RECEIVER" CORRESPONDENCE

ENORMOUS INTEREST has been evinced in the Ideal receiver announced last month. Readers will remember that we invited suggestions regarding the desirable features of a short-wave receiver, and that from these a receiver will be designed and published in THE SHORT-WAVE MAGAZINE.

So far the superhet and straight receiver enthusiasts are about level, but the demands of the latter are far less ambitious than those of the former.

### ● Three-Valve Straights

No reader has as yet expressed a desire for a two-valve receiver, the least number of valves suggested being three. Typical of this is a specification from J.E.C., Newcastle, in favour of a tuned R.F. stage, detector, and pentode L.F. amplifier. The set would be battery operated and would have plug-in coils covering from 12—200 metres.

This type of set is very efficient, and having only one R.F. stage presents no complications in tuning. Naturally the price would be low.

### ● Four-Valvers

The four-valve enthusiasts are all in favour of one type, that having two tuned R.F. stages, detector, and one L.F., again battery operated. G.G. (Croydon) puts forward an ingenious suggestion regarding coils. He specifies a range of from 5—15 metres, and then from 15—180, the 5—15 metre range being covered by plug-in coils, while 15—180 is arranged by coil switching. That is certainly one way of overcoming the losses occasioned by coil switching on five metres. He also suggests a calibrated band-spread and a wavemeter, but surely if the bandspread is calibrated accurately a wavemeter will not be needed?

Other suggestions include an "R" meter (a meter to indicate the strength of reception), A.V.C., automatic grid bias, and, of course, a headphone-speaker switch.

Some readers suggested adding a crystal filter to sets of this type, but it is impracticable with other than superhets.

### ● Superhets

Which brings us to superhets. Here we have some very ambitious designs, the most prominent being that of J.N. (London, E.C.1). This specification starts with "Principle Details," and is worth quoting in full.

"The set would consist of a nine-valve superhet, using octal valves with 6.3 v. heaters, so that it

could be run on a car battery, or through an A.C. power pack using a full-wave rectifier.

There would be an RCA 913 oscilloscope tube as field strength indicator. (Visual indication of reception strength.—*Ed.*); a crystal filter and noise silencer; a continuous tuning range of 56 mc.—1.5 mc.; manual and automatic volume control. And as some amateurs experiment with television, maybe a circuit could be devised which could be attached together with a time-base unit to the ultra-short section of the receiver."

The circuit suggested is: RF stage, first detector, oscillator, two iron-core I.F.'s on 465 kc., double-diode second detector to provide A.V.C., triode L.F. amplifier followed by a pentode power amplifier, and a beat oscillator (for Morse reception and easy tuning).

### ● Unit Construction

"To finish with," he writes, "I suggest that a set like this should be built in sections for the convenience of those who cannot afford the entire set at once."

On rather similar lines is the ideal of H.B. (Brig-house), who would like the same circuit arrangement but thinks that perhaps the second detector could be used as beat oscillator, thus reducing the cost of a separate beat oscillator valve. The range required is from 9—180 metres, wave change to be done by means of plug-in coils, and both these coils and the intermediate transformers to be designed so that they can be home made.

One interesting point this reader raises is that the strength of the oscillator valve should be arranged to vary for maximum response on weak signals. The easiest way to do this is to use a variable- $\mu$  valve between the oscillator and mixer, but this entails additional expense.

From Lerwick comes a cry for more selectivity and for precautions to reduce man-made static. Selectivity appears to be the keynote of most of the specifications.

E.B.M. (Barnsley) suggests a wave-range between 2 and 200 metres, visual and vernier tuning, speaker or headphones, beat oscillator, and all-mains operation.

### ● Pre-Selector Difficulty

Every superhet supporter is in favour of a pre-selector stage, and it is here that the main difficulty in design will occur. If the receiver is to tune down

to five metres the use of plug-in coils will make tuning very difficult. There will be the R.F. detector, and oscillator circuits, three separate tuning controls. This can be overcome by the use of padding condensers, each coil being made as a separate shielding unit, together with its own padding condenser, and this will be rather expensive and extremely difficult for the constructor to make. In the case of switched coils, the cost of a unit goes up enormously as extra ranges are added. For example a receiver tuning from 15—150 metres in four ranges would have the cost of the tuning unit nearly doubled if an extra ultra-short range were added. Again an R.F. stage operating between 5 and 15 metres requires far more elaborate shielding than an R.F. stage working on waves above 15

metres. If money is no object it is easily possible to incorporate all these refinements, but cost is of primary importance.

