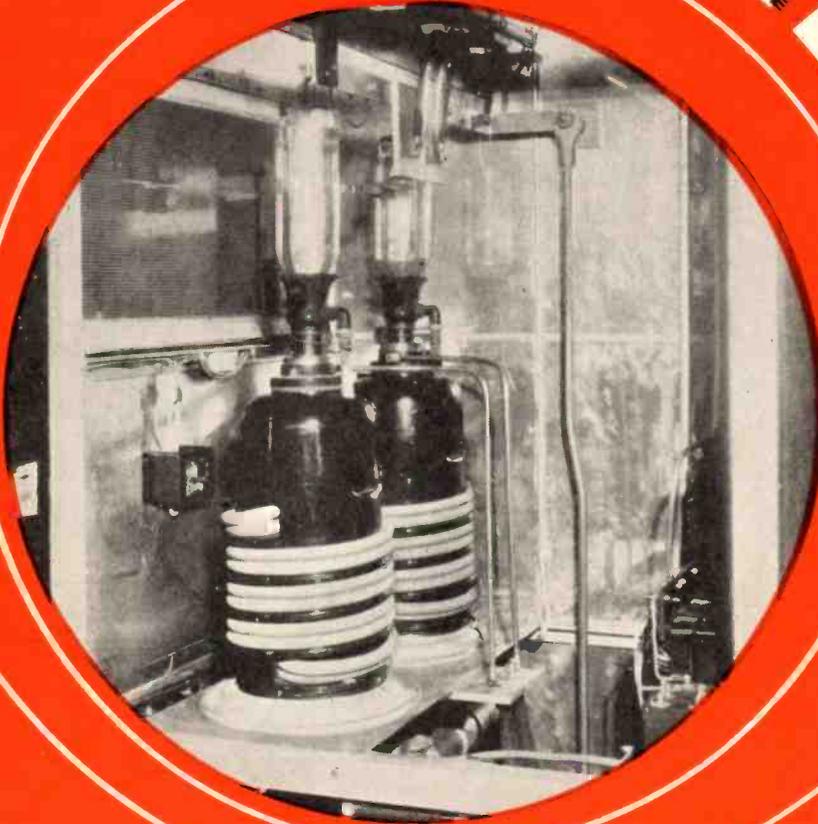


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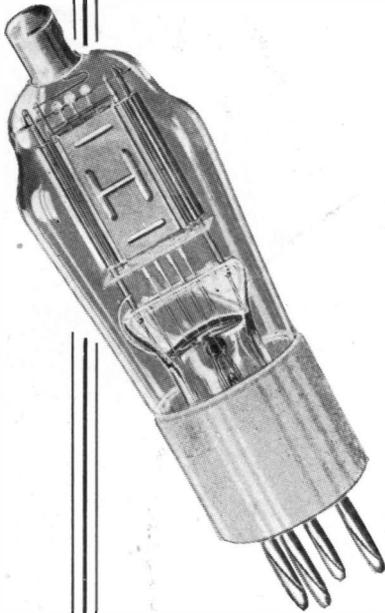
SHORT-WAVE MAGAZINE



No. 3

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Courtesy of the N.B.C.

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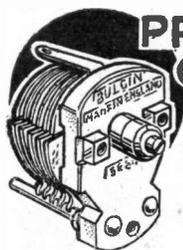
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THE SHORT-WAVE MAGAZINE

Vol. 1.

MAY-1937

No. 3

Editor: BASIL WARDMAN (G5GQ)

Editorial Asst.: S. W. CLARK

Advertisement Manager: C. T. MILDENHALL

It may be said with confidence that one of the greatest factors in the development of short waves has been that simplest of receivers—the single-valve detector, with reaction.

Readers who remember the beginning of short-wave broadcasting will recall the efforts made to obtain amplification with conventional forms of R.F. amplifier, and the lack of success due to the unsuitability of components and design. Many experimenters attempted to use superheterodynes, but for the same reasons their efforts met with failure.

It is only recently that the problems peculiar to short-wave reception may be considered overcome and that a state of stability in designs exists.

Years of research in laboratories has resulted in new apparatus, ideas, and circuits, which manufacturers have put into production, providing the short-wave constructor with components which are suitable for the highest frequencies in use.

With these special components in production, and with the present stability of design in short-wave receivers, we feel that the time is ripe to design a receiver for the constructor. This receiver will have all the latest improvements included, and will not be out of date in a year from the time of construction. On page 17 readers will find an announcement regarding this receiver, in which they are asked to put forward suggestions of those features they consider to be suitable.

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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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Europe's Oldest Short-Wave Station

Ten Years of Inter-Continental Broadcasting

THE TENTH anniversary of the first short-wave broadcast from Europe to the East is a notable wireless occasion that has just recently been celebrated, and the romantic story lying behind it is one that cannot fail to be of interest to readers of *THE SHORT-WAVE MAGAZINE*.

In the early days of wireless transmission the long and medium wavelengths were the only ones utilised to any great extent, but these proved by no means reliable and regular over distances of more than a thousand miles, and it became obvious that the key to the bridging of greater distances lay in the short wavelengths.

● First Short-wave Programme

The laboratories of the Philips works in Eindhoven in Holland thereupon took the initiative, and, after the most careful and comprehensive investigations, it was decided to construct an efficient short-wave

transmitter. The result was seen on March 11, 1927, when for the first time the voice of the new Dutch short-wave transmitter encircled the earth on a wavelength of 30.2 metres. From a small studio, the walls of which were hung with loose lengths of cloth to prevent reverberation, the first short-wave programme was sent forth on its long journey from Europe. Incidentally, it is interesting to note that it consisted mainly of gramophone records which were changed before each-call signal.

Success was immediate. The next day a brief cable reading "Marvellous short-wave reception" was received from Bandoeng, in the East Indies, and this was only the forerunner of many others recording excellent reception in Australia, New Zealand, South Africa, British India, South America, Canada, and even Japan. In fact listeners in the United States reported that they could hear PCJJ—the call sign of the new station—as clearly and powerfully as their own local stations!

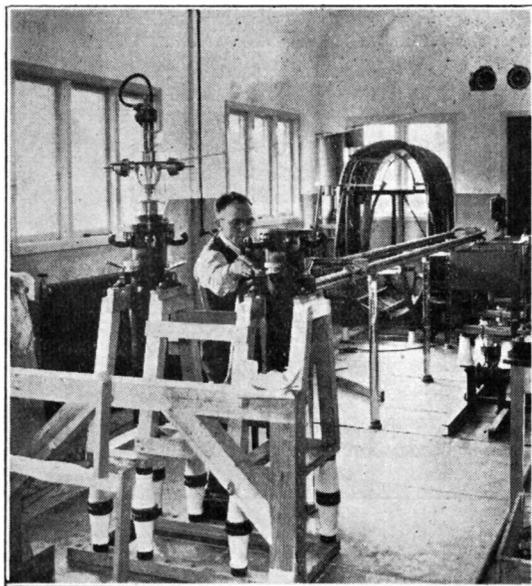
● B.B.C.'s Request

Nothing could better illustrate the success of this pioneer broadcast than the fact that on May 20 of the same year the B.B.C. requested the PCJJ transmitter to radiate the Daventry programme to the whole world. This transmission was also perfectly successful, so much so that wireless stations in South Africa, Australia, New Zealand, and in many other parts of the world picked up the short-wave station and relayed the programme to their local listeners, using their own wavelengths. Then, on June 1 of this historic year, PCJJ received its greatest meed of honour when Queen Wilhelmina and Princess Juliana spoke for the first time direct to Holland's Eastern colonies.

The next problem was that of converting the experimental station into a permanent one. A plan was evolved which resulted in the formation of a limited company, "N. V. Philips Omroep Holland-India," briefly known as PHOHI, which was registered on June 18, 1927. Regular transmissions henceforward took place on a wavelength of 16.88 metres, with an output of 80 kilowatts from a new short-wave transmitter built with the aid of the technical experience gained from PCJJ.

● Popular "PHOHI"

In 1930, however, owing to certain difficulties in organisation, the successful activities of PHOHI



Installing the large water-cooled valves of the power stage in the transmitter building of the new PCJ. In the background can be seen the system of copper tubes for the tuning and the rubber tubing for the water-cooling.

were interrupted. The Dutch Government attempted to distribute the transmission hours of the new station to the political and religious broadcasting bodies, which resulted in the new station closing down. So well-known and liked was PHOHI, however, that protests were lodged from all parts of the world, and, as a result of these, transmissions were resumed after an interval of two years on December 24, 1932.

It was then found that an extended period of sunspots had radically altered the conditions of reception. To meet these the transmitter was adapted for a second wavelength to be employed during the winter months. The experimental transmissions with the new wavelength of 25.57 m. gave such satisfactory results that in April, 1934, the PHOHI broadcasts were recommenced officially.

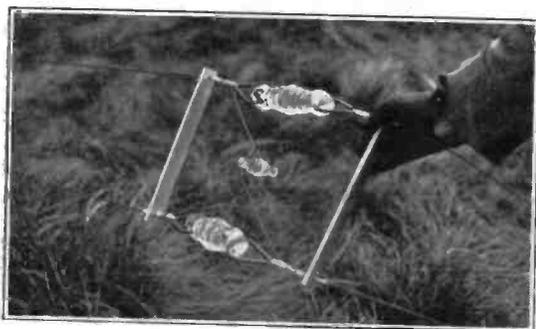
The old PCJJ transmitter, which was now given the call-signal PCJ, remained in service without interruption and acted as a relay station for the new PHOHI. Here also the transmitter was adapted for a second wavelength so that the two stations had four different wavelengths at their disposal, and, according to the season of the year, could use either the 16.88 m., 19.71 m., 25.57 m., or 31.28 m. wavelengths—an arrangement that remains to the present day.

● Still Growing

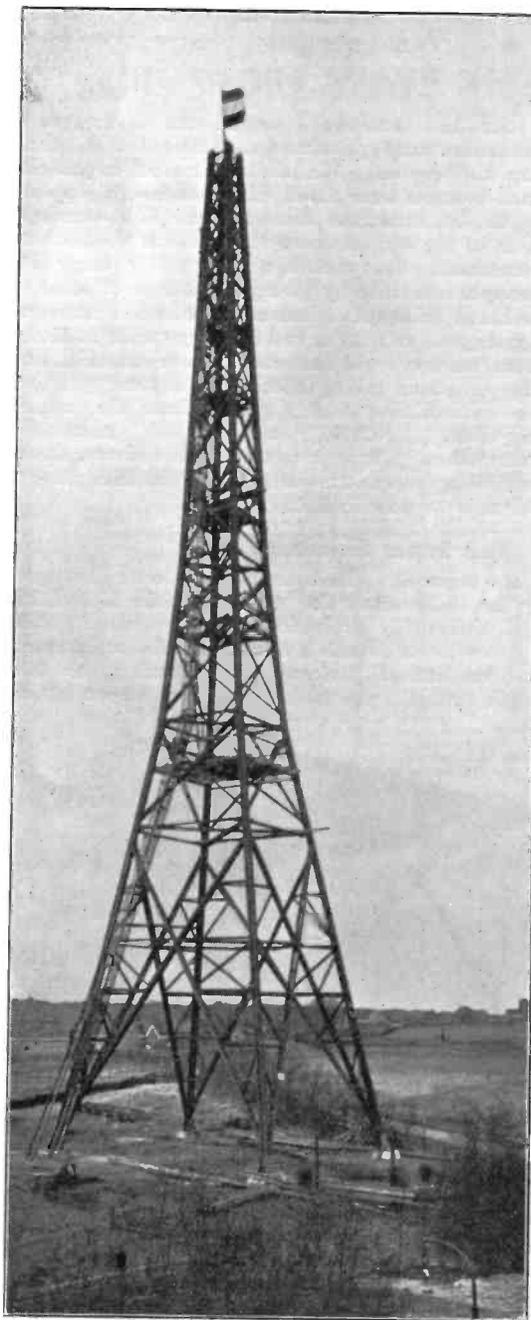
Now modern radio conditions demand still further expansion, and a new PCJ is rising—on the shores of the Zuider Zee. Here on the grounds of the PHOHI station at Huizen the short-wave transmitter is being set up again and reinforced. The buildings are completed and, behind them, a steel auxiliary aerial tower is already being erected for the first experimental PCJ programmes.

Soon the wonderfully shaped dipole aerial will be suspended in the high tower, there to carry the powerful voice of PCJ over countries and seas. When all is ready PHOHI, supplemented by the reconstructed PCJ, will rank among the most powerful world radio transmitters, with a truly remarkable long range. Then Europe's oldest short-wave station will faithfully maintain its tradition

of always occupying a leading place in the van of radio progress, and listeners throughout the world will assuredly not stint their appreciation of its services and efficiency.



The new dipole aerial, shortly to be installed in the tower.



The aerial tower of PCJ station in course of erection. This will carry the dipole aerial.

Communication Receivers Compared

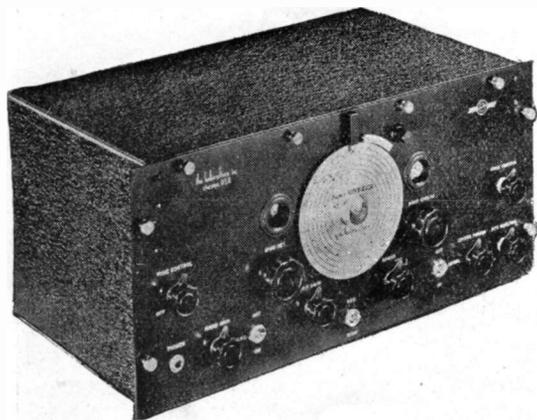
PART II. OF AN ARTICLE FOR THE NON-TECHNICAL LISTENER

By G2NK

IN OUR last issue we described the advantages a communication type of receiver offers over the ordinary all-wave set. We mentioned that, in general, extra controls were fitted which, although perplexing to the broadcast listener, were of inestimable value to the serious short-wave listener or amateur transmitter. This month we propose to carry our description further by giving particulars of some of the better known American communication receivers. If you spend an hour or two listening on the 20-metre phone band you will undoubtedly hear American and other amateurs giving descriptions of their gear and the chances are that you will hear the names "Skyrider," "NC100," and "RME69" mentioned pretty often. These three makes of receivers, therefore, being representative of the American market will now be described in detail.

● The Super Skyrider

The Super Skyrider is the latest receiver developed by the Hallicrafters Co. As seen in the illustration it is thoroughly professional in appearance, while a glance inside reveals a host of details incorporated to give utmost performance. Counting the 6G5 magic tuning eye, the receiver uses eleven tubes,



THE SUPER SKYRIDER

ten of them being the efficient metal type. The circuit has a pre-selector stage using a 6K7 tube, followed by a 6L7 first detector. A separate oscillator tube, a 6C5, is used to give optimum conversion, and the two I.F. stages use 6K7 pentodes operating at 465 kcs. The I.F. stages are followed by a multi-element tube, the 6R7, which functions as second detector, AVC and first stage audio amplifier.

The output stage consists of two 6L6 tubes giving the amazing undistorted output of 14 watts. Another 6K7 is used as an electron-coupled oscillator working near the intermediate frequency to act as a beat-frequency oscillator for C.W. reception. The power rectifier, which completes the tube line-up, is a full-wave rectifier type 6Z3.

The large central dial is operated by the knob on its immediate left, just below the 6G5 tuning eye. This dial is directly calibrated in five wavebands, giving continuous selection from 560 metres down to 7.5 metres. Band spreading is arranged by building a small parallel ganged condenser into the main condenser frame and operated by the knob on the right of the main dial, the reading being observed through a small illuminated window opposite to the tuning eye.

Other controls on the front panel include radio and audio-frequency gain, tone, beat frequency, oscillator amplitude, beat frequency oscillator pitch, B.F.O. on-off switch, A.V.C. on-off switch, crystal switch and crystal phasing, and last but by no means least, a send-receive switch, which makes the receiver dead while transmitting, but at the same time keeps the tube-heaters on and ready for immediate operation.

Looking inside we see other features which go towards making this receiver so justly popular. The I.F. transformers have iron dust cores and are tuned by variable air condensers, thus giving stability over long periods. Ceramic and steatite insulation is used at all vital R.F. points, while the rugged construction of the tuning condenser and wave-change switches goes far towards keeping the performance of the receiver up to maximum after long periods of hard use.

● The National NC100

A glance at the circuit diagram of the National NC100 reveals the fact that it is very similar theoretically to the Super Skyrider just described. The big difference however is in the mechanical construction. Instead of using the usual type of wave-change switch with the coils mounted alongside, the NC100 receiver has its fifteen sets of coils or trimmers fitted into a solid cast aluminium box with fifteen compartments, each coil thus being screened from its neighbours. The whole box is mounted on a slide rod with rack and pinion arrangement operated by the large knob under the tuning dial. By turning the knob, therefore, the whole coil assembly slides along inside the receiver, the terminal pins on the coils engaging in a series of clips

mounted under the tuning condenser. The unit automatically locks itself in place at each band, and a green spot appears at the appropriate waveband on the panel.

The tuning dial is a fine example of precision engineering. By means of a gear box inside the receiver, ten complete revolutions of the dial are needed to turn the condenser through 180°. By means of an ingenious gearing arrangement the figures appearing through the slots in the dial change at each revolution, thus each waveband is divided into 500 divisions which makes calibration extremely easy. Thus fifty revolutions or 2,500 dial divisions will tune the receiver from .54 megacycles to 30 megacycles.

Twelve tubes are used in the NC100 receiver, the extra one to the Skyrider being due to the fact that a separate tube is used for A.V.C. operation. The output circuit consists of two 6F6's in push-pull, which although perhaps not producing the fourteen watts output the 6L6's will give, provide an output power adequate for practically all purposes.

The NC100 receiver can be supplied with or without crystal filter in the I.F. stages, the crystal model being styled the NC100X. Whereas the short-wave broadcast listener will not always gain a lot by its inclusion, the amateur transmitter, who often has to read an R2 signal through an R7/8 background of mush and QRM, will find it possible to turn a QSA2 signal into QSA4 or 5 by putting the crystal into circuit.

A further edition of this popular receiver, the NC101X, is designed expressly for covering the amateur bands only, and on each of these bands a tuning scale length of 12 inches is obtained.

● The RME69

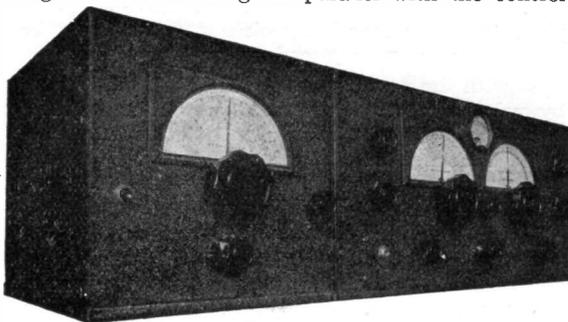
The RME69 receiver is one of those receivers which although designed over a year ago, gains in popularity every day. This fact of course points to one thing: that the receiver was designed correctly from the start. Built ruggedly, using a cast aluminium chassis instead of the usual pressed steel frame, the RME69 uses nine glass tubes. One stage of R.F. amplification using a 6D6 is followed by the mixer tube, a 6C6, used in conjunction with the R.F. oscillator, another 6D6. Two stages of I.F. amplification again using 6D6's are followed by a 6D7 double diode pentode acting as second detector, AVC and 1st stage audio. The output stage uses a 42 pentode giving about four watts undistorted output. Another 6D6 in the BFO stage and an 80 mains rectifier complete the tube line-up.

