THE AUSTRALASIAN

Radio World

JUNE 1, 1937
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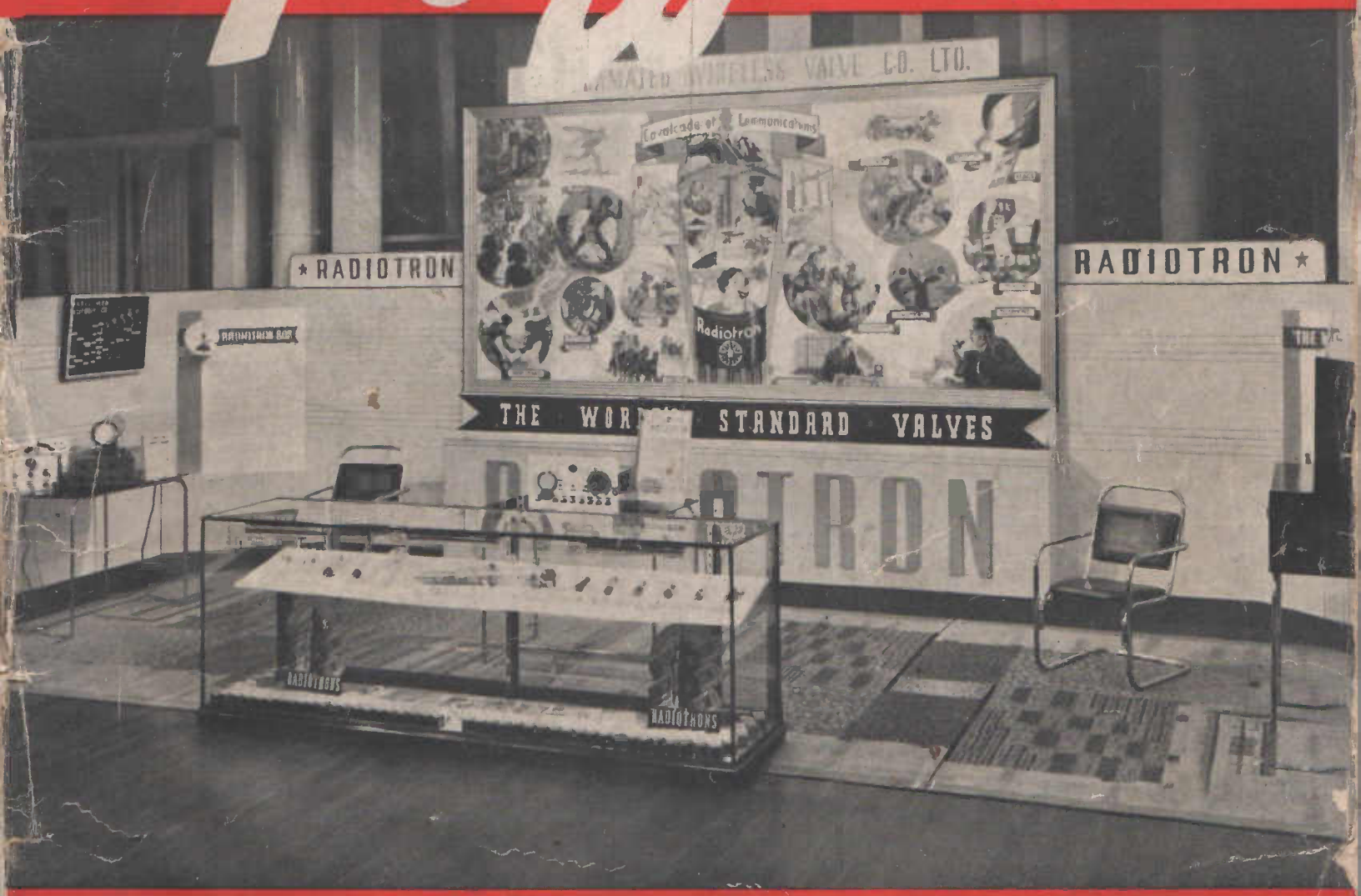

—See Page 7

AMATEUR COMMUNICATIONS RECEIVER: "1937 EAGLET ALL-WAVE TWO": WIRING THE "EMPIRE ALL-WAVE THREE": NEW SECTION FOR SHORTWAVE DXERS: WORLD SHORTWAVE STATION LIST.

Editorial Notes . . . .

At the 1937 Amateur and Shortwave Radio Exhibition held in Sydney last month, the man on the street was given an opportunity of learning something of the hobby of amateur radio. Certainly the casual visitor must have been greatly impressed by the tremendous amount of time, money and ingenuity that had obviously been expended on the design and construction of most of the equipment displayed.

In all, there must have been several thousands of pounds worth of home-built amateur gear on show, ranging from wavemeters and one-valve receivers to cathode ray oscillographs, elaborate transmitters and multi-valve amateur communication type superhets. Taken all round, this year's show was the most successful yet held, and the organisers are to be congratulated on their efforts.

This annual radio exhibition run by and for amateurs is a comparatively new innovation. Prior to 1936, the amateur exhibition was not a separate affair at all, but comprised merely a small section of the exhibition arranged annually by the radio and electrical trades in Sydney.

Last year the Council of the Wireless Institute of Australia (N.S.W. Division) decided to stage its own show, and this proved so successful that this year a decision was made to take the Lower Town Hall for the occasion. This meant a fairly heavy outlay, and so the backing of that section of the radio trade that specialises in catering for amateur requirements was sought. It was so enthusiastically given that when the show opened, nearly 40 stands were occupied, and the financial success of the venture was assured.

Last year's exhibition was in the nature of a feeler to determine public and trade reaction, and with its success confirmed by that of the latest show, it is now evident that an amateur exhibition will be a regular annual event in the Sydney radio world.

THE AUSTRALASIAN RADIO WORLD

Incorporating the

ALL-WAVE ALL-WORLD DX NEWS.

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

Vol. 2. JUNE, 1937. No. 2.

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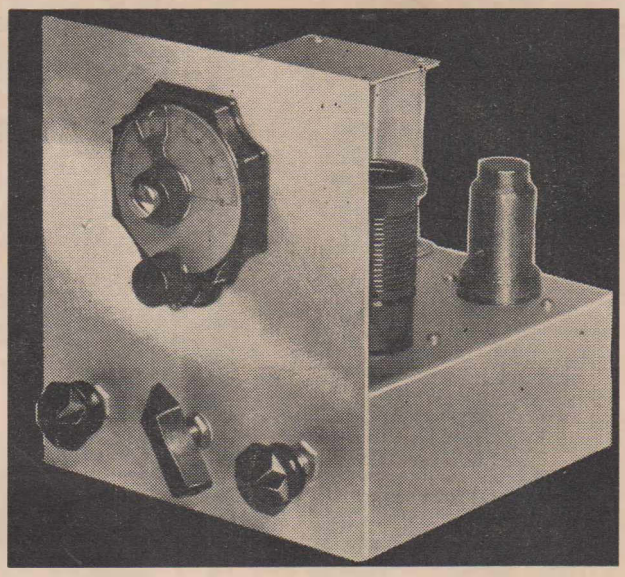
The . . . . 1937 Eaglet All-Wave Two . . .



Metal Valves ★ Bandspread Tuning ★ Electron-Coupled Regeneration ★ World-Wide Reception On Short Waves.

SINCE the "Eaglet Two" was first featured in the May, 1936, issue of the "Radio World" it has been built by hundreds of readers throughout Australia and New Zealand, and glowing letters in appreciation of its wonderful performance are constantly coming to hand.

The widespread popularity of this little two-valve short-waver is certainly well deserved, for many reasons. It is small, simple to build, and inexpensive—in fact, it is doubtful whether any other set giving the same results could be built for so little.

About This Year's "Eaglet"

The "1937 Eaglet" is very similar to the earlier model, except for minor improvements such as the use of the latest type Radiokes audio choke, an aluminium front panel (instead of ebonite), and a four-pin power socket and plug as a substitute for taking the power cable direct under the chassis through a bushing in the back wall.

Midget Aerial Condenser Omitted

The midget variable condenser used as a series aerial condenser in last year's model has been omitted in the latest version. Instead, coupling is obtained by attaching a short length of insulated flex to the aerial terminal, and twisting the lead-in round this half-a-dozen or so times. The resulting capacity effect formed between the two wires provides ample coupling. The aerial should never be taken direct to the aerial terminal, as this would prevent the set from oscillating.

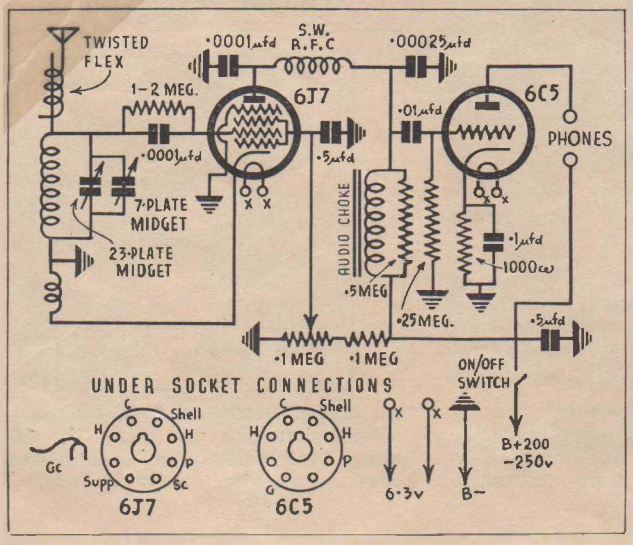
The most important new feature of this year's "Eaglet," however, is it is an all-waver. Five coils are used, three for the short waves and two to give coverage of the main portion of the broadcast band. Details of the coils required are given in a panel elsewhere.

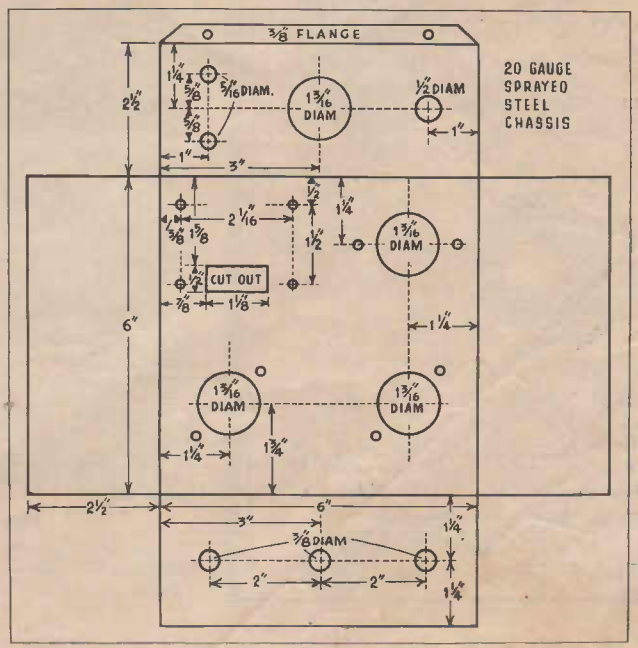
Metal Valves Used

Two metal valves are used—a 6J7 detector and a 6C5 triode audio amplifier.

Those with glass valves on hand can use a 57 detector and 56 audio, or in the 6.3 volt glass series, the 6C6 and 76. The sockets, of course,

The circuit of the "1937 Eaglet" (shown below) uses a 6J7 regenerative detector, choke-coupled to a 6C5 triode audio stage. Bandspread tuning and electron-coupled regeneration are features. On the right is a sketch showing dimensions for preparing the chassis.





"1937 Eaglet Shortwave Two."—List of Parts

1—Chassis and panel.
1—Coil kit, comprising 5 plug-in coils (Standardised Products).
3—Wafer sockets, 1—4-pin and 2 octal.
1—4-pin Dalton socket and 4-pin plug.
1—23-plate midget tuning condenser (Radiokes).
1—7-plate midget tuning condenser (Radiokes).
1—Small vernier tuning dial (Ormond).
1—High impedance audio choke (Radiokes).
1—Shortwave r.f. choke (Radiokes).
1—'Phone jack (Igranic) and plug.
1—4-wire cable.
1—100,000-ohm carbon potentiometer.
1—Indicator plate (100 divisions, 180-degree) with pointer.
3—Small knobs.
1—Rotary type on/off switch.

RESISTORS:

1—1,000 ohm carbon (Bifrost).
1—100,000 ohm carbon (Bifrost).
1—.25 megohm carbon (Bifrost).
1—.5 megohm carbon (Bifrost).
1—2 megohm ½-watt carbon (Bifrost).

FIXED CONDENSERS:

2—.0001 mfd. mica.
1—.0005 mfd. mica.
1—.01 mfd. tubular
1—.1 mfd. tubular.
2—.5 mfd. tubular.

VALVES:

1—6J7, 1—6C5 (Radiotron, Raytheon, Mullard, Philips).

MISCELLANEOUS:

2 doz. 8in. nuts and bolts; 1 doz. solder tags; 2 yards 18-gauge tinned copper wire; 2 feet 3 m.m. spaghetti; 1 small grid clip; red and black "A" and "E" terminals (Dalton).

should be changed to ordinary six- and five-pin types.

For battery operation, a type 15 indirectly-heated screen-grid 2-volt valve makes a fine detector, and a 30 triode could be used in the audio socket. As an alternative detector, a 1K4 could be used, employing the circuit as shown for the "1937 Empire All-Waver" last month.

If desired, however, batteries can be used with the 6J7 and 6C5, a 6-volt accumulator and 135 to 180 volts of "B" being required.

COIL WINDING DETAILS

Band	Grid	Reaction
17— 30 metres	7	2
28— 51 metres	15	3
48— 99 metres	22	4
220—360 metres	136	12
360—540 metres	182	16

24 g. s.w.g. enamelled wire used for all shortwave grid windings; 26 g. enamelled for reaction. 32 g. enam. for both windings of smaller broadcast coil, and 34 g. enam. for larger.

Electron-Coupled Regeneration

Excellent stability and negligible de-tuning of the signal when the regeneration control is operated are two of the outstanding advantages given by electron-coupled regeneration, which is employed in this set. In addition, reaction is very smooth, the detector sliding in and out of oscillation without a trace of "ploppiness."

Feedback is controlled by varying the voltage applied to the detector screen—a method that is both simple and effective.

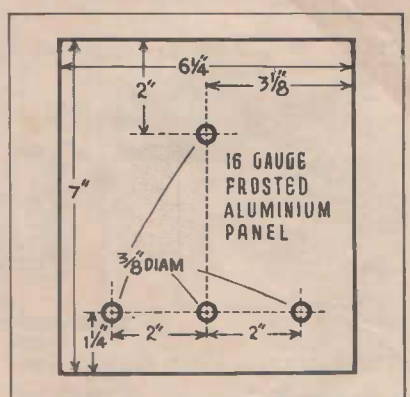
6C5 Audio Amplifier

The detector is impedance-capacity coupled to the 6C5 audio amplifier. Choke coupling is more expensive than resistance, but its use is more than justified by the two important advantages it gives. Firstly, there is nothing like the voltage drop across a choke that there is across a plate resistor, which means that the plate voltage on the detector is high, and the gain is at maximum. Secondly, with a high plate voltage, smooth regeneration is much easier to obtain over every waveband. The .5 megohm resistor across the audio choke, by the way, is there primarily to check any tendency towards threshold howl.

The Power Supply

The set is designed to be operated either from bateeries or from any suitable power supply that might be available. Most shortwave experimenters have a power-pack on hand that would do the job, but, failing this, the set can be run from any a.c. receiver. If 6.3-volt valves are used in the latter, then both the plate and heater supply can be taken from it. Of the four leads in the "Eaglet's" power cable, two are for the heater supply, one for "B+250 v.," and the fourth for "B—" (or earth). The cable should not be too

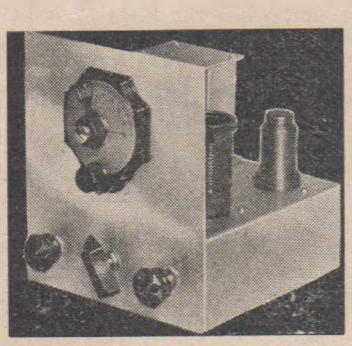
(Continued on page 48)



Dimensions for preparing the 16-gauge aluminium panel are shown above.

Newest Sensation In All-Wave Receivers

Eaglet All-Wave Two!



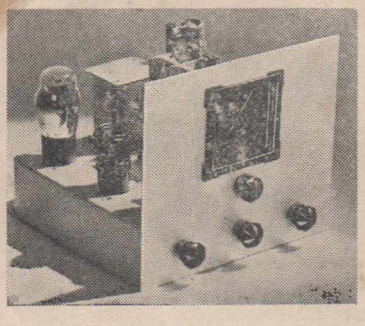
This fine little receiver (described in this issue) is just the set for the short-wave enthusiast. It is an excellent performer yet is simple and inexpensive to build; in fact, it can be easily put together in an evening. Every part supplied in our kit is of first quality, and is exactly as specified by the Editor.

Our price for the complete Kit, including valves, 'phones £5 0 0

★

THE "EMPIRE" ALL-WAVE THREE

Another All-Wave Set for the Short-Wave Fan!



★ Tunes from 12-600 metres, with standard two-gang condenser.

★ Uses latest 1K4 screen-grid detector, with electron-coupled regeneration.

★ Low "A" and "B" drain, giving low initial and running costs.

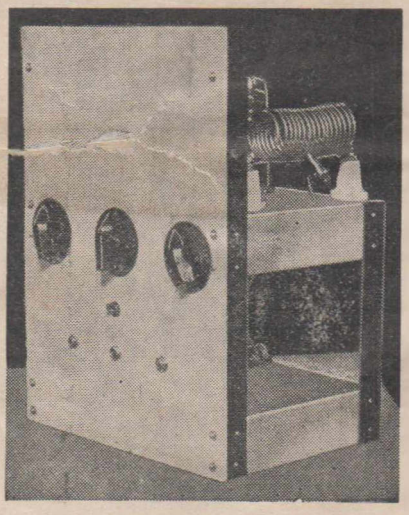
★ No "C" battery required — automatic bias used.

These are just some of the features of this great little distance-getter also described in this and last month's issue "Radio World." Complete kit of parts .... £10 0 0 (This price includes batteries, valves and 'phones.)

★

GET ON THE AIR!

Build this inexpensive TWO-BAND CRYSTAL-CONTROLLED TRANSMITTER

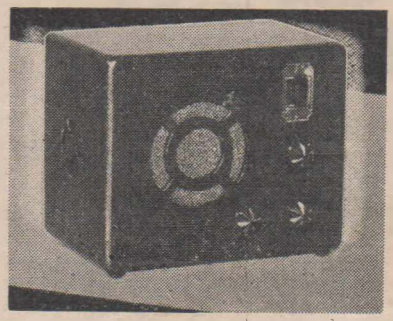


Designed for operation on the 20 and 40-metre amateur bands, this rig is up-to-the-minute in design and a wonderful performer. (VK2CP, using the same circuit, recently worked 100 U.S. amateurs on C.W. in one month.

Complete kit of parts £12/10/-

★

Modern . . . compact "PERSONAL" radio



"COMPANIONETTE" THREE

This fine little A.C.-operated receiver was described in the March and April issues of "Radio World" and has proved immensely popular with set-builders. The "Companionette" is small in size, yet no harder to construct than the ordinary set. Get busy and construct this excellent little performer now . . . we can supply all parts, including cabinet, for £7 0 0

★

"INTERNATIONAL" ALL-WAVE SIX

(A.C.-operated)

Featuring the new Radiokes tri-wave coil assembly and midget iron-cored intermediates, as well as the triple-band tri-colour dial just released by the same firm, this latest "International" provides a number of features not usually found in ordinary receivers. An exclusive feature of the "International" Kit-set is the special type of output circuit, incorporating inverse feedback.

Complete Kit of parts £16 17 6

Communications Type Superhet For Amateurs

Simplicity of construction is combined with outstanding performance in this eight-valve superhet designed for amateur work. A review of its capabilities is given below-

By A. V. BENNETT (VK2VA)

Full Description Next Month

In the latest issue of "Radiotronics" (Technical Bulletin No. 75) issued by Amalgamated Wireless Valve Co. Ltd., a circuit is given of an eight-valve communications type superhet designed for amateur work. An experimental model built by VK2VA, author of the accompanying article, is giving exceptionally fine results. Highly selective and with plenty of gain, it is a receiver that in these days of crowded bands is an essential for every up-to-date amateur station. A "Radio World" version is now under construction, and a description of it will be featured in next month's issue.

THE T.R.F. has at last been placed on the shelf, and my ears have returned to the sensitivity of the average human's. That "peaked up" feeling which results after an hour or two of DX chasing has given place to an attitude of "it is there if you want it," the only requirement being to choose the desired signal and leisurely allow the speaker to do the rest.

These remarks are due to the fact that the writer has completed the construction of a very fine superhet, the circuit used being recently published by the A.W. Valve Co. in the latest "Radiotronics." It is the eight-valve Radiotron Junior superhet receiver, and I have found that if the circuit is truthfully followed, the performance leaves nothing to be desired, even by the most critical of communication men or the "DX chaser" who likes performance with comfort.