Analysing the suggestions received so far, it appears that certain requirements are in the minds of all, viz.:

Battery or mains operation.

Unit construction enabling additions to be made as finance permits.

As the supporters of the straight set and the superhet are about equal, we are going to extend the time for readers' specifications for another month. Here are the "ideals" of some of them, it is going to be your receiver, so please let us have your criticisms and suggestions.

## LISTEN TO LATIN AMERICA

MANY SHORT-WAVE listeners believe that the only American transmissions worth listening to are those emanating from U.S.A. or Canada. This is not so however, many interesting and entertaining programmes are radiated from Latin-America. By Latin-America is meant Mexico and other countries of South and Central America. Many of these stations using very low power are heard with amazing strength and consistency, even when North Americans working in the same wavebands are weak. The Latin-Americans work mainly between 30 and 52 metres and number about 90 in all. Of these 50 or more are well heard on an ordinary receiver when conditions are fairly good. The majority incorporate frequent English announcements in their programmes whilst a few broadcast all-English programmes "for the benefit of English-speaking listeners in all parts of the world." Most of these stations have their own slogans and identification signals; XEBT uses the slogan "El Buen Tono" followed by a long siren call.

### ● Colombia

English listeners will find the programmes of VP3MR, at Georgetown, British Guiana very entertaining, especially the "Musical Tours" conducted by this station on Saturday nights. Also PRF5, Rio de Janeiro, Brazil gives an English programme in the "Brazilian Hour" on Mondays at 22.30 G.M.T. English talks about the Argentine may often be heard by tuning to LSX Transradio Buenos Aires on Mondays or Fridays around 22.45 G.M.T. Turning to Colombia special English transmissions may be heard on 6,030 kcs. from HJ4ABP Medellin on Sundays, 4 to 5 G.M.T., with interesting talks about the country. HJ1ABE the Voice of the Fuentes Laboratories, situated at Cartagena and now operating on 31.58 metres, has an English schedule on Tuesdays, 3 to 4 G.M.T. HJU, the Voice of the Pacific, operated on 31.55 metres by

the National Railroads of Colombia at Buenaventura, is on the air again thrice weekly: Tuesday, Thursday and Saturday, 1 to 4 G.M.T. The programmes include frequent English announcements and short talks. Venezuela may be logged easily by listening for YV1RH of Caracas, 6,360 kcs. around 3 to 4 G.M.T. when a Mail Bag programme is broadcast, including typical Venezuelan music.

### ● Panama

The Central American Republics are well represented on the short waves, Panama boasting of HP5B, 5K and 5J, all including English transmissions. The Costa Rican Hour is well worth listening to as broadcast by TIPG, the Voice of Victor, on Sundays and Thursdays 2 to 3 G.M.T. Informative talks are given, as well as musical selections, which are not recordings. Guatemala is always well heard through a very interesting station, TG2X, 50.51 m., operated by the National Police. Occasionally the Police Band broadcasts from about 3.30 to 4.00. The Mexican Government station XEXA is heard with English talks around 4.15, and XECR on Sunday nights 23-24.00.

### ● West Indies

Finally the monoglot Englishman may turn to the West Indies for short-wave entertainment. From Havana, Cuba COCD transmits DX "Programmes" on 6,130 kcs. on Sundays until 8.00 G.M.T. On other days music from the Eden Night Club is broadcast until about 6.00 G.M.T. The Dominican Republic, though small in size, is the source of 20 or more transmissions and most of them announce in English. HIN, the Voice of the Dominican Republic, has been heard with occasional English talks, and is a strong signal on 48.05 m. from about 23.00 G.M.T. on. HIIS on 6,420 kcs. also gives talks around midnight on Saturdays.

# ON TEST and CATALOGUES RECEIVED

## "ADABAND" BATTERY CONVERTER

Many owners of receivers covering the long and medium bands hesitate to indulge in short-wave listening because their present set satisfies in all other respects. It is felt that the change to an all-wave model would not compensate for the additional outlay and those features now associated with their listening might not be present in another receiver.