Band spreading is arranged on this receiver by a small ganged condenser in parallel to the main tuning condenser. This is operated by the right hand control, while the left hand control operates the main tuning condenser over six wavebands, giving a continuous frequency range from 550 kc. to 32 megacycles.

In the illustration will also be seen the DB20 unit coupled to the RME69 receiver. This is a pre-selector unit with two extra stages of radio-

frequency amplification. On one particular test, W2XAD was tuned in on the RME69 receiver using a small aerial. Signals were not coming over very well and the tuning meter registered R4 to R5, while the background noise was sufficient to mar the enjoyment of the programme. On connecting the DB20 unit and tuning to W2XAD, the signal strength came up to R8 while the background noise dropped down in proportion due to the extra selectivity given by the three tuned circuits in the pre-selector.

Another useful addition that can be fitted to the RME69 is the LS1 noise silencer. By bridging another I.F. stage in parallel with the control



R.M.E. 69 and PRE-SELECTOR UNIT

grid of one of the I.F. tubes and rectifying the output by a diode 6H6 tube, a voltage is developed which is fed back to the first I.F. stage. Thus sudden surges caused by atmospherics and man-made static tend to make the receiver dead by over-biasing the I.F. stages. Thus instead of a loud splutter, the receiver gives only a slight hiss during the time of the disturbance. Of course it will not operate on all forms of interference but the results obtained go a long way toward making a QSA2 signal into QSA5, and that after all is one of the main requirements of a communication receiver.

[English receiver design will form the continuation of this series].

World Friendship Society of Radio Amateurs

BRANCH FOR HACKNEY

The Hackney and District Wireless Club is a newly formed branch of the World Friendship Society of Radio Amateurs. Meetings are held the first and last Mondays in every month, and special meetings when necessary. Morse classes are held for the first hour of every meeting; a competent Morse instructor is always in attendance for this purpose.

When fully launched a licence will be applied for, and transmitting will take place on Saturday afternoons. For particulars of membership, etc., apply to E. PENROSE, 2, Coopersale Road, Homerton, E.9, or ARTHUR H. BIRD (G8AQ), Hon. Secretary, W.F.S.R.A., 35, Bellwood Road, Waverley Park, Nunhead, S.E.15.

Books for the Radio Amateur

A NEW THEORY

"Inventions and Experiments in Wireless and Television," by D'Arcy Ford. Published by the author, at 15, Gandy Street, Exeter, Devon. 44 pp., 1s. 1d., post paid.

EVERY THEORY is based on some primary assumption, and if this primary assumption can be proved incorrect, then the entire theory based on it will also be incorrect. Throughout the history of science this has repeatedly happened, the original theories of gravitation, atoms, etc., have all given place to newer theories, which may tomorrow be proved wrong and replaced by others.

So with the present theories of detection, whether by valve or otherwise. Mr. D'Arcy Ford does not believe in the present ideas of modulation and detection. He suggests that the sideband theory is wrong and puts forward a theory based on the refraction of light in its place.

We will not express an opinion either way, but those who would care to pursue the matter further will find the book and the experiments described interesting reading.

TELEVISION CYCLOPAEDIA

By Alfred T. Witts, A.M.I.E.E. Publishers: Chapman and Hall. 151 pp., 7s. 6d.

THE ADVENT of a new science introduces a large number of new words into the vocabulary. Television, for example, is a word only to be found in the most recent dictionaries, and so a large number of the expressions used in this new science, although used glibly by technicians, are incomprehensible to the majority who have nowhere to turn to discover their meaning.

Mr. Witts has collected all these many terms together, and presents them in the "Television Cyclopaedia," together with a semi-technical explanation of their meaning. Such expressions as Raster, Frusto-Cone, and Telepantoscope, to mention but a few, are explained in an easily understood manner.

Apart from its obvious appeal to the television enthusiast the book also contains explanations of many terms common to radio and optical phenomena.

THERMIONIC VALVES IN MODERN RADIO RECEIVERS

By Alfred T. Witts, A.M.I.E.E. Publishers: Sir Isaac Pitman and Sons, Ltd. 192 pp., 8s. 6d.

THE MORE obvious a thing, the less is there known about it. Such is the case of the valve, common to practically all receivers, yet probably the least understood component.

(Continued on p. 11).

Correspondence

MORE SUGGESTIONS

"I would like to offer you my congratulations on producing a magazine devoted entirely to short waves. A publication like yours is long overdue in this country and, with the advent of all-wave sets and the increasing interest in this absorbing branch of radio, will fill a long-felt want. The first two numbers have made very interesting and instructive reading and are full value for money. Keep it up, please!

"Regarding suggestions, there are not many I can usefully put forward as you have covered the ground so well. However, here are one or two for what they are worth. I think a 'Calls Heard' column should in due course be included, eliminating of course those stations which are easily heard and to whom a report would be of no value. Then perhaps you could give us some descriptions and photographs of British amateur stations, both transmitting and receiving. Competitions might be organised for receiving stations to take part in—these I feel sure would be popular. A lot of pleasure is missed on the short waves if one does not read Morse, and there must be many who do not, so perhaps you could have an article or two dealing with this aspect, giving advice on learning the code. Incorporate a few pages which could be used as log-sheets, ruled and headed accordingly."—F. PEMBERTON (ex-G6PM), 68, Langham Road, S.W.20.

"I quite agree with your editorial regarding the proposed contents of the Mag, it is a job to cater for the beginner and the learned, but so far you seem to do the trick quite well. One of the things that I think would be welcomed by readers would be a beginners' course, in which would-be 'hams' were supposedly taken up by the journal and piloted along the channels from listener to full radiating licence with a groundwork of theory, Morse and finally transmitter construction and design. Another point, don't overlook the battery user, although most 'hams' are fortunate enough to be on A.C., there are still a large number who are still using accumulators, etc., for H.T., especially the beginners, and I think that designs for ten-watt transmitters using English valves and powered by batteries, would prove of interest."—L. F. S. PARKER (G5LP, B.S.W.L.54), 127, Jubilee Crescent, Wellingborough, Northants.

"Allow me to congratulate you on the excellence of the Magazine. It supplies a need which I am sure has long been felt—that of a 'short-wave' radio magazine. I hope you will keep up the reviews of wireless books as one gets so little opportunity of hearing about them otherwise."—F. P. CAWSON, 33, Osborne Road, Ainsdale, Southport.

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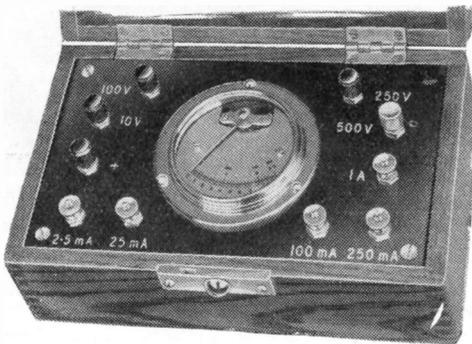
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Described in March issue.

★ **Peto-Scott Version** ★

See Photograph and Editorial Mention on Page 34.

KIT "A" as detailed below, 49/6
with 3 4-pin Coils

Peto-Scott, Specialists in kits of parts since 1919, offer an economy version of this popular 1-valve Shortwaver. Each component is specially tested to ensure that the performance of the built-up kit is equal in all respects to the original model described in the March issue of this publication. Only Peto-Scott can offer such a combination of efficiency and value.

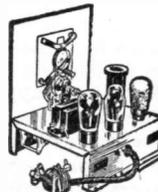
KIT "A" Comprises 1 ready-drilled grey stove-enamelled chassis, 1 ready-drilled black crackle finished panel 1 .00016 main tuning condenser, 1 .00016 bandspread condenser 1 .0002 reaction condenser, 1 slow-motion drive calibrated 0-180, 1 black ivoryine scale (0-10) for tank condenser, 1 scale (0-180) for reaction condenser, 1 air-spaced aerial balancer, 1 all-wave H.F. choke, 1 4-pin and 1 7-pin coil and valve holders, 1 on-off switch, 1 telephone jack, 1 L.F. transformer, 3 condensers, 2 resistances, 7 ebonite shrouded terminals, 3 4-pin coils (12-94 metres), all necessary screws, wires, flex, etc. Cash or C.O.D. Carr. Paid 49/6 or 5/- down and 11 monthly payments of 4/3.

If 10-metre Coil required with Kit "A," add 2/9 to deposit.

KIT "B" exactly as for Kit "A," but with 1 Class "B" valve, 1 additional 4-pin coil (10 metre band) and 1 pair of headphones. Cash or C.O.D. Carr. Paid £3.10.6 or 6/6 down and 11 monthly payments of 6/6.

Peto-Scott BANDSPREAD SHORT WAVE SUPER THREE KIT

12-94 METRES.



● Maximum volume and efficiency
Detector and 2 L.F. Circuit ● Slow-
Motion Reaction Condenser ● Dual
Ratio Slow-Motion Dial ● Matched
and tested Components.

Will give you hours of thrilling entertainment on the short-wave band. Simple but efficient circuit comprising Det. and 2 L.F. valves, ready drilled and enamelled chassis. Bandspread tuning simplifies station finding.

KIT "A" Cash or C.O.D. £2 : 5 : 0
Carriage Paid

Or 2/6 down and 11 monthly payments 4/3. Complete kit of parts including 3 coils, 12-94 metres, and building instructions and wiring diagram, less valves, speaker and cabinet. If 3 valves required with Kit, add 1/9 to deposit and each monthly payment.

B.T.S. See Editorial mention on page 37.

ADABAND

BRINGS SHORT WAVES TO YOUR PRESENT SET

The Adaband
Stands
Beneath
Your Set

■ Suitable for any make or type of receiver
■ Single tuning control ■ 13-74 metres ■ Walnut Veneered Cabinet ■ Long and medium wave reception on your present set may be continued without disconnecting the ADABAND, a special change-over switch being incorporated. Stand your present set, whatever make or type, A.C. or D.C. Mains or Battery, on the B.T.S. ADABAND, simply plug in, and you have an all-wave receiver with a range limited only by the ends of the earth itself, adding a hundred short-wave programmes to those you now hear.



BATTERY MODEL Cash or C.O.D. Carriage Paid £5.5.0, or 8/- down & 14 monthly payments 8/-.

A.C. or D.C. MAINS MODEL Cash or C.O.D. Carr. Pd. £6.12.6 10/- down and 14 monthly payments 10/-.

All postal orders must be crossed and currency registered.

PETO-SCOTT CO. 77 (S.M.1) City Road, London, E.C.1
Ltd. 62, (S.M.1) High Holborn, London, W.C.1

EST. 1919

RADIO IN SPAIN

An Explanation of the Spanish Short-Wave Position

FORTY DIFFERENT propaganda stations all shouting at once. A bedlam of whistles, music, noise. One half trying to drown the transmissions of the other half. Such is the present situation on the 40-metre amateur band.

Radio, the greatest propaganda weapon the world has ever seen, has been utilised by both sides engaged in the Spanish Civil War. The printed word, the moving picture, can be refused admission to a country, but radio knows no boundaries and is there for all who care to listen.

Broadcasting had yet to be born when the World War broke out. A few private experimenters possessed wireless apparatus, but this was immediately confiscated or sealed up upon the commencement of hostilities.

What would happen to radio if war broke out again? This has been a question upon the lips of thousands. Would receivers and transmitters be confiscated, or would use be made of broadcasting for propaganda?

● The Abyssinian War

In the Italo-Abyssinian war last year an appeal to the world was made by the Empress of Abyssinia over the Addis Ababa short wave station. Deliberately jammed by a Morse station it was heard by few. The number of receivers in Abyssinia could almost be counted on the fingers of both hands. There was no vast national population to be reached by radio.

In Spain broadcasting was an established service. The country was covered by a number of medium-wave stations. Receivers were commonplace in homes. Madrid possessed a modern short-wave broadcast station with world-wide range. Innumerable amateurs operated their own short-wave transmitters. Here would be the answer to the use to which radio would be put in war.

The government retained control of Madrid, the rebels of Seville. Nightly these two stations, supposed to be sharing the same frequency of 731 kc., tried to outdo each other. But these medium-wave stations were of limited range. Material, men, money, sympathy were required from the outside world. Low power short-wave stations could reach where medium-wave stations failed.

EAQ, the Madrid short-wave station operating on 30 metres, was immediately used for international propaganda. News was transmitted daily in English, French and German. Commercial circuits were liable to interruption, news was difficult to obtain.

Newspapers soon seized on the new medium for information. Short-wave sets were installed at their offices and news picked up from EAQ.

Immediate action by the rebels followed. The station of the Radio Club of Teneriffe, on 28 metres, was taken over and used as a counter-attack.

One short-wave station to the government, one to the rebels. Stalemate!

● Amateurs

There remained a large number of amateur short-wave transmitters, apparently of minor importance. They were not closed down but formed themselves into what they called the "succour service." Non-partisan in character it was used at first as a



H. V. Kaltenborn interviewing Spanish soldiers for The Columbia Broadcasting System's war reports.

means of informing families of the fate of relatives. The procedure was for a station, say in Tetuan, to call out "Hullo, Madrid, . . . hullo Madrid, here is Tetuan, . . . , here is Tetuan. Juan Gomez, . . . , Juan Gomez, please inform his wife in Blank Street, Madrid, that he is safe." Stations in rebel territory contacted those in government. No call signs were given, just the name of the town.

Rapid communication is of the utmost importance in warfare. Other use was soon made of these amateur stations. They began to be used for public announcements regarding transport, food supplies, hospitals, for communication between military units.

(Continued at foot of next page).

Book Reviews

(Continued from page 8).

In "Thermionic Valves in the Modern Receiver," the author seeks to remedy this state of affairs. He deals with the valve from two points of view—the technical, and the practical. In the first section the reader is introduced to the theoretical considerations in valve design and manufacture. He is told, for example, of the different types of filament, why indirectly-heated cathodes are used, the reason for "gettering" and is shown the plotting and use of valve curves.

The practical side of the book deals with the application of the valve as a detector, amplifier, frequency changer, or A.V.C. control valve. Each of these applications is treated with the utmost detail and simplicity. As an example of this, in the chapter on "Frequency Changer Valves," every type used for this purpose, together with the circuit in which it is employed, is discussed.

With the aid of this book it is possible to analyse any usual circuit and understand exactly how the valve is working.

Here was a large number of stations, ready for immediate use, using low power but capable of reaching far overseas. An opportunity not to be missed. Propaganda was the order of the day, and all available radio stations were conscripted.

Had these stations used waves allotted to short-wave broadcast or commercial stations, there would have been an outcry from other nations about interference with their essential services. Interference with foreign amateurs was the least likely to evoke protest. The 40-metre amateur band was selected, every available transmitter put on it, and bedlam ensued. Every hour of the day they are to be heard, an indescribable babel of interference.

● World News

Outside interests also took advantage of short waves, but for different purposes. Broadcast companies used portable short-wave equipment (not on the amateur bands) to relay eye-witness accounts of the fighting to the rest of the world.

H. V. Kaltenborn hastened by plane from London to Spain to cover the Civil War. The veteran CBS commentator became radio's first regular war correspondent. Establishing a neutral base at Hendaye, France, he brought Americans the now historic series of war reports which culminated in the most unusual broadcast of the year. Placing himself in the line of fire, Kaltenborn brought to radio the first programme ever to carry the sounds of actual warfare.

News agencies, unable to rely on interrupted communication services, dispatched short-wave transmitters to Spain, with which to flash their news direct to all parts of the world.

Tune to forty metres at any time of the day or night, and hear red-hot news from both sides.

LISTENERS' DX CORNER

WHEN I penned the article "Have You Heard All Continents?" last month I had no idea of the number of listeners who had succeeded in this feat. From all over the country I have received a stream of correspondence, in which listeners tell me not only of hearing all continents, but also a considerable number of countries in each.

Among the many excellent logs received is one from 2BHP (Oxford) who has heard all six continents and exactly 100 countries, a wonderful record. Bob Everard (Sawbridgeworth), winner of the B.L.D.L.C. contest has succeeded in getting verifications from no fewer than 24 different stations in Australasia, 23 in Asia, 26 in Africa, and from hundreds in North, Central, and South America. Among these are 17 from VE5, 17 from VE4, 64 from W6, and 21 from W7. Just imagine, not one of these stations is nearer than Winnipeg. He also says that he has 1,403 verifications from 87 different countries. Well, I doubt whether many will even approach his figures. About the only ones he hasn't got veries from are K6 and K7 (Alaska and Hawaii), but with conditions improving as they are now in the mornings, I think he soon will.

Another good log comes from C. Hill (Lewisham) who has obtained verifications from 54 countries in all continents, all on 20 m. phone. He has received all W districts except W7, but makes up for this by logging W10XDA, the expedition ship "Morrissey." This is very good reception because W10XDA was working on 14,300 kc., right at the edge of the American phone band, and the QRM on him was terrific. This log also includes all Canadian districts, and the experimental station VE9AL. A home-constructed mains super is used, and all listening is done on the loudspeaker.

G. Petch (Bristol) has heard all continents and the British Empire. He has logged 35 stations outside Europe since the beginning of the year. Among these are VE5TV, VE5RA, W7CPN, and VS7RF. A commercial five-valve receiver is used.

2CHD (Thornton Heath), using an o-v-Pen, has verified all continents four times—pretty good going! In his interesting letter he says, "I have been in short-wave amateur radio for some years now, and I must say that at no time have I found it to pall or get boring as there is a touch of glorious adventure in turning on the set and tuning in—what?" Well, I think that expresses the sentiments of most of us. Thanks, 2CHD.

G. C. Furness (Liverpool) has received all continents between the 1st and 20th of last month, all on the loudspeaker. He also picked up over 20 W's on 20-metre phone during the same period. He asks whether there is a short-wave club in Liverpool.

No reports from Scotland or Ireland. Are there no H.A.C. candidates in these countries?

Well, I've reached the end of my allotted space, so until next time, 73 and good DX.

DIRECTIONAL AERIALS

BEAM EXPERIMENTS FOR THE AMATEUR

MOST SHORT-WAVE enthusiasts have noticed the tremendous increase in the strength of W2XAD and W2XAF coincident with their change-over to the use of directional aerials and have wished, no doubt, that they could erect similar aerials in their gardens to improve reception.

Those who have visited any of the beam transmitting stations will have seen the enormous size of the aerial arrays used and have dismissed all thoughts of directional reception as impracticable.

But there are directional aerials which are compact enough to erect in a fair size garden, and which will result in a very considerable increase in signal strength.