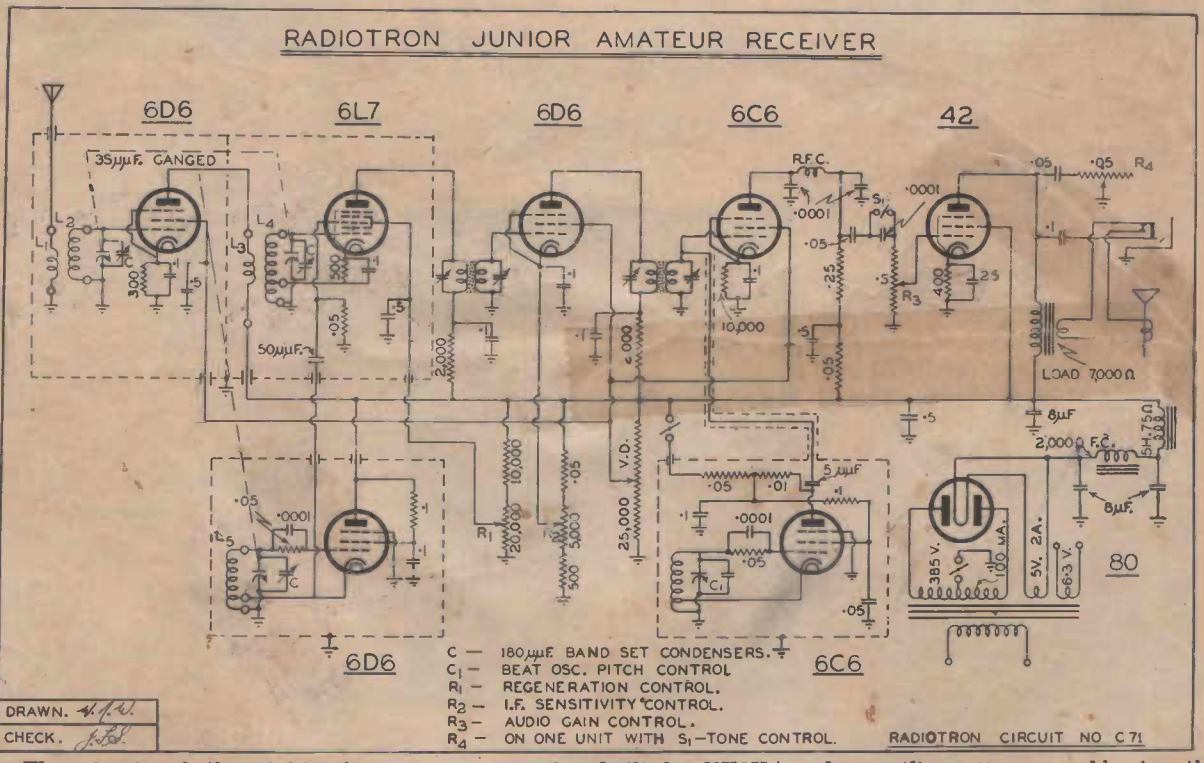
Standard Parts Used Throughout

The construction of the set is not difficult. All parts are standard, and can be procured from any of the leading radio parts distributors.

The chassis is constructed of 14-gauge aluminium—16-gauge is the minimum thickness which should be used. As the chassis is fairly large, the metal needs to be thick to ensure that when the receiver is being moved around it does not buckle and twist, thereby disturbing the alignment of the ganged tuning condensers.

A steel chassis could be used, but aluminium has a lower reactance to radio frequency currents. When using aluminium, the chassis can act as a common earth. The earthed sides of condensers and resistors can then go to the nearest screw head, which is very convenient when short leads are a consideration.

The front panel is also made of aluminium, the edges being turned



The circuit of the eight-valve amateur superhet built by VK2VA, who outlines its assembly in the accompanying article.

over ½ inch. This gives excellent rigidity, there being no vibration from the speaker when heavy 'phone signals are being received.

The Layout Described

The general layout is shown in the accompanying sketch. The chassis is 15in. x 13in. x 3in. deep. By allowing 3in. for the depth of chassis there is plenty of clearance for the potentiometers, which are mounted with the shafts extending through the front panel. Also, resistors and by-pass condensers can be bunched around the valve sockets, ensuring short leads.

The beat frequency oscillator unit is mounted below the chassis in a shielded can. The variable condenser shaft, which varies the pitch of the beat frequency note, extends through the front panel. This is in the centre of the chassis, and directly under its attendant valve. The advantages of this variable control and the manner in which it is constructed will be described later.

Placement Of The Controls

The front panel has the tuning dial on the left-hand side and the midget speaker on the right. There are five controls spaced evenly along the bottom of the panel. From the left they are: the 6L7 regeneration control, intermediate frequency gain control, beat frequency pitch note tuning knob, audio tone control, and the audio volume control.

In addition, there are two single-pole switches spaced evenly on each side; one switch is the on-off switch for the beat frequency oscillator, and the other is the main high potential on-off switch.

There are several advantages in placing these controls as stated. Apart from the actual advantage of short leads, which is an item that must be observed in the construction of all high frequency equipment, the accessibility of the controls is a mechanical feature which is well worth considering in a receiver which has such a high electrical performance as the Radiotron Junior.

Convenience In Handling Important

When lifting the desired signal above the "mush," the position of the regeneration control is very convenient. It is a natural action to drop the hand from the tuning dial to the regeneration control, to give the 6L7 just that little extra selectivity which is required when a local is putting some few millivolts into your antenna. The I.F. gain control is in an almost similar position. The beat frequency pitch control is in the centre, and is directly accessible to the right hand, as are the audio tone control and the audio volume control.

The layout (see sketch) as seen from the top is as follows:—On the left-hand side are three shielded compartments, containing, at the front, the radio frequency stage, centre the mixer 6L7, and at the back the high frequency oscillator. Next to this on the right is the intermediate stage, with its transformers. Following the line to the front, the 6C6 anode-bend detector is directly behind the beat frequency oscillator shield. The detector is then almost in direct line with the power pentode audio amplifier.

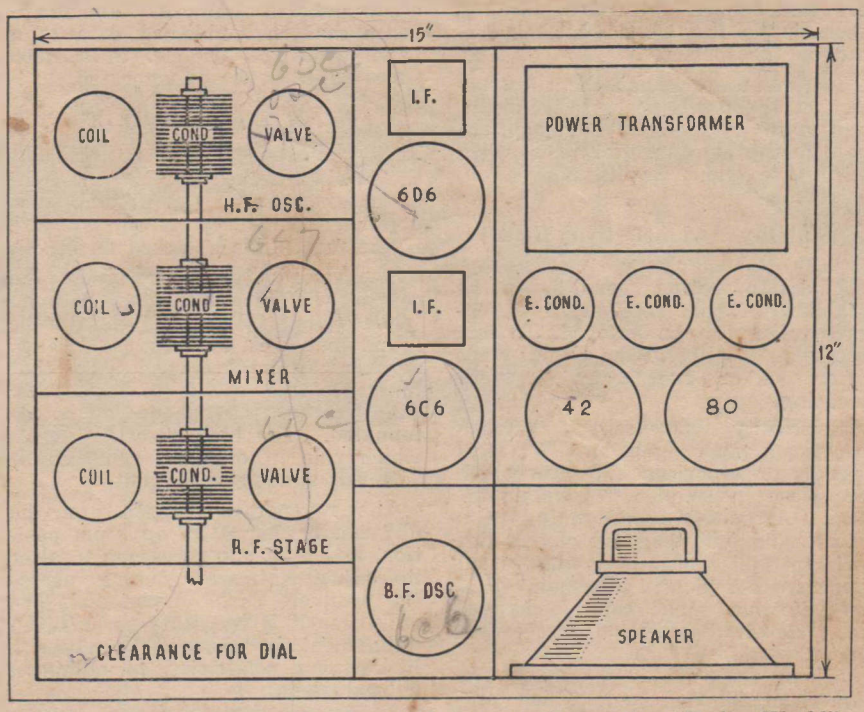
Power Supply And Output Stage

On the right end of the chassis, at the back, the power transformer is mounted. In front of this are the electrolytic condensers, power choke, rectifier valve, and power pentode.

The speaker is mounted behind the panel, but there is ample room for the valves and choke. A double-section filter is used, with condenser input. When the earth connection is off the set, only a trace of hum is noticeable.

The band-setting condensers are mounted under the chassis, along the left-hand side, a small aluminium shield being placed between each condenser. The condensers are central in respect to the stages they tune. This permits the use of very short leads to the coil sockets, which are directly above. The tuning condensers are then wired in parallel, a small hole being drilled in the chassis near the coil socket to allow the connection to go through.

Plug-in coils are used. Band-changing is simple, and if the coils



This sketch shows the layout being used in the "Radio World" laboratory model.

This Month's Front Cover

Many special features of particular interest to experimenters and others are shown in this month's front cover photograph of Amalgamated Wireless Valve Co. Ltd's. display at the Sydney Town Hall on the occasion of the recent W.I.A. Amateur and Short Wave Radio Exhibition.

The showcase in the foreground contains a complete range of Radiotron transmitting types used by experimenters. As a comparison, a 12 k.w. water-cooled transmitting valve is mounted alongside several "Acorn" types.

On the extreme left are two oscillographs (one using Radiotron 913 and the other a Radiotron 909 cathode-ray tube), while above them is a display board showing the component parts of a Radiotron valve, with a brief explanation concerning its manufacture. In the corner is an 808 on a rotating table, with a thermostat-controlled flashing light fitted behind the opaque screen for the purpose of attracting attention.

The background is a large oil painting, 20 feet by 6 feet, illustrating the various methods of communication from early ages, and is similar to that portrayed in the Radiotron Cavalcade Price List which is available, free of charge, from all radio dealers using Radiotron valves.

In the right-hand corner is an animated enlarged display of the "Magic Eye," operated mechanically. It shows the effect of precision tuning and stresses the fact that the 6G5 is the only tuning device which does not overlap on local station reception.

The apparatus on the right is a special "demonstration" valve having a fluorescent plate which makes visible the effect that varying the grid voltage has on the electron flow from filament to plate.

Immediately at the rear of the showcase can be seen the 13-valve receiver designed to cover the amateur wave bands. This set was built around Radiotrons and was specially developed for the use of experimenters.

The above features attracted an extraordinary amount of interest, the display being acclaimed generally as one of the most outstanding at the Show.

are well "doped" with clear lacquer, there is no fear of the turns shifting on the former.

It can be seen that the construction of the set is not at all difficult, and with a reasonable amount of care in the placement of parts when wiring, excellent results can be obtained.

Stability And Selectivity Both Excellent

Under operating conditions, the stability of this receiver is a feature which can be enjoyed. To find the signal still in the same place after one or two "overs" is very pleasing.

Selectivity is excellent. When copying a weak signal on C.W., local signals or American kilowatts which are close in frequency have no effect. After the broad tuning of a T.R.F. and that tendency of one signal to pull the other, the usual apology of: "Sorry, old man, QRM on you that time" can be changed to: "Received solid on my 8-tube super."

'Phone reception is the same. The American 'phone band, which previously was a jumbled mass of hetrodyne whistles has become intelligible.

Strong signals can be divided on a few degrees of the dial, and it appears that the published data of a band width of 32 k.c. at a 1,000 times ratio is not exaggerated.

Noise Level Very Low

The noise level is low. Without the beat frequency oscillator switched in, there is no background noise at all, so that at times one wonders if the receiver is switched on or off.

The varied uses of the audio tone control will be appreciated, both on 'phone and C.W., and it will be found that it is not a luxury. 'Phone signals can be deepened, and that hard metallic sound of the other chap's carbon microphone can be attenuated. The high scratchy noises which ride in on C.W. can also be softened and smoothed out.

The regeneration control on the 6L7 can be set at an optimum position, and it is not necessary to alter its adjustment when tuning across the complete scale of the dial. The only time it is necessary to make an adjustment is when one requires a little extra selectivity to eliminate a local signal.

B.F.O. Note Is Variable

The beat frequency oscillator is coupled to the detector by twisting together two pieces of insulated hook-up wire, and the coupling can be tightened sufficiently to give the maximum beat note on weak signals. A variable condenser is fitted in the unit, permitting variation of the pitch note. When weak signals are very close to one another, a slight change in beat note pitch will often make the desired signal stand out from the interference. These little points will be appreciated after use, and one wonders how it was ever possible to do without them.

The gain of the receiver is very high. The advantages of the iron-cored intermediate transformers will be found to be well worth the additional cost. An interesting feature is the use of the 6C6 as an anode-bend detector. This enables full use to be made of the high selectivity of iron-cored intermediate frequency transformers by removing the damping associated with diode and grid leak detectors.

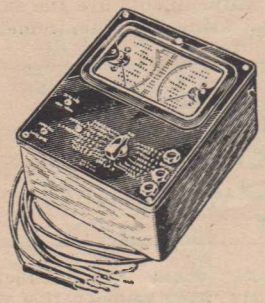
More could be written about the interesting features, the smoothness of operation and the dependability of this receiver, but I am sure that much more will be heard about the Radiotron Junior superhet from other experimenters.

NEW... AND YEARS AHEAD

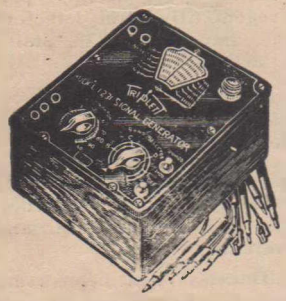
1937 TRIPLETT and READRITE INSTRUMENTS

FEATURING

- MAXIMUM PROTECTION AGAINST OBSOLESCENCE. All designs carefully considered from a viewpoint of possible obsolescence. Being single purpose instruments in itself is great protection. Also damage to one unit makes repairs single and does not tie up other instruments.
- UNITS ARE INTERCHANGEABLE IN CARRYING CASE, inasmuch as they are contained in metal cases of one size.
- ULTRA PORTABLE. Unit size is small, compact, hence light in weight and practical for the best results.
- SOLID CONSTRUCTION. The internal construction of all UNITS is designed so all small parts are rigidly supported. All units will stand up under hard usage and give service.
- PRECISION BUILT. Every test will show these UNITS are outstanding in quality. Every effort made to maintain accuracy throughout. Each Unit represents the most up-to-date engineering practice in every detail.

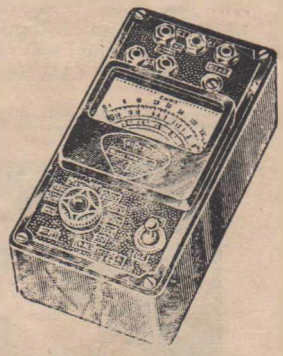


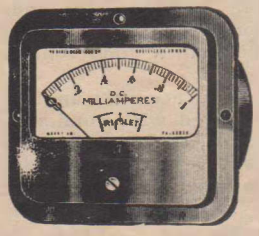
TRIPLETT VOLT-OHM-MILLIAMMETER (1200-A Unit) has two instruments, A.C. and D.C. in moulded case. Can be tilted to any reading angle. Resistance measurements have individual zero adjustments. Selector Switch for all readings includes 22½ volts and 1½-volt batteries. Price £8. (Twin Instrument and complete kit of parts to build this unit—Price £6/5/-.)



TRIPLETT SIGNAL GENERATORS. 1231 Unit (illustrated at left). An All-Wave Direct-reading D.C. Signal Generator, having built-in trimmer calibrated coils for an accuracy of 1%. Six wave bands, 100-30,000 k.c., all fundamentals, fully stabilised, 12-in. vernier dial. 400 cycle audio note available. Complete £10/10/-. MODEL 1232 is similar to Model 1231, but for 240 volts, 50 cycles, A.C. operation. Price £10/10/-. MODEL 1230 is an All-Wave Signal Generator supplying a continuously variable signal. Frequencies controlled on six bands from 100-18,000 k.c. Complete £6/5/-.

TRIPLETT VOLT-OHM-MILLIAMMETER (Pocket Size), Model 666 (at right). A.C. and D.C. voltege ranges; D.C. milliamperes, low and high ohms scales. Selector switch for all instrument readings. Slips easily into coat pocket. Complete, including self-contained battery, test leads, and instructions . . . £5/15/-.





TRIPLETT D.C. MOVING COIL INSTRUMENTS are of the D'Arsonval type with an extra light moving coil and reinforced strong parts. Sapphire jewel bearings. Accuracy within 2%. Permanent magnets. Supplied in sizes from 2⅜in. diam. to 5¼in. diam. (flange). Model 421 (at left) 4¼in. x 4 in.

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Radio Ramblings

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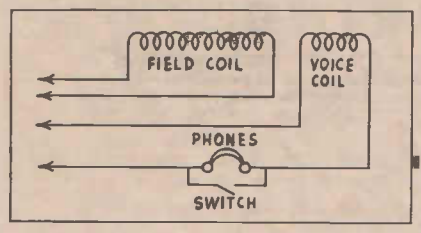
★ ★ ★

Adding 'Phones To An A.C. Set

Here is a novel 'phone attachment for a modern a.c. receiver. As seen below, a pair of 'phones is inserted in series with the voice coil of the dynamic speaker, and a switch connected across the terminals. The resistance of the voice coil is approximately 15 ohms, so it may be seen



that the comparatively high resistance of the 'phones will cut off the voice frequency currents from the speaker. When the switch shorts the 'phones, the loud speaker functions normally.

The connection shown is inexpensive and simple, with no blasting or high voltage through 'phones, etc. It would be well worth the while of a s.w. dxer to thus obtain earphone reception on stations not having enough volume for the speaker.—H. Whyte-Meach (AW69DX), Artarmon, N.S.W.

Vernier Regeneration Control

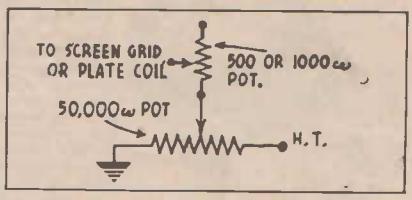
Although keenly interested in the doings of the club, I have not done much dxing of late, due to the fact that I have been doing some rebuilding. I recently built a six-valve t.r.f receiver, but although very sensitive, it lacked selectivity. VK3ME interfered badly with other stations on the 31-m. band. However, I managed to log a few stations and forwarded reports to VK6ME, Perth and ZBW, Hong Kong, and received a verification from VK6ME early this week. I have now decided to change the t.r.f. set into a superheterodyne.

I was pleased to see that you have started publishing articles on transmitters. As I am starting on an A.O.P.C. course this month they should be very useful.

Here is a hint for "Radio Ramblings." Although the superheterodyne receiver is the logical receiver for best all-round purposes, the regenerative and t.r.f. receivers are still in high favour. To get the most out of these receivers, regeneration must be completely under the control of the operator.

The receiver is in its most sensitive condition when it is just on the point of oscillation. It is often very hard to get the set into this condition, as the slightest adjustment may cause the detector to break into oscillation. Here is an idea which gives vernier control over regeneration. A 500-ohm or 1,000-ohm potentiometer is connected in series with the conventional 50,000-ohm regen. control.

Coarse adjustment is made with the large potentiometer, and fine adjustment with the smaller one. In the case of a set using a variable condenser, a 3-plate midget condenser may be connected in parallel with the larger one. Adjustments are the same as for the set using the potentiometer.



Experiments could be conducted with superhets using regenerative preselectors or regenerative first detectors by using the above idea.—V. Smith (AW23DX), Melbourne (Vic.)

★

Simple Condenser Tester

I have used the condenser tester illustrated extensively while constructing receivers and transmitters, and found it invaluable.

Operating Data:—When neon lamp glows brightly, indicates a shorted condenser—glows intermittently, indicates a leaky condenser—one flash and no further indication, a good condenser.

The unit is quite accurate in testing, and can be used with confidence in testing mica or paper condensers. It will not, however, test electrolytics. It can also be used for testing for leakages and shorts, etc. Two circuits can be used—one rectifying the A.C. mains for a high tension supply. In this type the voltage is limited to approx. 300 volts peak when 230 v. A.C. mains are used. The other type is more versatile, inasmuch that it uses an external power supply, and any desirable voltage can be used. D.C. mains can also be employed. Philips neon bulbs have been found to operate the most satisfactorily.

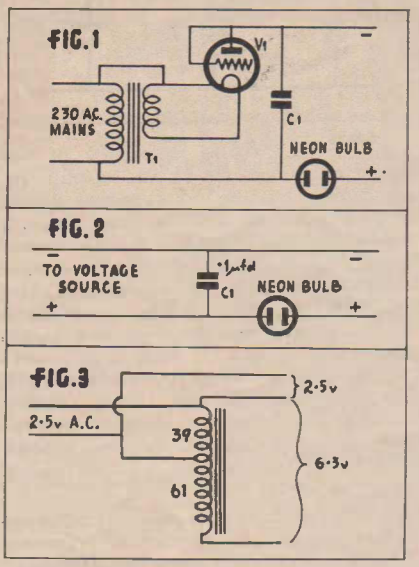
A good high-resistance terminal strip should be used for the output terminals, as the bulb will glow faintly even with an extremely high resist-

ance across the output. Wood is generally unsatisfactory for the terminal strip.

Circuit 1.—T_1 is a filament transformer to supply required voltage to rectifier filament. V_1, any suitable valve, either rectifier type or triode, e.g., 201A, 112A, etc. C1 .1 mfd. tubular.

Circuit 2.—Note that C1 must be able to stand voltage applied to condenser under test.

Here is another "gag" which I find very useful. It is an auto-transformer to obtain 6.3 volts from a 2.5 volt winding. Wind 100 turns of 20 s.w.g



on an old audio transformer core and tap at the 39th turn. 2.5v. winding can be used as well as 6.3v. Up to about six valves can be run from the 6.3v. tapping with good results.—John M. White, Auckland, N.Z. (ZL2GX—1FV).

★

Space Charge Connection Is Best

On page 14 of the May issue of the "Radio World," a correspondent, K. P. Mackinnon, outlines a 2-valve receiver for use with only 12 volts of "B" battery. This arrangement is quite effective, and the other valves beside the 49 type suitable for the purpose are the Mullard PM1DG

The most important point, however, which has not been explained in the circuit diagram or text, is that both detector and audio amplifier valves are used as space-charge types respectively, or at least they are obviously intended that way. Although it will be possible to get fair results with suitable coil constants with normal connections, much better operation will be obtainable with the valves used for space charge action. To do this, the control grid and screen grid are reversed; i.e., the grid leak and condenser combination in the detector will be connected to the screen grid, and the control grid will have 6-volts positive applied to it.

I recently made up a receiver similar to this as a broadcast and shortwave portable with plug-in coils. It was quite successful, and it should be possible to add another 49 in the way of a t.r.f. amplifier with advantage. There is really nothing new about the space-charge application, though. It was used regularly around 1926 with the old Philips A141 tetrode, and somewhere I have a sheaf of old circuits employing the idea.—Don B. Knock (VK2NO), Sydney.