A solution is the installation of the Adaband, which permits the use of the existing receiver as before. The turn of a switch, after the initial few connections are made, adds two short-wave bands to any receiver that incorporates at least one screened grid stage—very few receivers nowadays are lacking in this direction.

The ranges covered by this battery model are 13 to 29 metres and 30 to 71 metres, the scale being in two divisions and calibrated in metres. The tuning is controlled by a dual ratio knob which permits that control necessary in short-wave tuning. During test the calibration of the dial proved correct, thus assisting in the location of each band which provided its full complement of broadcasters.

Although the unit is intended primarily for battery users it worked equally well connected to an A.C. receiver, power being supplied from batteries. When used with a battery set no additional H.T. and L.T. is required. An eight-page instruction booklet makes operating details clear to the non-technical listener.

The price, including two valves (X21 and HL2), is five guineas. There is an A.C. model available at £6 12s. 6d. Both models are available by a reasonable hire purchase scheme if desired. Messrs. British Television Supplies, Ltd., of Faraday House, 8-10, Charing Cross Road, London, W.C.2, are the manufacturers.

## NEW TIMES SALES THREE-IN-ONE KIT

Often the addition of the short-wave ranges gives some perplexity to the owner of a set capable of medium and long-wave reception. This kit will function as an adaptor, converter or as a one-valve receiver, therefore no matter what type of set is in use, short waves can be added by building this simple unit. Full and lucid instructions are enclosed with each set of parts.

When tried as a one-valver, American amateurs were heard at sufficient strength to operate two pairs of headphones, whilst the usual broadcasters proved of entertainment value. The most notable points were the velvety smooth reaction with no overlap; entire freedom from hand capacity effects (even on 13 metres with tight aerial coupling); blind spots were eliminated; and due to the use made of bandspreading, ease of tuning.

Extremely satisfying were the results obtained when used as an adaptor and converter, the above points were apparent during this test.

Three coils are included covering 12/94 metres. The price is 12s. 6d., and further details may be had of Messrs. The New Times Sales Co., 56, Ludgate Hill, London, E.C.4.

## WARD and GOLDSTONE AERIAL KITS

Messrs. Ward and Goldstone make a speciality of aerial kits and in the latest literature to hand are details of two such kits. The first consists of an all-range aerial at 10s. 6d. with two spans of 66ft., 120ft. down lead coil, transposition blocks and three glass insulators. The "Overseas" kit comprises two 30ft. aerials, 50ft. twin feeder, the necessary insulators, stand-off brackets, receiver coupler, and staples. Ready assembled, the kit cost 17s. 6d. The makers, at Frederick Road, Pendleton, Manchester, offer service through their technical department on interference problems.

## NEW TIMES SALES, CO.

This company's range of short-wave kits and components are fully illustrated in a new catalogue available to readers on application addressed to 56, Ludgate Hill, London, E.C.4. A full page is devoted to each kit specification from the "Three-in-One" at 25s., to the "DX Fans' S.W. A.C. 4," priced 75s. Low prices also apply to components, an example being headphones at 7s. 6d. per pair.

## BULGIN MONTHLY BULLETIN

Not only do Messrs. A. F. Bulgin, Ltd., cater for every branch of radio construction they also publish a monthly Bulletin giving details of new ranges of apparatus that are constantly being produced. It also contains technical articles by well-known authorities and many circuits and formulas are published in the course of a year making the Bulletin a handy reference. Specifications of components are written up in an interesting manner, avoiding the usual catalogue style.

The Editor of the Bulletin invites our readers to send their names and addresses for the mailing list, and creates a friendly atmosphere by asking readers to send in suggestions of mutual benefit. The address is Abbey Road, Barking, Essex.

## FERRANTI LTD.

An A.C. set at 8 guineas covering 16.7 metres to 2,000 is an addition to the well-known Ferranti range of all-wave receivers illustrated in a leaflet setting out full specifications. This model (837) can be supplied on hire purchase terms.