● Advantages

The advantages of a directional aerial for reception can best be realised by comparing it with a simple experiment of childhood. Most of us have at one time or another used a burning-glass to concentrate the rays of the sun strongly enough to

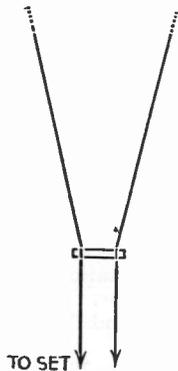


FIG. 1.

set fire to paper or wood. In the normal way the rays of the sun do not ignite paper, but the burning-glass collects them and concentrates them into one place. In the same manner a directional aerial collects and concentrates the waves from one particular direction, but it must be remembered that this entails a loss of strength from other directions. This, however, is not the disadvantage that it appears at first sight, for the signals from other directions may cause interference to the particular station it is desired to receive. A further point is that it will reduce man-made static and atmospheric which are generated at places outside the line of reception. As an example of this, an aerial directional for U.S.A.

will be arranged so that its direction of reception is from the W.N.W. (the great circle direction from England), while it has been found that most atmospheric have their origin in North West Africa, right away from the direction of reception.

● The "V" Beam

One of the easiest types of directional aerial for the amateur to erect is the V beam (*Fig. 1*). This works on the principle of what is known as harmonic aerial operation. In radio work, harmonic is the term used to denote multiples of a fundamental frequency. If the fundamental frequency is 1,000 cycles, then 3,000 cycles will be the third harmonic, 5,000 cycles the fifth, and so on. When we reach higher frequencies, say 15 megacycles (20 metres) the harmonics will be 45 megacycles (6.6 metres) for the third, 60 megacycles (5 metres) for the fourth, etc.

In the case of an aerial, when its length is half that of the wavelength, it is then operating on its fundamental frequency. Thus, if the wavelength is 20 metres, the length of the aerial will be 10 metres. Now if the aerial is lengthened until it is 100 metres long, it will be ten half-wavelengths long, and will be operating on its tenth harmonic, that is it will be a harmonic aerial.

If a half-wave aerial is used, the direction of maximum reception is at right angles (90 degrees) to it, but as the length is increased, i.e., it works on harmonics, this angle of reception changes, until at about seven wavelengths long it is about 18 degrees.

If two such aerials are connected as a V, and the angle between them is 36 degrees (twice 18 degrees), then the maximum reception direction of each will coincide, and a simple form of directional aerial will result. Of course seven waves long is too large for the ordinary garden, but for one wavelength to each leg the angle between the V should be about 80 degrees, and for two waves 60 degrees.

● Adding a Reflector

This type of aerial is bi-directional, and receives in a line which bisects the angle made by the V. To obtain reception in one direction (with increased strength again) a reflector should be added. This consists of another similar aerial, spaced one quarter-wave behind the first aerial, but not connected to it, just left free (*Fig. 2*).

In all experiments with directional aerials it should be remembered that the proximity of trees, houses, and other nearby objects affect its directivity, and the direction and angle should be adjusted by experiment for best results.



FIG. 2.

Reports that will bring in Q.S.L. Cards

R. Pearce tells you how

To THE newcomer short-wave reporting must be only too mystifying; but, if it is borne in mind that the station requires all the information you can supply, then a good start will have been made. Although I have been a short-wave listener for a few years it is only recently that I commenced sending in reports, and up to the present none have been sent in vain.

Having got a grasp of the bare essentials, a good and helpful report can be compiled; first, there are the questions of signal and finding, both were dealt with in last month's issue, but one word of warning—the volume is not so easy to determine as one may think and a degree of accuracy can only be obtained by constant listening or, better still, the employment of an output meter which, if calibrated correctly, shows the exact volume in R's.

Coming now to the "refinements" of the report, many of which may seem useless to the beginner, but in practice they form the basis of the trans-

mitter's conclusions. The weather conditions are the most important, and with the aid of a barometer (preferably an Aneroid), thermometer and wind indicator, accuracy can be assured. Then there are the statistics at your receiving end which you must supply, these must be carefully prepared, failing this, the station being reported will be misled.

A typical example of an efficient report is shown below. However good reports may be, they *will not* be replied to by non-QSL'ing stations, so make sure before sending.

A word concerning the stations to report to. Most DX transmissions verify, but those to avoid are the powerful and well-established ones (unless reports are requested) who have long since arrived at their own conclusions concerning their signals. Reports to all G stations (above ten metres) are useless, and to a certain extent those on the Continent.

Now then, short-wave fans—get busy!

To Radio Station —		Address	Country					Your QRA	
DATE.	BST GMT	ANNOUNCEMENT OR ITEM.	VOL.	FAD.	ATM.	INT.	TONE.	QSA.	REMARKS.
13.4.37	22.04	Orchestra and Singing ...	R6	N	N	N	Ex.	5	Low noise level
13.4.37	22.05	Orchestra and Singing ...	R5	F/SS	N	X (morse)	Ex.	4	
13.4.37	22.06	News	R7	N	N	N	Ex.	5	Better reception
15.4.37	20.56	Talk	R3-4	F/SS	N	XX (phone)	Bad	2-3	Very poor signal
15.4.37	20.57	Music	R4	N	N	X	Bad	2-3	
		Etc.							

LOCATION OF RECEIVING STATION

LATITUDE

LONGITUDE

DISTANCE FROM TRANSMITTER

RECEIVER (Rx) o-v-2 Employing Band'rd.

ANTENNA. Inverted L type.

Length — ft.

Height — ft.

Direction —

PREVAILING WEATHER CONDITIONS (Wx).

Bar Redg. — inches or cms.

Temperature — F deg.

Wind Light.

Wind Direction. NE.

PHONES used.

L.S. used.

I have *not* previously heard your transmission.

(Strike out "not" if it is inapplicable).

Average reception conditions:

Poor.

Good.

Moderate.

Excellent.

I should appreciate your confirmation of the above Report.

METHOD OF INDICATING

SIGNAL STRENGTH. See April issue, page 9.

INTERFERENCE (electrical apparatus, etc.) and

ATMOSPHERICS:

X Slight.

XXX Very bad.

XX Rather bad.

N None.

FADING:

F Slight.

SS Very slow fading.

FF Fairly deep.

S Slow.

FFF Complete fade-out.

R Rapid.

N none.

RR Very rapid.

Coronation Plans

VAST WORLD AUDIENCE TO BE LINKED UP FOR MAY 12th CELEBRATIONS

WORLD-WIDE INTEREST in the Coronation on May 12th next has resulted in much preparation being made to relay it to listeners all over the world. Via short-wave links it is estimated that an audience of 400,000,000 will listen to eye-witness accounts of the ceremony, descriptions of the pageantry, and the cheers of the enormous crowds assembled to watch the scene.

● C.B.S. Using 50 Microphones

In conjunction with the B.B.C., the Columbia Broadcasting System has made arrangements for the relay of this programme to U.S.A.

The preparations began a few weeks back, when the European head of C.B.S., Cesar Saerchinger, cruised to and fro along the procession route in a special radio equipped car, looking for suitable locations for microphones to pick up the cheers of



Bob Trout, Ace Commentator of the Columbia Broadcasting System. Over here to describe the Coronation for the benefit of American listeners. Born in North Carolina in 1908, worked at many trades before becoming announcer: sailor, cab-driver, Stock Exchange runner, to mention only a few. Bob Trout's voice was heard in this country last year when BBC relayed a special broadcast from Coney Island, the great amusement and fun park of America.

the crowds. Finally, 30 locations were chosen at which more than 50 microphones will be installed.

The route was covered at various speeds so that estimates could be made of the times at which the procession would reach certain points. Prominent microphone positions will be: Constitution Hill, The Cenotaph, Trafalgar Square, St. James Palace, and Hyde Park.

The broadcast will begin just before 10.30 a.m. when a commentator, located within the inner courtyard of Buckingham Palace, will describe the departure of the King and Queen for Westminster Abbey. Listeners will then be switched over to various points on the route until their Majesties

reach the Abbey. Here, from the annexe, a description of the scene will be transmitted, while a commentator within the Abbey describes the actual Coronation service.

● Notable Speakers for American Networks

Following this, listeners will hear described the scenes on the return journey to Buckingham Palace, and the broadcast will conclude with the Coronation broadcast address of the King.

In addition to the actual Coronation broadcast, C.B.S. have made arrangements for a special series of talks, both before and after the event, to be relayed to America. Speakers will include such prominent personalities as: Sir Josiah Stamp, Commander Stephen King-Hall, Sir Frederick Whyte, Viscount Cecil of Chelwood, Lord Strabolgi, Miss Ellen Wilkinson, the Duchess of Atholl, and Hector Bolitho, official biographer of King George for the Coronation programme.

Short-wave listeners in this country will be able to hear these special broadcasts over the C.B.S. short-wave stations W2XE and W3XAU.

● Thousands of African Natives will listen

The General Electric Company has received orders for the installation of wireless equipment over a very large part of British West Africa. It will be completed in time for Coronation broadcasts. The chief feature will be a permanent radio relay service that will provide the British Government with a powerful weapon of propaganda among the native peoples.

An official of the G.E.C. said: "The service will operate, through 5,250 loud-speakers, from seven centres. Installations at Lagos, Accra, Cape Coast, Sekondi and Freetown have already been completed, and those at Kaforidus and Kumasi, as well as other towns, are in course of construction.

"Thousands of short-wave sets have been dispatched to Africa, but to make quite sure that the natives have every facility for listening to the Coronation broadcasts, these and the radio relay service will be supplemented by transportable public address equipment.

"This equipment is being fitted up in the main villages, and will later be used for education and entertainment use. At each point at which this equipment is erected as many as 5,000 natives will be able to hear the broadcasts."

MAJOR EDWARD BOWES

Creator of "Major Bowes' Amateur Hour."

By BASIL KOLK

A PROGRAMME undoubtedly one of the most popular in the United States, and which has helped many a budding artiste on the road to fame, is Major Bowes' Amateur Hour, broadcast by C.B.S. every Friday at 2 a.m. Meet then Major Bowes, one-time office boy, to-day one of the most famous executives in America, and impresario of one of the most remarkable programmes.

In his varied and colourful career the Major has experienced success and disaster, gained a fortune, lost it, and then regained it.

● The Start of a Varied Career

His first steady job was in an estate agent's office in his native town of San Francisco, and whilst still a young man he acquired his first fortune, and was able to indulge in his favourite hobbies, yachting and racehorse breeding.

His position as a prominent citizen, however, soon drew him into a sweeping investigation of the graft and corruption that was going on then, and because of his splendid reform work vested interests threatened him and he had always to travel with a bodyguard.

● Reform Work

The position became more serious, and he found it necessary to engage a lawyer to defend him in the many suits created in efforts of intimidation. This young lawyer later became one of the United States' most prominent senators.

Matters came to a head during the trial of a Chinatown tong head whom Major Bowes had arrested with considerable danger to himself. The prosecuting counsel was shot down in court and the Major's lawyer replaced him. Since then Major Bowes has been left alone.

● Of Irish Descent

The Major is of Irish descent. Both his mother and father were born in Ireland. He married in 1903 one of America's greatest actresses, the late Margaret Ellington, but despite her fame, and the name she had made for herself, she always preferred to be known as Mrs. Bowes.

In 1906 he visited the birthplace of his parents, returning shortly afterwards to his native town. Soon after he arrived he was awakened one night by severe tremors, buildings began to collapse, huge fissures appeared in the roads; the disastrous earthquake and fire of 1906 was on, and soon all the Bowes' estate and holdings were in ruins. Un-

daunted he immediately began rebuilding and soon regained his fortune, came to New York and entered the theatrical business through his estate agent connections.

● Theatre Manager

He built and still continues as managing director of the great "Capitol Theatre," and father of the "Capitol Family," one of Columbia's most popular radio programmes. It was these "Capitol Family" broadcasts that made him so familiar to listeners, who later were to know him as the guiding genius of hitherto unrecognised talent.

The Major is very strong and active, five feet one and a half inches high, weighs 174 pounds and has blonde hair.



The Major listens to the familiar gong, which, as listeners know, is the signal for the end of the "Amateur Hour."

His apartment in New York has fourteen rooms well furnished and containing many valuable paintings and antiques, of which he is so fond of collecting. But it is his country home in the Westchester Hills overlooking the Hudson River that he really likes the best, for it is here that he finds the peace and quietness he so appreciates after the rush and turmoil of New York.

How Secrecy is Attained by Commercial Stations

AT FREQUENT points on the short-wave tuning dial listeners often come across peculiar noises. Sometimes they may sound like the human voice, incredibly distorted, speaking through a long tube. Others sound as if there were a perpetual whistle super-imposed on speech.

These noises are the trans-oceanic radio-telephone services, and the peculiar effects heard are caused by the secrecy devices which are attached to prevent listeners eavesdropping.

The first long-distance radiophone circuit opened was between England and America, and this used a wavelength of 8,000 metres. To prevent listeners intercepting the phone calls made over this link, single sideband operation was used.

● "Single Sideband"

This single sideband method operated in the following manner. The wavelength of the station was 8,000 metres, or, expressed in terms of frequency, 37.5 kc. This is known as the carrier wave frequency, upon which the station radiates wireless waves at all times.

When speech is transmitted the carrier wave is modulated. Supposing the modulation consists of a continuous note of 4,000 cycles (4 kc.), then this will be added to the carrier frequency, 37.5 kc. plus 4 kc., totalling 41.5 kc., and will also be subtracted from the carrier frequency, 37.5 kc. minus 4 kc., totalling 33.5 kc.

Thus when this continuous note is transmitted, instead of the transmitter radiating just the carrier wave of 37.5 kc., it also radiates on 41.5 kc. and 33.5 kc., these two latter being called the sidebands. Note that two sidebands are radiated: the carrier frequency plus the frequency of the tone, and the carrier frequency minus the frequency of the tone. At the same time the original carrier frequency is still radiated.

By means of a special filter circuit, only one of these sidebands was transmitted, hence the name. To receive transmissions of this type it was necessary to employ a valve oscillating on the carrier frequency of the transmitter, and unless this oscillating valve was adjusted very accurately, reception would be distorted.

● Secrecy on Short Waves

At the comparative low frequency of the wavelength of this particular transmitter, it was possible to design filters which would eliminate one sideband, but on short waves it was almost an impossibility. Even if the filters were made satisfactorily, the oscillating valve at the receiver end would not remain constant. At first no secrecy devices were used, and short-wave listeners had great fun listening to supposedly private telephone conversations.

Some attempt had to be made to prevent this eavesdropping, so a different method was used. If the lower tones of the voice could be made to sound high, and the high notes low, it would be impossible to understand what was being sent, unless special apparatus was used. This sounds a difficult feat but is really very simple. As has been shown above, if a carrier is modulated, two sidebands are formed. Instead of directly modulating the carrier frequency, a valve operating on a frequency of about 4,000 cycles was first modulated. For the transmission of speech only, a band of frequencies between 300 and 3,000 cycles is sufficient for intelligibility. One sideband will therefore consist of a band between 4,000 plus 300 to 3,000, i.e., 4,300 to 7,000 cycles, and we will call this the upper sideband. The lower sideband will consist of 4,000 cycles minus 300 to 3,000 cycles, i.e., 3,700 cycles to 1,000 cycles. Now in this lower sideband, the 3,700 cycles is produced by the 300 cycle modulation, i.e., the low notes, and the lower frequency of 1,000 cycles by the 3,000 cycle modulation, i.e., the high notes. If now the lower sideband alone is taken, and used to modulate the transmitter, the effect will be that the high notes appear as low, and the low notes as high, with the result that the transmission will be unreadable.

● Decoding

At the receiver end the speech was rendered readable by means of beating a 4,000 cycle note with the received signal, and this restored the speech. A separate oscillator was used to beat with the signal, and this had the effect of restoring the high and low notes to their correct positions, rendering the speech readable.

This particular system of obtaining privacy for conversations over the international radio-telephone circuits was very successful until someone found that it could be decoded with the ordinary receiver using reaction. The reaction control was advanced until the set burst into oscillation, and the receiver then tuned until a whistle of about 4,000 cycles was produced. This had the same effect as the oscillator used at the commercial receiving station, and resulted in the conversations being made understandable. There was always the whistle present when intercepting the conversations with the simple receiver, but this did not prevent listeners understanding what was going on. So prevalent became the habit of listening to the supposedly secret telephone calls that a press campaign was started in the daily papers.

This state of affairs had to be stopped so a modification of this system was introduced. The same system was employed but the wavelength of the

(Continued on page 23).

THE IDEAL RECEIVER

READERS TO ASSIST IN DESIGNING A SET INCORPORATING FEATURES DEMANDED BY PRESENT-DAY AND FUTURE CONDITIONS

WHAT IS your ideal in a short-wave receiver? Every owner, or would-be owner of a short-wave set has certain ideas he would like to see incorporated in the receiver of his dreams.

This month, THE SHORT-WAVE MAGAZINE presents a fascinating problem to its readers: that of designing their own ideal short-wave receiver.

There are devotees of battery receivers, mains receivers, superhets, straight receivers, listeners who like a row of controls, and those who like just one knob on the panel.

We invite readers to forward their ideas as to what they consider the most desirable features of a home constructed, short-wave set.

All these suggestions will be carefully analysed, and THE SHORT-WAVE MAGAZINE will then produce a receiver designed according to these specifications.

In offering suggestions, readers should consider a few of the major requirements.

● Mains or Battery?

Should the receiver be mains or battery powered? Battery operation reduces the initial cost and simplifies construction, but the power output is far less than that of a mains receiver. Mains sets cost more in the first place, are more difficult to construct, but the power output is almost unlimited, and there are no batteries to run down and renew.

What wave-range should the set cover? Many commercial receivers cover from 13-150 metres, others only 16-50 metres; some receive-as low-as 7 metres. The larger the wave-range, the greater the cost and complexity.

● Straight or Superhet?

Should the receiver be a straight set (R.F. or R.F.'s followed by detector and audio amplifier) or a superhet? For the number of valves used the straight receiver is more efficient than the superhet, but compares unfavourably from the selectivity angle.

If a superhet is preferred consideration must be given to the number of pre-selector stages (if any), intermediates, and the power of the output stage. Special types of frequency changer may be individual preference, such as the combined oscillator-detector type (e.g., the triode-hexode or octode), or the separate oscillator-detector. Whichever type of receiver is required, the number of valves must be taken into account.

Reduction of interference from man-made static could be accomplished by Faraday screening of the input circuit, but this again involves additional expense.

Provision for doublet (noise reducing) or ordinary aerials will naturally be a part of the design.

● Selectivity and Tone

The selectivity and audio response of a short-wave receiver involves different requirements to those of a medium-wave set. For example, a certain type of fading, called "selective fading," peculiar to short waves will cause the top notes of a short-wave broadcast station to fade, whilst at the same time the low notes remain constant. If the top notes are eliminated, either by means of a tone control or variable selectivity, this selective fading will be greatly reduced. Apart from acting as a tone control variable selectivity also reduces interference from unwanted stations. Hence should variable selectivity or tone control, or both, be incorporated in the ideal short-wave receiver?

Fading immediately leads to thoughts of automatic volume control. Here again there are various systems: instantaneous A.V.C., in which volume responds instantly to fading; delayed A.V.C., in which a time lag in the automatic volume is introduced; quiescent A.V.C., which reduces volume and therefore noise between stations.

● Morse Reception

Many amateurs like to receive Morse, and this is easily accomplished by fitting a beat oscillator, which can be switched out of action when it is desired to receive music. Even for listeners not interested in the reception of Morse this beat oscillator is a useful aid in searching for distant stations, as it will indicate the presence of a station on the air during an interval when the carrier wave is unmodulated.

These are a few of the points to be taken into consideration, readers will no doubt think of many more.