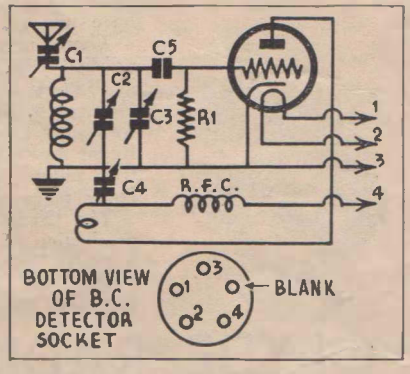
★

An Adaptor For Shortwave Work

Heartiest congratulations to "R.W." on attaining its first birthday, and may we all have the pleasure of reading it for many years to come. In my opinion, "Radio Ramblings" is the page of most general interest. One can see what the other fellows are doing, and this "swapping" of ideas helps to keep up that friendly spirit. Here is my contribution.

I have seen quite a number of broadcast band sets of 1932-33 vintage, employing two or three 27's, and either a single or pair of 45's in the output. Such sets at a small expense may be adapted for shortwave reception. The circuit of a suitable adaptor is shown in the accompanying diagram. (C1 and C3, 3-plate midgets, C2, C4, 23-plate midgets, C5, .0001 mfd. mica, R1, 5 meg. grid leak.)

The 27 detector is transferred from the broadcast set to the adaptor, and a 5-pin plug, carrying the leads 1—4, is plugged into the vacant '27 socket. However, I recommend replacing the 27 with a more modern valve—the 56.



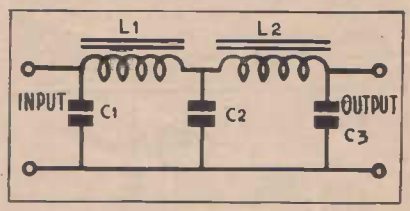
In closing, I may state that a battery-operated adaptor using a 30 may be similarly constructed, the negative filament lead being earthed in place of the cathode in the A.C. version.—John B. Healey, Malvern (Vic.)

★

Series Resonance In Filters

A good filter circuit as is often used in the power supplies of transmitters is shown in the sketch. A glance at the circuit will show that a series resonant circuit is formed by the choke L1 and the condenser C2 Should the value of these two components be such as to cause resonance at the frequency of the pulsations super-imposed on the D.C. supply, the effectiveness of the filter is considerably reduced. This may be explained in the following manner.

In a resonant circuit, inductive reactance and capacitative reactance balance out. These two reactances being so necessary in a filter circuit, it will be understood that if they



balance out at the frequency of the ripple or pulsations in the circuit, instead of assisting to suppress them, they will be allowed to pass through the filter unopposed. The resonant frequency of the choke and condenser combination can be calculated, and by doing so it can be ascertained whether they resonate at the ripple frequency or not. Using a full-wave rectifier on a 50-cycle mains supply, the frequency of the ripple present in the D.C. rectifier output will be 100 cycles or pulsations per second, this being the frequency it is necessary to avoid.

To calculate the resonant frequency of the choke and condenser combination, the following formula is used:—

Resonant frequency:—

$$\frac{1}{2\pi \sqrt{L \times C}}$$

Where "L" is in henries and "C" is in farads.

Taking, for example, a choke of 30 henries and a condenser of 2 mfds., their resonant frequency will be:—

$$\frac{1}{6.28 \sqrt{30 \times .000002}} = 20.6 \text{ cycles.}$$

It will be observed that their resonant frequency is sufficiently removed from the ripple frequency (100 cycles), so that it will not impair the action of the choke and condenser.—Harry F. Owen, 21 Lancelot Street, Punchbowl, N.S.W.

★

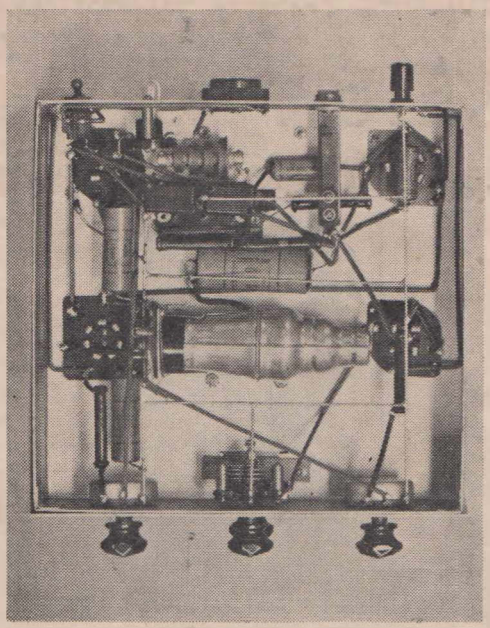
A T.R.F. D.C. Four-Valver

I am enclosing a circuit diagram for a 240-volt direct current-operated shortwave receiver. The valve lineup is 78 r.f., 77 electron-coupled detector, 37 voltage gain and 43 output valve.

The main point to watch is the earth terminal, which must be well

(Continued on page 16)

Assembling and Wiring the 1937 Empire All-Wave Three . . . . .



The assembly and wiring of the "1937 Empire All-Wave Three" featured in last month's issue is outlined below.

An under-chassis view of the completed receiver, showing the wiring. Note the method of mounting the 1C4 r.f. valve between the aerial and detector coils to ensure short grid and plate leads.

THE assembly of the "1937 Empire All-Wave Three" is commenced by first of all mounting the coil and valve sockets. These should be arranged so that the filament pins face in the directions shown in the under-chassis wiring diagram. The next components to mount are the on/off switch, fuse holder, power socket, 'phone jack and aerial and earth terminals, together with the bracket required under the chassis to support the 1C4.

Of these components, the jack should be insulated from the chassis (if it is of the type that requires insulation) and the aerial terminal should be insulated as well.

Condenser Gang And Choke Next

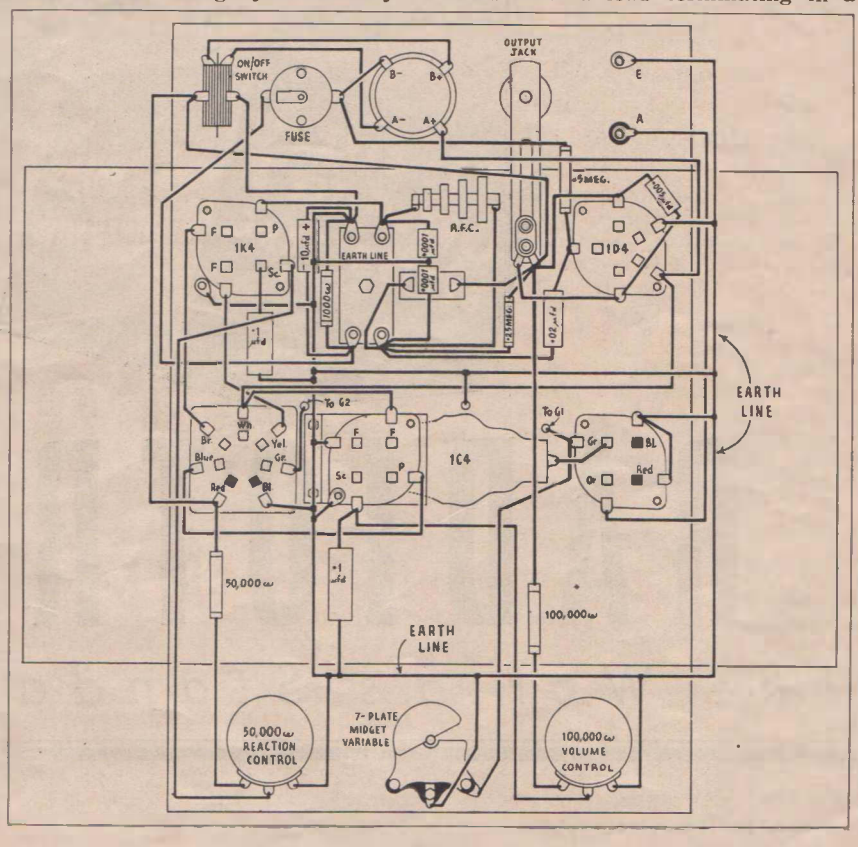
Next, the condenser gang and audio choke can be mounted. The former is mounted ¾ in. above the chassis by means of four 1¼ in. bolts and twelve nuts. Three leads pass from the condenser gang through the chassis—one from each fixed plates terminal underneath the gang to the grid terminal on the correct coil socket, and the third from the wipers to earth. The insulated strip of bakelite with four solder lugs mounted on it (see wiring diagram, to right of 1K4 socket) can be mounted next, about 1in. away from the chassis. Finally the dial can be fitted, the aluminium front panel placed in position, and the three lower front panel controls mounted.

A sketch showing the complete wiring. To indicate clearly the connections to the 1C4 socket, this has been drawn as if the bracket holding it had been folded back flat against the chassis.

The Wiring Outlined

The wiring is commenced by running an earth line of 16 or 18-gauge tinned copper wire around the chassis, all earth returns being made to this line, which is connected directly to the earth terminal. Next, the filament circuits can be wired, and then, starting from the aerial terminal, put in the remainder of the wiring systematically.

The grid leak and condenser are supported by a small bakelite strip, with a solder lug on one end and the other bolted to the top of the audio choke. One side of the grid leak and condenser, together with a lead from the fixed plates terminal on top of "G2," are connected to this lug, the other side of the grid leak/condenser combination being fitted with a lead terminating in a



clip that fits over the grid cap of the detector.

Further Coil-Winding Details

For those who prefer to wind their own coils, full details, together with socket connections, were published last month. All windings are put on in the same direction, the reaction winding in the case of each detector coil being located below the grid winding and separated from it by about ¼in. (Note: In the panel showing the coil details published last month, the headings "L1, L2, L3, L4, L5, Wavebands" were not located over the columns to which they should have referred. All headings should be shifted one column to the left).

After the wiring has been thoroughly checked and the battery cable wired, the valves and headphones can be plugged in and the aerial and earth leads connected up. Next, plug in the broadcast band coils and switch on. Advance the volume control to maximum and the regeneration control until a slight hiss, gradually increasing in intensity, is heard, denoting that the set is on the verge of oscillation.. Plenty of stations should soon be picked up.

The "1937 Empire All-Wave Three" is capable of putting up an excellent performance, and builders will undoubtedly be delighted with its amazing DX capabilities on all wavebands.

S.W. Stations VK2ME And VK3ME — Transmission Schedules For June, 1937

According to advice just to hand from Amalgamated Wireless (A'sia.) Ltd., the following transmission schedules will be observed by short-wave stations VK2ME and VK3ME during June:—

VK2ME (31.28 m., 9590 k.c.)

	Sydney Time	G.M.T.
Sundays:	3 p.m.-5 p.m.	0500-0700
„	8 p.m.-Mdt.	1000-1400
Mondays:	2.30 a.m.	1630-1830
	4.30 a.m.	

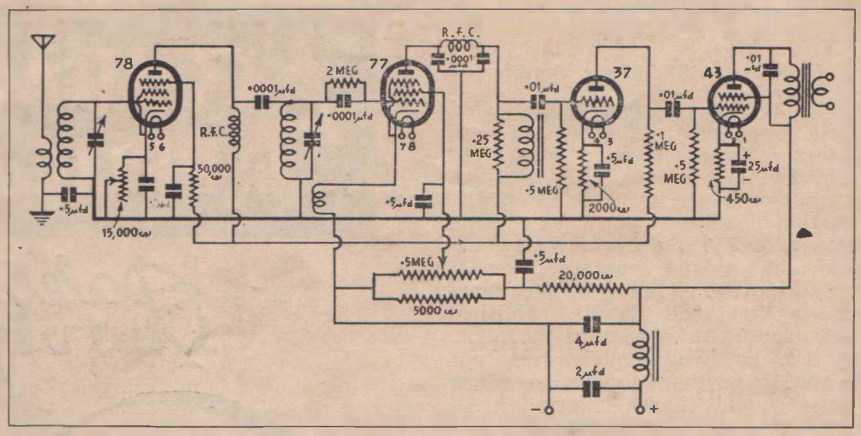
VK3ME (31.5 m., 9510 k.c.)

	Melbourne Time	G.M.T.
Nightly Monday to Saturday (inclusive)	7 p.m.-10 p.m.	0900-1200

VK6ME, PERTH

Wavelength 31.28 metres (9590 K.C.'s)

	Perth Time	G.M.T.
Nightly Monday to Saturday (inclusive)	7 p.m.-9 p.m.	1100-1300



This circuit of a D.C. four-valve t.r.f. shortwaver was sent in by a "Radio World" reader, who claims excellent results for it.

Radio Ramblings

(Continued from page 12)

insulated from the chassis. Also, a piece of bakelite bolted to the chassis outside so that the chassis is covered around the terminal for an inch or two, is a good idea, so that the earth wire will have no possible chance of touching the chassis. Also, an excellent precaution is to bolt an insulated panel to the front panel.

I have had this set in operation for three years or so and have not had the slightest trouble with it.

I have the r.f. stage in one compartment and the detector in another while the audio stages are behind the two, with the 75-watt lamp. I have this lamp fitted in a bakelite holder pushed up through a valve socket hole, and the ring that holds the shade ordinarily, holds the lamp-holder to the chassis.

For the benefit of the reader in a recent issue who said that his set would not regenerate without the beat of the power house engines, this set may be brought right up to it without any trouble whatever. This set will give full loud speaker strength from London, Germany, and from American "hams."

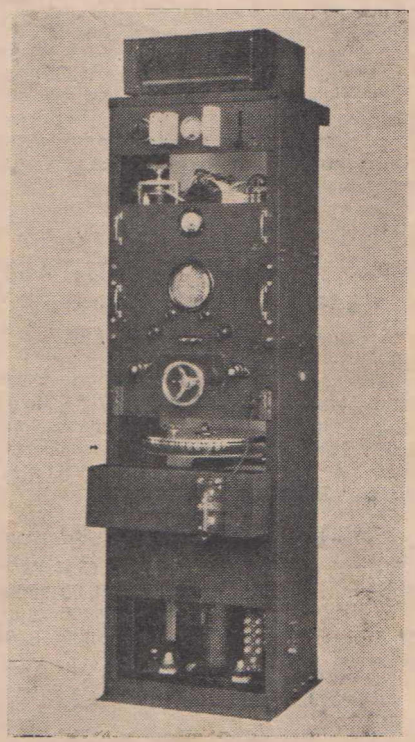
The heaters are wired from positive through a 75-watt lamp to "1," through to "8," and "8" is then connected to the negative main. The R.F.C. in the plate lead to the 78 is a three-winding job on a glass tube. I have tried transformer coupling instead of this choke and found that the choke was much better. Both the tuning condensers may be ganged, but I use them separately and thus do without a trimming condenser.—S. White, Nyngan.

★

Starting Nuts In Awkward Positions.

Here is a hint which may be of interest to readers, as, although very simple, it saves both time and temper.

When putting a nut on a bolt which is situated in an awkward place, where pliers and fingers are in the way, the remedy is to use an old tapered penholder. Just place this on the nut and direct it to the bolt.—A. E. Freeman, Geelong, Vic.



This 250-watt automatic distress transmitter, designed and manufactured by Amalgamated Wireless, was a feature of the A.W.A. display at this year's Amateur Radio Show, held in Sydney last month. Intended primarily for the transmission of the SOS distress signal, this transmitter has become standard equipment on about 75 small ships trading on the Australian coast.

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A.C. OHMS—0-5 Megohms, 0-500,000 ohms, 0-50,000 ohms, 0-5,000 ohms.
HENRIES—0-20,000; 0-2,000; 0-200; 0-20.
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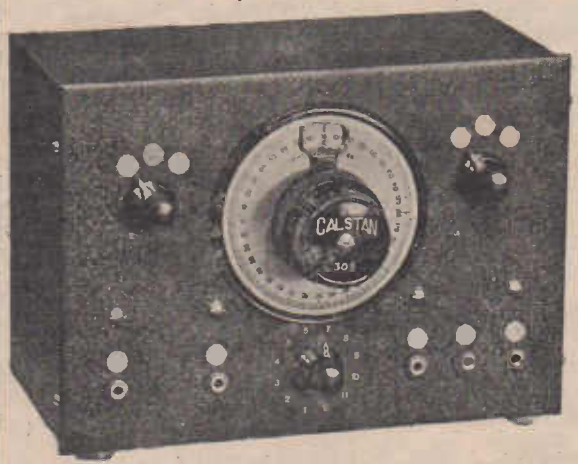

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25 Years In Amateur Radio . . . . . (2)

The second instalment of a biography covering the early days of radio, and written for the "Radio World" by . . . .

DON B. KNOCK (VK2NO)

Radio Editor "The Bulletin."

The author at the door of the armament "workshop" (an aeroplane packing case) at Stavros, Macedonia, in 1918.

BY this time, with signals audible, the urge came along to make them better and still better, and thus the writer started on the business of aerial experimentation. The idea of aerial improvement has been, and still is, his primary consideration through the years.

I had read all about Marconi and his reception across the Atlantic not many years previously by means of long wires supported by kites. Why not fly a kite and try the effect? No sooner thought of than it was in process of undertaking. By this time I had acquired two kindred spirits—fellow schoolmates—and had imbued them with some of my own enthusiasm.

A portable receiver of a kind was made up, and a massive kite built laboriously from bamboo and silk. From somewhere a few hundred feet of phosphor-bronze telephone wire was obtained, and things began to move.

Adjacent to the old home was a large-sized cricket-field in which we boys were wont to disport ourselves without arousing the undue ire of the committee. At least, we respected the pitch! This field was chosen for the trial, and on a very windy day, five or six boys could be seen struggling to hold the kite in restraint while bricks were attached as a tail.

Up she went with a rush, hands being cut and burnt as the wire whipped out. A concerted dive with handkerchief-wrapped fingers, and the wire was finally secured by winding it around a staunch wooden post, leaving the kite soaring placidly in the sky with several hundred feet of "aerial" reaching down to earth.

I busied myself with preliminary detector adjustments, and when all was considered ready, asked a friend to hand me the end of the wire hanging from the post, and dangling about two feet above earth. He reached for it, and what followed was a distinct surprise to us, and a very nasty one for the victim. A blue spark leapt out as his hand neared the wire, jumping about three inches in the process. Boylike, the assailed one retreated in fear, and no-one was game to go near that wire.

Static Electricity The Cause

What had happened was a natural sequence of events. A dry windy day, and the kite well up in the sky just under scudding clouds resulted in the accumulation of a hefty static charge on the aerial, which was insulated from earth by the wooden post. Ideas of connecting that aerial to the receiver were dismissed forthwith.

But how to get the kite down with out further shocks? Simple, really, if we had had the sense to throw a bare wire over the aerial and to let it touch earth, but nobody thought of it!

Picking up a chunk of stone, one of the party dashed it at the aerial wire near the post, and it parted with a twang. Away went our kite, propelled by a stiff wind, trailing about half a mile of twisting, snaking wire. It careered on over that field, reached the heart of the town, and caught up sacreligiously on the tower of the parish church.

En route the trailing wire crossed the overhead tramway cables, and sparks flew and wire melted. We didn't see that, but we heard about it afterwards through our respective parents in forceful terms. After that, kite aerials were OUT, and I have since thought how near we might have come to emulating Franklin, and meeting with tragedy, if a sufficiently strong static charge had lined up in that elevated aerial.

Getting On The Air

Experiments from then on were confined to home, and the idea of transmission began to arise. A license?—nobody ever thought about such things in those days. They were merely a formal matter. Application was made, and permission given gratis forthwith by the Post Office in encouragement of the new wireless art. A callsign with an "X" somewhere in it was issued. Prefixes were unknown, as the very idea of amateur international working was not even thought of at the time.

Anyway, with much labour and perspiration, an induction coil was constructed with a few miles of fine silk-covered wire, and behold, it gave a nice crackling spark when energised from a six-volt accumulator. With glass plate condensers the spark was fattened up nicely, a helix was constructed, a hand-key made, and the week-end afternoons and nights were rendered hideous for the household by the fitful crashing and singing across the gap as I and another boy a mile distan tried to work with each other. We did too, and thereby improved our morse knowledge considerably.

In time, we found that by using a simple buzzer connected to the aerials, we could work equally well over the distance. Heaven alone knows what the wavelengths were, for the signal from both ends was so broad as to have no noticeable peak, but it was wireless communication, and that was the main thing.

Time progressed, and in due course I became apprenticed as a mechanical engineer in a local steel-works. In between learning my trade, I must confess to having done several "nix" jobs for myself when the "gaffer"

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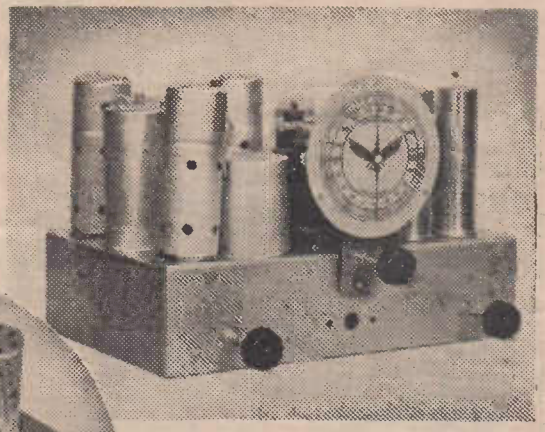

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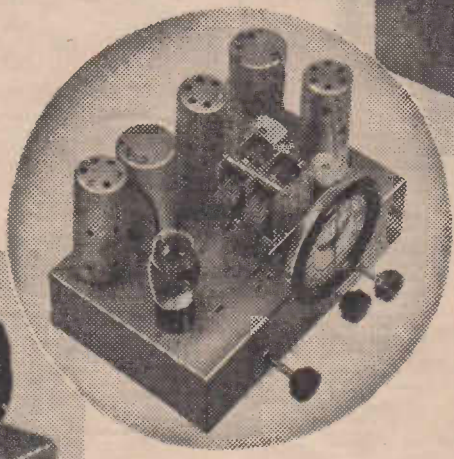

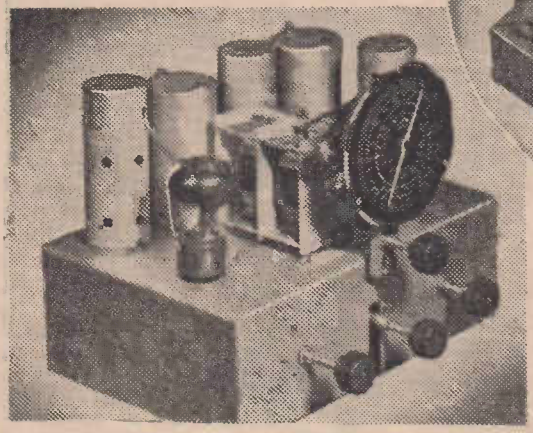

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wasn't looking, and all those jobs were something or other for my wireless outfit.