## SLOW MORSE PRACTICES

Details will be found below of the slow Morse practices organised by the Radio Society of Great Britain for those members wishing to learn or improve their code. As usual, test matter will be taken from recent issues of THE T. & R. BULLETIN. The page number and month of issue will be given at the end of each test—by telephony. A telephony announcement will also be given at the commencement of each test to assist those interested in tuning in the sending station.

		B.S.T.	k.c.	Stations
June	1	Tuesday	2200	7184 G6UA
"	2	Wednesday	2300	1775 G6ZQ
"	2	Wednesday	2315	1741 GI6XS
"	3	Thursday	2200	7184 G6UA
"	5	Saturday	National Field Day	
"	6	Sunday	National Field Day	
"	7	Monday	2300	1741 GI6XS
"	8	Tuesday	2200	7184 G6UA
"	9	Wednesday	2300	1775 G6ZQ
"	9	Wednesday	2315	1741 GI6XS
"	10	Thursday	2200	7184 G6UA
"	12	Saturday	2300	7145 GI5QX
"	13	Sunday	0915	1775 G6ZQ
"	13	Sunday	0945	7155 GI5UR
"	13	Sunday	1900	7260 G5JL
"	13	Sunday	1015	1825 G5SU
"	13	Sunday	1330	7180 G2YV
"	14	Monday	2300	1741 GI6XS
"	15	Tuesday	2200	7184 G6UA
"	16	Wednesday	2300	1775 G6ZQ
"	16	Wednesday	1315	1741 GI6XS
"	17	Thursday	2200	7184 G6UA
"	19	Saturday	2300	7145 GI5QX

Reprinted from THE T. & R. BULLETIN, the official organ of the Radio Society of Great Britain.

### EVES RADIO, LTD., BUSINESS EXTENSION

Messrs. Eves Radio, Ltd., have transferred their Short-Wave Mail Order Department to larger premises situate in Willenhall Road, Wolverhampton.

Visitors to Wolverhampton are advised to call at their branch, 11, Lichfield Street, before calling at the new address, as the former is quite near the station.

## CRYSTAL CONTROL FOR ALL—

Band		Accuracy
(a)	1.75 Mc ...	16/6 plus/minus 1 kc.
"	3.5 and 7 Mc. ...	15/- plus/minus 2 kc.
"	14 Mc. ...	30/- plus/minus 5 kc.
(b)	100 kc. ...	15/6 plus/minus 0.1 kc.
	Temp. Coeff. (a) — (23x10 <sup>6</sup> )	
	(b) — (5x10 <sup>6</sup> )	

Enclosed Holders, plug-in-type, suitable all bands. 12/6

### BROOKES MEASURING TOOLS,

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Tel.: Greenwich 1828.

## BOOK REVIEW

### PATENTS, TRADE MARKS, AND DESIGNS

By H. T. P. Gee, Patent Agent and Trade Mark Agent, Great Britain; U.S.A. and Canadian Reg. Patent and Trade Mark Attorney, etc. 49 pp. From H. T. P. Gee, 51 and 52, Chancery Lane, London, W.C.2. Free on application.

MOST OF US at one time or another think out some great idea, and wonder if we should patent it, but few of us know how to go about it.

In this booklet Mr. Gee tells not only how to patent an article, but also how to profit by it when once it is patented. It is a very complex subject but the author explains it in such a manner that it can be understood by all.

We see trade marks on every hoarding, advertising their wares to all and sundry, but until I picked up this book I was quite unaware of the many regulations regarding their registration.

## WHAT THE CLUBS ARE DOING

### A.-A.R. & T.S.

The Psychological Consultant of the Anglo-American Radio and Television Society is visiting America during June and July. During his visit he will probably broadcast from short-wave stations.

The SOUTHALL Branch of the A.-A.R. & T.S. are visiting Margate near the end of June. Readers of SHORT-WAVE MAGAZINE are cordially invited to join the fun under the same terms as branch members. Particulars from Mr. L. BERRY, "Nyella," Alleen Park, Norwood Green, Southall.

Mr. Leslie W. Orton attended a meeting held at MAESTEG, Glamorganshire during Whit-week. The A.-A.R. & T.S. has a large membership in South Wales and meetings are held irregularly in Swansea, Cardiff, Porthcawl, etc.