● Advance Design

Remember, this set is for your own use, you do not want one that will be out of date; design one which will still be the premier receiver in a year's time, a receiver which you can sit back and listen to with the thought that you have helped design it. We on our part wish to produce one incorporating all the latest refinements with simplicity of construction and real short-wave performance, not to be torn down each month for "something different."

Send us views of your ideal home constructed short-wave receiver, and thus help to produce the finest short-wave receiver the constructor has ever handled.

BROADCAST PROGRAMMES FOR MAY

(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)
 - 11.45 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, Heien Alexander (Coloratura Soprano), Nicholas Cosentino (Opera Tenor), Edward Matthews (Baritone), Charles Magnante (accordionist), Sam Herman (Xylophonist) and Waldo Mayo's Orchestra (a)

- 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.—Alistair Cook on "London Letters" (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 Echoes of New York Town (g)
 - 11.00 The World's Week (m)
 - 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)



Virginia Clark, plays title role in C.B.S. "Helen Trent" series.



Hendrik Van Loon, historian, author and artist, presents word-pictures of American scene.

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)
 - 2.15 "Jack and Loretta"—Songs and Patter (daily, except Sunday) (a)
 - 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) (i)
- 5.45 "Our Gal Sunday"—Dramatic Sketch (daily, except Sunday) (b and d)



Kate McComb, N.B.C. character actress of "The O'Neills" fame.

- 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)
- 6.00 News in German (daily, except Sunday) (i)
- 6.21 News in English (daily, except Sunday) (i)
- 6.30 Bob Byron—Songs (c and d)
- 6.44 News in French (daily, except Sunday) (i)
- 6.45 Aunt Jenny's Real Life Stories (daily, except Sunday) (c and d)
- 7.00 News Through a Woman's Eyes (c and d)
- 7.05 Varied Programme from Italian Stations (daily, except Sunday) (i)
- 7.15 American School of the Air (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 "Pop" Concert, directed by Howard Barlow (c and d)
- 9.15 The Dictators (c and d)
- 9.30 Chicago Variety Hour (c and d)
- 9.30 Johnny O'Brien (Harmonica Player) and Orchestra (f)
- 9.45 "Young Hickory" — Dramatic Sketch (daily, except Sunday) (f)
- 10.30 The Singing Lady — Nursery Jingles, Songs and Stories (f)
- 11.00 News Reporter (daily, except Sunday) (g)
- 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 (g)
- 11.15 Patti Chapin—Songs (d)
- 11.30 Press Radio News (daily, except Sunday) (g)
- 11.45 Lowell Thomas—News (daily, except Sunday) (g)
- 11.40 Press Radio News (daily, except Sunday) (d)
- 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 Easte 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 Merrymakers (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 (g)
- 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)
- 2.30 "The Wife Saver"—Allen Prescott (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 (g)
- 11.40 Press Radio News (d)
- 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), Marilyn Stuart, and Sud Gluskin's Orchestra (e)

THURSDAY

- p.m.
- 2.00 Greenfield Village Chapel (a)
- 2.30 As You Like It—Variety Programme (a)
- 2.10 Life in Paris, by Mr. Henri Bellamy (j)
- 2.40 Press Radio News (a)
- 4.15 The Quality Twins—Ed Easte and Ralph Dumke (a)
- 6.00 Jack Berch and His Boys (c and d)
- 7.00 "Tell Us Your Story"—Dramatic Sketch (d)
- 7.45 Piano Recital (f)
- 8.00 The Caballeros—Jorge Negrette (Baritone), Ramon Armengo (Tenor) and Paul Baron (Pianist) (f)
- 8.00 Bill Wright, Vice-President ((c and d)
- 8.30 "Do You Remember"—Old Favourite Melodies (c and d)
- 9.00 Westminster Choir of Princetown (c and d)
- 9.30 U.S. Army Band (c and d)
- 10.00 Current Questions Before the Senate (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 (g)
- 11.20 Latin American Hour—News in Italian, Spanish and Portuguese (i)
- 11.35 Chuchu Martinez—Tenor (g)
- 11.40 Press Radio News (d)
- a.m.
- 12.00 "Easy Aces" — Comedy Sketch, featuring Jane and Goodman Ace (g)
- 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)



Franklyn MacCormack, C.B.S. "Poetic Melodies" star.

PROGRAMMES—continued.

FRIDAY

- p.m.
- 2.00 Metropolitan Parade (a)
- 2.10 Events of the Moment (j)
- 2.25 Press Radio News (a)
- 2.30 The Wife Saver—Allan Prescott (a)
- 4.00 Magazine of the Air—Gretta Palmer and Guest (a)
- 4.45 Dr. Allan Roy Dafoc (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)
- 8.30 Dorothy Dreslin (Soprano), with Orchestra, directed by Josef Honti (f)
- 9.30 Among our Souvenirs (c and d)
- 9.45 Salvation Army Staff Band (c and d)
- 10.30 Doris Kerr—Songs (c and d)
- 10.45 The Old Homestead—Dramatization (f)
- 11.05 Harry Kogen and His Orchestra (g)
- 11.05 North American Hour—News in English and Italian; Concert of Request Numbers (i)
- 11.15 Buddy Clark, Four Stars and Orchestra (d)

- a.m.
- 12.00 "Poetic Memories"—Jack Fulton (Tenor), Franklyn MacCormack (Reader), and Carlton Kelsey's Orchestra (d)
- 12.00 Uncle Sam at Work—Dramatization of the activities of the U.S. Government under the auspices of the U.S. Office of Education (g)
- 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)
- 2.00 Hollywood Hotel—Fred MacMurray, Frances Landford, Anne Jamison, Igor Gorin, Raymond Paige's Orchestra, and others (e)

- 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 The Dancopators (b and d)
- 8.00 "Down by Herman's" (c and d)
- 8.00 Bob Crosby and His Orchestra (f)
- 8.30 Harry Kogen and His Orchestra (f)
- 8.45 European Post Box (m)
- 9.00 Monitor Views the News (m)
- 9.00 The Dictators (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)
- 11.35 N.B.C. Home Symphony Orchestra (g)

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 The Orleanders Male Quartet (a)
- 2.30 Mellow Moment (a)
- 2.55 Press Radio News (a)

- a.m.
- 1.00 Ed Wynn the Perfect Fool, with Grayham McNamee (g)
- 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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DEFERRED TERMS IF DESIRED

You Can Record Your DX Reception

By Charles Lawrence

I EXPECT you have often wished you could make gramophone recordings of your long-distance catches. Well, why not? For a few shillings you can possess a recorder that will enable you to get endless enjoyment from your radio. Better still, your junk box will probably provide the necessary apparatus. Let us see—have you a pick-up? And a length of threaded rod? Good, then you have the main essentials.

If a recorder can be said to possess a heart then the pick-up (or recording head) is that for without it you cannot record.

If you insert a pick-up in place of your loud-speaker you will discover that the armature (in which the needle is inserted) vibrates in accordance with the programme received in much the same way as a loud-speaker diaphragm or cone vibrates.

● Tracker

Now if you insert a steel needle (or cutting stylus) in the pick-up and hold it lightly against a revolving aluminium disc you will discover that you can record broadcast music—it's quite a thrill I assure you. You will also find that you cannot record more than a few spirals on a disc owing to your inability to guide the pick-up across it evenly enough. This is where the tracker comes to the rescue.

There are many forms of tracker employed, but in all the principle is the same: the pick-up head being guided slowly across the disc.

If you procure what is termed a transverse groove tracker (try for one at firms that sell oddments) your troubles are ended. On the other hand you may wish to make your own. With a little ingenuity one may be made from a rod threaded through a nut fixed to the pick-up and driven by means of a pulley geared to the centre spindle of the gramophone motor in such a way that as the motor turns the rod revolves and gradually draws the pick-up across the disc. Sounds a bit complicated doesn't it? In reality it is comparatively simple.

● Adjustments

The tracker should be kept lubricated with a fine oil. Failing this the records will probably be ruined through vibration setting in during recording.

Another point worth remembering is that a powerful motor is essential, for the cutting device creates a braking action that will slow or even stop poor motors.

To record local stations is an easy matter. Little trouble will be experienced as regards sensitivity—the main trouble being that overloading will result in the cutter vibrating so violently that the grooves run together, creating an amusing, but annoying result.

In recording distant stations the average recorder is useless without adjustment of the tensioning rubbers (called damping) which keep the armature more or less rigid. You will find that this adjustment is easily made through the turning of a small screw or knurled wheel on the pick-up. Adjust so that the armature vibrates readily with very faint signals.

Now take particular notice of this. You *cannot* play the records over with steel needles, only fibre or Burmese colour.

I know an enthusiast who wanted very much to let a friend hear his choice recordings but he had no fibre needles. With a certain amount of hesitation he used a steel needle. Yes, the record played, but that was the last time—the record was ruined!

If you are in the same predicament you can make use of a piece of bamboo or even a rose thorn, but *don't* use a steel needle—it won't work!

● Recording

Although the average receiver will give quite good results a powerful amplifier is advisable if very weak stations are to be recorded.

Having attended to the above matters you are all ready for the great moment when you are in a position to record reception.

I have personally made gramophone records of over fifty medium and short-wave stations—many of them 5,000 miles away—and in all cases signal strength on the record is excellent.

The secret, if you could call it such, of my success is that I never attempt to record a station that is not coming in at sufficient volume. The best way of judging this is to listen to the pick-up. You will hear the programme coming from it at good strength when volume is correct. Then you turn on the gramophone motor, wait until it is properly started, and then place the cutter on the disc. By this means you will make excellent and worth-while records of some of your best catches. Stations that have closed down can be heard again, entertainment is unlimited, and there is no need to tell your friends how well such and such a station came in. Let them come around and hear for themselves!

CHOOSING TRANSMITTER COMPONENTS

How the Beginner can start
with Simple Apparatus

By AUSTIN FORSYTH (G6FO)

IN THE writer's experience, beginners requiring advice on amateur transmission usually have either one of two fixed ideas: They think that amateur radio is an expensive hobby involving heavy expenditure on complicated apparatus or, at the other extreme, that telephony signals can be pumped out on the 7 mc. band with any old junk which can be made to generate R.F. energy.

Both these ideas are, of course, equally wrong, and it is the purpose of this article to try and indicate the sort of apparatus the average beginner should be looking round for if he contemplates going in eventually for amateur transmission, it being assumed that finance is as important a consideration as anything else. The following remarks and suggestions are likewise based upon the fact that all beginners start with a ten-watt licence, which simplifies for them what might be called the essential requirements in the way of gear.

● Buy for the Future

A low-power transmitter on this licence can be operated from batteries or from mains, either A.C. or D.C. Where an A.C. supply is available, a power pack giving 250-300 volts at 60 or 100 ma. will be sufficient, and probably something within this rating will already be installed. If a power unit is to be put in, however, it is advisable to have one of 500 volts at 120-150 ma. to take care of future requirements, whilst at least three L.T. outputs at different current ratings should be provided. D.C. mains of the usual 200-230 volts can be used very successfully and, in the case of battery-operated stations, the equivalent voltage in triple-capacity batteries. Some stations are run from H.T. accumulators or Milnes units, where low-voltage charging sources are available.

At least one good meter is needed—but you cannot have too many—and an 0.50 ma. moving coil is the best thing to buy if initial cost is to be kept low. There are some quite good moving-iron instruments on the market, which are cheaper but correspondingly less satisfactory. An investment is one of the multi-range test instruments, which are comparatively expensive; something between the two in price is an 0.1 or 0.5 ma. moving coil meter which can be made into a multi-range by the addition of shunts and resistances. A meter rectifier unit will extend its application to A.C. circuits.

For voltages in the neighbourhood of 300, receiving type short-wave components can be used. The various items are as follows:

● Valves

For a battery station, battery-type valves can be run up to about five watts input. The P220 of most makes will give good results in circuits using triodes, but it is as well to consider going in for the larger output valves having higher wattage filaments, as they last better, though requiring more L.T. Such types as the P650 and P625 of various makes—now largely obsolete from the receiving point of view but still very good for low-power transmission—have 6v. filaments taking $\frac{1}{2}$ - or $\frac{1}{4}$ -amp. The PX4's of different manufacturers, Cossor 41MXP, Mazda ACP, Tungstram 0-15/400, "362" ACPX4a, Brimar PA1, and similar valves make very good oscillators or amplifiers. In general, any output receiving valve with an impedance greater than about 1,200 ohms can be used successfully as a crystal-oscillator, frequency-doubler or power-amplifier in low-power transmitters operating on 14 mc. and even higher. The next size of output receiving valve, such as the DO24, PP5/400 and similar, are of lower impedance, and though good self-oscillators, are not to be recommended for CO, FD or PA stages; they are, however, very useful modulators.

A good many modern designs for transmitters involve the use of pentodes of different types. Though greater efficiency is sometimes obtained with these arrangements, it is better to start with straight circuits and use the valves and other components which may be to hand or which are easily obtainable. A good investment for the man who wants a valve designed for low-power transmission is the "362" RFP15, an RF pentode, or the Mullard TZ-025, a 25-watt triode.

● Condensers

Several good ones are needed, and by "good" is not necessarily meant new! The points to look for are solid low-loss construction, good insulation between rotor and stator with the minimum of dielectric, and a smooth working rotor which is not too light in its movement. The spacing between fixed and moving vanes should be from 1/16th inch to 1/20th inch. Some of the older makes, to be had for a few shillings on the clearance market are better in all these respects than the later designs. A

further point is that condensers of the built-up type, in large capacities, can be adapted for short-wave work by double-spacing the vanes, which also reduces the capacity. Useful capacities for the communication bands—1.7, 7 and 14 mc.—are from .0003 mfd. to .0001 mfd.

Fixed condensers should be mica, and for plate voltages up to 300 volts, of the 500-volt working type. A dozen assorted values from .01 mfd. to .001 mfd. made a useful stock.

● Resistors

Values from 5,000 to 50,000 ohms are usually required, and the wire-ended type are best. They should be rated at high wattages, anything from 3 to 10 watts. Filament circuit balancing resistors (“hundingers”) are also wanted, as are such things as volume controls and filament rheostats.

● Coils

These can be bought quite cheaply, but it is a simple matter to make them. Those in CO and FD stages can be wound on receiving type plug-in forms. Coils which carry more power—ten watts or so—are best wound on skeleton forms with spaced turns, or they can be made almost entirely self-supporting by the celluloid strip method, using bare soft-drawn copper wire of the heaviest gauge available. 12 or 14 S.W.G. can usually be obtained from ironmongers by the pound weight.

● Miscellaneous

Transmitting R.F. chokes can also be bought quite cheaply, but they are just as easily home-made.

Odd requirements are $\frac{1}{2}$ -doz. medium-size stand-off insulators and the same quantity of midget size, though these can be dispensed with if the constructor uses strip ebonite insulation. Several good low-loss valve-holders are needed, and a Morse key. A few words about this latter item, which is worth buying with an eye to the future, as there are cheap keys on the market not worth the two or three shillings asked for them. A good key must have large contacts—the pinpoint type burn—of some alloy which will resist arcing. The spring should be adjustable over a wide range of tension—cheap keys have only two settings, very hard and no spring at all—and the movement should be smooth and without side-play, as this spoils the points. The gap-adjusting screw should be fine-threaded and the rocker mounted on generous bearings, with a pig-tail connection between it and one terminal. A number of people make the cardinal error of buying a cheap key “to learn on.” Sending good Morse is an art and should be the pride of a self-respecting operator. Therefore, not only should one learn on the key with which transmissions will ultimately be made, but since it is impossible to send well on a bad key, a good one should be obtained in the first instance. A key up to the general specification given can be bought for about 7s. 6d.

The frequency control of the transmitter is another matter requiring consideration, i.e., whether it is

to be crystal-controlled or self-excited. Without going into the pros and cons of this question here, it may be said that from the point of view of the Post Office, some form of frequency control is essential; the transmitter itself can be self-excited, master-oscillator controlled or crystal-controlled, but if not directly CC, a means of frequency measurement must be provided. As this involves a crystal to get the required degree of accuracy in the measuring apparatus, it is simpler and more satisfactory if crystal-control is adopted from the outset. The quartz crystal in a suitable holder will cost about £1, and is likely to be about the most expensive item in the beginner's equipment apart from the meter.

The remarks above cover low-power CW (telegraphy) transmission. Where telephony is to be used, such apparatus as a modulating choke, rated 20 henries at 100 ma., coupling transformers of the ordinary L.F. type, and a microphone with matching transformer, will also be wanted.

Practically all the gear mentioned can be had for reasonable prices from firms advertising short-wave apparatus in this paper. Their catalogues and lists are interesting reading and will, incidentally, give a lot of useful information to the discerning reader.

One last point regarding transmitting aeri-als. Though a lot of space is desirable, particularly for 1.7 mc. work, it is not essential. If acres of back garden are available, so much the better, but good work is done at scores of stations where the aerial is no better than the neighbours' broadcast receiving antenna. It is even possible to get out to DX using an indoor radiating system, and more than one amateur has had to work under these conditions.

“SECRECY”—(continued from page 16).

transmitter was wobbled up and down many times a second. This wobble was only of a few hundred cycles, but was quite sufficient to prevent casual listening to the calls. Both transmitter and receiver were synchronised as the wave was varied.

The “wobble” system is still the most widely used method of rendering these circuits secret, and any hour of the day or night listeners can hear these stations swishing to and fro.

Other methods are also used, but most are variations of one or other of the above methods.

It is more difficult to obtain satisfactory operation with a privacy device in circuit than without. Accordingly these devices are only used when it is essential that the call be private. During the day, when the operators are talking to each other devices are cut out of circuit, and listeners can then pick up the conversation. Most listeners will have heard at some time some of these stations relaying broadcast programmes, in which case ordinary, undistorted transmission is used. Usually an announcement is made “This is not a broadcast station but a commercial, point-to-point service.” Many programmes relayed to England from America come over these stations. Early morning is one of the best times to hear them, for then the operators may often be heard as they prepare the circuit for the day's work.

STOP PRESS

Flashes from Around The Globe

Conducted by Leslie W. Orton

HAVE YOU noticed how consistently good long distant reception is these days? Besides the regularly heard stations, lesser known ones are coming in from all corners of the earth like locals.

Japan, land of the rising sun, has provided some of the best signals, and recently I heard JYR, Kemikkawa-Cho for the first time on 48 metres. I picked him up at about 11 a.m.

The "Four J's" JZI (31.48 m.), JZJ (25.42 m.), JVM (27.93 m.) and JVN (28.14 m.)—all in Tokio—might well be termed the voices of the East for they provide wonderful volume on most occasions—the present time being no exception.

South of Japan lies the land of short-wave stations, Java. You have all heard PLE, PMA (15.5 m.) and PMN (29.34 m.) but less frequently heard Javans which I have heard of late are YDA (98.68 m.), YDB (31.11 m.) and YDC (19.8 m.)—have you tuned them in yet?

Incidentally, I've bad news for you. Official information from the Javan broadcasting authorities is to the effect that verification of commercial broadcasters is now a thing of the past. "Veries" may still be obtained from PLP, PMN, PMH, YDA, YDB, etc.—so, if you want to verify them you had better hurry up before the authorities change their mind!