Parental ruling said that I was going to be an engineer whether I liked it or not, and that there couldn't be any future for "this new fangled wireless." And so I tackled both jobs, with, unfortunately for my desires, wireless only as a hobby. Visions of walking the deck as a gold braided wireless operator at sea had been uppermost, but the "guvnor" was adamant. No wireless school for me.

Time went on, and in between learning to become a good fitter of steam engines and motor lorries, all kinds of wireless gadgets were constructed, with varying success. Then came the war, and things happened. A Post Office official arrived on the scene, sealed in boxes everything down to the last bit of tinfoil, took down my pride—the big white pole in the garden—and departed after handing me a receipt and instructions regarding the dire penalties of working wireless apparatus forthwith.

A year went by, and I must confess to having run the risk of being interned as a spy by getting together more gear; scrounged, it is true, from a maring friend. Indoor aerials were erected in all shapes and forms, but such was the insensitivity of my home-made detectors and gear that silence predominated.

Telephone Line As Aerial

However, it so happened that the next door house had a disused telephone circuit. A long wire led from a telephone pole across the road to an insulator on the side of that house, the wire terminating there. An idea was born. In the dead of night the fence was scaled and a thin insulated wire run around the walls into my den.

I wasn't game to risk transmission, but I had a great deal of enjoyment in copying the war bulletins from old "FL" and listening to the medley of activity among shipping. That aerial was miles long, and brought signals in galore!

1916 came along, and old school friends and older apprentices had gone into various services. Being big for my age I felt that I could do my bit also, and the climax came when a scornful flapper handed me a white feather as an intimation that I ought to be in uniform. Under the Munitions Act I was exempt from active service as a skilled worker, but that meant nothing to romantic ideas of adventure. So one day, an apprentice didn't clock in, and a naval recruiting petty officer had enrolled a mechanic for the Royal Naval Air Service, ostensibly 18 years old, but actually quite a bit younger.

The news was broken to the family, and before I realised I found myself in the old Crystal Palace in London, with a lot of other fellows, old and young, ready to take what was before us. Had I had time to think, I might have enrolled in the wireless section, but mechanical engineers were wanted for aero engines, and so I took the plunge in that direction. Anything before my late employers had time to find out where I was and bring me back as under age!

It was a wet morning, and I had arrived at the Palace in sports coat and flannels. Inside, a roll was called, and a petty officer marched us up and down for two hours until the steam rose in clouds from us sorry, bedraggled recruits. Then we were handed eating utensils and were fed and re-heartened. Next, an important-looking fellow handed me a broom, with the order to "get busy and sweep this store out clean." Having heard all about naval discipline, I sprang to it and got the job over. This had a sequel three weeks afterwards, as I will relate later.

(To be continued next month)

World Shortwave Stations

Below is published a comprehensive list of world short-wave stations, giving call-signs, locations, frequencies (and wave-lengths) together with schedules in East Australian Standard Time. Stations marked with an asterisk are those most regularly heard, or less regular stations recently reported.

NOTE: To convert kilocycles to megacycles, shift the decimal point three places to the left (e.g., read 21,540 k.c. as 21.54 m.c.).

Compiled By ALAN H. GRAHAM

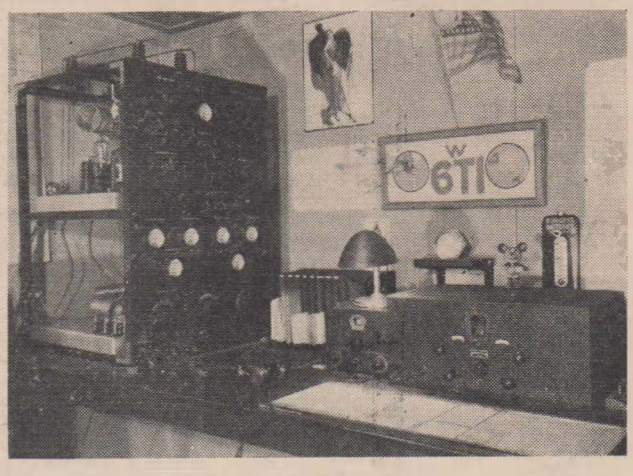
(SHORT-WAVE EDITOR, "RADIO WORLD")

CALL	KC.	M.	LOCATION	SCHEDULE, ETC.
W1XKA	31,600	9.49	Boston, Mass., U.S.A.	Daily, midnight-3 p.m.
W2XDU	31,600	9.49	New York, U.S.A.	Relays WABC. Daily 8 a.m.-1 p.m. Also Sun. and Mon. 3-8 a.m.
W3XKA	31,600	9.49	Philadelphia, Pa., U.S.A.	Daily 3 a.m.-1 p.m.
W4XCA	31,600	9.49	Memphis, Tenn., U.S.A.	Relays WMC. Daily.
W8XAI	31,600	9.49	Rochester, N.Y., U.S.A.	Relays WHAM. Daily 10.30 p.m.-3.05 p.m.
W8XKA	31,600	9.49	Pittsburgh, Pa., U.S.A.	Relays KDKA. Daily 6 a.m.-2 p.m.
W8XWJ	31,600	9.49	Detroit, Mich., U.S.A.	Daily 9 p.m.-3.30 p.m.; Mons. 11 p.m.-3 p.m. (Tues.)
W9XPD	31,600	9.49	St. Louis, Mo., U.S.A.	Relays KSD. Daily.
W9XAZ	26,400	11.3	Milwaukee, Wisc., U.S.A.	Daily.
*W6XKG	25,950	11.5	Los Angeles, Calif., U.S.A.	Relays KGFJ, Daily, 24 hours.
CRCX	24,380	12.3	Bowmanville, Canada	Experimental.
GST	21,550	13.92	Daventry, England.	Irregular.
*W8XK	21,540	13.93	Pittsburgh, Pa., U.S.A.	Relays KDKA, Daily 10 p.m.-midnight.
GSJ	21,530	13.93	Daventry, England	Trans. 2: 8.45 p.m.
*W2XE	21,520	13.94	New York, U.S.A.	Relays WABC. Daily 10.30 p.m.-3 a.m.
*GSH	21,470	13.97	Daventry, England	Trans. 2: 9 p.m. Trans. 3: 12.15 a.m.
KBI	21,140	14.2	Manila, P.I.	Tests irregularly.
GAA	20,380	14.72	Rugby, England.	Irregular.
*DHO	20,020	14.99	Nauen, Germany.	Irregular.
*KAX	19,980	15.02	Manila, P.I.	Irregular.
PMA	19,345	15.51	Bandoeng, Java, D.E.I.	Irregular at 1 a.m.
HS8PJ	19,020	15.77	Bangkok, Siam.	Mondays 11 p.m.-1 a.m.
*GAQ	18,970	15.81	Rugby, England.	6 p.m.
JVA	18,910	15.86	Nazaki, Japan.	Tests irregularly.
ZSS	18,890	15.88	Capetown, S. Africa.	6 p.m.
HBH	18,480	16.23	Geneva, Switzerland.	Irregular.
HBF	18,450	16.26	Geneva, Switzerland.	Irregular.
IUD	18,270	16.42	Addis Ababa, Ethiopia.	Irregular.
*PLE	18,830	15.93	Bandoeng, Java, D.E.I.	Irregular.
*GSG	17,790	16.86	Daventry, England.	Trans. 1: 6 p.m.
JZL	17,785	16.87	Tokyo, Japan.	Irregular.
*W3XAL	17,780	16.87	Bound Brook, N.J., U.S.A.	Relays WJZ: Daily (exc. Mon.) Midnight-8 a.m.
W9XAA	17,780	16.87	Chicago, Ill., U.S.A.	Irregular.
*PHI	17,775	16.88	Huizen, Holland.	Daily (exc. Wed.) 11 p.m.-12.30 a.m. Sun. 10 p.m.-1 a.m.
W2XE	17,760	16.89	New York, U.S.A.	Daily 3-4 a.m.
*DJE	17,760	16.89	Zeeson, Germany.	Daily 3 p.m.-2 a.m.
ZBW5	17,755	16.9	Hong Kong, China.	Irregular.
DFB	17,520	17.12	Nauen, Germany.	Irregular.
W3XL	17,310	17.33	Bound Brook, N.J., U.S.A.	Irregular.
CMA5	17,260	17.37	Habana, Cuba.	Irregular.
FZR3	16,233	18.48	Saigon, Indo-China.	Tests with Paris.
*XOJ	15,800	18.99	Shanghai, China.	9.30 p.m.
JYT	15,760	19.04	Kemikawa-Cho, Japan.	Irregular.
JVE	15,660	19.16	Nazaki, Japan.	Irregular.
JVF	15,620	19.2	Nazaki, Japan.	Irregular.

CALL	KC.	M.	LOCATION	SCHEDULE, ETC.
CMA3	15,505	19.36	Habana, Cuba.	Irregular.
KKR	15,460	19.4	Bolinas, Calif., U.S.A.	Irregular.
KWE	15,430	19.44	Bolinas, Calif., U.S.A.	Tests with Japan and Java.
KWO	15,415	19.46	Dixon, Calif., U.S.A.	Tests with Hawaii.
HAS3	15,370	19.52	Budapest, Hungary.	Midnight (Sunday)-1 a.m. (Monday).
DZG	15,360	19.53	Zeesen, Germany.	Irregular.
KWU	15,355	19.53	Dixon, Calif., U.S.A.	Tests Japan.
*DJR	15,340	19.56	Zeesen, Germany.	Daily 11 p.m.
*W2XAD	15,330	19.56	Schenectady, N.Y., U.S.A.	Relays WGY: Daily 1-7.30 a.m.
GSP	15,310	19.6	Daventry, England.	Not in use at present.
CP7	15,305	19.6	La Paz, Bolivia.	Irregular: Relays CP4.
LRU	15,290	19.62	Buenos Aires, Argentine.	Daily 10 p.m.-9.30 a.m.
*DJQ	15,280	19.63	Zeesen, Germany.	Daily 2.10 a.m.-3.20 a.m.: 7.50 a.m.: 11.15 p.m.
*W2XE	15,270	19.65	New York, U.S.A.	Relays WABC: Daily 4-10 a.m.
*GSI	15,260	19.66	Daventry, England.	Trans. 4: 3.15 a.m.
RIM	15,252	19.67	Tachkent, U.S.S.R.	10 p.m.
W1XAL	15,250	19.67	Boston, Mass., U.S.A.	Irregular.
*TPA2	15,245	19.68	Paris, France.	Daily 9 p.m.-2 a.m.
HS8PJ	15,230	19.7	Bangkok, Siam.	Irregular: Mondays 11 p.m.
OLR5A	15,230	19.7	Prague, Czecho-Slovakia.	Irregular.
*PCJ	15,220	19.71	Eindhoven, Holland.	Tues. 7.30 p.m.: Weds. 11 p.m.: Suns. 10.30 p.m.
*W8XK	15,210	19.72	Pittsburgh, P.A., U.S.A.	Relays KDKA: Midnight-10 a.m.
*DJB	15,200	19.74	Zeesen, Germany.	Daily, Midnight-2 a.m.: 7.50 a.m.: 3.5 p.m.
ZBW4	15,190	19.75	Hong Kong, China.	Irregular.
*GSO	15,180	19.76	Daventry, England.	Trans. 1: 3 p.m. Trans. 4: 7 a.m. Trans.5: 9.20 a.m.
RW96	15,180	19.76	Moscow, U.S.S.R.	Irregular.
JZK	15,160	19.79	Tokyo, Japan.	Irregular: Around 6 a.m.
*YDC	15,150	19.80	Bandoeng, Java.	Daily 9-10.30 a.m.: 1.30-5 p.m.: 8.30 p.m.-12.30 a.m.
*GSF	15,140	19.82	Daventry, England.	Trans. 3 and 7: 12.15 a.m. and 7 a.m.
HVJ	15,120	19.83	Vatican City, Italy.	Daily (exc. Sun. and Mon.) 1.30-1.45 a.m. Sun. 1-1.45 a.m.
*DJL	15,110	19.85	Zeesen, Germany.	Daily 2.30 a.m.: 9 p.m. (Suns.): 11 p.m.
RKI	15,090	19.88	Moscow, U.S.S.R.	10 p.m.
*LZA	14,970	20 04	Sofia, Bulgaria.	Daily 3-5.45 a.m. and 8-9.30 p.m. Also Suns. 3.30-11 p.m.: Mons. 1-7.30 am.
ROU	14,790	20.28	Omsk, U.S.S.R.	Irregular.
*JVH	14,600	20.55	Nazaki, Japan.	Broadcasts irregularly 8 a.m.: Phones Europe.
HBJ	14,535	20.64	Geneva, Switzerland.	Irregular.
DZH	14,460	20.75	Zeesen, Germany.	Irregular.
IBC	14,410	20.8	San Paolo, Italy.	Irregular.
*EA9AH	14,200	21.13	Tetuan, Span. Morocco.	Daily (exc. Mon.) 5.15-8 a.m. and 10 a.m.-Noon.
PZ1AA	13,980	21.46	Paramaribo, Dutch Guiana.	Irregular.
*KKW	13,780	21.77	Bolinas, Calif., U.S.A.	Special relays.
CGA2	13,745	21,83	Drummondville, Canada.	Tests with Europe.
RIS	13,738	21.83	Tiflis, U.S.S.R.	Tests with Moscow.
KLL	13,720	21.87	Bolinas, Calif., U.S.A.	Special relays.
KKZ	13,690	21.91	Bolinas, Calif., U.S.A.	Tests with Japan and Java.
SPW	13,635	22.0	Warsaw, Poland.	Tues., Thurs., Sat., 3.30-4.30 a.m.
CGA3	13,285	22.58	Drummondville, Canada.	Tests with London.
*ZMBJ	13,200	22.7	T.S.S. "Awatea"	Phones Wellington.
VPD	13,075	22.94	Suva, Fiji Is.	Not in use at present.
*CNR	12,825	23.39	Rabat, Morocco.	Sundays 10.30 p.m.
CT1GO	12,396	24.2	Parede, Portugal.	Mon. 1-2.30 a.m.: Wed., Fri., Sat. 4-6.15 a.m.
*TYB	12,250	24.49	Paris, France.	Irregular.
*TFJ	12,235	24.52	Reykjavik, Iceland.	Phones England: broadcasts Mon. 4.40-5.30 a.m.
GBS	12,150	24.69	Rugby, England.	Irregular.
DZE	12,130	24.73	Zeesen, Germany.	Irregular.
CJA	12,100	24.79	Drummondville, Canada.	Tests with Australia.
PDV	12,060	24.88	Kootwijk, Holland.	Irregular.
VIY	12,020	24.95	Rockbank, Australia.	Tests with Canada.
*RNE	12,000	25.0	Moscow, U.S.S.R.	Sun. 9 p.m.: Mon. 1 a.m.: Mon., Tues., Fri, Sat. 7 a.m.: Wed. 9 p.m.
IUC	11,955	25.09	Addis Ababa, Ethiopia.	3 p.m.
IBC	11,955	25.09	San Paolo, Italy.	Irregular.
*KKQ	11,950	25.10	Bolinas, Calif., U.S.A.	Irregular tests.
*XEWI	11,900	25.21	Mexico City, Mexico.	Tues., Thurs., Sat. 6-7 a.m., noon-3 p.m.: Wed., Fri., 10.30 a.m.-3 p.m.: Sun., noon-3 p.m.: Mon., 3.30-5 a.m.

CALL	KC.	M.	LOCATION	SCHEDULE, ETC.
*TPA3	11,880	25.23	Paris, France.	Daily 2.15-9 a.m.: 7-8 p.m.
*OLR4C	11,875	25.24	Prague, Czecho-Slovakia.	Irregular.
*W8XK	11,870	25.26	Pittsburgh, Pa., U.S.A.	Relays KDKA: Daily 10 a.m.-1.30 p.m.
YDB	11,860	25.29	Soerabaja, Java, D.E.I.	Daily (exc. Sun.) 1.30-5 p.m. Sun. 10.30 a.m.-5 p.m.
GSE	11,860	25.29	Daventry, England.	Not in use at present.
DJP	11,855	25.31	Zeesen, Germany.	Not in use at present.
W9XAA	11,830	25.36	Chicago, Ill., U.S.A.	Relays WCFL: Irregular.
*W2XE	11,830	25.36	New York, U.S.A.	Relays WABC: Daily 10 a.m.-1 p.m.
GSN	11,820	25.38	Daventry, England.	Not in use at present.
OER2	11,810	25.4	Vienna, Austria.	Irregular: Midnight-8 a.m.
*I2RO	11,810	25.4	Rome, Italy.	Daily 10 p.m.-3.30 a.m.
*JZJ	11,800	25.42	Tokyo, Japan.	Daily, Midnight-1 a.m., 7-8 a.m., 3-4 p.m. Wed. and Sat. 5.30-6.30 a.m.
OAX5B	11,795	25.43	Ica, Peru.	Daily 7 a.m.-2.15 p.m.
HP5I	11,795	25.43	Aguadulce, Panama.	Irregular.
DJO	11,795	25.43	Zeesen, Germany.	Not in use at present.
*W1XAL	11,790	25.45	Boston, Mass., U.S.A.	Daily (exc. Mon.) 8.15-9.15 a.m. Mon. 8-10 a.m.
*DJD	11,770	25.49	Zeesen, Germany.	Daily 2.35 a.m.: 7.50 a.m.
OLR4B	11,760	25.51	Prague, Czecho-Slovakia.	Irregular.
*GSD	11,750	25.53	Daventry, England.	Trans. 1: 3 p.m. Trans. 4: 3.15 a.m. Trans. 5 and 6: 9.20 a.m.-2 p.m.
(F3ICD)	11,730	25.57	Saigon, Indo-China.	Irregular 8.30 p.m.
PHI	11,730	25.57	Hulzen, Holland.	
CJRX	11,720	25.6	Winnipeg, Canada.	Daily 11 a.m.-3 p.m.
*TPA4	11,715	25.61	Paris, France.	Daily 9.15 a.m.: 1 p.m.
*SM5SX	11,710	25.63	Stockholm, Sweden.	Daily 2-8 a.m. (Thurs. till 9 a.m.)
KIO	11,680	25.68	Kahuku, Hawaii.	Irregular.
HH2T	11,570	25.93	Port-au-Prince, Haiti.	Irregular.
XGR	11,538	26.0	Shanghai, China.	Irregular.
*COCX	11,435	26.24	Habana, Cuba.	Relays CMX: Daily 11 p.m.-4 p.m.
*HBO	11,405	26.3	Geneva, Switzerland.	Mondays around 3 p.m.
HIN	11,280	26.6	Ciudad, Trujillo, D.R.	Daily: 7.40 a.m.
XBJQ	11,200	26.79	Mexico City, Mexico.	Irregular.
ZLT4	11,050	27.15	Wellington, N.Z.	Calls Australia.
*PLP	11,000	27.27	Bandoeng, Java, D.E.I.	Relays YDB: 8 p.m.-2 a.m.
HS8PJ	10,955	27.38	Bangkok, Siam.	Mondays 11 p.m.
DFL	10,850	27.63	Nauen, Germany.	Irregular.
*GBP	10,770	27.85	Rugby, England.	Calls Australia.
*JVM	10,740	27.93	Nazaki, Japan.	Daily 5.30-6.30 a.m.
CEC	10,670	28.12	Santiago, Chile.	Daily 10-10.15 a.m.
*JVN	10,660	28.14	Nazaki, Japan.	Daily 5-11 p.m.
*VLK	10,520	28.51	Sydney, Australia.	Calls England.
ITK	10,480	28.63	Mogadiscio, It. Somaliland.	Irregular.
YBG	10,430	28.76	Medan, Sumatra, D.E.I.	Daily 10.30-11.30 a.m. and 8.30-9.30 p.m.
KES	10,410	28.8	Bolinas, Calif, U.S.A.	Irregular.
EHZ	10,370	28.93	Teneriffe, Canary Is.	Relays EAJ43: 5-7 a.m.; 9-10 a.m.
LSX	10,350	28.98	Monte Grande, Argentine.	Broadcasts Tues., Sat., 8-9 a.m.: Also tests irregularly.
*ORK	10,330	29.04	Ruysselede, Belgium.	Daily 4.30-6 a.m.
*DZC	10,290	29.16	Zeesen, Germany.	Irregular.
PMN	10,260	29.24	Bandoeng, Java, D.E.I.	Relays YDB 8.30 p.m.-2 a.m.
CED	10,230	29.33	Antofagastan, Chile.	Tests around 10 a.m.
SUV	10,055	29.84	Abou Zabal, Egypt.	Tests with Europe: 4 a.m.
*DZB	10,042	29.87	Zeesen, Germany.	Irregular.
HJA3	10,040	29.88	Barranquilla, Colombia.	Irregular.
IRS	9,966	30.08	Rome, Italy.	Irregular.
*EAQ	9,860	30.43	Madrid, Spain.	Daily 8.15 a.m.-12.30 p.m.: also Sun. 3-5 a.m.
JYS	9,840	30.49	Kemikawa-Cho, Japan.	Irregular around 2.30 p.m.
DFE	9,810	30.58	Nauen, Germany.	Irregular.
LSI	9,800	30.61	Monte Grande, Argentina.	Irregular.
VLZ	9,760	30.74	Sydney, Australia.	Calls Java and N.Z.
*COCQ	9,740	30.78	Habana, Cuba.	Daily 9.50 p.m.-4 p.m.
LQA	9,700	30.93	Buenos Aires, Argentine.	Irregular.
*CT1AA	9,680	31.0	Lisbon, Portugal.	Wed., Fri., Sun. 7-10 a.m.
DZA	9,675	31.01	Zeesen, Germany.	Irregular.
*TI4NRH	9,670	31.02	Heredia, Costa Rica.	Daily 11.30 a.m.-1 p.m. and 2.30-3 p.m.