The UXBRIDGE and District Branch announce that a special social and dance will be held in Uxbridge at the beginning of July. The A.-A.R. & T.S. Dance Band will play during the evening. Particulars from Miss EILEEN G. HARRIS, Plemont, The Greenway, Uxbridge.

### BINGLEY, YORKS

Formed recently, principally for the staff of Milnes Radio Co., Ltd., the Milnes Radio and Television Society's membership is open to all interested in wireless. Meetings are held each Monday evening, and Morse instruction is given at the close of the lectures. Visits to places of interest have been

arranged, and one interesting and instructive evening was spent recently at the Bradford City Electricity Works.

It is intended to apply for a transmitting licence, and to undertake experimental work on ultra-short waves. The annual subscription is 7s. 6d., and 5s. for those under 18. Secretary: Mr. F. RIDLER, Technical Department, Milnes Radio Co., Ltd., Bingley, Yorks.

#### **BLACKPOOL AND FYLDE**

Meetings of the Blackpool and Fylde Short-Wave Radio Society are to be reduced to alternate Thursdays during the summer: June 3, 17; July 1, 15, 29, but otherwise activities will continue. A party of 12 to 15 hope to have visited Southport on May 23rd to the R.S.G.B. Conventionette, and it is hoped to arrange 56 mc. schedules and to do some serious work.

Several evenings have been spent in comparing the various 56 mc. receivers in the district, it being found that there were 8 or more in working condition. It is hoped to borrow the S.-W.M. one valver to demonstrate at a future meeting.

The local membership now totals 7 full radiating permits, 7 A.A. and two waiting to hear about A.A. as also is the Society. 2ARL is now G8NU and busy on 7 mc. G6MI has applied for 50 watts and G6VQ for 28 mc. and 56 mc. G8GG has been licensed for 1.7, 28 and 56 mc. and at last received his T20. Secretary: H. FENTON, 25, Abbey Road, Blackpool.

#### **DOLLIS HILL**

"Dollis Hill Radio-Communication Society" is the title of yet another newly-formed society. Twenty-seven members were present at the first meeting held on April 27th at the Brainteroft School, Dollis Hill. After making a few preliminary business arrangements an interesting lecture on "Five-metre Super-regenerative Receivers" was given by Mr. Search, a member. A demonstration ensued, two transceivers being used.

A very interesting talk on valves, given by Mr. Ash (G6OV), was the subject for May 27th. There were about 28 members present, an increase of six. The next two meetings take place on June 8th and 29th. A 5-metre field day is being arranged for Sunday, June 20th or 27th.

All interested in B.C. or S.W. radio will be welcomed as members. The annual subscription is 2s. 6d., and application for further details should be made to the Hon. Secretary: J. R. HODGKINS, 102, Crest Road, Cricklewood, N.W.1.

#### **FARINGDON**

The second newly formed club reported this month is to be known as The Faringdon Short-Wave Club. The hon. secretary is Mr. D. J. BOFFIN, BRS1469, Market Square, Faringdon, Berks. The club will provide the usual features, some of which have already been fixed, such as field days and visits to ham stations. Prospective members should apply to the secretary for further particulars.

#### **GUERNSEY**

A series of technical lectures was inaugurated at the May 4th meeting of the Guernsey Chapter of the International Short-Wave Club by the President, Mr. J. Dowding (G8DO) who spoke on "The Electron Theory." Subsequent talks will be given throughout the summer on all phases of radio. A contest for listeners in the Channel Islands has been arranged, with "the world" as an objective. A choice of prizes is promised. Among other summer activities Morse instruction classes will be featured every Tuesday; the last series of such lessons having been completely successful. The interest shown by the members continues and the membership is still growing. Details of all features may be obtained from the Hon. Secretary: F. S. LE PAVOUX (2BTP), 8, Upper Canichers, St. Peter-Port, Guernsey, C.I. The local Chapter, by the way, is supported by voluntary subscriptions.

#### **PORTSMOUTH AND DISTRICT**

There was a good attendance at the meeting held by the Portsmouth and District Wireless and Television Society, when Mr. Cholot, of Lissen, Ltd., gave a demonstration of short-wave receivers and transmitters. The advantages of dipole aerials for short-wave work were explained and a novel coil unit which would tune as low as the television broadcasts from Alexandra Palace, and as high as the trawlers on 160 metres was put on test. By means of lantern slides diagrams were given. The evening came to a close all too soon and Mr. Cholot was warmly thanked. Anyone interested in short waves is invited to write to the chairman, Mr. HAROLD LEIGH, 20, King Street, Southsea, for particulars of membership.