By the way, a rare catch of mine the other day was CQN, Macoa, Portuguese China on 31.4 metres. Can you beat it?

And here is another catch of which I am proud—FIQA in Madagascar. I heard a light musical programme from this source on approximately 50 metres the other day. Announcements were in French.

● Thrills from the west

I've some good catches to report from the West. How is this for a start? HP5J, Panama on 31.22 metres? And another to make you jealous! CE96O, Santiago, Chili, on 31.22 metres. Incidentally the best time to search for these stations is around midnight—you may hear them both at once though!

Colombia—land of "gongsters"—has provided a decent batch of stations during the month. I've heard HJ1ABB (49.02 m.), 2ABA (48.78 m.), 2ABC (31.33 m.) and 1ABE (31.58 m.) at excellent strength.

The other day I was rather puzzled to hear an American sketch from OAX4J, Lima, Peru. It appears that this station occasionally broadcasts

15-minute transcriptions (made in the United States) and so the puzzle was no puzzle at all!

The Dominican Republic has a reputation for "mushroom" stations. Recent catches from the republic are HIT, HIN, IX and 2X.

● Overseas

Looking over the reports from our overseas listening posts I am particularly struck by that from our Japanese operator. Beside reporting reception of the Empire stations he has heard DIP, TYA (a French phone station), TDE (28 m.), OLR, RIM, JVK, JVG, ZMBJ (23 m.), PLE, CT-1AA, LSL2 (wherever that may be!), VPD2, RV15, ZBW3, 3LR, and hosts of amateurs—a log that is conclusive proof that Easterners are quite up to our standard in handling sets!

"Mediocre" is how our San Francisco operator describes reception. However his list seems to belie his words for he had heard RAN, LSX, VK3LR, PMN, YDB, JVN, and JZJ, as well as the Empire stations. Latin American stations have been off colour.

In South Africa conditions are good. Besides the European stations 3XAL, 2XAF, 2XAD, 8XK and the Latin-American stations have been heard well.

So much for overseas reception. What about a little short-wave dope now?

● Schedules

Have you heard the "Queen Mary" yet? Using the call GBTT it operates between 16.85-18.27 m.; 22.5-24.3 m.; 33.93-36.58 m., and 67.89-73.17 metres.

You may fail to pick up this giant of the seas but in searching for it you are almost sure to tumble on some other well-known ship. The "Empress of Britain" (GMBJ), "Hamburg" (DHJZ), "Bremen" (DOAH), "Europa" (DOAI), "Rex" (ICEJ) and "Normandy" (FNSK) all operate regularly upon those bands.

Then you can hear WOO, Ocean Gate calling all manner of ships upon 62 metres—certainly the North Atlantic is full of interesting floating stations all awaiting for you boys to pick up.

● Short-wave flashes

Under this heading I intend to try to rival the tune-a-minute merchant by giving you a short-wave flash a second. I'll doubtless fail but I'll go down fighting! Well, off we go.

VWYT, Poona has been heard phoning GAU on approximately 18 metres between 1 and 2 p.m.

On the same wavelength JVP—a phone station—has been picked up around mid-day.

Contrary to rumour VPD2, Suave, Fiji, has not closed down. It operates daily on 31.45 metres.

DGH, Nauen has been heard on 28.8 metres calling SUZ, Cairo.

A heterodyne on CSW on 31.5 metres has been traced to the new Puerto Rican station WCU at San Juan. This station works with WNK, Hialeah daily.

A broadcaster HS-1PJ, Bangkok, Siam has been heard calling New Zealand amateurs on 20 metres between 2.30 and 6 p.m. on Saturdays.

Moscow advises that the early morning broadcasts in English from RV96 have been discontinued. RAN on 31.25 metres has extended its transmissions by an hour, however.

Two increases of power are reported. VK3LR, the popular Australian will shortly increase its power from 5 to 20 kw.'s—three cheers! W9XAA, Chicago will increase its power to 20 kw.'s in 1938—three groans, we may be dead by then!

ZL-2QZ, Wellington is the voice of the New Zealand Short Wave Club—it operates irregularly upon the amateur bands.

A new Japanese, JZK, has commenced transmissions on 19.8 metres with a power of 20 kw.'s and I've already heard him!

Phew! how's that? I'll swing into a lower gear now if you don't mind and get my breath back!

● Listen to these

Now for a few advance details of interesting transmissions to keep a special watch out for.

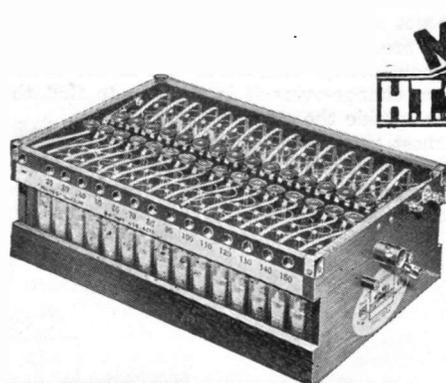
TI-4NRH, Heredia continues to broadcast DX concerts—dedicated to the Newark News Radio Club and the Universal Radio DX Club.

WAAF occasionally broadcasts DX concerts on 42.7 metres and I understand that arrangements have been made for the irregular broadcast of concerts dedicated to the New Zealand Short Wave Club—so keep a watch out for them, my lads.

● Five Metre Test

Many of you fellows wonder whether it is any use your building the S.-W.M. ultra-short-wave receiver described in the last issue, owing to your distance from London. Well, in a few days I am taking a model of the receiver on a trip across the country and I am going to see just how well—if at all!—the television stations will come in up to 200 miles from London. I'll let you know all about the results later, and I'm expecting something exciting!

Well, until next month, I will run down the curtain and remember that I shall be delighted to hear of any out of the way reception you may experience.



MILNES
H.T. SUPPLY UNIT

gives the steady,
silent H.T. current
essential for Short Wave work

Important extracts from users' letters:

From MR. H. J. BARLOW, 8, Harton Avenue, Gorton, Manchester.

"Having had my Unit now 9 months, I can say that it is worth every penny of its price and every short-wave listener should invest in one. It is dead quiet in operation and I have been able to log many stations on 10 metres which I couldn't hear before owing to mains hum and noises."

From MR. JOHN H. GEAR, 8, Nottingham Terrace, N.W.1.

"I have had a 130 v. Milnes Unit in constant use for the past 9 months. It is an unqualified success. It is good for any wavelength reception but specially fine for Ultra Short Wave radio. Apart from any statics which may be about, I look upon short-wave work with it more like a glorified Crystal set, as it is so perfectly free from extraneous noises."

From MR. FRED LANAWAY, 49, Granville Avenue, N.9.

"Three years have elapsed since the day I put my 120 volt D.S.C. Unit to work during which time it has done all I have asked of it. For short-wave work, a silent, crackle-free background is essential. This is where the Milnes Unit comes to the fore. A more silent H.T. supply could not be obtained, and the voltage drop, even after a long period of use, is very little. This also is a great advantage to the DX fan, as a receiver, once calibrated, stays calibrated. My success in the International Short Wave Club's DX contest is due, in no small measure, to my Milnes Unit which I used throughout the contest."

THE MILNES H.T. SUPPLY UNIT is a battery of alkaline cells with nickel-cadmium plates. It is fitted with an ingenious trouble-free switch whereby banks of four cells can be connected in parallel for automatically regulated charging from a 6 v. L.T. accumulator. With the switch in the opposite position, all cells are connected in series, giving H.T. voltage.

Recharging takes place whenever the set is not in use, so that the Milnes Unit maintains a fully-charged condition. Running costs are negligible.

Any voltage available up to 200 volts, with or without G.B. sections.

Ask your radio dealer for details or write to—

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CHURCH ST., BINGLEY, YORKS.**

Portable versus Transportable

Transmitter-Receiver Mobility on Five Metres

By E. J. Pickard, G6VA

WITH THE ADVENT of summer time and the promise of summer weather (we hope!) many transmitters furiously start thinking of portable and transportable equipment, particularly gear for the five metre band. To the motorist to whom weight up to 100 lbs. or so is of no consequence, the transportable receiver-transmitter offers considerable latitude of design, and the power output need only be limited by the voltage and capacity of the high-tension batteries (or accumulator-driven generator) and L.T. accumulators he is willing to carry. However, there seems no great advantage for the mobile 5-metre transmitter to exceed 10 watts input, providing an elevated operating locality is chosen.

A tried and tested arrangement, striking a compromise in weight and power, is to use two power valves as a push-pull oscillator modulated by a Class B valve. This equipment is capable of being built in very compact form, and with 180 volts H.T. will give a modulated input of some six watts, a suitable circuit being given in skeleton form in *Fig. 1*.

● Receivers for the Transportable

What is probably the best combination of three valves for reception is the circuit of *Fig. 2*, using an optional quench valve, so allowing crystal-controlled C.W. to be received if necessary, the high-gain L.F. stage ensuring very strong signals.

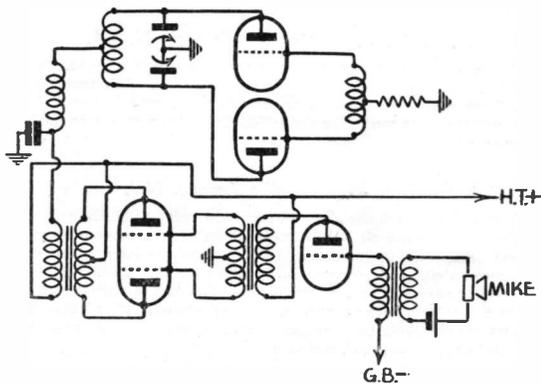


FIGURE 1.

So far we have considered the transportable gear, but true portability necessitates an easy carrying weight. (We all remember the suit-case broadcast receivers of a few years ago, optimistically styled portable, but weighing perhaps 30 to 40 lbs.!) This means limiting the H.T. to 120 volts with a small capacity L.T. accumulator, and the type of gear which comes naturally to mind is the transceiver, employing the same valves for receiving as for transmitting.

● Transceiver Limitations

These little sets are capable of quite good results, but they generally have at least two disadvantages, one of which is that the transmitting frequency differs from the receiving frequency. This at first sight may not appear to be a defect, but if two such transceivers are in communication the tuning of each has to be continually readjusted, and in the course of six or so change-overs it is possible to find the transmitter outside the amateur band.

Again, most transceivers seem to fail in efficiency in one or other of their roles; if good as a transmitter the receiver is below standard and vice-versa, also duplex working is obviously impossible.

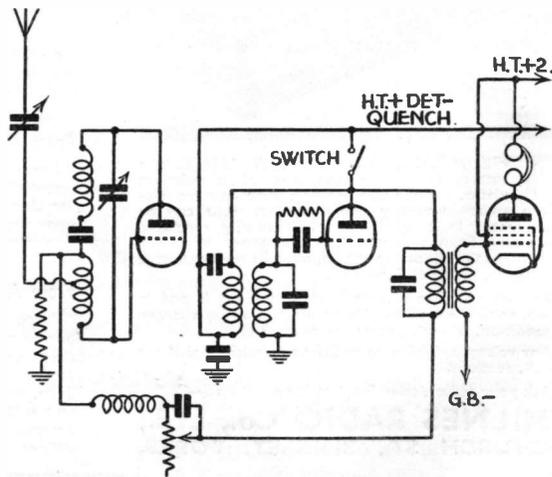
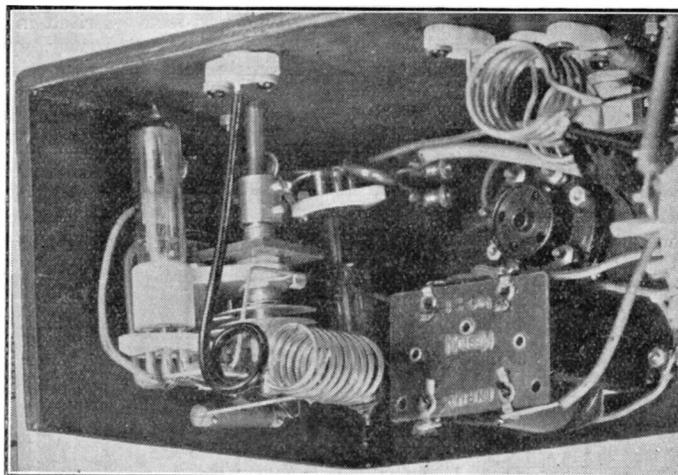


FIGURE 2.

Top photo shows the receiver portion, whilst the lower picture illustrates the transmitting end of G6VA's suitcase portable described below.



● The Attache Case Portable

A most satisfactory approach to the problem is to design a separate transmitter and receiver, using midget type valves to save space on the receiver. A successful combination is shown in *Fig. 3*, a Mazda P220a or Osram P2 being used as the oscillator with 1.8 watts input, 120 volts H.T., modulated Heising fashion with a Mullard MP22 pentode, the L.F. supply serving as the microphone potential. The receiver uses Hivac midget valves, an XD as a self-quench detector with one resistance-capacity coupled stage following.

● Construction (Receiver Section)

Both transmitter and receiver are built into a wooden chassis, measuring $9\frac{1}{2}$ ins. by $5\frac{1}{2}$ ins. by $4\frac{1}{2}$ ins. deep, but the actual dimensions should be governed by the size of the suitcase to be used. The overall bulk of the complete receiver section need not be more than $4\frac{1}{2}$ ins. by $2\frac{1}{2}$ ins. by 2 ins., thus leaving scope for latitude in the spacing of transmitter components. The receiver section is best assembled and wired as a separate unit before mounting in the chassis, the detector valveholder being supported on one of the fixed vane connections of the tuning condenser, whilst the L.F. valveholder finds rigidity by fastening to the upturned

tag of condenser C4, together with additional support from the wiring. The tuning coil comprises 9 turns of 16-gauge wire, $11/16$ ins. inside diameter, $1\frac{1}{2}$ ins. long, self-supported in the wiring, centretapped to the H.F. choke.

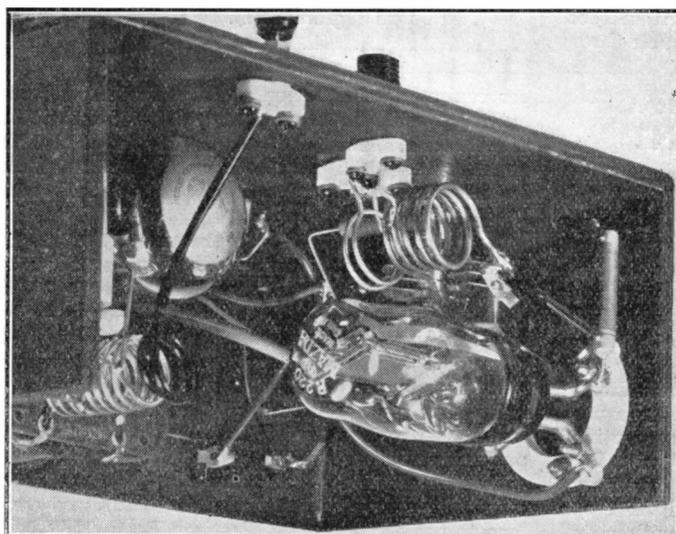
As both sides of the tuning condenser are at H.F. potential an insulated mounting bracket must be used, and the shaft extended by an insulated coupler. The by-pass condenser C3 should be mounted to allow substitution, as this capacity plays an important part in the correct working of the self-quench detector, and is fairly critical as to value. Too large a capacity will produce an audible whistle, but if too small the detector may refuse to super-regenerate. However the capacity shown (.001) just puts the whistle above audible frequency, but any substitution of components may necessitate adjustment of this value.

The aerial for reception is coupled very lightly by means of a two-turn coil of 16-gauge, about $\frac{1}{4}$ in. from the grid end of the tuning coil. The receiver H.T. should be adjusted between 60 and 80 volts to give a fairly strong super-regenerative hiss constant over the band, when no variable regenerative control is necessary. To obtain band-spread and easy tuning it is advisable to reduce the vanes of the condenser to one moving and two fixed.

Results with the receiver show very good sensitivity to weak signals, as good if not better than the more ambitious three-valve circuit of *Fig. 2*.

● Transmitter

The transmitter construction is straightforward, and no difficulty will be experienced in obtaining good output over the amateur band. Alternative aerial couplings are provided, a two-turn coil for feeders, and a direct tap one turn



down from the plate end for use with end-feed aerials. This latter provision is worth while making, as it is often convenient to use a simple 8-foot vertical half-wave radiator.

With the valves suggested the total H.T. consumption is 28 ma. on transmit for 120 v. H.T., and this allows for good modulation of the carrier. This seems too heavy for the normal H.T. battery, but with intermittent use it is surprising what the ordinary battery will stand.

To economise in current it is possible to use a combination of a Mazda P220 or Osram LP2 as

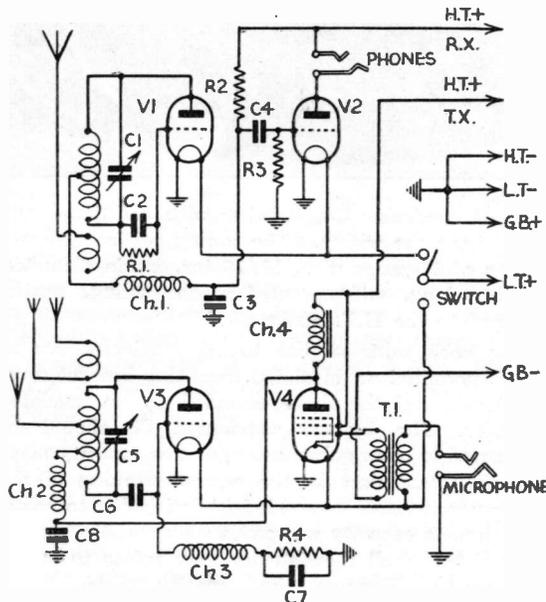


FIGURE 3.

oscillator modulated by a Mullard PM22a or similar economy pentode, when the consumption will be down to 15 milliamps, but the power output is reduced considerably. The change-over from send to receive is effected by a single-pole double-throw

switch in the positive filament lead, though here a rotary type switch with central "off" position would be an advantage.

● Adaptation

Alternative ideas of construction will suggest themselves, for instance to make duplex working possible it would be advisable to construct receiver and transmitter as two separate units, using metal chassis construction, with a plug-in cable system for linking. The control switch for change-over could be mounted on the receiver section.

COMPONENTS REQUIRED

- C1, C5—15 mnfd. (Webb's "Apex").
- C2—.0001 (T.C.C., type "M").
- C3—.001 "
- C4—.006 "
- C6, 7, 8—.0003 "
- R1—5 megohms, 1 watt (Erie).
- R2—100,000 ohms "- R3—1 megohm "- R4—10,000 ohms "- Ch1, 2, 3—H.F. Chokes (Eddystone, 1011).
- Ch4—25 hy. 40 ma. Choke (Keston, type 204a).
- T1—Microphone Transformer (Keston, W44).
- Switch—Snap Switch (Bulgin, S.P.D.T., S81T).
- V1—Hivac Midget XD.
- V2 " XL.
- V3—Mazda P220a or Osram P2.
- V4—Mullard PM22.
- One Valveholder (Eddystone, 949).
- Four Midget Insulators (Eddystone, 1019).
- Two Knobs and Dials (Eddystone, 1041).
- One 5-pin Baseboard Valveholder (W.B.).
- Two Jacks (Igranic, 71).