CALL	KC.	M.	LOCATION	SCHEDULE, ETC.
CR6AA	9,660	31.06	Lobito, Port. W. Africa.	Thurs. and Sun. 6.45-8.30 a.m.
PSJ	9,660	31.06	Rio de Janeiro, Brazil.	Irregular.
LRX	9,660	31.06	Buenos Aires, Argentine.	Daily 10 a.m.-3 p.m.
YDB	9,650	31.09	Soerabaja, Java, D.E.I.	Daily 9.-10.30 a.m.; 8.30 p.m.-2 p.m.
HH3W	9,645	31.1	Port-au-Prince, Haiti.	Daily 4-5, 10-11 a.m.
YNLF	9,645	31.1	Managua, Nicaragua.	Daily 3.30-5.30 a.m.: 9.30 a.m.-1 p.m. and 11 p.m.-midnight.
*I2RO	9,635	31.13	Rome, Italy.	
HJ2ABD	9,630	31.14	Bucaramanga, Colombia.	Irregular around 10 a.m.
*HJ1ABP	9,620	31.18	Cartagena, Colombia.	Daily 2-4 a.m.: 8 a.m.-2 p.m. Also around 10 p.m.
HP5J	9,615	31.22	Panama City, Panama.	Daily 3-4.30 a.m.: 9 a.m.-1.30 p.m.
RAN	9,600	31.25	Moscow, U.S.S.R.	Sun., Mon., Tues., Wed., Thurs., Fri., 10 a.m.
CB960	9,600	31.25	Santiago, Chile	Around noon.
*HBL	9,595	31.27	Geneva, Switzerland	Sundays 8.30-9.15 a.m.
*VK6ME	9,590	31.28	Applecross, W. Australia	Daily (exc. Sun.) 9-11 p.m.
*PCJ	9,590	31.28	Eindhoven, Holland.	Mon. 5-6, 10-11 a.m.: Wed. 4.30-6 a.m. Thurs. 10 a.m.-1 p.m.
*VK2ME	9,590	31.28	Sydney, Australia.	Sun. 4-6 p.m., 8 p.m.-midnight. Mon. 12.30-2.30 a.m.
*W3XAU	9,590	31.28	Philadelphia, Pa., U.S.A.	Daily 3-11 a.m. Relays WCAU.
*GSC	9,580	31.32	Daventry, England.	Trans. 6: Noon.
*VK3LR	9,580	31.32	Melbourne, Australia.	Daily 6-11.30 p.m.: 11.45 p.m.-12.45 a.m.
HJ2ABC	9,575	31.34	Cucuta, Colombia.	Daily 11 a.m.-3 a.m.
*W1XK	9,570	31.35	Springfield, Mass., U.S.A.	Relays WBZ: 10 p.m.-4 p.m.
VUB	9,565	31.36	Bombay, India.	Wed., Fri., Sat., 2.30-3.30 a.m.
*DJA	9,560	31.38	Zeesen, Germany.	Daily 7.50 a.m.: 3-5 p.m.
HJ1ABB	9,560	31.38	Barranquilla, Colombia.	Daily 2.30-4 a.m.: 7.30 a.m.-1 p.m.
*DJN	9,540	31.45	Zeesen, Germany.	Daily as DJA.
*VPD2	9,540	31.45	Suva, Fiji Is.	Daily (exc. Sun.) 8.30-10 p.m.
CB954	9,540	31.45	Santiago, Chile.	Irregular.
*JZI	9,535	31.46	Tokyo, Japan.	Daily 5.30-6.30 a.m. and midnight-1 a.m.
*W2XAF	9,530	31.48	Schenectady, N.Y., U.S.A.	Relays WGY: 7 a.m.-3 p.m.
*ZBW3	9,525	31.49	Hong Kong, China.	Daily 2.30-4.15 p.m.: 7 p.m.-1 a.m.
LCJ1	9,525	31.49	Jeloy, Norway.	Daily 8-11 p.m.
HJ4ABH	9,520	31.51	Armenia, Colombia.	Irregular.
XEME	9,520	31.51	Merida, Yucatan, Mexico.	Daily 1-6.30 a.m.: 8.30 a.m.-2 p.m.
*VK3ME	9,510	31.55	Melbourne, Australia.	Daily (exc. Sun.) 7-10 p.m.
*GSB	9,510	31.55	Daventry, England.	Trans. 1-4-5-6: 3 p.m. and 3 a.m.-2 p.m.
*HJ1ABE	9,505	31.57	Cartagena, Colombia.	Daily 10.30 a.m.-noon: also around 9 p.m.
HJU	9,500	31.58	Buenaventura, Colombia.	Tues., Thurs., Sat., 11 a.m.-2 p.m.
HI5E	9,500	31.58	Ciudad Trujillo, D.R.	Daily 1.40-5.40 a.m.: 7.40-11.40 a.m.: 9.40-11.40 p.m.
*PRF5	9,500	31.58	Rio de Janeiro, Brazil.	Irregular. 7.45 a.m.
XEFT	9,490	31.61	Vera Cruz, Mexico.	Relays XETF as on 6120 kc.
*EAQ(2)	9,480	31.65	Madrid, Spain.	Daily 6-7 a.m.
KET	9,480	31.65	Bolinas, Calif., U.S.A.	Irregular.
XEDQ	9,470	31.68	Guadalajara, Mexico.	Irregular.
WET	9,470	31.68	Rocky Point, N.Y., U.S.A.	Irregular.
*TGWA	9,450	31.75	Guatemala City, Guatemala.	Daily 2-4 a.m.: 11 a.m.-3 p.m., Sun. noon-8 p.m.
HH2R	9,440	31.78	Fort de France, Martinique.	Irregular.
YVR	9,430	31.8	Maracay, Venezuela.	Irregular.
*COCH	9,428	31.8	Habana, Cuba.	Daily 10 p.m.-4 p.m.
TITG	9,410	31.89	San Jose, Costa Rica.	Irregular.
*HS8PJ	9,350	32.09	Bangkok, Siam.	Thurs. 11 p.m.-1 a.m. (Fri.)
*OAX4J	9,340	32.12	Lima, Peru.	Around 1.30 p.m.
CGA4	9,330	32.15	Drummondville, Canada.	Irregular.
XGU	9,250	32.48	Shanghai, China.	Irregular.
HAT4	9,125	32.88	Budapest, Hungary.	Mondays 9-10 a.m.
KUW	9,110	32.94	Manila, P.I.	Tests irregularly.
TFK	9,060	33.11	Reykjavik, Iceland.	Phones London: broadcasts irregularly.
*TYA2	9,030	33.2	Paris, France.	Around 6 p.m.
KEJ	9,010	33.3	Bolinas, Calif., U.S.A.	Relays NBC programmes irregularly.
*HCJB	8,948	33.52	Quito, Ecuador.	Daily 3-5 a.m.: 9 a.m.-1 p.m. (exc. Tues.)
*ZMBJ	8,840	33.94	T.S.S. "Awatea."	Phones Wellington.
HKV	8,795	34.09	Bogota, Colombia.	Tues. and Fri. 10-10.30 a.m.
ZBW	8,750	34.29	Hong Kong, China.	Irregular.
KBB	8,710	34.44	Manila, P.I.	Irregular 9 p.m.
CO9JQ	8,665	34.62	Camaguey, Cuba.	Daily (exc. Sun., Mon.) 8.30-9.30 a.m. and 11 a.m.-Noon.



These two de luxe amateur stations belong to Elvin Leige (W6TT) and Horace Greer (W6TI) two well-known American amateurs located at Oakland, California.

CALL	KC.	M.	LOCATION	SCHEDULE, ETC.
YNVA	8,590	34.92	Managua, Nicaragua.	Daily 10.30 a.m.-12.30 p.m.
HC2CW	8,400	35.71	Guayaquil, Ecuador.	Daily 11 a.m.-2 p.m.: Sundays 6-8 a.m.
IAC	8,380	35.8	Pisa, Italy.	Irregular.
XEME	8,190	36.63	Merida, Yucatan, Mexico.	Daily 1-3 a.m.: 9 a.m.-3 p.m.
PSK	8,185	36.65	Rio de Janeiro, Brazil.	Irregular.
ZP10	8,110	37.0	Asuncion, Paraguay.	Daily 11 a.m.-1 p.m.
*CNR	8,036	37.33	Rabat, Morocco.	Mondays 5.30-8 a.m.
HC2TC	7,975	37.62	Quito, Ecuador.	Mon., Fri., 11 a.m.
XGL	7,970	37.64	Shanghai, China.	Irregular.
HSJ	7,968	37.65	Bangkok, Siam.	Irregular.
IDU	7,890	38.02	Asmara, Eritrea, Africa.	Irregular.
JYR	7,880	38.07	Kemikawa-Cho, Japan.	Daily 7-10.40 p.m.
HC2JSB	7,854	38.2	Guayaquil, Ecuador.	Daily 9 a.m.-2 p.m.
HBP	7,799	38.47	Geneva, Switzerland.	Sundays 8.30-9.15 a.m.
PDM	7,765	38.63	Kootwijk, Holland.	Relays to D.E.I.
KEE	7,715	38.89	Bolinas, Calif., U.S.A.	Relays NBC and CBS programmes.
IUB	7,620	39.37	Addis Ababa, Ethiopia.	Irregular.
TI8WS	7,550	39.74	Punta Arenas, Costa Rica.	Daily 9 a.m.-3 p.m.
JVP	7,510	39.95	Nazaki, Japan.	Irregular.
JVQ	7,470	40.16	Nazaki, Japan.	Irregular.
HBQ	7,445	40.30	Geneva, Switzerland.	Irregular.
ZLT2	7,390	40.6	Wellington, N.Z.	Calls Sydney.
XECR	7,380	40.65	Mexico City, Mexico.	Mondays 9-10 a.m.
HJ1ABD	7,281	41.04	Cartagena, Colombia.	Irregular.
VP3BG	7,220	41.55	Georgetown, Br. Guiana.	Daily 9-11.45 a.m.
*ECN1	7,220	41.55	Barcelona, Spain.	Around 7 a.m.
*EA1AZ	7,100	42.25	Coruna, Spain.	Around 7 a.m.
FO8AA	7,100	42.25	Papeete, Tahiti.	Wed., Sat.: 2-3 p.m.
HKE	7,100	42.25	Bogota, Colombia.	Tues. and Fri., 9.30-10 a.m.: Wed. and Sun., 11 a.m.-Noon.
*EA9AH	7,030	42.67	Tetuan, Sp. Morocco.	Daily 7-7.30 a.m.
HJ1ABK	7,030	42.67	Barranquilla, Colombia.	Mon. 6-9 a.m.
HRP1	7,030	42.67	San Pedro Sula, Honduras.	Irregular.
*EA8AB	7,010	42.80	Sta. Cruz, Canary Is.	Around 6.15 a.m.
ECH	7,000	42.87	Barcelona, Spain.	Around 7 a.m.
PZH	6,996	42.88	Paramaribo, Dutch Guiana.	Daily 8.30-11.30 a.m.: 9-11.30 p.m. Mon. 12.30-2.30 a.m.
XBA	6,977	43.0	Tacubaya, Mexico.	Daily 12.30-4 a.m.: 10-11.30 a.m.
HCETC	6,976	43.0	Quito, Ecuador.	Fridays around Noon.
VK8SC	6,960	43.1	Port Hedland, W.A.	Sundays 7.30 p.m.
IUF	6,922	43.34	Addis Ababa, Ethiopia.	Irregular.

Call	KC.	M.	LOCATION	SCHEDULE, ETC.
HI2D	6,900	43.48	Ciudad Trujillo, D.R.	Daily 1.40-5.40 a.m.: 7.40-11.40 a.m.: 9.40-11.40 p.m.
CGA7	6,880	43.60	Drummondville, Canada.	Irregular.
KEL	6,860	43.70	Bolinas, Calif., U.S.A.	Irregular.
TI6OW	6,850	43.80	Puerta Limon, Costa Rica.	Daily 3-4.30 a.m.
XGOX	6,850	43.80	Nanking, China.	Daily 9.40-11.40 p.m.: Sun. 7.40-9.05 p.m.
HI7P	6,809	44.12	Ciudad Trujillo, D.R.	Daily (exc. Sun. and Mon.) 3.40-4.40 a.m. 9.40-11.40 a.m. Sun. 3.40-4.40 a.m. Mon. 1.40-2.40 a.m.
HIH	6,770	44.26	San Pedro de Macoris, D.R.	Daily 3.10-4.40 a.m., 10.30 a.m.-Noon. Sun. 6-7 p.m. Mon. 7.15-9 a.m.
*JVT	6,750	44.44	Nazaki, Japan.	Irregular.
HI3C	6,730	44.58	La Romana, D.R.	Daily 3.30-5 a.m. and 8-9 a.m.
*PMH	6,720	44.64	Bandoeng, Java, D.E I.	Relays YDB, etc., 8.30 p.m.-2 a.m.
TIEP	6,710	44.71	San Jose, Costa Rica.	Daily 10 a.m.-1 p.m.
YVQ	6,672	44.95	Maracay, Venezuela.	Sundays 11 a.m.-Noon.
HC2RL	6,635	45.21	Guayaquil, Ecuador.	Mon. 8.45-10.45 a.m.: Wed. 12.15-2.15 p.m.
HIT	6,630	45.25	Ciudad Trujillo, D.R.	Daily (exc. Mon.) 3.40-4.40 a.m.: 8.40-11.40 a.m.
PRADO	6,625	45.28	Rio Bamba, Ecuador.	Wed. Noon-2.45 p.m.
HI4D	6,558	45.74	Ciudad Trujillo, D.R.	Daily (exc. Mon.) 3-4.40 a.m.
XBC	6,550	45.8	Vera Cruz, Mexico.	Daily 11 p.m.-Midnight.
*TIRCC	6,550	45.8	San Jose, Costa Rica.	Mons. 2-5 a.m.: 9-10 a.m.: 11 a.m.-noon. Fri. 9 a.m.-2 p.m. Daily 3-5 a.m.
YV6RB	6,545	45.84	Bolivar, Venezuela.	Daily 9 a.m.-1.30 p.m.
YN1GG	6,530	45.94	Managua, Nicaragua.	Daily 11 a.m.
YV4RB	6,520	46.01	Valencia, Venezuela.	Daily 2-5 a.m.: 8 a.m.-1 p.m.
HIL	6,500	46.15	Ciudad Trujillo, D.R.	Daily 3.10-4.40 a.m.: 8.40-10.40 a.m.
HI4V	6,477	46.32	Ciudad Trujillo, D.R.	Daily 2.40-4.40 a.m.: 8.10 a.m.-12.40 p.m.
HJ4ABC	6,450	46.51	Ibaque, Colombia.	Daily 2-3 a.m.: 11 a.m.-2 p.m.
HI8A	6,450	46.51	Ciudad Trujillo, D.R.	Daily 5.40-7.10 a.m.: 11.40 p.m.-1.40 a.m. Sun. 12.40-1.40 p.m.
W9XBS	6,425	46.7	Chicago, Ill., U.S.A.	Relays WMAQ Irregular.
HI1S	6,420	46.73	Puerto Plata, D.R.	Daily 2.40-4.40 a.m.: 8.40-10.40 a.m.: 12.40-2.40 p.m.
HJA3	6,415	46.77	Barranquilla, Colombia.	Irregular.
*TIPG	6,410	46.8	San Jose, Costa Rica.	Daily 3-5 a.m.: 9 a.m.-2.30 p.m.
YV5RH	6,400	46.88	Caracas, Venezuela.	Daily 10 a.m.-2 p.m.
YV1RH	6,355	47.2	Maracaibo, Venezuela.	Daily 11 a.m.-2 p.m.
HRP1	6,351	47.21	San Pedro de Sula, Honduras.	Daily 3-5 a.m.: 10.45 a.m.-1 p.m.
YV1RG	6,350	47.21	Valera, Venezuela.	Daily 8.30-9.30 a.m.
HIX	6,340	47.32	Ciudad Trujillo, D.R.	Daily 3.10-4.10 a.m.: 7.40-8.40 a.m. Sun. 10.40 p.m.-12.40 a.m. (Mon.)
JZG	6,330	47.39	Nazaki, Japan.	Irregular.
HH3NW	6,325	47.43	Port-au-Prince, Haiti.	Daily 4-6 a.m., 10-11.30 a.m. (exc. Mon.)
HIZ	6,316	47.5	Ciudad Trujillo, D.R.	Daily 2.10-5.30 a.m., 8.10-11.40 a.m. Sun. 8.10 a.m.-2.10 p.m. Mon. 2.40-4.40 a.m.
YV4RG	6,300	47.62	Maracay, Venezuela.	Daily 11 a.m.-1.30 p.m.
YV5RP	6,290	47.69	Caracas, Venezuela.	Irregular
COHB	6,282	47.76	Sancti Spiritus, Cuba.	Daily 7-9 a.m.: Noon-2 p.m.
HIG	6,280	47.77	Ciudad Trujillo, D.R.	Daily 3.10-5.10 a.m.: 11.10 a.m.-12.40 p.m.: 10.10-11.40 p.m.
HIN	6,243	48.0	Ciudad Trujillo, D.R.	Daily 3-5 a.m.: 10.30 a.m.-12.30 p.m.
HI8Q	6,240	48.08	Ciudad Trujillo, D.R.	Daily 1.40-4.40 a.m.: 7.40-11.40 a.m.
HRD	6,235	48.11	La Ceiba, Honduras.	Daily 11 a.m.-2 p.m. Mon. 7-9 a.m.
OAX4G	6,230	48.15	Lima, Peru.	Daily 10 a.m.-1.30 p.m.
HJ4ABJ	6,230	48.15	Ibaque, Colombia.	Daily 11 a.m.-2 p.m.
HI1A	6,185	48.5	Santiago, D.R.	Daily 1.40-4.40 a.m.: 10.40 a.m.-12.40 p.m. Thurs. 9 a.m.-1.30 p.m
*XEXA	6,171	48.61	Mexico City, Mexico.	Daily 10 a.m.-2 p.m. Also around 11 p.m.
HJ3ABF	6,170	48.62	Bogota, Colombia.	Daily 10 a.m.-2.15 p.m.
	6,160	48.7	Colombo, Ceylon.	Daily from 9.30 p.m.
YV5RD	6,160	48.7	Caracas, Venezuela.	Daily 2-5 a.m.: 7 a.m.-1.30 p.m.
*CSL	6,150	48.78	Lisbon, Portugal.	Irregular 5 a.m. and 10 p.m.
CJRO	6,150	48.78	Winnipeg, Canada.	Daily 11 a.m.-3 p.m. Mon. 6 a.m.-1.30 p.m.
HJ5ABC	6,150	48.78	Cali, Colombia.	Tues. to Sat. 2-3 a.m. and 10 a.m-1 p.m. Mon. 3.5 a.m.
ZEB	6,150	48.78	Bulawayo, S. Africa.	Around 5 a.m.
CB615	6,150	48.78	Santiago, Chile.	Daily 7.10 a.m.
COKG	6,147	48.8	Santiago, Cuba.	Daily 12-1 a.m.: 2.30-4.30 a.m.: 6-7.30 a.m., 1-2 p.m.: 3-5 p.m.