#### **SHEFFIELD**

Meetings of the Sheffield and District Short-Wave Club are held fortnightly on Wednesdays at 8 p.m. During its four years' existence many interesting lectures and demonstrations have been given, those of recent dates covering such subjects as short-wave detectors, H.F. stages, photo-electricity, short-wave superhets, and a demonstration of an experimental short-wave superhet. The hon. secretary, D. H. TOMLIN, invites readers to the meetings, who may obtain further details by addressing correspondence to the club's headquarters, The Wharcliffe Hotel, West Street, Sheffield, 1. Subscription 5s., payable in two instalments.

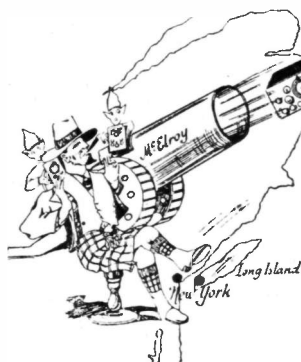
#### **SOUTHALL**

Recent activities of the Southall Radio Society include an extremely successful visit to the Paris Radio Show, when more than thirty members and friends took advantage of the special facilities available. Mr. S. Gould was the organiser.

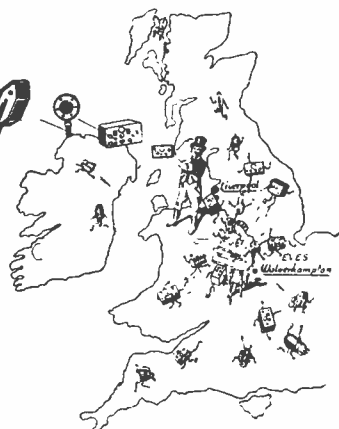
Four teams were entered in the Golders Green and Hendon Society's Direction Finding Contest, and they were placed 1st, 2nd, 3rd and 5th respectively, the leaders being Messrs. Swann, Lee, Rapsey and Pinsent. Hon. Secretary: Mr. H. F. REEVE, 26, Green Drive, Southall.

#### **QUERY COUPON**

S.-W.M. 6/37.



NOTE NEW  
ADDRESS



## BRITISH AND AMERICAN AMATEUR SUPPLIES

### MORE NEW RELEASES BY

**G2NO** (H. R. ADAMS) and **W1JYN** (TED McELROY) of  
**EVES RADIO LTD., Willenhall Road, WOLVERHAMPTON**

Authorised Distributors in England for

HALLICRAFTERS : TOBE : R.M.E. : TAYLOR : HARVEY : COLLINS

A few items from our list:—

**HALLICRAFTERS SKY CHALLENGER:**—9 tubes; 1 stage R.F.: 7.5 to 550 metres; B.F.O.: Std. Bi.: 230 volt input.

Price complete, £23. Xtal Model, £25.

**HARVEY U.H.X. 10 TRANSMITTER:**—2.5 to 20 metres; 'phone: CW: MCW: Separate power pack: Output down to 14 Mc. approx. 25 watts. Price of TX only, £16/15/0. Price of TX complete all bands, Tubes, Power Pack, etc., £36/0/0.

**HARVEY U.H.X.35 TRANSMITTER:**— 2.5 to 20 metres: RF Line-Up: 42, RK25, 2/RK25's, RK37, Audio output 6L6's in Class B, 3 Separate Power Supplies, 6 Meters, Xtal Mike, Bliley Xtals. Price of TX complete for one band, £82. Complete all bands, £110.

**TUBES:** Taylor T20, 18/6; T55, 45/-; 886 Jnr., 7/6; 866, 11/6.

**RAYTHEON** (1st grade only):—913 Cathode Ray, 37/6; 885 Trigger Tube, 16/6; 955 Acorns, now 26/6; 954 and 956, now 34/6; 6L6 and 6L6G in Raytheon only 7/6. All other Raytheons in stock.