GOLDERS GREEN TO STAGE "CORONATION" EVENT

The Golders Green and Hendon Radio and Scientific Society visited the Television demonstration theatre of Messrs. Marconiphone Co. Interest was so great that admission had to be refused. Mr. A. S. Radford dealt briefly but clearly with the subject from the optical point of view. The interlaced system of scanning and emiscop tube were fully explained. The importance of the correct mixture of fluorescent salts to coat the screen was necessary to ensure that the delay time in the light fading is constant and even. Six stages of T.R.F. are used having a gain between 40,000/100,000 times, rectified to give a variable voltage between 0/10 volts D.C. Unfortunately the various circuits used were only briefly dealt with and this rather limited the scope of the discussion. The meeting closed with a full

programme demonstration on three models all working at the same time. The pictures were remarkably bright, steady and clear, and it was noted that the apparatus required very little attention; local interference was much more noticeable on the sound side than in the pictures.

On Sunday, May 23rd, in the country about St. Albans, the Coronation Direction Finding Competition on 80 metres will be directed by Lieut.-Col. H. Ashley Scarlett, D.S.O. This annual event is open to all interested in radio. After tea a conference is to be held to which radio enthusiasts are invited as well as those participating in the competition.

On June 2nd and July 11th 5-metre field days will be held to test out apparatus; and a 5-metre competition will be organized on Sept. 12th.

Full details of the above arrangements may be obtained on sending a stamped and addressed envelope to the Secretary, 60, Pattison Road, N.W.2.

INTERNATIONAL SHORT WAVE CLUB

European and Colonial Representative:

ARTHUR E. BEAR, 100, Adams Gardens Estate,
London, S.E.16.

THE INTERNATIONAL Short-Wave Club has a large membership throughout the British Isles. Its aims and objects are to provide the short-wave listener with the latest news and data regarding short-wave stations so that he may obtain the greatest satisfaction from his receiver, and also to promote friendship among short-wave amateurs and listeners.

Membership which begins from the month of joining costs 5s. per year, and includes the Club's official organ, "International Short Wave Radio," published each month. In various localities the Club has local Chapters where the members are able



Photograph taken on the occasion of the recent fourth annual dinner. The guest of honour was the American Consul, Harry E. Carlson. Members from all parts of the British Isles together with representatives of the radio manufacturers and broadcasting organizations were also present.

to meet and where lectures and demonstrations dealing with every aspect of radio are arranged. The Club also issues a monthly "News Letter" containing much of interest to the short-wave listener, a copy of which will be sent to all readers who enclose a stamp with the application.

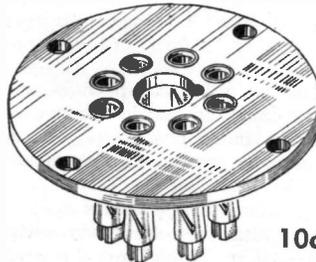
The LONDON CHAPTER meets each Friday evening at the Clubroom, 80, Theobalds Road, W.C.1. Full details of meetings from the Secretary, 100, Adams Gardens Estate, S.E.16. The BRIGHTON CHAPTER meets every Wednesday evening at 100, Cromwell Road, Hove; for details of coming meetings write the Secretary, 205, Braeside Avenue, Brighton, 6. The GUERNSEY CHAPTER meets every Tuesday at 5, Well Road, St. Peter Port, Guernsey. A hearty welcome will be afforded readers at the meetings of the Chapters.

A SOLUTION

to any problem relating to short-wave radio is offered free to our readers. All queries must be sent with the coupon cut from page 40 and addressed to "The Editor, The Short-Wave Magazine, 84-86 Tabernacle Street, London, E.C.2."

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PRECISION METERS

THE DIX-ONEMETER 50 Range Test Set. —Will measure 0-100 millivolts 25 microamps. to 20 amps. Dix-onemeters are now only 55/-. This is a remarkably small price for a meter worth £10 in comparison with others. Latest model, Mirror Double Scale. Moulded Base. The finest Precision Multi-Measuring instrument is the DIX-ONE METER. A de luxe Meter in Case.

Multipliers, 6/6 each. Radio Outfit Test Set, complete in Case with five Multipliers, 90/-.

MICRO-AMMETERS for Valve Voltmeters, etc., 0 to 50 microamps full scale, 50 mV. moving coil, flush panel, 2½ in. dial. Reads direct signal strength on crystal, 1,000 ohms, 40/-.

LIGHT AND RAY CELLS.—Selenium Raycraft, 21/-; Kingston, 15/-. Raycraft outfit with relay and amplifier, 45/-. Photo-Cells, for sound on Film, Television and Ray work, B.T.P., 15/-; R.C.A., 25/-; Beck, Angle Prisms, mounted in carrier, 5/6. Micrometer adjusters for lens, 1/-. Eyepieces with prism and lenses for photo-cell inspection, 12/6. Service Set Headlamps with Battery Holder, 7/6.

HEADPHONES.—Sullivan 120 ohms, 2/9. Ericsson, Lissen and others, 2,000 and 4,000 ohms, 4/6. Single high res. ear-pieces, 2/6.

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NEUTRALISING SIMPLY EXPLAINED

A TRICKY OPERATION MADE EASY

"TAKE A LOOP with flashlamp bulb across, couple the P.A. tank coil, and juggle the neutralising condenser until the lamp goes out." These are the instructions usually given for neutralising a transmitter.

I remember many happy hours spent "juggling" with this loop and the condenser setting. Sometimes I thought I really had got the wretched thing perfectly "neuted," only to find a day or two later that it was immaterial whether the drive was on or not—the P.A. still delivered power to the aerial.

● A Successful Method of Testing

Most of us think our transmitters are properly neutralised, but when grid bias is reduced until the valve draws anode current without drive, they usually burst into oscillation. This is about the finest test to see if neutralisation is complete—reduce the bias, see if the P.A. oscillates, if it doesn't apply and then take away the drive, and if the P.A. still doesn't oscillate it is perfectly neutralised.

Of course success is sometimes attained with the loop method, but most times if the P.A. is neutralised with the loop in position, removal of it causes unbalance and away the whole thing goes again.

● The Principle of Neutralising

Let's have a look at this neutralising job. The valve oscillates because owing to the proximity of the grid and anode inside the valve there is a cer-

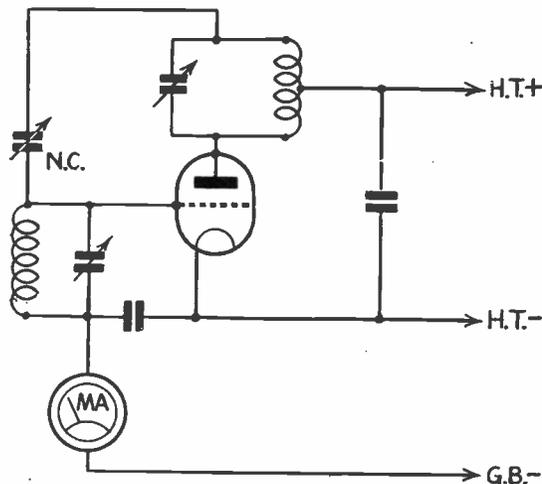


FIG. 1.

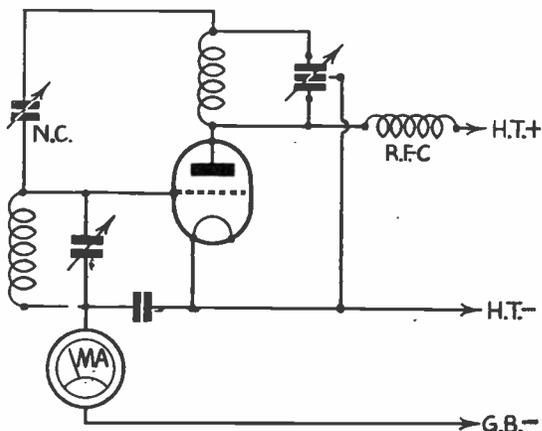


FIG. 2.

tain capacity between them, and this is sufficient to act as a condenser coupling the grid and anode circuits. H.F. volts are transferred from the anode back to the grid and oscillation occurs. Remember the old single valve reaction receiver? Couple the reaction coil one way and it would oscillate, couple it the other and it would not oscillate. In this reverse direction volts were transferred back to the grid which cancelled out the original grid volts. This was the first neutralising system.

Now if instead of coupling the two coils together we had inserted a condenser between the anode coil and the grid, the valve would have oscillated just the same, and in fact this system is very popular for reaction control on many short-wave receivers. By earthing the centre of the anode coil via a condenser, the anode coil was split in two, and the two ends were of equal voltage but different phase. Coupling one end of the coil back to the grid via a condenser fed back volts in the correct phase for oscillation, coupling the other end fed them back in the wrong phase, equivalent to reversing the reaction windings. This is the principle of neutralising (*Fig. 1*).

● Short-Wave Application

On short waves the capacity between grid and anode is sufficient to allow enough volts to be fed back for oscillation without any other coupling. These volts feed back from the anode end of the tank coil. The other end of the tank coil is of opposite phase (because we have split it by earthing the centre), so if this other end is coupled back to

the grid via a condenser of the same capacity as that of the anode/grid the same voltage in the opposite phase will be fed back. These two voltages will cancel out and no oscillation will occur

Once these principles have been grasped it will be obvious that any load, whether in the nature of a loop or an aerial, will affect the voltage distribution in the P.A. coil. The transmitter must be neutralised with the aerial attached.

● Place Meter in G.B. Lead

Neutralisation can most easily be accomplished by means of a milliammeter in the grid bias lead of the P.A. The drive should be switched on, bias on the P.A. reduced to zero. The P.A. filament should be lighted but no H.T. applied. The P.A. valve then acts as a diode rectifier, rectifying the drive voltage, which shows as current in the milliammeter. As the P.A. tank tuning condenser is rotated, a point is reached where the tank circuit is in resonance with the grid. If there is any feedback the tank circuit will absorb power, drive volts will drop, and the milliammeter will show a decrease in current. When the neutralising condenser is adjusted until there is no feedback the P.A. will not absorb power when it is in resonance, and so there will be no drop shown on the milliammeter.

Why reduce the bias to zero whilst neutralising? Because the bias battery acts as a resistance, reducing the rectified grid current, and so making any variations in current more difficult to see, but don't forget to apply normal bias again before switching on the H.T.!

● Grid Neutralising

A popular system of splitting the tank circuit is by the use of a split stator condenser (Fig. 2). The centre goes to earth, and no earth bypass condenser should be used. The split stator condenser should be of good manufacture, for if the two units of it are not of equal capacity the voltage distribution in the circuit will be uneven, and complete neutralisation will be difficult.

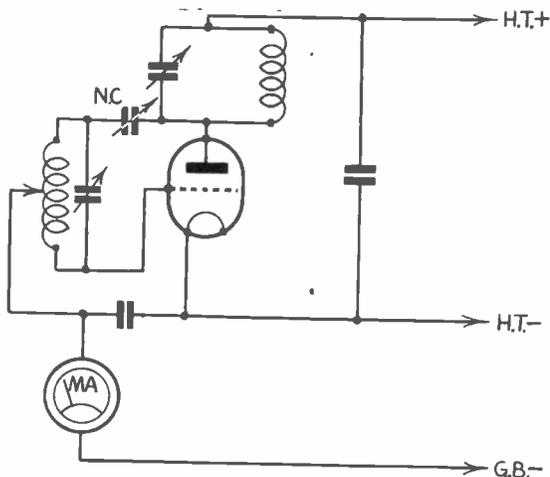


FIG. 3.

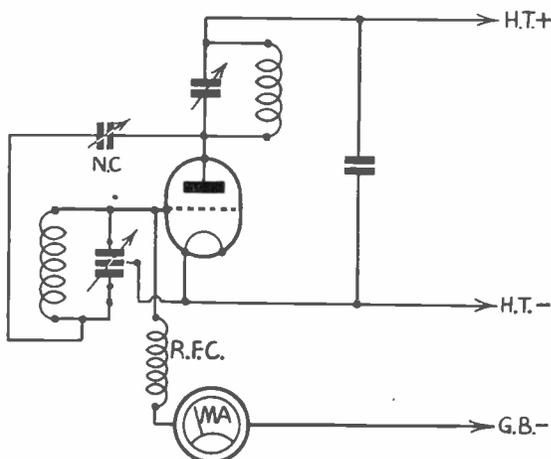


FIG. 4.

Another neutralising circuit uses grid neutralising (Fig. 3) in which the grid coil is centre tapped. This is just as effective as the circuit in Fig. 1 and operates in the same way. I once thought I would try to use a split-stator condenser in the grid circuit as it would be cheaper than the one necessary in the anode circuit. The circuit in Fig. 4 was the result but it won't work, because of what is known as the "Miller Effect." This effect is that the actual grid input of the valve is not the same as that occasioned by the proximity of the electrodes only, and is often enormously higher. The result is that it is difficult to split the grid circuit properly and so neutralisation cannot take place.

● Careful Positioning Necessary

Neutralisation only takes care of feed-back caused by the grid-anode capacity of the valve, it will not cancel feed-back caused by incorrect layout and stray coupling. Coils should be placed so that their fields do not interact, screens should be placed where necessary, and every precaution to prevent stray feed-back should be made before neutralisation is attempted.

Excessive damping or losses in a transmitter will reduce the effect of feedback, and I have actually seen a transmitter which was so badly constructed that it was impossible to make it oscillate. Usually the better a transmitter the more likely it is to oscillate. If it does not want to oscillate look for losses somewhere in the circuit. A common source of trouble in the circuits of Figs. 1 and 4 is the anode bypass condenser, which can be the cause of all sorts of erratic effects. If a new transmitter neutralises at the first attempt I always suspect something and examine everything for possible losses. On low power in particular losses are not very obvious, but on higher power show up by the insulation of variable condensers catching fire, or R.F. chokes burning out. However, losses in components is another story so I will leave it for a future article.

fixed into position they should be tested for a short to chassis. No washers are required on the switch as the rotor is already insulated from the contacts.

● Operation

To operate the transmitter the use of a small milliammeter is necessary. This has not been built into the transmitter as one milliammeter can be used for all measurements, thus reducing expense.

First of all H.T. should be applied only to the crystal oscillator valve (the class B valve). The doubler section should be switched out of circuit, and the milliammeter connected between the power amplifier bias lead and the chassis. On turning the crystal oscillator tuning condenser into resonance oscillation will be recognised by a reading on the grid milliammeter. The 7 mc. coil should then be inserted in the power amplifier circuit, and the transmitter neutralised (see article on neutralising in this issue).

Once the transmitter has been neutralised, and the crystal oscillator adjusted for maximum grid milliamps normal bias to the P.A. should be applied, the milliammeter moved to the H.T. lead, and the H.T. applied.

The correct bias for the P.A. can be determined by applying H.T. volts, removing the H.T. from the C.O., and biasing the P.A. until no anode milliamps are consumed. Correct bias will then be double this value.

As a check on efficiency the aerial load may be removed, and then the anode current to the P.A. should not exceed 5 milliamps when tuned to resonance. Of course if it is out of tune the current will rise to a very high value, up to 50 milliamps or so.

The aerial should then be coupled so that the valve draws reasonable anode current. With 150 volts H.T. this may be in the region of 30 milliamps, giving an input of $4\frac{1}{2}$ watts. Higher voltage may be used, and with 200 volts it is easily possible to draw 50 milliamps (10 watts), but this will reduce the life of the valve.

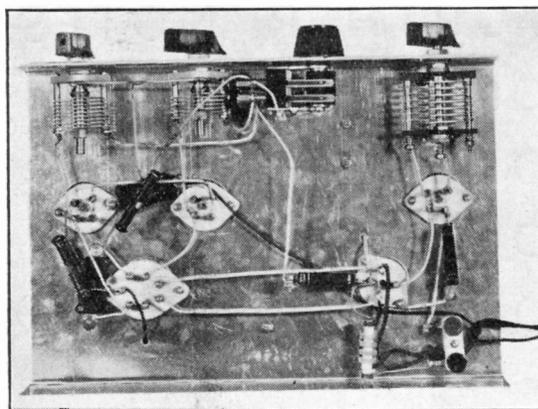
For use on 14 mc. the doubler section should be switched into circuit and tuned in the same manner as the C.O. by means of the grid milliammeter in the P.A. stage. It will be noticed that it is only necessary to change the P.A. coil. The P.A. stage must be neutralised again for 14 mc. operation.

● Keying

Keying is done in the negative H.T. lead, thus cutting off power to all stages. By this means H.T. consumption is reduced to a minimum. A simple key filter should be used, which can consist of a 2 mfd. condenser across the key. The keyed note resulting is excellent, there being no sign of chirp or echo.

● Results

Under test the transmitter has performed up to expectation. On 7 mc. the best DX so far is Russia, and on 14 mc. Algeria. All the stations worked have expressed surprise at the low power used. This was deliberately kept down to under 4 watts at 120



volts H.T. The transmitter will be in regular use during May and a further account of results obtained will be published in the June number of the SHORT-WAVE MAGAZINE.

Owing to the lack of a 14 mc. crystal the transmitter has not been used on ten metres, but no difficulty should be encountered in operation on this band. It is hoped that (conditions permitting) this will also be the subject of test during the month.

COIL TURNS

Crystal Oscillator: 7 mc., 17 turns 20 S.W.G.

Doubler: 14 mc., 8 turns 20 S.W.G.

P.A.: 7 mc., 24 turns; 14 mc., 10 turns, both 18 S.W.G. and centre tapped.

LIST OF PARTS

C6—.0001 (Jackson, 1054, double spaced).

C4—.00016 (B.T.S.).

C5—.000045 "

C7—50 mmf. (Jackson, 2144).

C1, 2, 3, 8—.001 (Dubilier, 670).

3 4-pin Coil Holders (Bulgin).

1 4-pin Valveholder (Graham Farish).

1 7-pin " "

R1—15,000 ohm. 1 watt resistor (Erie).

R2—50,000 " " "

Switch—D.P.D.T. (Wearite).

R.F.C.—(Graham Farish).

3 Dials and pointers (Eddystone).

Open type Crystal Holder (Brookes).

Terminal Bracket (Eddystone).

4 4-pin Coil Formers (Eddystone).

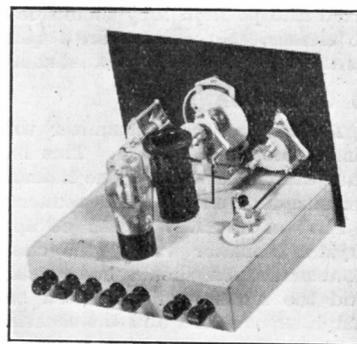
Aluminium Chassis (Paroussi).

Valves: Hivac PP220, B230 or Tungstram
SP220, CB220.

CATHODE RAY OSCILLOSCOPE

Owing to pressure on space, it has been found impossible to include the Cathode Ray Oscilloscope Time Base article this month.

FURTHER NOTES ON THE ONE-VALVER DESCRIBED IN OUR FIRST NUMBER



A LARGE NUMBER of readers have written to us regarding the use of the single-valve receiver described in the March number of *THE SHORT-WAVE MAGAZINE* on ten metres. We did not employ the usual superlatives regarding its performance on this frequency because we felt that our readers would rather have an account of the actual results obtained; we therefore accordingly published a list of stations received during a half-hour's listening on this frequency.