Call	KC.	M.	LOCATION	SCHEDULE, ETC.
HJ4ABU	6,145	48.8	Pereira, Colombia.	Daily 12-2 a.m.: 10-11 a.m.
*W8XK	6,140	48.86	Pittsburgh, Pa., U.S.A.	Relays KDKA: Noon-4 p.m.
HJ4ABD	6,138	48.88	Medellin, Colombia.	Daily 1 a.m.-5 a.m. Mondays 2-5 a.m.: 10 a.m.-2 p.m.
CR7AA	6,137	48.88	Lourenco Marques, Africa.	Daily 3.45-6 a.m. Sundays 11 p.m.
HJ1ABB	6,135	48.9	Barranquilla, Colombia.	Daily 2.30-4 a.m.: 7.30 a.m.-1 p.m.
HI5N	6,135	48.9	Santiago, D.R.	Daily 9.40 a.m.-12.10 p.m.
HIX	6,132	48.93	Ciudad Trujillo, D.R.	Daily 3.40-4.10 a.m.: 7.40-8.40 a.m. Mon., Wed., Sat., 11.10 a.m.-1.10 p.m.
LKL	6,130	48.94	Jeloy, Norway.	Relays Oslo 2-9 a.m.
TGXA	6,130	48.94	Guatemala City, Guatemala.	Irregular.
LCJ1	6,130	48.94	Jeloy, Norway.	Daily 1-9 a.m.
*COCD	6,130	48.94	Habana, Cuba.	Relays CMCD 2-3 a.m.: 10 a.m.-1 p.m. Mon. 3-7 a.m.
*ZGE	6,130	48.94	Kuala Lumpur, Fed. Malay States.	Sun., Tues. and Fri., 9.40-11.40 p.m.
VE9HX	6,130	48.94	Halifax, Canada.	Relays CHNS: Tues.-Sat. 12 m.-4 a.m., 8 a.m.-2 p.m.: Sat. 4-6 a.m. Sun. and Mon., 12 m.-4 a.m. and 5 a.m.-2 p.m.
OAX1A	6.125	48.98	Chiclayo, Peru.	Daily 11 a.m.-2 p.m.
HJ3ABX	6,122	49.0	Bogota, Colombia.	Daily 1.30-5 a.m., 8.30 p.m.-2 a.m. Mon. 9 a.m.-2 p.m.
*W2XE	6,120	49.02	New York, U.S.A.	Relays WABC. Daily 2-3 p.m.
XEFT	6,120	49.02	Vera Cruz, Mexico.	Relays XETF. Daily 2-7 a.m.: 10.30 a.m.-3 p.m. Mons. 2-7 a.m. and Noon-3 p.m.
OLR2C	6,115	49.05	Prague, Czecho-Slovakia.	Irregular.
GSL	6,110	49.1	Daventry, England.	Not in use at present.
VUC	6,110	49.1	Calcutta, India.	Daily 6-8.30 p.m.: 12.30-3 a.m. Mon. 10.30 p.m.-3 a.m.
HJ4ABB	6,105	49.14	Manizales, Colombia.	Tues.-Sat. 3.15-4 a.m. Mon. 5.30-8 a.m.
*W3XAL	6,100	49.18	Bound Brook, N.J., U.S.A.	Relays WJZ: Tues., Thurs., Sun., 8-9 a.m. Mon. 3-4 p.m.
*YTC	6,100	49.18	Belgrade, Yugo-Slavia.	Daily 4 p.m.-9 a.m.
*W9XF	6,100	49.18	Chicago, Ill., U.S.A.	Relays WENR: Wed., Fri., Sat., 3-4 p.m. and 11 a.m. Tues., Thurs., Fri., 2-4 p.m.
ZTJ	6,097	49.2	Johannesburg, S. Africa.	Mon.-Sat. 2.45-3.30 p.m.: and 6.30-10 p.m. and 12 m.-7 a.m. Sun. 11 p.m.-1.15 a.m (Mon.)
JZH	6,095	49.22	Tokyo, Japan.	Irregular.
HJ4ABE	6,092	49.25	Medellin, Colombia.	Daily 2-3 a.m.: 9 a.m.-1.30 p.m.
CRCX	6,090	49.26	Toronto, Canada.	Daily 8.30 a.m.-2.30 p.m. Sun. 8 a.m.-2 p.m.
VE9BJ	6,090	49.26	St. John, Canada.	Daily 10-11.30 a.m.
ZBW2	6,090	49.26	Hong Kong, China.	Irregular.
HJ5ABD	6,085	49.3	Cali, Colombia.	Daily 3-4 30 a.m., 8.10 a.m.-12.40 p.m.
*VQ7LO	6,083	49.31	Nairobi, Kenya, S. Africa.	Mon.-Fri. 8.45-9.15 p.m. Tues.-Sat 2.30-5.30 a.m. and 11.30 p.m. Sun. 2.30-6.30 a.m. Mon. 2-5 a.m.
ZHJ	6,080	49.34	Penang, Malaya.	Daily (exc. Sun.) 9.40-11.40 p.m. Sun. 2-4 p.m.
CP5	6,080	49.34	La Paz, Bolivia.	Daily 10 a.m.-1.30 p.m.
HP5F	6,080	49.34	Colon, Panama.	Daily 2.45-4.15 a.m.: 10.45 a.m.-1 p.m.
W9XAA	6,080	49.34	Chicago, Ill., U.S.A.	Relays WCFL. Mon. 2.30 a.m.-Noon. Wed., Fri., Sun., 7 a.m.-3 p.m.
DJM	6,080	49.34	Zeesen, Germany.	Not in use at present.
*OER2	6,072	49.41	Vienna, Austria.	Daily Midnight-8 a.m. (9 a.m. Suns.)
YV1RE	6,070	49.42	Maracaibo, Venezuela.	Daily 9 a.m.-2 p.m.
HJ4ABC	6,070	49.42	Pereira, Colombia.	Daily 12-2 a.m.: 10-11 a.m.
VE9CS	6,070	49.42	Vancouver, Canada.	Mons. 4.45 a.m.-12 n., 1.30-4 p.m. Weds 9-10.30 a.m., 2.30-4.30 p.m. Daily 9-10.30 a.m.
HJ4ABL	6,065	49.46	Manizales, Colombia.	Daily 2-3 a.m., 8.30-10 30 a.m. Sun. 8.30 a.m.-1.30 p.m.
*W8XAL	6,060	49.5	Cincinnati, Ohio, U.S.A.	Relays WLW. Daily 8.30 p.m.-11 a.m. and 2 p.m.-4 p.m.
*W3XAU	6,060	49.5	Philadelphia, Pa., U.S.A.	Relays WCAU. Daily 11 a.m.-2 p.m.
*OXY	6,060	49.5	Skamleboack, Denmark.	Daily 4-9.30 a.m.
GSA	6,050	49.59	Daventry, England.	Not in use at present.
HJ3ABD	6,050	49.59	Bogota, Colombia.	Daily 3-5 a.m.: 10 a.m.-2 p.m. Sun. 8 a.m.-Noon.
HI9B	6,045	49.63	Santiago, D.R.	Irregular 9 a.m.
HJ1ABG	6,042	49.65	Barranquilla, Colombia.	Daily 2 a.m.-2 p.m. Mon. 2 a.m.-11 a.m.
W4XB	6,040	49.67	Miami, Fla., U.S.A.	Relays WIOD. Temporarily off air.
W1XAL	6,040	49.67	Boston, Mass., U.S.A.	Wed., Fri., 10.15 a.m.-12.15 p.m. Mon. 8-10 a.m.
*YDA	6,040	49.67	Tandjongpriok, Java.	Daily 1.30-5 p.m. Sun. 10.30 a.m.-5 p.m.
PRA8	6,040	49.67	Pernambuco, Brazil.	Daily 12.30-2.30 a.m.: 5 30 11.30 a.m.
HJ4ABP	6,030	49.75	Medellin, Colombia.	Relays HJ4ABQ. Daily 11 a.m.-2 p.m.

CALL	KC.	M.	LOCATION	SCHEDULE, ETC.
HP5B	6,030	49.75	Panama City, Panama.	Daily 3-4 a.m.: 10 a.m.-1.30 p.m.: and at 10 p.m.
VE9CA	6,030	49.75	Calgary, Canada.	Fri. 12 a.m.-5 p.m. Mon. 3 a.m.-3 p.m.
*OLR2B	6,030	49.75	Prague, Czecho-Slovakia.	Irregular.
HJ1ABJ	6,025	49.79	Sta. Marta, Colombia.	Daily (exc. Thurs.) 8.30 a.m.-1.30 p.m.
*DJC	6,020	49.83	Zeesen, Germany.	Daily 2.30-7.30 a.m.
XEUW	6,020	49.83	Vera Cruz, Mexico.	Daily 11 a.m.-3.30 p.m.
*ZHI	6,018	49.85	Singapore, Malaya.	Mon., Wed., Thurs., 8.40-11.10 p.m.
HI3U	6,015	49.88	Santiago, D.R.	Daily 3-5 a.m.: 8-10 a.m.: 11 a.m.-12.30 p.m.: 10.30 p.m.-12 m.
HJ3ABH	6,012	49.91	Bogota, Colombia.	Daily 9 a.m.-2 p.m. Mon. 3-5 a.m. and 7 a.m.-2 p.m.
VP3MR	6,010	49.92	Georgetown, Br. Guiana.	Daily 7.45-11.45 a.m. Sun. 10.45 p.m.-1.15 a.m.
COCO	6,010	49.92	Habana, Cuba.	Daily 12.30-4 a.m.: 7-10 a.m.: 11 a.m.-1 p.m. Also Sun. 2.30 p.m.-5 p.m.
*HP5K	6,005	49.96	Colon, Panama.	Daily 3-4 a.m.: 9 a.m.-Noon: 10.30 p.m.-12 m.
CFCX	6,005	49.96	Montreal, Canada.	Relays CFCF. 9 p.m.-2.15 p.m. Mon. 12.30 a.m.-2.15 p.m.
VE9DN	6,005	49.96	Drummondville, Canada.	Sundays 2-5 p.m.
*VK9MI	6,003	49.98	S.S. "Kanimbla".	Irregular around 9 p.m.
HJ1ABC	6,000	50.0	Quibdo, Colombia.	Daily 8-9 a.m. Mon. Noon-2 p.m.
*RV59	6,000	50.0	Moscow, U.S.S.R.	Daily 3.30-9 a.m.
*XEBT	5,990	50.08	Mexico City, Mexico.	Daily 11 p.m.-4 p.m.
HJ2ABD	5,988	50.1	Bucaramanga, Colombia.	Daily 2.30-3.30 a.m.: 8.30-9.30 a.m.: 10.30 a.m.-1.30 p.m.
*HVJ	5,968	50.27	Vatican City, Italy.	Daily 5-5.15 a.m. Sun. 8-8.30 p.m.
HJN	5,950	50.42	Bogota, Colombia.	Daily 9 a.m.-2 p.m.
TG2X	5,940	50.5	Guatemala City, Guatemala.	Daily 7-9 a.m.: Noon-2 p.m.: Sun. 5-8 p.m.
HJ4ABD	5,930	50.59	Medellin, Colombia.	Daily 11 a.m.-2.30 p.m.
HH2S	5,915	50.72	Port au Prince, Haiti.	Daily 10 a.m.-12.45 p.m.
YV3RA	5,898	50.86	Barquisimeto, Venezuela.	Daily 3-4 a.m.: 9 a.m.-1 p.m.
HCK	5,885	50.98	Quito, Ecuador.	Daily 11 a.m.-2 p.m.
IUA	5,880	51.02	Addis Ababa, Ethiopia.	Irregular.
HRN	5,875	51.06	Tegucigalpa, Honduras.	Daily 4.15-5.15 a.m.: 11.30 a.m.-2 p.m. Mon. 6.30-8.30 a.m.: 11.30 a.m.-12.30 p.m.
HI1J	5,865	51.15	San Pedro de Macoris D.R.	Daily 3-5 a.m.: 9.30 a.m.-12 n.
YV1RB	5,850	51.28	Maracaibo, Venezuela.	Daily 2.15-3.15 a.m.: 7.45 a.m.-1 p.m.: 11.45 p.m.-12.45 a.m.
TIGPH	5,830	51.46	San Jose, Costa Rica.	Relays TIX. Noon-1 p.m. Also 2-4 a.m.: 9 a.m.-Noon.
YV5RC	5,800	51.72	Caracas, Venezuela.	Daily 2-4.30 a.m.: 7 a.m.-12.30 p.m. Sun. 11.30 p.m.-1.30 p.m. (Mon.)
JVU	5,790	51.81	Nazaki, Japan.	Irregular.
OAX4D	5,780	51.9	Lima, Peru.	Tues., Thurs., Sun., 12-2.30 a.m.
HJ4ABD	5,780	51.9	Medellin, Colombia.	Daily 1-5 a.m., 7 a.m.-2 p.m. Mons. 2-5 a.m.: 10 a.m.-2 p.m.
HC1PM	5,725	52.4	Quito, Ecuador.	Weds.: Noon-2 p.m.
YV2RB	5,720	52.45	San Cristobal, Venezuela.	Daily 9 a.m.-2.30 p.m.
TGS	5,713	52.51	Guatemala City, Guatemala.	Thurs., Fri., Mon., 9 a.m.-Noon.
TI5HH	5,500	54.55	San Ramon, Costa Rica.	Irregular: 6.30 a.m.: 11 a.m.
ZBW	5,410	55.45	Hong Kong, China.	Irregular.
*PMY	5,145	58.31	Bandoeng, Java, D.E.I.	Daily 8.30 p.m.-2 a.m.
TFL	5,000	60.0	Reykjavik, Iceland.	Irregular: Also phones London.
	5,000	60.0	Pretoria, S. Africa.	Irregular.
*YDE2	4,810	62.37	Solo, D.E.I.	Daily 8.30 p.m.-2 a.m.
VE9BK	4,790	62.63	Vancouver, Canada.	Daily (exc. Mon.) 2.30-2.45 a.m., 6-6.15 a.m. and 11-11.15 a.m.
HC2ET	4,600	65.22	Guayaquil, Ecuador.	Thurs., Sun., 12.15 p.m.-2 p.m.
*RV15	4,250	70.4	Khabarovsk, U.S.S.R.	Daily 4 p.m.-1 a.m.
HCJB	4,107	73.05	Quito, Ecuador.	Daily 3-5 a.m., 9 a.m.-1 p.m.
CT2AJ	4,002	74.95	Ponta Delgada, Azores.	Thurs., Sun., 8-10 a.m.
HCK	3,750	80.0	Quito, Ecuador.	Tues. 11.30 a.m.
*YDA	3,040	98.68	Tandjongpriok, D.E.I.	Daily (exc. Sun.) 9-10.30 a.m. Daily 8.30 p.m.-2 a.m. Sun. 8.30 p.m.-3 a.m.
			ADDENDA	
*CR7BA	11,718	25.6	Lourenco Marques, Port. W. Africa.	Irregular around 5 a.m.
*CSW	11,010	27.2	Lisbon, Portugal.	Daily around 6 a.m.
*CSW	9,939	30.21	Lisbon, Portugal.	Daily 7-9 a.m.
HH2R	9,545	31.44	Port au Prince, Haiti.	Irregular.
*KKP	16,030	18.71	Kahuku, Hawaii.	Tests around 1 p.m.

Breaking Into The Amateur Game . . . . (5)

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

By GEORGE THOMPSON (VH3TH) and IVOR MORGAN (VK3DH)

WITH reference to the subject of keying, it must be kept in mind that to produce satisfactory code-character formation, the keying method must reduce the output of the transmitter to zero when the key is open and allow full power when closed.

There is considerably more in a keying system than merely switching the power on or off. Practically every type of transmitter will be keyed most satisfactorily with one particular method that happens to suit the conditions. Keying in the power transformer primary is one method that will be found quite satisfactory if the filter in the supply is not very large.

Where a full wave secondary is in use, the key may be inserted in the centre-tap lead. This system would suffer from the same complaint as the last method when the filter is large—that is, in a power supply using a large choke and high capacity condensers. The resultant signal has "tails."

The key could also be placed in the H.T. positive or negative lead from power supply to transmitter, the negative being the better, since the key is then not above earth by the amount of the H.T. supply voltage, with its associated dangers. There are several other systems of keying in the transmitter itself, and these will be introduced when we come to transmitters for key work.

Instruments and Designs for Receivers

Broadly reviewing any radio receiver, we notice that it is built around a comparatively few basic principles. Designs of multi-valve receivers are legion when reviewed from the detail aspect, but for the purpose of comparison there is not the slightest need to consider these "details"—we need only take each receiver as a combination of related units. In the following, these units will be examined, and an endeavour made to find how different types of receivers are assembled by the combination of a few units in various ways.

Two Common Basic Types.

Fundamentally there are two receiver types for amateur use, the superheterodyne and the autodyne, or regenerative detector. Firstly, let us consider how to arrive at a definition of what goes to make up a section of a receiver.

In the very simplest form of receiver, which is only just sufficient and no more to do the work required for an amateur station, there is only one unit, as we shall call the sections of a multi-valve receiver later. Essentially this one-valve set has only one function, that of detecting.

To make a one-valve set really satisfactory it is necessary to make use of the function already discussed in the third instalment of this series, that of reaction. By providing the detector with tuning and reaction controls, C.W. signals may be copied by setting the latter control to allow the detector to oscillate weakly. Telephone ('fone') or modulated signals of any kind will be readily copied by having the reaction control set to the point just prior to oscillation. The details of the actual circuit diagram and constants of this "detector unit" are referred to in instalment number 3.

Adding An Audio Amplifier

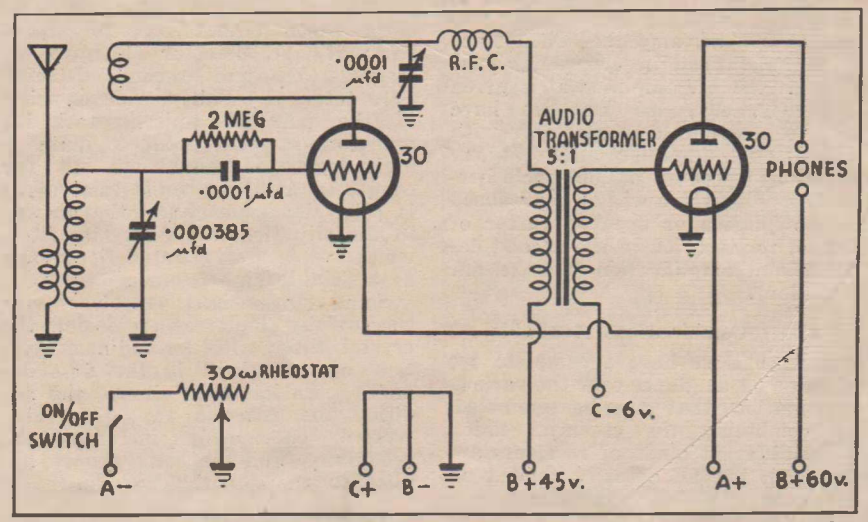
The first improvement to be made in the one-valver is the addition of an audio frequency amplifier unit. Details of such a unit were given in the discussion on valves (second instalment). It is here that design considerations commence to intrude. The size and type of audio frequency stage is determined entirely by the demands to be made on the receiver.

Briefly, if we are to simplify matters, two major types of audio frequency amplifier units may be considered, one for use to feed a pair of headphones and the other to operate a loudspeaker.

In the first case a one-valve a.f. amplifier unit as referred to in the second instalment is exactly the thing, but to meet the second requirement either a pentode valve, plus associate apparatus, or two triode valves in cascade would be essential. This matter of audio frequency amplification, being a rather broad subject, comes under a separate sectiou and will be dealt with later on in the course.

The Radio Frequency Amplifier

Adding a third unit to this receiver, we come to the radio frequency amplifier, as covered in instalment 3.



The circuit of a simple two-valve battery set, using a triode as leaky-grid detector, with reaction, transformer-coupled to another triode as audio amplifier.

By the addition of this "r.f." amplifier unit to the present two-unit (2 valves actually) set-up, we increase the sensitivity of the receiver considerably.

The selectivity is also improved since we have another tuned circuit.

A considerable improvement would be manifest in the action of the detector's reaction control—it will function much more smoothly, since the damping effect of the aerial has been transferred to the r.f. stage. The plate circuit of the r.f. amplifier unit does not present such a variable disturbing influence on the detector grid circuit as the antenna would.

The r.f. amplifier units may be added in cascade manner until approximately three stages have been added for the majority of lay-outs. Such problems as noise-to-signal ratio becoming poorer, and oscillations in the r.f. stages, tend to limit the number of stages that can be successfully employed.

Such cures as anti-oscillation "dampers" and excessive shielding could be employed, but the result in actual practice would in all probability reduce the all-round efficiency of a four-stage (unit) r.f. amplifier to that of a three-stage arrangement. Using carefully-engineered layouts, the process of r.f. amplification has been carried to a high state of efficiency in commercial fields, but for amateur use the following system is far superior.

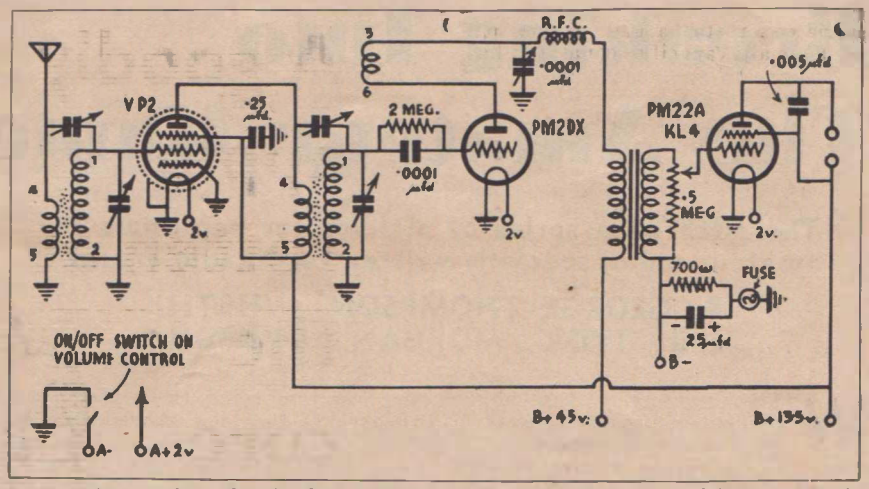
The Intermediate Frequency Amplifier

This brings us to the intermediate frequency amplifier unit. As we learned in the discussion on a typical receiver, the first detector converts the incoming signal to a lower frequency (465 or 175 k.c.). It is a much easier proposition to maintain circuit stability at this lower frequency than at the higher signal frequency, and for this reason greater amplification per stage is obtainable. Intermediate frequency (I.F.) amplification has been dealt with—it is sufficient to say here that the unit is best considered as embracing the whole i.f. amplifier, and not each stage.

Cascade i.f. stages can be continued up to about four with ordinary apparatus, but the amateur would be considered most unusual if he desired more than two good stages of i.f. Here again two good stages are much better than three mediocre ones.

B.F.O. For C.W. Reception

There is still another unit that should be kept in mind when dealing with amateur receivers, or to be more exact, receivers for other than ordinary broadcast reception. It is known as the "continuous wave beat oscillator," and is nothing more or less



A three-valve circuit for battery operation, using a multi-mu pentode in the r.f. stage, a triode leaky-grid detector with reaction, transformer-coupled to an output pentode.

than the convential oscillator circuit—tuned to a frequency very near to that of the i.f. of the superheterodyne, and coupled thereto.

There is often a tuning control on the beat oscillator so that the operator may vary the frequency of the c.w. note heard in the phones or loud speaker.

To clarify this set-up, we should visualise a conventional super-heterodyne consisting of six units:—r.f. stage, detector, oscillator, i.f. amplifier, second detector and a.f. amplifier.

As we know from the description of the function of the typical five-valve receiver in the third instalment of this series, this combination cannot satisfactorily receive continuous wave (C.W.) signals.

The simplest way of producing the desired heterodyne is to couple an oscillator, the frequency of which is very close, say 1,000 cycles (1.k.c.) to that of our i.f. amplfier—Then since all signals tuned in eventually pass through the i.f. amplifier at a given frequency, e.g., 465 k.c., we have only to beat our local oscillator with with the i.f. amplifier output at say 466 k.c. to produce a 1,000-cycle heterodyne note which will be reproduced in the 'phones or speaker (after of course, rectification in the second detector and amplification via the a.f. amplifier).

Many Combinations Available

Now that we have a complete set of units, let us glance over the various combinations that may be assembled. By combining the essential units, many different kinds of receivers are designed, but all actually depend on the same principles in their action.