**New CERAMIC TUBE SOCKETS.** All types. Octal, 1/3. Octals, 1/6. **STEEL AND ALUMINIUM PANELS AND SUB BASES:**—Bases: 19" x 12" x 3", 17" x 12" x 2" or 3". All panels 19" long x 5", up to 16". All finished Black Japanned and Crackle.

**1937 LITERATURE:**—"ARRL" Handbook, 5/3. Maps, 4/6. Jones Handbook, 7/-; Antennae Handbook, 2/6; RCA Tube Data Book, 1/3.

**TOBE CABINETS** for Amateur Seven Receiver 19/6

**HALLICRAFTERS** P.M. Speaker, 12" communication type, £3.

**UTC** Modulation Transformers, VM1, 29/-; VM2, 37/-; VM3, 58/-.

All Thordarson and UTC Transformers for 6L6 in stock.

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# BROADCAST STATIONS

The list of short-wave broadcast stations given below will be added to and brought up to date each month. New stations of programme value, alterations in wavelength and frequency to be shown in heavy type, thus making the feature as complete as possible month by month.

Station	Call	Wave	Freq.	Station	Call	Wave	Freq.
PITTSBURG ... ..	W8XK	13.93	21.54	SYDNEY ... ..	VK2ME	31.28	9.59
DAVENTRY ... ..	GSJ	13.93	21.53	EINDHOVEN ... ..	PCJ	31.28	9.59
WAYNE ... ..	W2XE	13.94	21.52	DAVENTRY ... ..	GSC	31.32	9.58
DAVENTRY ... ..	GSH	13.97	21.47	LYNDHURST ... ..	VK3LR	31.32	9.58
BANGKOK ... ..	HS8PJ	15.77	19.02	MILLIS ... ..	W1XK	31.35	9.57
BANDOENG ... ..	PLE	15.93	18.83	ZEESEN ... ..	DJA	31.38	9.56
DAVENTRY ... ..	GSG	16.86	17.79	PODEBRADY ... ..	OLR3A	31.41	9.55
BOUNDBROOK ... ..	W3XAL	16.87	17.78	ZEESEN ... ..	DJN	31.45	9.54
ZEESEN ... ..	DJE	16.89	17.76	JELOY ... ..	LKJ1	31.48	9.53
WAYNE ... ..	W2XE	16.89	17.76	TOKIO ... ..	JZI	31.48	9.53
BUDAPEST ... ..	HAS3	19.52	15.37	SCHENECTADY ... ..	W2XAF	31.48	9.53
ZEESEN ... ..	DJT	19.53	15.36	MELBOURNE ... ..	VK3ME	31.55	9.51
ZEESEN ... ..	DJR	19.56	15.34	DAVENTRY ... ..	GSB	31.55	9.51
SCHENECTADY ... ..	W2XAD	19.57	15.33	CARTAGENA (COLOMBIA)	HJ1ABE	31.58	9.50
DAVENTRY ... ..	GSP	19.60	15.31	RIO DE JANEIRO ... ..	PRF5	31.58	9.50
BUENOS AIRES ... ..	LRU	19.62	15.29	HAVANA (CUBA) ... ..	COCH	31.82	9.42
ZEESEN ... ..	DJQ	19.63	15.28	BANGKOK ... ..	HS8PJ	31.85	9.35
WAYNE ... ..	W2XE	19.65	15.27	BUDAPEST ... ..	HAT4	32.88	9.12
DAVENTRY ... ..	GSI	19.66	15.26	RADIO NATIONS ... ..	HBP	38.48	7.78
RADIO COLONIAL (Paris)	TPA2	19.68	15.24	MOSCOW ... ..	RV96	38.89	7.52
PODEBRADY ... ..	OLR5A	19.71	15.22	TOKIO ... ..	JVP	39.95	7.51
EINDHOVEN ... ..	PCJ	19.71	15.22	SAN DOMINGO ... ..	HIT	45.25	6.63