● Highest Efficiency on Ten Metres

In a receiver for ten-metre work particular care is necessary in the design and construction. What is good enough for forty metres will not be good enough for ten. Every detail must be watched if good results are to be obtained. This receiver was designed especially for ten metres, it will even go below five, but we were of opinion that constructors would prefer to have details of how to use it on the lower frequency bands and so details were given for operations from 80 to 9 metres.

During a lengthy test outside the control of *THE SHORT-WAVE MAGAZINE* staff the receiver has arrived back with flying colours. There have, of course, been suggestions with a view to gaining still more from the receiver, also we have been asked for increased amplification, a mains version, whilst the usual crop of questions concerning the use of alternative components has kept the designers busy.

● An Offer

We invite responsible radio societies to participate in this test, and to communicate with the Editor when every facility will be granted for the loan of the receiver. All we require in return for fixing you with an interesting evening is a candid report and strict adherence to the date agreed for return. Now then, secretaries, here's an opportunity to fill in one of those blank days in your fixture calendar!

From the letters received ten metre operation appears to be the only difficulty and this mainly owing to the incorrect spacing of the coil. The turns should approximately $\frac{1}{8}$ in. apart; slightly less wire and closer spacing will however have the

same effect as more wire and wider gaps between the turns. An increase to the full 150 volts. H.T. often brings the desired effect, but a little experiment on these lines may be necessary when the coil is home-constructed. For half-a-crown Messrs. B.T.S., of 8/10, Charing Cross Road, London, W.C.2, will supply the ten-metre coil ready wound. We have tested this in the original and can recommend its use to the constructor who does not wish to wind his own.

● Kit of Parts Available

A kit of parts is now obtainable from Messrs. Peto Scott, 77, City Road, E.C.2. The price of 49s. 6d. less valve and battery, but including 3 coils, enables the home-constructor to build with the minimum of effort. The kit is undergoing a strenuous test and will be reported on at length in the June issue. From observations made we have confidence in recommending to readers this version of our Class B receiver, a photograph of which appears above.

Certain modifications are of course possible, at the same time it must be pointed out that an alternative component or value may and often does mean that an associated component requires alteration. Remember that poor results may be the outcome of your deviation from the original lay-out. The receiver as designed gives entire satisfaction on all wavebands.

● Adding a Stage of L.F.

The question of mains working, on which so many readers have written, is under consideration, and will form a future considered report.

Loudspeaker results have been the cause of some readers wishing for just that extra volume in order to place the weaker signals on the speaker. Bad listening conditions also suggest stronger output.

There is no reason why a second stage of amplification should not be used. The chassis is of sufficient size to accommodate the extra components, and from a theoretical viewpoint there should be no difficulty. The approved method of making this addition will be fully described in our next issue.

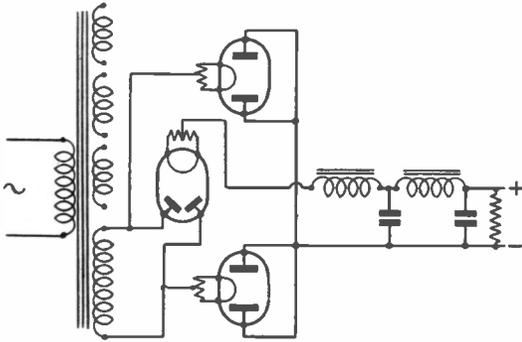
AN ECONOMICAL 1,000 VOLT SUPPLY

ONE OF THE most expensive items in the construction of a transmitter or public address amplifier is the H.T. supply. For voltages up to 500 volts transformers are made in quantity by a number of manufacturers, and being manufactured in bulk are reasonable in price.

Above 500 volts there is not so great a demand for transformers, and accordingly the price of the equipment goes up out of proportion to the extra voltage.

● 500 Volt Transformer

A cheap method of obtaining 1,000 volts or so is to use a 500-volt transformer with a bridge rectifier. To do this in the normal manner four valves would be required (one in each arm of the bridge), but by using full-wave rectifiers the number can be reduced to three. Using a 500-volt transformer (500-0-500)



the valves need only be of the standard 500 volt rating, such as the DW4 or MU14, the expense of 1,000 volt rectifying valves being obviated.

The circuit diagram shows the method employed. Three separate windings for the rectifier filaments are used, and great care must be taken with their insulation, as they have to withstand the full 1,000 volts A.C.

● Choke Input Filter

The filter circuit is perfectly normal, with choke input allowing the use of full-wave mercury vapour rectifiers. With a transformer of 500-0-500 volts rating, the output voltage will be in the vicinity of 800 volts. The use of thermionic rectifiers will enable the choke input to be left out, with a consequent increase in volts, readings of 1,100 volts being obtained. On no account should it be dispensed with if mercury vapour valves are used, otherwise the life of the valves will be very considerably reduced.

It is advisable to use an entirely separate filament transformer, and to light the filaments of the rectifiers at least one minute before the H.T. volts are applied.

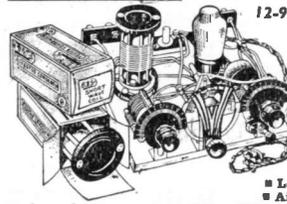
BARGAINS

New Times Sales Co. (Est. 1924) offer the Short Wave Fan remarkable opportunities to secure NEW short-wave Kits and Components at amazing bargain prices. Take advantage of these remarkable offers and order to-day. Thirteen years of radio-by-mail trading is your guarantee of complete satisfaction.

● Something entirely NEW! ●

"3-in-1" SHORT-WAVE KIT

Adaptor—Converter—Receiver Reviewed on Page 37
LIST VALUE 37/6 **BARGAIN 25/-**



12-94 metres
 ■ Adapts or converts your battery set for short-wave reception, or may be used as 1-valve Short Wave Receiver.
 ■ Reacting Detector Circuit.
 ■ Slow-motion bandspread tuning SIMPLIFIES WORLD RECEPTION!

■ Low-loss reaction condenser. ■ Air-spaced bandspread and tank condensers. ■ SPECIAL ANTI-BLIND SPOT CONDENSER.

■ 3 scales calibrated in degrees.
 The N.T.S. "3-in-1" Short-Wave Kit is entirely unique in short-wave technique. This amazing combined Adaptor-Converter-Receiver is offered you for the first time... at an astonishing low price.

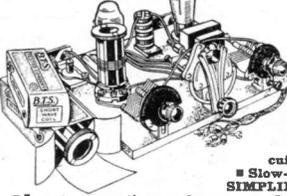
KIT "1" comprises every part for assembly, including 3 4-pin coils, drawing, and operating instructions, less valve only. Cash or C.O.D. Carr. Pd. 25/- or 2/6 down and 10 monthly payments 2/6.

KIT "2." With 2-volt valve, £1/8/9 or 2/6 down and 11 monthly payments 2/9. If N.T.S. headphones required, add 7/6 to Cash Price, or 8d. to deposit and each monthly payment.

**2/6
DOWN**

New 2-Valve BANDSPREAD SHORT WAVE KIT

LIST VALUE 59/6 **BARGAIN 32/6**



12-94 metres
 Assembled by even a novice in an evening, this wonderful receiver, of entirely new and unique design, will bring you a lifetime of fascinating short wave entertainment.

Send your order now. Delivery from stock.
 ■ Reacting Detector and Transformer coupled circuit, Power Output.

■ Slow-motion bandspread tuning SIMPLIFIES WORLD RECEPTION!
 ■ Low-loss reaction condenser. ■ Air-spaced bandspread and tank condensers. ■ SPECIAL ANTI-BLIND SPOT CONDENSER.

■ 3 scales calibrated in degrees and tenths.
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Kit "2." With 2 British Valves, £2/1/8, or 4/- down and 11 monthly payments 3/10. If N.T.S. Headphones required, add 7/6 to Cash Prices, or 8d. to deposit and each monthly payment.

**2/6
DOWN**

COMPONENT BARGAINS

N.T.S. Short Wave Coils.—Three ranges: 12-26, 22-47, 41-94 metres: 4-pin. List Value, 2/9. Bargain, 1/8 each. 6-pin. List Value, 3/6. Bargain, 2/- each. Coil Bases, 4-pin, 1/-; 6-pin, 1/6.

10:1 Slow Motion Dial.—Illuminated Scale 0-180. With escutcheon and knob. List Value, 2/8. Bargain, 1/8.

Bandspread and Tuning Condensers.—For all short and ultra-short wave circuits. Type 3/15. 00015 mfd. List Value, 4/9. Bargain, 3/6. Type 4/16. 00016. List Value, 4/9. Bargain, 2/9.

Slow Motion Reaction Condenser.—For utmost amplification from reacting detector circuits. Type No. R3/20. 0002 mfd. List Value, 7/6. Bargain 5/-.

L.F. Transformer.—High permeability core, low self-capacity windings. Type LF13, ratio 1:3; Type LF16, ratio 1:5. List Value, 8/6. Bargain, 4/.

Headphones.—With lightweight head-band, two ear-pieces, each 2,000 ohms resistance. Total weight, 4½ ozs. List Value, 15/-. Bargain, 7/6.

Orders over 10/- sent Post Paid. Orders below 10/- Post 6d. extra. Postal Orders must be crossed and currency registered.

FREE! Write to-day for free Booklet describing in full, with actual photographs, 5 entirely new N.T.S. Bargain Short-Wave Kits, and range of Bargain Short-Wave Components, including the "3-in-1" Kit and 2-valve Bandspread Receiver Kit offered above.

NEW TIMES SALES Co. 56 (S.M.I.), Ludgate Hill, London, E.C.4

EST. 1924

On the Amateur Bands

"Ham" News by G5GQ

THE EXTRAORDINARY weather we have had this winter seems to have reacted on conditions, 14 mc. has been wonderful up to midnight, but with the sudden change of weather for the better, May/June conditions have begun to prevail in April. During the last week of April signals have been poor on 14 mc. during the evening but the early morning has been productive of hundreds of Pacific coast Americans.

● Which Way?

It is generally assumed that these signals travel the long way round, but it would be interesting to hear from readers who have made directional measurements on them. Sometimes one will hear a solitary east coast station through the racket of W6's. In a case like this do the signals travel direct across the Atlantic or do they go across America, and then the long way round?

What has happened to the Japanese stations this last year? At one time it was possible to hear a large number of them during similar conditions to those prevailing now, but recently they have been



Owner of the well-known Japanese station, J5CC.

conspicuous by their absence. I have not heard J5CC lately, although at one time he was one of the most prominent signals on the band.

South Africans appear to be the most consistent signals now—there always are some to be heard on 14 mc.

At one time 7 mc. was a "lowbrow" band, apparently the exclusive property of the low-power phone people, but more of the high-power crowd

● Cairo

are using phone there now. I was very surprised to hear GM6RV rocking in the other Sunday as I always thought he was permanently fixed on 14 and 28 mc. G2PL is another of the key thumpers who is now to be heard on phone.

Everyone I meet seems to be worrying about Cairo next year. It seems pretty definite that we shall not obtain any more frequencies, so we can

only hope we will not lose anything. The 1.7 mc. band is the most likely to be lost, many other services taking increasing interest in it. Still we shall only have ourselves to blame if we do lose it, because this band has been practically deserted for years. Even at week ends I rarely hear anyone using it. 56 mc. is another band we should watch. Unless more serious work is done here there is every likelihood of this being taken away. Self-excited transmitters are all very well in their way, but it is high time they were all scrapped for some form of stabilised transmitter. Some transmitters have been designed, but they are so complex that they are not worth the trouble. What is wanted is a three-stage transmitter, crystal-controlled, and with an output of 250 watts. If 14 mc. transmitters had remained in the same state as the present 56 mc. ones are all thought of DX on 14 mc. would have been given up as impossible.

● Phone Versus C.W.

The age-old argument, phone versus CW, also has a bearing on Cairo. Phone is all very well but a phone station requires a channel of at least 4 kc., compared with the 200 cycles of the CW station. If we can afford to allow phone on our bands, surely we shall be told that we have enough room and that more frequencies are unnecessary. Please do not think that I have a grudge against phone, I use it myself, but on phone I know I use twenty times the space I do on CW. Another point is the number of amateurs using their stations for broadcast programmes. The chief offenders are certain foreign radio societies, and every step should be taken to stop them, because other interests are watching our bands for misuse of this nature and will undoubtedly bring them up against us at the convention.

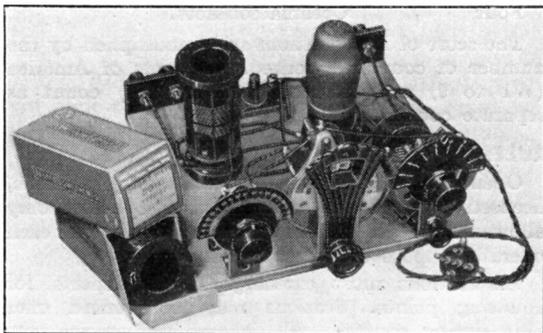
● The Post Office Bogy

Many hams are scared stiff at the thought of a visit from the Post Office engineers. I have had them down to my station many times and have nothing but praise for the way in which they treat amateurs. The trouble has been interference caused by the 7 mc. phone transmitter, and after making sure that my transmitter was not at fault they did everything possible to cure it at the receiving end. Many hams treat the G.P.O. as enemies, but I have always known them to give sympathetic consideration to any amateur, whether it be over interference or higher power facilities. Let's forget this enmity business—decent feeling between both sides will do more for us than all the representations and threats in the world.

ON TEST

NEW TIMES SALES "THREE-IN-ONE" SHORT-WAVE KIT

The three uses of the N.T.S. kit are: (1) single valve receiver, (2) adaptor, (3) converter. The designers are to be complimented on producing an original kit of this description. The constructor requires the minimum of practical knowledge and tools in the process of assembly, for he is assisted by precise instruction and a chart showing the exact layout—he cannot fail if these simple but full instructions are followed.



A kit of parts has been built up and is on test. A report of its full capabilities will be given in our June issue, and from knowledge already to hand, this will make interesting reading.

The price of the "Three-in-one" is 25s., including coils covering 12 to 94 metres. A valve is provided in kit No. 2 (28s. 9d.), and No. 3 version includes a valve and headphones (36s. 3d.).

BULGIN INDICATOR RESISTANCE

A sample of a Bulgin M.V.14 indicator resistance, 10,000 ohms, rating 60 watts, price 10s. 6d., has been received. This is actually a 60 watt 10,000 ohm variable resistance, having a sliding contact running on a calibrated bar, the calibration being according to the amount of resistance in circuit. Its primary use is to determine the value of resistance required for replacement or experimental use. Connections are taken from the sliding contact and from one end of the resistance and the slider adjusted for best results, the required resistance then being indicated on the scale.

Under test, measurements taken were:—Slider reading, 2,000 ohms; actual measured value, 2,120 ohms; 4,000 ohms, 3,950 ohms; 6,000 ohms, 5,800 ohms; 8,000 ohms, 7,600 ohms; 10,000 ohms, 10,000 ohms.

The maximum current rating is 77 milliamps, and at this value no undue heating was experienced.

The resistance is also equipped with potentiometer connections for use when necessity arises. A second model, type M.V. 15, is also available, the rating for which is 50,000 ohms total resistance, 60 watts at 34 milliamps, and priced at 10s. 6d.

B.T.S. DIAL AND I.F. TRANSFORMER

From British Television Supplies we have samples of an airplane tuning dial, and variable I.F. transformer.

The dial is of the frictional ball-bearing type, with spring and pulley drive to the dial pointer. Provision is made either for direct or vernier control, there being no sign of "backlash" on either setting. The dial can be mounted on the panel or from the baseboard by means of adjustable feet provided. The price, complete with glass and all necessary fittings is 8s. 6d.

The variable I.F. unit is an intermediate frequency transformer with provision for varying the coupling between windings, hence the selectivity. The amount of variation possible is 10 kc., sufficient for any requirement. The windings, which are of the sectionalised type, are wound with stranded wire, each wire being insulated from the rest by enamel, and the entire number covered with silk, the "Q" of the unit being 95. An air-spaced trimmer is incorporated.

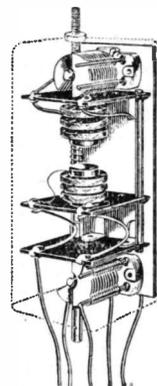
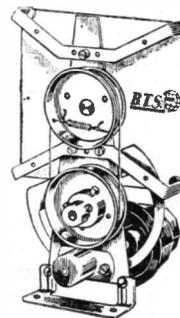
The unit is designed for chassis mounting, and is arranged so that two or more can be ganged together. The price is 21s.

Constructor readers will find much of interest in the new B.T.S. list of short-wave components; whilst those whose interest lies in converters should procure details of the "Adaband," which may be used with any receiver—A.C., D.C. or battery. Owing to lack of space the test report is held over until next issue.

46-RANGE UNIVERSAL AVOMETER.

We have been using during the past month a model 7 Avometer, the new 46-range measuring instrument manufactured by The Automatic Coil Winder and Electrical Equipment Co. With this instrument it is possible to measure voltages from 100 mv. up to 1,000 volts, and from 1 milliamp to 10 amps, A.C. or D.C., A.C. rectification being by the use of a metal rectifier.

Normally the full-scale deflection requires 2 milliamps (500 ohms per volt) but the depression of a button on the front panel releases a shunt and



reduces the current consumption for full-scale deflection to 1 milliamp.

Using the internal battery, resistance ranges of 10,000, 100,000 and 1,000,000 ohms are available, whilst the addition of external shunts enables measurements to be made of from 10 to 40 megohms. Using an external source of A.C. capacity measurements between .01 and 20 mfd. can be taken.

A new measurement incorporated in this instrument is that of power, expressed either in watts or decibels, the range being from -10 to +15 db, zero level being 50mw, whilst the measurement is made across a transformer having an impedance of 4,000 ohms.

An interesting feature is the automatic cut-out which protects the meter against accidental overload. With 40 milliamps flowing in a circuit the meter was deliberately set for 2 milliamps full scale deflection, and every time power was applied the breaker came out, being reset by a button on the panel. This is a very useful protection, which, unlike a fuse, does not require replacing after overload.

An important consideration in a meter is the "dead beat" action of the needle, and this was found to assume position with a minimum of delay, there being no swinging to and fro.

Priced at 16 guineas, it is a good investment for any service man or amateur.

CLIX VALVEHOLDERS

A full range of valveholders and connection strips are shown in the latest leaflet of British Mechanical Productions, Ltd., 79a, Rochester Row, London, S.W.1. Twenty-two patterns of short-wave holders, from 4- to 9-pin, are listed together with illustrations. The mounting strips, complete with terminals, obviate the drilling of an ebonite strip and fixing terminals, also a saving in cost is represented; as an example a 4-socket strip with terminals and engraved is listed at the low price of 8d.

KÖLSTER-BRANDES KB30

Full specifications are given in a new pamphlet issued by Messrs. Kolster-Brandes of their newly-released 630 all-wave superhet. The receiver covers 16 to 2,300 metres in three steps, and is also designed for use with the K.B. "Rejectostat" aerial. K.B. dealers are in a position to give demonstrations. The price is 12 guineas.