For example, let us consider two quite different receivers containing four units. No 1 has the following:—First r.f. stage, second r.f. stage, detector, and audio frequency stage supplying a loud speaker. Number 2 receiver:—First detector, oscillator, i.f. amplifier, second detector and a.f. amplifier stage to loud speaker. The first is known as a tuned radio frequency receiver, the second as a superheterodyne.

An ambitious combination could consist of the following seven units: r.f. stage, 1st detector, oscillator, i.f. amplifier (two stages), c.w. beat oscillator, 2nd detector, and audio frequency amplifier.

Selectivity Considerations

Approaching the subject of selectivity, a certain degree of this is achieved when the above type of receiver is carefully aligned—particularly in the i.f. stages.

Let us check up for a moment—with the r.f. unit, detector, two i.f. stages and second detector, we have eight tuned circuits, as follows:—r.f. unit (1), detector (1), two i.f. stages (5), and second detector (1), total, 8. Fairly wide spacing of the pair of coils in each i.f. transformer will produce quite a high degree of selectivity, but for congested amateur bands this set-up is often inadequate, and the answer to the situation is the crystal flter, which, when incorporated, is known as a "single signal super."

Some single-signal receivers are successfully built by replacing the crystal filter with an ordinary system of "reaction" in the first detector. As has been shown, the addition the reaction to a one-valve receiver enormously increases the selectivity, and the same theory applies to the superheterodyne.

How The Crystal Filter Works

Dealing with the crystal filter, in the first i.f. transformer a bridge

circuit is set up with the crystal and associated crystal holder in one leg, and a small capacity, equal to that of the crystal holder, in the other leg. The crystal is ground to one of the popular intermediate frequencies, and since it will only operate over a very small band of frequencies, a very high degree of selectivity is the result. Of course, the intermediate frequency transformers are first very accurately tuned to the exact frequency of the crystal. The degree of selectivity in this set-up is so high that the signal at the second detector is practically nil even as low as only a hundred or so cycles off resonance.

Now, if the beat oscillator is coupled to the input of the second detector, practically only the one frequency will be reproduced in the output, i.e., the peak frequency to which the i.f. unit is tuned. This extremely high degree of selectivity also has a marked effect in the reduction of noise level.

Automatic Volume Control

Another handy design feature for multi-valve receivers is the inclusion of some system of automatic volume control. Briefly, this system functions on the principle that in a diode rectifier circuit (2nd detector) an average rectified signal voltage always appears across the diode load resistance. This voltage varies in amplitude according to the strength of the carrier being received.

If we provide a means of filtering out the audio frequency component, we are left with a d.c. voltage varying in proportion to the strength of the carrier tuned in. All that is necessary to make use of this voltage, which, incidentally, in the usual detector circuit is negative in respect to earth or the receiver's neutral point, is to feed it along to the i.f. and r.f. grid return circuits in the same manner as an ordinary bias battery.

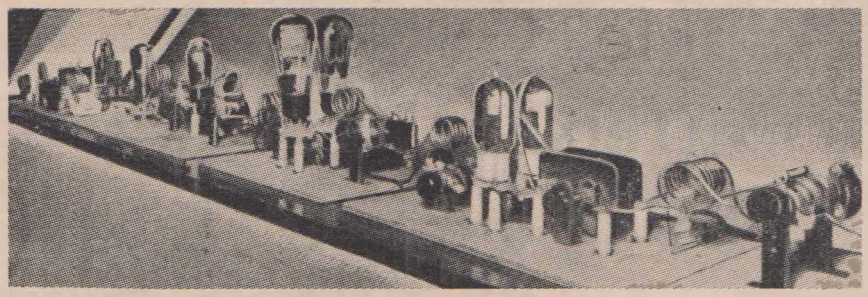
Useful Test Instruments

Let us now turn to instruments that are helpful to an amateur building and maintaining his own receivers. Before a t.r.f. receiver or a "super." may be put successfully into operation, it must be accurately aligned on a suitable test oscillator, sometimes known as a signal generator.

In the case of the t.r.f. receiver, the r.f. circuits could be lined up more or less accurately on a signal from a transmitter, preferably of a weak order and at the high frequency (low w/l) end of the receiver's tuning range. To use this method with a superhet is almost hopeless, since the actual setting of the L/C circuit of the receiver's os-

(Continued on page 46)

Across The Atlantic On Five Metres



Static Electricity Likely Cause Of Hindenburg Disaster: These "Ham" Terms: Highly Successful Amateur Radio Show.

By W.J.P.

THE above photograph shows the crystal-controlled transmitter used by G5BY, who was recently successful in transmitting signals across the Atlantic from England to America on 5 metres. The final amplifier consists of two 35T's, with a maximum input of 250 watts. G5BY's signals were first logged by W2HXD, after which tests were conducted, and finally actual two-way communication between the two continents was established.

The "Hindenburg" and Static Electricity

Recently, much discussion took place in the columns of "R.W." on the various effects and possible dangers connected with static electricity. The recent destruction of the German airship "Hindenburg," most certainly demonstrated in a very tragic manner just what is likely to happen when these static discharges take place in the near vicinity of inflammable gases or liquids.

Although no definite solution of the disaster had been established at the time of writing these notes, it was the general belief that the huge airship acquired a heavy electrical charge in its passage through the air, which was discharged with a flash when it came into contact with the mooring mast.

Lakemba Club Office Bearers

At the recent annual meeting of the above club, the following were elected to hold office for the ensuing year:—President, Mr. E. P. Hodgkins, 2EH; Vice-President, Mr. J. C. Warren, 2QX; Hon. Secretary, Mr. G. Brown (unopposed); Treasurer, Mr. H. D. Ackling, 2PX (unopposed); Publicity Manager, Mr. W. J. Phelps, 2DL (unopposed); QSL Manager, Mr. L. W. Hughes, 2QP (unopposed); Librarian, Mr. E. P. Hodgkins, 2EH; W. I. A. Delegate, Mr. T. M. O'Donnell, 2OD; Committee of Three, Messrs. Pinnell, 2ZR; Taylor, 2CL and Clarke, 2IC.

These "Ham" Terms

Since the introduction of dual-wave receivers, many broadcast listeners are fast becoming very keen dxers. In the course of his search for long-distance stations, the newcomer to the short waves eventually tunes in dozens of amateur stations in a few degrees on his receiver dial. The "ham" language may sound somewhat strange and meaningless at first, but by constant listening he is able to understand some of the abbreviations used.

The radio amateur does not necessarily confine the use of his abbreviations to radio. We recently had occasion to go on a hiking trip, there being included in the party a number of radio experimenters. One of them had a slight mishap with his luggage, and was expressing his opinion of the whole situation in no uncertain terms, when a "ham" who was walking several yards ahead, suddenly cried out: "QRT! QRM! T9 YLs 30 Metres!" Translated into suitable English, this meant: "Be quiet—somebody is coming! Good-looking young ladies about 30 yards away!"

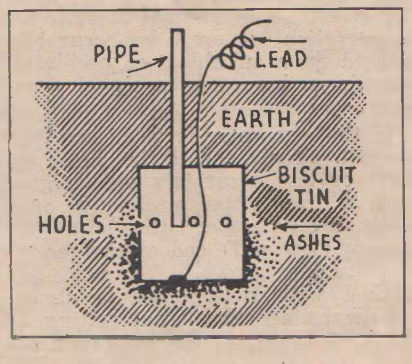
This Year's Amateur Show

Mr. B. Dimmock (VK2OW) was once again successful in winning the first prize in a transmitting section at the recent Amateur Exhibition. His transmitter was displayed on the Lakemba Club stall, which was highly commended by the judges. Other exhibits by Lakemba members included a transmitter by 2QP, using Tylux panels, a rather unusual semi-portable transmitter by 2EH (details of which will appear in a later issue of "R.W."), the two-band transmitter as described in "R.W." by 2QX, and the push-pull electron-coupled 5 metre oscillator as described in "R.W." by 2OD. A coil winder costing 6d. to make was exhibited by 2JT. It undoubtedly created plenty of attention, as it registered over 1,000 turns at the end of the exhibition!

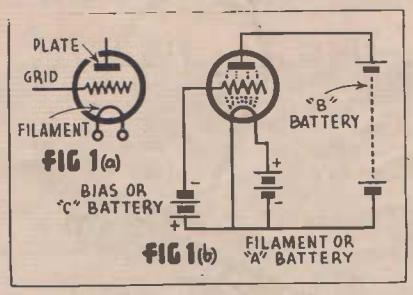
The show was a great success, due no doubt to the efforts of the organisers and the co-operation of stall-holders. Next year's show, if given plenty of publicity beforehand, should surpass any yet attempted.

A Cheap And Effective Earth

A good earth can be made from an empty biscuit-tin with the paper scratched off. The lead is soldered to the bottom and several holes are punched about half-way up the sides. A short length of piping is taken through the lid. A hole is dug a few feet down, bedded with ashes, the tin placed in it and the hole filled up. Water is poured down the pipe to keep the connection with earth damp. —David Hogan, Taree, N.S.W.



Radio Step By Step 9



More About The Valve

The action of the control grid in controlling the electron flow, and the reason why further grids are added in some types of valves, are explained below.

LAST month the working of the simple diode valve was explained, together with the effect of the space charge on current flow. Now, suppose a third element is added to the valve, which now becomes a triode or three-element valve.

This new element, called the grid (or more fully, the control grid), is in the form of a widely-spaced mesh-like structure. It generally consists of a spiral of wire, and is located between cathode (or filament) and plate. In circuit diagrams, a grid is represented by the zig-zag line shown in fig. 1 (a), separating filament from plate.

The Action Of The Grid

Now imagine a triode connected up in the circuit shown in fig. 1 (b). This is similar to the circuit used to illustrate the action of the diode, except that a third battery, known as a "C" or grid bias battery, is included, with its negative terminal connected to the grid and positive to the negative pole of the filament battery.

This arrangement obviously means that the potential applied to the grid is negative to that of the filament.

The effect of this negatively-charged electrode between filament and plate should now be obvious. The negatively-charged electrons leaving the filament for the plate under the influence of the positive voltage applied to the latter, come under the influence of the negative grid, which repels them. The number that manage to pass through the open spiral of wire constituting the grid, and reach the plate, depends on the repelling force exerted by the grid, which in turn depends on the negative potential applied to it.

Grid Potential Controls Electron Flow

Thus with the grid at zero potential, there is no repelling force; with it negative to filament, there is, while when the grid is positive to filament it exerts an attracting force augmenting that of the plate. If the grid is positively charged, it actually captures a few electrons of its own, and these, in returning via the grid circuit to the negative side of the filament, constitute what is known as grid current.

Effect Of The Grid Illustrated

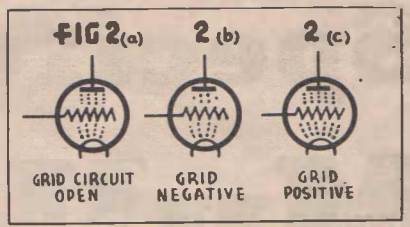
The steady plate current that flows with the zero grid potential decreases when the grid is negative and increases when it is positive. These effects are illustrated diagrammatically in figures 2 (a), (b), and (c).

Thus we have learnt that the action of the grid is that of a valve or trigger, in that by varying its potential in respect to that of the filament, the electron stream flowing from filament to plate, and constituting the plate current, can be varied from zero to maximum.

Adding a Second Grid

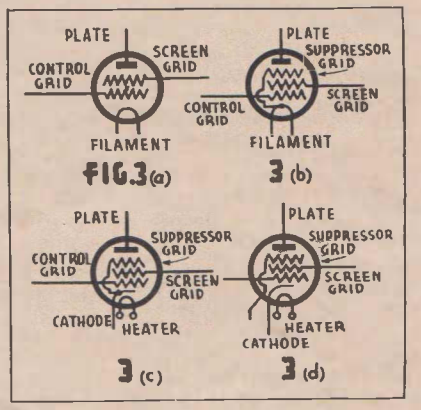
The triode valve was for some time regarded as perfect for the functions it had to perform, until there came a new development which made the valve far more useful in many ways.

Between the grid and plate of a triode valve there exists a tiny capacity which can cause serious trouble in some applications by providing undesirable coupling between the plate (or output circuit) and the grid (or



input) circuit. This drawback can be obviated by placing yet another element within the valve, making four in all.

This new element — generally known as the screen grid — is interposed between the control grid and plate. In order that it will not have any detrimental effect on the electron flow from filament to plate, a positive potential is applied to it approximately equal in value to the potential of the electron stream at the point where screen grid is inserted.



Thus this grid does not obstruct the flow of electrons, but provides an effective electro-static shield between grid and plate that greatly reduces the capacity between these two elements. This type of valve is known as a tetrode, or four-element valve, the theoretical symbol for it being shown in fig. 3 (a).

Adding Still Another Grid

With the inclusion of the screen grid, a new effect arises. Some of the electrons flowing from filament to plate knock out other electrons from the latter, and as the screen grid nearby has a positive potential on it, some of these dislodged electrons are attracted to the screen. These electrons are called secondary electrons, and the effect is known as secondary emission.

To overcome it, the introduction of yet another grid, known as the suppressor grid, is required. This gives us the pentode, or five-element valve.

In some types of pentodes, notably those of the output variety, the sup-

(Continued at foot of col. 1 opposite)

What's New In Radio

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

Triplett And Readrite Catalogue

An 8-page catalogue illustrating and fully describing the complete range of latest Triplett and Readrite electrical and radio measuring instruments and testers has just been released by the exclusive factory representatives for Australia and New Zealand—Messrs. W. G. Watson & Co. Pty. Ltd., of Sydney.

All types of instruments and equipment are featured, ranging from an extensive variety of moving coil and moving iron meters to multimeters, oscillators and other service equipment. The catalogue is lavishly illustrated throughout, complete specifications and prices being given for all equipment listed.

Copies of this catalogue will be sent, free and post free, to readers desiring them by Messrs. W. G. Watson & Co. Pty. Ltd., 267 Clarence Street, Sydney.

★

New Line Of American Microphones

An attractive range of American Regal carbon microphones specially designed for amateur or public address work has just been landed by the Australian agents, Messrs. John Martin Ltd., of Sydney. This new line will undoubtedly fill an urgent need that has existed among those requiring a reasonably-priced microphone capable of high-quality performance.

Of the five models available, Model C-7 is a single-button type, while C-8 and C-9 are double-button models, all three being 2½in. in diameter.

Main features include excellent quality and high sensitivity with low carbon hiss, due to the special diaphragm material used and the damping applied to it. The frame is assembled from fully machined alloy castings, finished in polished nickel or chromium. Bakelite is used throughout for insulating. Normal current rating is from 12 to 18 m.a., the double-button models being designed to feed into a 200-ohm per side microphone transformer.

Models A-4 and A-4D (single and double-button) are desk-type microphones housed in cases of cast aluminium, finished in a grey wrinkled lacquer.

Further details are available on request from Messrs. John Martin Ltd., 116-118 Clarence Street, Sydney.

★

Practical Applications of C.R. Oscillograph In Service Work

"Applying The Cathode Ray" is the title of a 32-page book recently compiled by the Paton Electrical Instrument Company, manufacturers of the well-known Palec meters and test equipment.

Written around the Palec Models CR and M1 oscillographs, the book is designed to give servicemen a thorough working knowledge of these instruments and their almost endless applications in radio work generally and servicing in particular. Without doubt, the cathode ray oscillograph is the most versatile testing instrument that has yet been designed, as the applications listed in this book prove.

Apart from the dozens of well-known uses given, one particularly valuable application described is the checking of the overall response of an amplifier, using the oscillograph only. For servicemen specialising in

Radio Step By Step

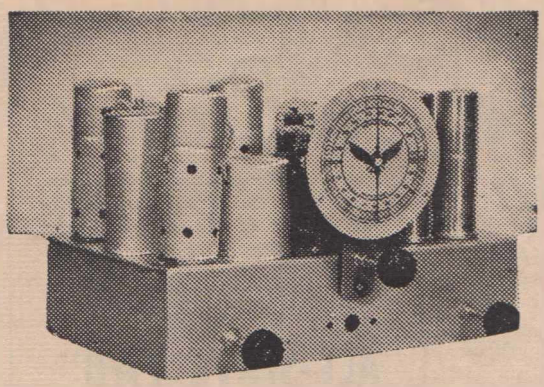
(Continued from opposite page)

pressor grid is connected to the centre point of the filament in the case of battery valve (see fig. 3b), and to the cathode in the case of indirectly-heated valve (see fig. 3c). This "zero potential" grid interposed between plate and screen effectively eliminates secondary emission.

In r.f. pentodes the suppressor grid is not connected internally to filament or cathode, but the connection from it is taken out to a separate pin on the valve base (see fig. 3d).

Other Multi-Element Types

There is a tremendous variety of multi-element valves, used for dual and specialised purposes. However, these need not be considered for some time yet.



The latest Radiokes "Money-Saver," a five-valve dual-wave superhet incorporating many modern refinements, including inverse feedback applied to the output pentode.

public address or talkie work, this obviates the need for a beat frequency oscillator and vacuum tube voltmeter.

Servicemen interested in investigating the possibilities of using the oscillograph in their service work are invited to write the Paton Electrical Instrument Company, 90 Victoria Street, Ashfield, Sydney, for further details.

★

Price's Radio Service Catalogue

Of interest to all amateurs and set builders is the 1937 Radio Catalogue just released by Price's Radio Service, Sydney. This firm is one of the few in Australia that cater specially for radio enthusiasts, so it is not surprising to find listed in their new catalogue many lines that amateur set-builders need, but find difficult to obtain elsewhere.

Raymart midget variable condensers with ceramic insulation, a wide range of vernier dials, condenser scales, microphones and name-plates are among the hundreds of lines listed and illustrated.

"Radio World" readers can obtain a copy of this catalogue free on request by writing Price's Radio Service, 5-6 Angel Place, Sydney, enclosing a 2d stamp to cover postage.

★

New Line Of Midget Jacks

A new line, certain to prove popular among experimenters, that has just been landed by Messrs. A. J. Veall's, of Melbourne, is a complete range of Igranic midget anti-capacity jacks. Neat, compact and simple to mount, they will be found invaluable for many purposes.

An attractive feature is that these jacks are designed to eliminate the capacity that usually exists between the springs of ordinary types of jacks. They are thus particularly suitable for jack switching purposes in radio frequency circuits where ordinary types of jacks could not be used. The springs are of German silver and are tipped with silver contact points to ensure perfect electrical contact. An added feature is that no live metal part is exposed on the front of the receiver or transmitter panel.

These jacks are made in four different types—single open circuit (as used in the "1937 Eaglet" described in this issue), single closed circuit, double circuit, and open and close circuit. All are available from Messrs. A. J. Veall Pty. Ltd., 243-249 Swanston Street, Melbourne, Vic.

★

Latest Radiokes Dual-Wave "Money Saver"

Among the latest Radiokes kit-set releases is the "1937 Moneysaver Super Five," a five-valve a.c. dual-wave superhet incorporating many up-to-date features.

Except that this receiver uses no r.f. stage, it resembles in design the "International All-Wave Six" recently described in these pages. A 6A7 is used as mixer oscillator, 6B7S as combined i.f. amplifier, diode detector and a.v.c. voltage generator, and a 6C6 as first audio stage, driving a 42 output pentode with inverse feedback. An 80 is used as rectifier.

Neat and compact in appearance, this latest "Moneysaver" is simple to build and is a very fine performer on both wavebands.

★

Ever-Ready Air-Cell Reduced

The Ever Ready Co. (Aust.) Ltd. advises that due to the widespread success of the Air Cell throughout Australia, a substantial reduction in price has been made possible. Listing when released at 56/3, the Air Cell now sells at 48/6.

★

Latest "Radiotronics" Gives Valuable Data On Air-Cell Receivers

The total filament current of sets using the new Ever-Ready Air Cell as "A" supply must not exceed .65 amperes, and so designers of this type of receiver will be particularly interested in the two latest battery type Radiotrons to be released in this country—the 1A4 and the 1F4.

The former, taking only .06 amps. filament current, is similar to the 34, except that it is fitted in a smaller bulb, has a short grid base, and is slightly more sensitive. The 1F4 is generally similar to the 1D4, except that the filament current is only .12 amperes, while the plate current for the same power output is about one-third greater.

Using these two valves in conjunction with other Radiotrons, an 8-valve receiver can be designed drawing only .5 amperes, as well as 5 and 4-valve models taking .42 and .36 amperes respectively.

The above information is contained in "Radiotronics" No. 75, published by Amalgamated Wireless Valve Co. Ltd., A table is also given showing 24 different valve combinations for Air-Cell receivers using from 4 to 8 valves.

"Multi Stage Amplifiers" is the title of a further article dealing with the advantages of high plate resistance pentodes over triodes, for early stages of audio amplifiers. Hum and decoupling problems are also discussed.

For the amateur and experimenter, two circuits, together with full constants, are given for a 13 and an 8-valve amateur communications type receiver (details of the smaller model are published elsewhere this month).

The concluding article deals with two types of oscillographs designed to use the latest Radiotron type 913 1-inch cathode ray tube.

Latest Radiotron Receiving-Tube Manual

Supplies are also now available of the latest Radiotron Receiving Tube Manual—RC13. While similar in form to previous editions, many additions and revisions have been made to bring the latest Manual thoroughly up-to-date. Comprising nearly 200 pages, the book lists complete characteristics of Radiotron glass, octal-based, and metal receiving type valves, and gives numerous applications and circuits that amateurs, experimenters and servicemen will find invaluable.

Copies of this latest Radiotron Manual are available from Price's Radio Service, 5-6 Angel Place, Sydney, or from Messrs. Swain & Co. Ltd., 123 Pitt Street (price 1/8, posted). Alternatively, they may be

obtained direct from Amalgamated Wireless Valve Co. Ltd., P.O. Box 2516 BB, G.P.O., Sydney.

★

Amateur Radiotelephony

Above is the title of the latest Frank C. Jones publication, which is written primarily for the amateur interested in 'phone work.

The first few chapters cover, among other subjects, microphones, amplifiers, modulation and modulators, and the procedure for tuning r.f. amplifiers. Constructional details are then given of a multi-purpose 'phone test set, an absorption type wavemeter, and a simple cathode-ray oscillograph. A set of oscillographic patterns covering plate and grid modulation are published, with interpretations.