PITTSBURG ... ..	W8XK	19.72	15.21	VENEZUELA ... ..	YV4RB	46.95	6.36
ZEESEN ... ..	DJB	19.74	15.20	MARACAIBO ... ..	YV5RP	47.81	6.27
DAVENTRY ... ..	GSO	19.76	15.18	HAVANA ... ..	COKG	48.39	6.20
SOURABAYA ... ..	YDC	19.80	15.15	MARACAIBO ... ..	YV5RD	48.78	6.15
DAVENTRY ... ..	GSF	19.82	15.14	WINNIPEG ... ..	CJRO	48.78	6.15
VATICAN CITY ... ..	HVJ	19.84	15.12	PITTSBURG ... ..	W8XK	48.86	6.14
ZEESEN ... ..	DJL	19.85	15.11	JELOY ... ..	LKJ1	48.94	6.13
SOFIA ... ..	LZA	20.24	14.82	HAVANA (CUBA) ... ..	COCD	48.94	6.13
WARSAW ... ..	SPW	22.00	13.63	GEORGETOWN ... ..	VP3BG	48.94	6.13
REYKJAVIK ... ..	TFJ	24.52	12.23	BOGOTA ... ..	HJ3ABX	48.96	6.12
MOSCOW ... ..	RNE	25.00	12.00	MEXICO CITY ... ..	XEUZ	49.02	6.12
RADIO COLONIAL (Paris)	TPA3	25.23	11.88	WAYNE ... ..	W2XE	49.02	6.12
PITTSBURG ... ..	W8XK	25.27	11.87	CHICAGO ... ..	W9XF	49.18	6.10
PODEBRADY ... ..	OLR4A	25.34	11.84	BOUNDBROOK ... ..	W3XAL	49.18	6.10
WAYNE ... ..	W2XE	25.36	11.83	BELGRADE ... ..		49.18	6.10
LISBON ... ..	CT1AA	25.36	11.83	HONG KONG ... ..	ZBW2	49.26	6.09
ROME ... ..	2RO	25.40	11.81	NAIROBI ... ..	VQ7LO	49.32	6.08
VIENNA ... ..	OER2	25.42	11.80	CHICAGO ... ..	W9XAA	49.34	6.08
TOKIO ... ..	JZJ	25.42	11.80	MARACAIBO ... ..	YVIRD	49.42	6.07
BOSTON ... ..	W1XAL	25.45	11.79	PHILADELPHIA ... ..	W3XAU	49.50	6.06
ZEESEN ... ..	DJD	25.49	11.77	CINCINNATI ... ..	W8XAL	49.50	6.06
PODEBRADY ... ..	OLR4B	25.51	11.76	COPENHAGEN ... ..	OXY	49.50	6.06
DAVENTRY ... ..	GSD	25.53	11.75	MOTALA ... ..	SBG	49.50	6.06
WINNIPEG ... ..	CJRX	25.60	11.72	BOGOTA ... ..	HJ3ABD	49.59	6.05
RADIO COLONIAL (Paris)	TPA4	25.60	11.72	BOSTON ... ..	W1XAL	49.67	6.04
HAVANA (CUBA) ... ..	COCX	26.24	11.43	ZEESEN ... ..	DJC	49.83	6.02
TOKIO ... ..	JVM	27.93	10.74	BOGOTA ... ..	HJ3ABH	49.85	6.01
BUENOS AIRES ... ..	LSX	28.99	10.35	HAVANA (CUBA) ... ..	COCO	49.85	6.01
RUYSSELEDE ... ..	ORK	29.04	10.33	PODEBRADY ... ..	OLR2A	49.92	6.01
MADRID ... ..	EAQ1	30.43	9.86	GEORGETOWN ... ..	VP3MR	49.92	6.01
HAVANA (CUBA) ... ..	COCQ	30.77	9.75	MONTREAL ... ..	CFCX	49.96	6.00
LISBON ... ..	CT1AA	31.09	9.65	MEXICO CITY ... ..	XEBT	50.00	6.00
ROME ... ..	2RO	31.13	9.63	MOSCOW ... ..	RW59	50.00	6.00
MOSCOW ... ..	RAN	31.25	9.60	VATICAN CITY ... ..	HVJ	50.26	5.97
CARTAGENA (COLOMBIA)	HJ1ABP	31.25	9.60	MARACAIBO ... ..	YV1RB	51.28	5.85
RADIO NATIONS ... ..	HBL	31.27	9.59	CARACAS ... ..	YV5RC	51.72	5.86
PHILADELPHIA ... ..	W3XAU	31.28	9.59	KHARBAROVSK ... ..	RV15	70.20	4.27