ECKO MODEL 108

"A Revelation in Radio" is the title of an introduction to the features incorporated in the Ekco Coronation all-wave 108 receiver contained in a leaflet setting out specifications of this new 9-stage A.C. model. Priced at 16 guineas.

GRAHAM FARISH COMPONENTS

Thirty-two pages of profusely illustrated matter giving details of the wide range of apparatus marketed by the makers of Formo products forms a catalogue of interest to short-wave constructors. The new booklet also contains particulars of goods other than radio. A copy will be sent on application to Messrs. Graham Farish, Bromley, Kent.

NORTHERN IRELAND CONTEST

The Leonard Trophy and Open Competition for Medals

The Radio Society of Northern Ireland announce details of the transmitting competition during May as follow:—

DATES AND TIMES

May 7	at 24.00 G.M.T.	to May 9,	24.00 G.M.T.
" 21	" "	" 23	" "
" 14	" "	" 16	" "
" 28	" "	" 30	" "

METHOD OF SCORING

One point for European contacts.

Two points for African contacts (above Equator).

Three " " (below Equator).

Three " North American contacts.

Four " South American contacts.

Four " Oceania contacts.

The score of Irish stations to be multiplied by the number of countries worked. Districts of America (W1 to 9) and Canada (VE1 to VE5) count as separate countries.

RULES AND AWARDS

Open to all licensed transmitting stations, licensed power must be used. One operator only allowed at each station; if more than one each operator's score counts separately.

All stations must exchange R.S.T. reports for counting points. Stations may be worked once only during contest. All licensed frequencies may be used.

To the leading Irish station will be awarded the Leonard Trophy for one year, also a replica. Gold and silver medals will be awarded respectively to the leading first and second stations outside Ireland.

All entries must reach the hon. secretary R.S.N.I., F. A. ROBB (GI6TK), 46, Victoria Avenue, Sydenham, Belfast, N.I., not later than July 31.

The society's headquarters are now the Y.M.C.A. Radio Club (GI6YM), Wellington Place, Belfast, and meetings are held at 8 p.m. on the first Wednesday of the month. The Morse classes, held every Wednesday, are well attended, and the radio club station (GI6YM) has now 12 operators. Two members of the club have recently obtained their full licences and may be heard with the calls of GI8LF and GI8MI.

The transmitting members hold a QSO party every Saturday night at 24.00 G.M.T., and the following may be heard on 20 m. telephony: GI5QX, GI1JN, GI5OY, GI6TK and GI8GK. At present the society's receiving contest is in full swing and a large entry is expected from the B.R.S. and A.A. members of the club. Two club members, GI5QX and GI6TK have now made W.A.C. on telephony, and GI6TK has also got F.B.T.O.C. (four band trans-Oceanic contacts) with W1, 2, 3, 4, 8 and 9. New members are welcomed and full particulars may be had from the Hon. Secretary.

160m. MAINS TRANSPORTABLE—G.P.O. TELEPHONY LECTURE GUERNSEY SUMMER PLANS—SOCIETY FOR NEWCASTLE OXFORD FIELD WORK

BIDEFORD

In view of the interest being shown in amateur transmission, the Bideford and District Short-Wave Society recently decided that alternate meetings, which are held fortnightly, should be devoted to this subject.

A large attendance of members witnessed the first transmitting demonstration by the Chairman on April 5th last, when a transportable low-power mains set produced satisfactory contacts with four amateur stations on the 1.7 mc. band.

The club now possesses its own very efficient short-wave receiving apparatus, consisting of a battery-operated 3-stage receiver and 2-valve mains amplifier, which are installed at the club-rooms.

Interested prospective members are invited to apply to the secretary, Mr. E. K. JENSEN, 5, Furzebeam Terrace, East-the-Water, Bideford, for particulars. The subscription has been fixed at 1s. per fortnight.

BLACKPOOL

The Blackpool and Fylde S.W. Radio Society is busy with details for the 56 mc. field day to be held on July 4. Four transmitting stations hope to be operating portable in the district, and stations in Garstang and Preston hope to co-operate.

The Society has applied for an artificial aerial licence, and it is their intention to build an experimental transmitter for demonstration purposes.

All the locals are active, with 2ARL waiting impatiently for his full ticket and BRS2851 for his A.A.—Secretary: H. FENTON, 25, Abbey Road, Blackpool.

EXETER

An interesting and instructive lecture was given to the Exeter and District Radio Society on April 5 by Mr. Bateman of the local G.P.O. Telephones, on Modern Telephony Methods. Mr. Bateman traced the history of telephony from Graham Bell's first attempts at communication between points connected by wire, and many lantern slides indicated the enormous strides which have taken place in the development of telephony. Pictures were also shown of the mechanism of modern exchanges, meters for registering the number of calls by subscribers, power plant, batteries and repeater stations; the latter, of course, being for use on main trunk lines every fifty or sixty miles for the purpose of boosting the speech strength.

At the meeting held on April 12th a lecture and demonstration was given by Mr. Mays consisting of the illustration of various forms of electrical interference as experienced in radio reception.

GUERNSEY

At the fortnightly meeting of the Guernsey Chapter of the International Short-Wave Club held at 5, Well Road, on Tuesday, April 20, it was announced that the club's activities would be con-

tinued throughout the summer and that a reception contest will be organised to sustain interest during the period.

The president of this go-ahead short-wave club is Mr. J. Dowding (G8DO) and the committee consists of Messrs. T. de Putron (G8MF), E. W. Vaudin and C. de la Hulinière.

Details of the summer programme may be obtained from the Hon. Sec., Mr. F. S. LE PAVOUX (2BTP), 8, Upper Canichers, St. Peter Port, Guernsey, C.I.

LEEDS

The interest shown by members in the Leeds Radio Society continues to expand and the numbers are increasing rapidly. One of the main features has been visits to North Regional, Kirkstall Power Station, Leeds Studios, and the Automatic Telephones. The president, Mr. Gautby, A.M.I.R.E. (G6GA) has delivered a very interesting series of lectures which were well attended. Many other interesting items are planned for the future. Details are available from the Secretary, J. KAVANAGH, 63, Dawlish Avenue, Leeds, 9.

NEWCASTLE

Newcastle enthusiasts have formed a radio society under the chairmanship of Mr. W. G. Smith. Meetings are held temporarily at 10, Henry Street, Gosforth, every Thursday at 7 p.m. and Sunday at 6 p.m. Hon. treasurer, W. C. English; hon. secretary, G. C. CASTLE. Entrance fee, 1s.; weekly subscription, 6d.

OXFORD

Membership is open to all members of the Radio Society of Great Britain. Its main principle is to allow members to meet and discuss points of general interest or of difficulty occurring during their experiments. Meetings take place on the first Tuesday in every month, and any experimenter interested in attending should communicate with the Hon. Sec., E. G. ARTHURS (2BHP), 13, Walton Well Road, Oxford.

Visits are occasionally arranged to other radio stations and places of radio interest. During the summer months experiments are carried out in the field using a wavelength in the 56 mc. band. Co-operation is desired, and other clubs or individuals, whether possessing a transmitter or receiver, or both which will work in this band, and who are prepared to enter into co-operation on the various tests are invited to communicate with the Hon. Sec. The first of these tests is expected to take place on Sunday, June 6, and those desirous of taking part should notify not later than June 1.

PORTSMOUTH

At the sixth annual meeting of the Portsmouth and District Wireless and Television Society held at 1a, Hudson Road, many points were discussed con-

PORTSMOUTH APPLICATION—DX AWARD—"S.-W.M." 5m. RECEIVER ON TEST—WELLINGBOROUGH CLOSE SEASON

cerning the coming year's programme. A library was formed and several gifts of books were promised. As the society has now four members holding transmitting licences it was decided to apply for a licence for a 10-watt transmitter for experimental purposes.

The president, vice-presidents and honorary members were re-elected. Mr. A. Parsons was elected vice-president in appreciation of the work he has done for the society; Mr. Harold Leigh as chairman; Mr. Kentsbeer, vice-chairman; Mr. F. L. Moore, hon. sec. and treasurer; Mr. Marsh, assistant hon. sec. The following committee were elected: Messrs. Leigh, Hentsbeer, Moore, Marsh, Batt, Wright, Bull, Bettinson, Evans and Pegler. Mr. Henry Lee and Mr. Beale were thanked for auditing the accounts.

TOTTENHAM

The Tottenham Short-Wave Club held a series of interesting meetings during the winter months and recently celebrated its second anniversary, at which the newly-elected president, Mr. Batt, was presented with the first prize for the DX phone competition held on the two middle week-ends in March. He succeeded in logging 52 countries.

The members awarded a vote of thanks for the services rendered by the secretary and treasurer (Mr. Cave), and a complete majority was obtained that they should continue office for the coming year.

The club has arranged a programme of field days for the summer months at which visitors will be welcome. A special 5-metre section is to be active at these events, and transmitting members in the locality will be looked out for if they notify the secretary.

Lectures together with practical experiments in transmitting are being given by the secretary. Morse practice is progressing and members are proving quite good at speed tests. The Log Department, which has been mentioned in previous reports, has now been collecting valuable data for the last eighteen months and a very comprehensive list of stations and conditions over this period has been obtained.

The secretary wishes to thank the various clubs at home and abroad that have written; those that have not yet received replies will do so in the very near future.

Particulars of membership, fees, meeting nights, etc., can be obtained by writing to the hon. secretary, L. WOODHOUSE, at 57, Pembury Road, Bruce Grove, Tottenham, N.17.

UXBRIDGE

At a recent meeting of the Uxbridge and District Branch of the Anglo-American Radio and Television Society members heard transmissions from the Alex-

andra Palace television station for the first time. It was on the occasion of a demonstration of THE SHORT-WAVE MAGAZINE ultra-short-wave two-valver (described in the April issue).

Although Uxbridge is approximately ten miles from the television station volume and clarity proved excellent. No experimental stations were heard—due to the time of the meeting—but the members left with the feeling that the set was well worth constructing.

The forthcoming cross-country ultra-short-wave test was discussed and society-made cine-films were shown to members. These depicted members of various branches participating in social and technical events.

For information regarding the society apply to Miss EILEEN G. HARRIS (Secretary).

The Southall Branch of the Anglo-American Radio and Television Society holds meetings at the Dominion Cinema Hall every Monday.

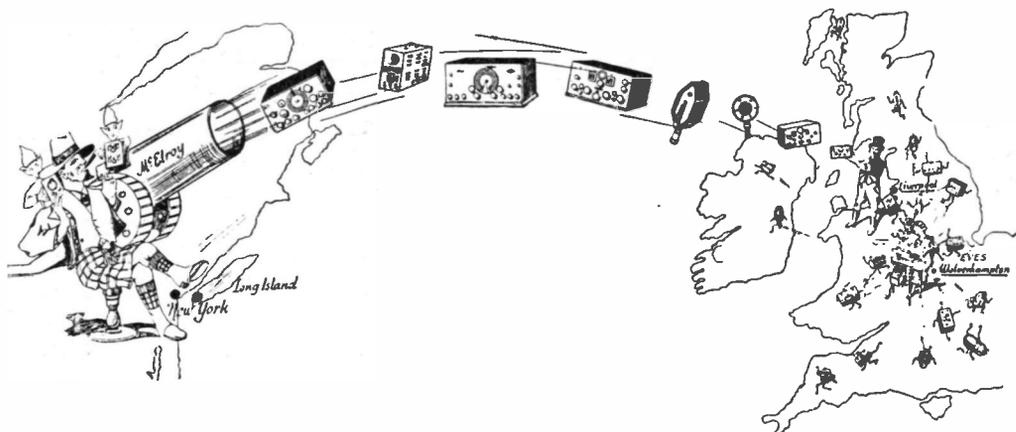
WELLINGBOROUGH AND DISTRICT

The final lecture meeting of the present winter programme of the Wellingborough and District Radio and Television Society was held at the Midland Hotel, Wellingborough, on Wednesday evening, April 7th, when a large and interested audience listened to a lecture given by Mr. A. Freeman of Kettering entitled "Sound on Film."

Mr. Freeman prefaced his lecture by a few remarks upon the history and progress of the Sound on Film patents. The Basis of reproduction was the photo electric cell, universally called the electric eye, and it was this cell, with its rapid sensitivity to changes in the intensity of light, that made the talking picture the model of perfection that it is to-day. Mr. Freeman then went on to explain in detail with the aid of diagrams, the problems of recording and gave instances to his audience of how these difficulties in transferring sound waves to light waves and then recording them on a sensitive film, has been overcome in recent years. He also stated that most of the actual recording on film was done separately from the picture. In this manner, it was possible later to adjust the sound to the film so that perfect synchronisation could be obtained. After the film was completed, perhaps several different sound versions would be made in different languages for foreign cinemas and in this instance too, the sound would be synchronised with the picture afterwards.

In thanking Mr. Freeman for his excellent lecture, the Society president, Mr. A. E. Fletcher, said that he hoped Mr. Freeman would again be visiting Wellingborough, and drew the members' attention to the winding-up night when a supper and junk sale would be held. The president was supported by the hon. sec., Mr. L. F. PARKER (G5LP), and an excellent attendance of members and visitors.

QUERY COUPON S.-W.M. 5/37.



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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/-.

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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.

<i>Station</i>	<i>Call</i>	<i>Wave</i>	<i>Freq.</i>	<i>Station</i>	<i>Call</i>	<i>Wave</i>	<i>Freq.</i>
PITTSBURG	W8XK	13.93	21.54	SYDNEY	VK2ME	31.28	9.59
WAYNE	W2XE	13.94	21.52	EINDHOVEN	PCJ	31.28	9.59
DAVENTRY	GSH	13.97	21.47	DAVENTRY	GSC	31.32	9.58
BANGKOK	HS8PJ	15.77	19.02	LYNDHURST	VK3LR	31.32	9.58
BANDOENG	PLE	15.93	18.83	MILLIS	W1XK	31.35	9.57
DAVENTRY	GSG	16.86	17.79	ZEESEN	DJA	31.38	9.56
BOUNDBROOK	W3XAL	16.87	17.78	PODEBRADY	OLR3A	31.41	9.55
ZEESEN	DJE	16.89	17.76	ZEESEN	DJN	31.45	9.54
WAYNE	W2XE	16.89	17.76	TOKIO	JZJ	31.47	9.63
BUDAPEST	HAS3	19.52	15.37	JELOY	LKJ1	31.48	9.53
ZEESEN	DJT	19.53	15.36	TOKIO	JZI	31.48	9.53
ZEESEN	DJR	19.56	15.34	SCHENECTADY	W2XAF	31.48	9.35
SCHENECTADY	W2XAD	19.57	15.33	MELBOURNE	VK3ME	31.55	9.51
BUENOS AIRES	LRU	19.62	15.29	DAVENTRY	GSB	31.55	9.51
ZEESEN	DJQ	19.63	15.28	CARTAGENA (COLOMBIA)	HJIABE	31.58	9.50
WAYNE	W2XE	19.65	15.27	RIO DE JANEIRO	PRF5	31.58	9.50
DAVENTRY	GSI	19.66	15.26	HAVANA (CUBA)	COCH	31.82	9.42
RADIO COLONIAL (Paris)	TPA2	19.68	15.24	BANGKOK	HS8PJ	31.85	9.35
EINDHOVEN	PCJ	19.71	15.22	BUDAPEST	HAT4	32.88	9.12
PITTSBURG	W8XK	19.72	15.21	RADIO NATIONS	HBP	38.48	7.78
ZEESEN	DJB	19.74	15.20	MOSCOW	RV96	38.89	7.52
DAVENTRY	GSO	19.76	15.18	TOKIO	JVP	39.95	7.51
SOURABAYA	YDC	19.80	15.15	SAN DOMINGO	HIT	45.25	6.63
DAVENTRY	GSF	19.82	15.14	VENEZUELA	YV4RB	46.95	6.36
VATICAN CITY	HVJ	19.84	15.12	MARACAIBO	YV5RP	47.81	6.27
ZEESEN	DJL	19.85	15.11	HAVANA (CUBA)	COKG	48.78	6.15
SOFIA	LZA	20.24	14.82	MARACAIBO	YV3RC	48.78	6.15
WARSAW	SPW	22.00	13.63	WINNIPEG	CJRO	48.78	6.15
REYKJAVIK	TFJ	24.52	12.23	PITTSBURG	W8XK	48.86	6.14
MOSCOW	RNE	25.00	12.00	HAVANA (CUBA)	COCD	48.94	6.13
RADIO COLONIAL (Paris)	TPA3	25.23	11.88	GEORGETOWN	VP3BG	48.94	6.13
PITTSBURG	W8XK	25.27	11.87	BOGOTA	HJ3ABX	48.96	6.12
DAVENTRY	GSE	25.29	11.86	MEXICO CITY	XEUZ	49.02	6.12
PODEBRADY	OLR4A	25.34	11.84	WAYNE	W2XE	49.02	6.12
WAYNE	W2XE	25.36	11.83	DAVENTRY	GSL	49.10	6.11
LISBON	CT1AA	25.36	11.83	CHICAGO	W9XF	49.18	6.10
DAVENTRY	GSN	25.38	11.82	BOUNDBROOK	W3XAL	49.18	6.10
ROME	2RO	25.40	11.81	HONG KONG	ZBW2	49.26	6.09
TOKIO	JZJ	25.42	11.80	NAIROBI	VQ7LO	49.32	6.08
BOSTON	W1XAL	25.45	11.79	CHICAGO	W9XAA	49.34	6.08
ZEESEN	DJD	25.49	11.77	MARACAIBO	YV7RMO	49.42	6.07
DAVENTRY	GSD	25.53	11.75	PHILADELPHIA	W3XAU	49.50	6.06
WINNIPEG	CJRX	25.60	11.72	CINCINNATI	W8XAL	49.50	6.06
RADIO COLONIAL (Paris)	TPA4	25.60	11.72	BOGOTA	HJ3ABD	49.59	6.05
CUBA	COCX	26.24	11.43	DAVENTRY	GSA	49.59	6.05
HAVANA (CUBA)	COCX	26.24	11.43	BOSTON	W1XAL	49.67	6.04
BUENOS AIRES	LSX	28.99	10.35	ZEESEN	DJC	49.83	6.02
RUYSSSELEDE	ORK	29.04	10.33	BOGOTA	HJ3ABH	49.85	6.01
MADRID	EAQ	30.43	9.86	HAVANA (CUBA)	COCO	49.85	6.01
HAVANA (CUBA)	COCQ	30.77	9.75	PODEBRADY	OLR2A	49.92	6.01
LISBON	CT1AA	31.09	9.65	GEORGETOWN	VP3MR	49.92	6.01
ROME	2RO	31.13	9.63	MONTREAL	CFCX	49.96	6.00
MOSCOW	RAN	31.25	9.60	MEXICO CITY	XEBT	50.00	6.00
CARTAGENA (COLOMBIA)	HJIABP	31.25	9.60	MOSCOW	RW59	50.00	6.00
RADIO NATIONS	HBL	31.27	9.59	VATICAN CITY	HVJ	50.26	5.97
PHILADELPHIA	W3XAU	31.28	9.59	MARACAIBO	YV1RB	51.28	5.85
				CARACAS	YV5RC	51.72	5.80
				KHARBAROVSK	RV15	70.20	4.27