A varied selection of transmitters is then described, ranging in output power from 5 to 800 watts. Constructional details are also given of an improved Jones "222" metal-valve superhet.

[Obtainable from Messrs. Angus & Robertson, 89 Castlereagh Street, Sydney. Price 4/9, posted.]

Manly Radio Club Notes

BY VK2MR

All the boys are elated over the result of their efforts at the W.I.A. Exhibition. Manly secured three firsts, a second, third, and the "special" for the Club's transmitter, which speaks well for our constructors.

Since the introduction of our regular morse class it is surprising how many of our chaps can now copy at a fair speed. Several new students have joined up, but have had to be classed separately. The great problem of "swotting" up the regulations and the handbook is being tackled seriously at the present time, and it is expected that a few more names will be placed on the "ham" list shortly.

More Interest In 5 Metres Wanted

Work on U.H.F. has not been too brisk lately, owing, no doubt, to the fact that there does not seem enough enthusiasm to keep the ball rolling steadily. We would be very pleased if any five-metre enthusiasts would drop us a line occasionally, making a sked. any week-end, and thereby bringing this band regularly on the air instead of overcrowding the lower frequencies.

All correspondence to this Club should be addressed to the Secretary, 71 Lawrence St., Harbord.

ALL-WAVE ALL-WORLD DX CLUB. . . . . NEW MEMBERS

AW148DX—Albert J. Gibbs, 129 Herbert St., West Subiaco, W.A.
AW149DX—Oscar Yde-Anderson, A. Dormitory, Mt. Isa Mines, Nth. Q'land.
AW150DX—Cedric W. Marley, 20 Louisa St., Highgate Hill, S.1, Sth. Brisbane, Q'land.
AW151DX—Graham M. Hart, 19 Fisher St., Fullarton Estate, S.A.
AW152DX—William Plant, Cnr. Union & Macquarie Sts., Junction, Newcastle, N.S.W.
AW153DX—F. Harten, 40 Legeyt St., Windsor, N.3, Brisbane, Q'land.
AW154DX—C. J. A. Taylor, 20 Bowen St., Kew, E.4, Melbourne, Vic.
AW155DX—G. O. LaRoche, 62 Gladstone Ave., South Perth, W.A.
AW156DX—Victor James Mildenhall, Coff's Harbour Jetty, N.S.W.
AW157DX—Douglas Broel, 18 Anzac St., Canterbury, Sydney, N.S.W.
AW158DX—H. Perkins, 80 Pacific Highway, Roseville, Sydney, N.S.W.
AW159DX—W. A. Aspinall, Westerway Post Office, Tasmania.
AW160DX—C. J. Wegert, Toolooa St., Gladstone, Q'land.
AW161DX—Frederick E. Williams, M.W.I.A., 25 Pendle St., Box Hill, E.11, Victoria.
AW162DX—Adrian Nall, 25 Griffith St., Hurlstone Park, Sydney, N.S.W.
AW163DX—A. McJennett, 135 Constable St., Sth. Wellington, N.Z.
AW164DX—Adrian H. Miller, 32 Brinsley Road, Camberwell, E.6, Vic.
AW165DX—Bernard John McCann, c/o R. C. Sheldon, Castlereagh St., Coonamble, N.S.W.
AW166DX—Aubrey R. Jurd, Box 562 P.O., Ingham, Q'land.
AW167DX—F. Bluett, Midhirst, Taranaki, Nth. Island, N.Z.
AW168DX—H. Doherty, 64 Wing's Line, Marton, N.Z.
AW169DX—H. J. Brennan, 187 Royal Parade, Parkville, N.2, Vic.
AW170DX—Douglas J. Temperley, Tully, Nth. Q'land.
AW171DX—A. E. Bruce, c/o 54 Currie Street, Adelaide, S.A.
AW172DX—Finlay D. McLeod, "Babbacombe," Russell Road, New Lambton Heights, Newcastle, N.S.W.
AW173DX—Philip G. Mitchell, 100 Gormanston Road, Moonah, Tasmania.
AW174DX—Ricardo F. Rubio, Calle 10 No. 4 entre 17 y 19 Vedado, Habana, Cuba.
AW175DX—W. R. Parker, 385 Centre Road, Bentleigh S.E.14, Melbourne, Victoria.
AW176DX—G. H. Luckin, Newall Road, Okato, Taranaki, Nw Zealand.
AW177DX—Kenneth G. S. Wright, 466 Hereford St., Christchurch, E.1, N.Z.
AW178DX—Ken Matthew, 77 Cunninghame St., Sale, Victoria.
AW179DX—J. Mitchell, Pura Pura, Victoria.
AW180DX—Howard Vinning, 33 Macalister St., Sale, Gippsland, Victoria.
AW181DX—Alfred George Vincent Green, 16 Chester St., Mt. Eden, S.2, Auckland, N.Z.
AW182DX—Peter T. Boyle, 197 Great South Road, Green Lane, Auckland, S.E.4, N.Z.
AW183DX—George A. Turner, 26 Cambridge Street, Maryborough, Vic.
AW184DX—Owen Whitaker, George Street, Bundaberg, Q'land.
AW185DX—W. Wilson, York Street, Levin, N.Z.
AW186DX—W. Durbin, 10 French's Road, Willoughby, N.S.W.
AW187DX—Charles Thomas Sallur, 68 Hampshire Street, Victoria Park, Western Australia.
AW188DX—L. A. Just, Oodlawirra, South Australia.
AW189DX—K. P. Mackinnon, 1 Palmer St., Watson's Bay, Sydney, N.S.W.
AW190DX—James Thomas Baker, "Beta," Margaret Road, Orange, N.S.W.
AW192DX—G. Garratt, 21 Holloway Road, Wellington, N.Z.
AW193DX—L. H. Bennett, Upper Landsdowne, N.S.W.
AW194DX—Bob Allard, 13 Bond Street, Devonport, Auckland, N.Z.
AW195DX—Arthur Sharp, 13 Anzac Street, Canterbury, N.S.W.
AW196DX—A. J. H. Croucher, Queen Street, Richmond, Nelson, N.Z.
AW197DX—M. F. Taylor, 223 Brisbane Street, Dubbo, N.S.W.
AW198DX—G. A. Clipsham, 38 Orange Road, Parkes, N.S.W.
AW199DX—Charles Kiepe, Charles Street, Roma, Q'land.
AW200DX—Lennard K. Wilson, Box 7, P.O., Barellan, N.S.W.
AW201DX—Robert J. Russell, Taupo Road, Taumarunui, N.Z.
AW202DX—T. W. G. Garbett, 5 Coromandel St., Newton, S.1, Wellington, N.Z.
AW203DX—L. C. Grainge, 12 Marsden Street, Parramatta, N.S.W.
AW204DX—Frederick Cox, Channon Street, Gympie, Q'land.
AW205DX—B. R. Connor, 8 Cameron St., Devonport, N.1, Auckland, N.Z.
AW206DX—Norman H. Capper, Lambert Street, Thames, N.Z.
AW207DX—Arthur L. Yeatman, 40 Scott Grove, Glen Iris, S.E.6, Melbourne, Victoria.

(To be continued)

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

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

From the Secretary's Pen

While writing of the month's activities it occurred to me that it was about time we thanked "Radio World" for the help given us with our organising work. Without the assistance of this magazine we would have faced a very difficult job, particularly outside N.S.W., but thanks to "R.W." we are now making excellent strides.

It is now the duty of the genuine serviceman to rally with us, for it is numbers that count. Our object, as you know, is to secure Government recognition of the radio servicemen. This must appeal to YOU, so join now in order to help a worthy cause.

Write to the following State organisers and secretaries for application forms:—

Sydney:—Mr. Hook, 287 Clarence Street.

Queensland:—Mr. W. Hudson, C/o. Q'land College of Science, Old Town Hall Chambers, Queen St., Brisbane.

Victoria:—V. H. Blight, 30 Ellis Rd., Glen Iris, S.E.6.; or H. Mendoza, 161 Lygor St., East Brunswick, N.4.

Western Australia:—A. J. Gibbs, 129 Herbert St., West Subiaco.

Tasmania:—J. G. Oliver, 63 North Terrace, Burnie.

Tracing Intermittent Faults

In a recent article appearing in the "Radio World," written by one of our members, cures for intermittent troubles were outlined. I personally found all of these very helpful, but have one thing to add.

As stated in the article, in the case of intermittent faults it is far better to take the set from the house back to the work bench for testing purposes, but often it is wise to hear the set in operation, if possible, in the house first. Though it is often hard for one to be able to do this, I have found that it is a good practice when such a service call comes through to instruct the customer to have the set running for some considerable time before I arrive. The set is thus thoroughly warmed up, and it is in this condition that most intermittent troubles are revealed. Thus a fair idea of what to look for back at the workshop can often be obtained, whereas if one depends on the customer's description one seldom knows.

Eliminating Man-Made Static

Special Suppressor Units Available

By H. HIGGINS (Memb. A.T.R.S.).

LAST month the problem of man-made interference being picked up by the aerial system was dealt with, and a very cheap and effective noise-reducing aerial was described. This month mains interference will be discussed.

Fig. 1 shows an ordinary commutator type of motor which according

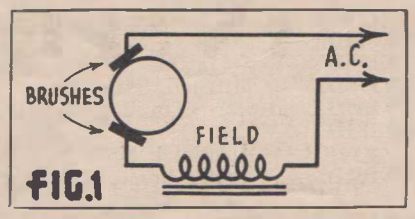


FIG.1

to Mr. Burbury, New South Wales radio inspector, causes 35 per cent. of all man-made radio interference.

Four Types Of Radiation

When the motor is switched on, the armature revolves at high speed, and at the points where the brushes make contact with the commutator, sparking occurs. This results in radiation, which can be picked up by a receiver either in one of four ways:—(a) By direct radiation through the air; (b) by conduction along the power lines to the set; (c) radiation of this interference from house wiring; (d) by re-radiation after transfer to metallic conductors that are insulated from earth.

Mains radiation (c) causes most of the interference encountered by listeners.

Fitting Special Suppressors

The most effective and cheapest method of tackling the problem is at the source, by installing suppressors on the motor that is causing the trouble.

The Ducon Condenser Company recently released a range of devices specially designed for suppressing electrical interference. The method of using the Chanex type H11 Unit is illustrated in fig. 2. Two fixed condensers of high test are housed within a compact metal case. The leads from the unit to the motor must be kept as short as possible. If after it is fitted the interference still persists, the earth connection from the condenser unit to the frame of the motor should be removed. If this causes a reduction in interference, earthing the frame through a suitable r.f. choke is indicated. In this case the centre point of the condenser must go direct to earth and not to the frame.

A Suitable Choke

For motors of fractional horse

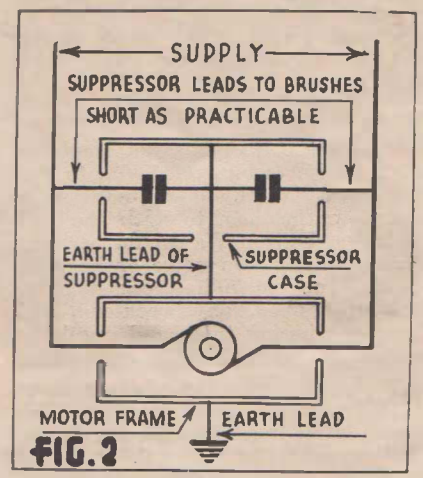


FIG.2

power, a honeycomb coil of 200 or 250 turns is quite suitable. The wire used should be capable of carrying one-third the normal load of the machine, for the interference current can be quite large.

[Note: An 8-page booklet entitled "The Suppression of Radio Inductive Interference" is available from the Ducon Condenser Pty. Ltd., 73-83 Bourke St., Waterloo, Sydney, and contains much valuable practical data on eliminating man-made static. "Radio World" readers writing to the address given will receive a free copy by return mail.—Ed.]

Locating And Curing Hum

Systematic Search Gives Best Results

By G. SIDLER (Memb. A.T.R.S.).

THERE is a certain amount of hum in almost all a.c.-operated receivers, but it is generally imperceptible a few feet away from the set, and music easily drowns it. However, it is sometimes present to an unpleasant degree, and in such cases the following hints on eradicating it will be found useful.

Stage By Stage Examination

Hum, generally, is not a big problem. That is to say, it is not as hard to trace as intermittent troubles. The logical way to track it down is to go over the set stage by stage, starting at the speaker and working backwards towards the aerial. By "shorting" (with, say, a .5 mfd. condenser) first the input and then the output of each stage successively, the search can be narrowed down appreciably.

Faulty Electrolytics Are Often Cause

In commercial receivers, a common cause is faulty electrolytic condensers. This is particularly the case with older sets using the earlier dry type, which by now have had some years of service.

Some of the low voltage, high capacity condensers (25 mfd.) are also causing trouble when used as by-pass condensers across bias resistors. While not actually breaking down, they give quite a low resistance reading, which, in parallel with the proper bias resistor, lowers the bias to such an extent that hum and sometimes distortion occurs. A faulty valve that may check O.K. on a tester can cause hum, and replacement is the only way to check up on this. The detector is particularly critical in this respect.

Hum Due To Induction

An overloaded power transformer will cause hum which cannot be eradicated in the circuit itself. Also, a transformer which is larger than one which is required will give less hum than one which is just the right size. Sometimes the addition of another choke or filter condenser will not make the slightest difference to the hum level. This generally denotes hum in an earlier part of the circuit, probably due to induction.

Hum by induction is caused by audio transformers or chokes being too close to the power transformer or smoothing chokes. This can be remedied by placing audio components with their fields at right angles to, or a distance apart from, the power supply, and earthing the shields of the parts concerned.

If an audio transformer is causing hum, break all the permanent connections to it and attach flexible leads. Now lift it in one hand and slowly rotate it, until the position of minimum hum is found. It is also often an advantage to mount a transformer giving trouble

in this way above the chassis, and insulate it from the latter.

Induction will affect any audio leads, especially in the detector grid circuit. The connections running to the secondary winding of the second intermediate frequency transformer are very susceptible to stray hum, and if shielding is not desirable, care should be taken to see that they are well away from a.c. leads. This applies to diode plate connections as well as grid, as the hum is fed in, not via the diodes themselves, but through the winding into the grid.

Short Pick-Up Leads Desirable

Pick-up leads should be as short as possible, and every inch of them shielded. There is generally a right and a wrong way to connect pick-up leads for least hum and best operation, which will be revealed by experimenting. Reversing the plug in the power socket will sometimes make a difference in the hum level, and will also correct a tendency for the operator to receive a slight shock on the arm or back of the hand when the chassis is contacted.

Loose laminations, or a loose winding in a power transformer, besides causing a mechanical rattle, will actually cause a high-pitched hum in the set, while a detector valve shield making dirty contact to the base can cause a very bad hum.

When filament centre-taps, or components which are connected to the high tension supply, directly or indirectly, such as decoupling by-pass condensers, negative leads of electrolytics, etc., are required to make contact with the chassis, do not earth them on or near the earthed pick-up terminal, even though it is connected to the chassis. Make another point of contact a little distance away. This has been found to cause a hum very difficult to track down.

Adequate De-Coupling Often a Cure

Some commercial receivers make use of two electrolytics before the speaker field. This is only a slight help, and is not effective in all cases. Thorough decoupling is to be preferred. Plates of detector and driver valves should be decoupled with resistors of approximately 1-5 to 2-5 of the value of the plate resistors (in resistance-capacity-coupled circuits) with by-pass condensers of .1 or .5 mfd. or even larger. The condenser values can be determined by experiment.

Motor-boating is a form of hum where the frequency is very low. This indicates an insufficiency of filtering, or in resistance-coupled circuits of more than one stage, feedback. In commercial sets a defective by-pass across a bias resistor can be suspected, while in an experimental receiver more elaborate decoupling will generally cure the trouble.

Where the motor-boating takes the form of very slow "popping" or even clicking at long intervals, this generally indicates an open grid in the detector or driver stage. Distortion of music, together with hum, can be due to the same cause, as is also intermittent hum.

Curing Modulation Hum

A hum which appears only on stations and not in between is known as modulation hum. Most transformers have an electrostatic shield between the primary and secondaries, which has one end left open, and the other brought out to a lug which should be earthed.

Where one is dealing with an old type of transformer without an electrostatic winding, however, a condenser of .001-.01 mfd., and of a high voltage rating, should be connected between one side of the power line and earth. Another remedy is to connect a .001 mfd. to a .01 mfd. mica condenser from each rectifier plate to rectifier filament.

Another form of modulation hum originates in the mixer valve in a superheterodyne circuit, where the plate supply of the valve in question is insufficiently filtered. Decoupling will remedy this.

Some of the very old sets still in operation use a 226 as a driver. This is a directly-heated valve, and an improvement in hum level is generally effected by replacing with a 227 or 56. Watch the filament voltages, however, as the 226 operates on a voltage of 1.5.

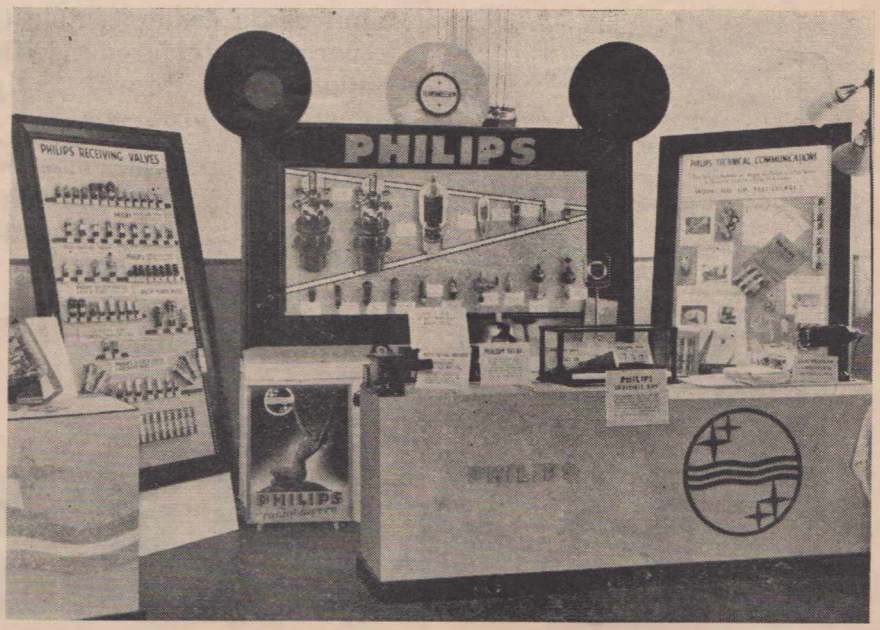
When the output valve bias is too low, hum will result. It is better to err on the side of too much bias. This, while not being conducive to fidelity, will result in a lower hum level and longer valve life. While on the subject of fidelity, it is as well to point out that a set with a good bass response will respond to hum, which is a low audio frequency, more readily than a set with a poor response in the low register. This makes the job a little harder, but not by any means impossible.

When Testing For Hum

When testing for hum on the workbench, make sure the speaker has a baffle. Otherwise most of the bass will temporarily disappear, and the hum with it, only to reappear again when the set is replaced in the cabinet.

The writer's own receiver uses two chokes and three electrolytic condensers in the high tension filtering for all the valves, and an additional choke for filtering the plate supply of the detector and driver valves. This latter choke is in the form of the secondary of an old audio transformer, which is quite efficient in this case, as the current is less than 2 milliamps. Thorough decoupling is also used throughout the audio stages.

When the set is running not tuned to a station, it is quite impossible, even when standing alongside it, to tell whether it is switched on or not.



The Philips Stand at the W.I.A. amateur radio show held in Sydney last month. In addition to a complete range of receiving valves and transmitting pentodes, exhibits comprised various types of microphones, cathode ray tubes, photo-electric cell gear, and a 60-watt "Maxiwatt" amplifier.

The All-Wave All-World DX News

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

★ ★ ★

Cuban S.W. Broadcasters

Below is given an up-to-date and authentic list of Cuban shortwave stations, supplied by AW174DX—Mr. Ricardo F. Rubio, of Habana, Cuba. He writes:—

"During the last ten months I have been logging stations. I have reported to around 300 and have received about 200 verification cards or letters. From your country I have received VK2ME, 3ME, 3LR, 8XT, 8SC, 2DL and 9MI."

CUBAN SHORTWAVE STATIONS.

COCD relays CMCD.—Slogan and owners "La voz del Aire S.A." Address: Apartado No. 2294, Habana, Cuba. Frequency: 6,130 k.c. Power: 250 watts. Wavelength: 48.92 metres. Operating schedule: 5.00 to 12.00 p.m. daily.

COCH relays CMBC.— Owners: General Electric Co. of Cuba. Address: Apartado No. 41, Habana, Cuba. Frequency: 9,428 k.c. Power: 750 watts. Wavelength: 31.80 m. Operating schedule: 7.00 a.m. to 12.00 p.m. daily.

COCQ relays CMCF.—Owner: Luis Casas, Jr. Address: Apartado No. 98, Habana, Cuba. Frequency: 6,010 k.c. Power: 500 watts. Wavelength: 49.92 m. Operating schedule: 8.00 a.m. to 11.00 p.m. daily.

COCX relays CMX.—Uses the slogan "La voz del Radio Philco." Owner: Francisco A. Levin. Address: Apartado No. 32, Habana, Cuba. Frequency: 11,435 k.c. Power: 2 kilowatts. Operating schedule: 8.00 a.m. to 12.00 p.m. daily.

COCQ relays CMQ.—Uses the slogan "De la RCA-Victor." Owners: Cambo and Gabriel. Address: Calle 25 No. 445 entre 6 y 8, Vedado, Habana, Cuba. Frequency: 9,750 k.c. Power: 4 kilowatts. Operating schedule: 7.00 a.m. to 12.00 p.m. daily.

CLX-Observatorio Nacional, Habana, Cuba.—Broadcasts weather reports at noon daily; on Saturdays at 9.30 p.m., work XBA at Tacubaya, Mexico. Frequency; 6,990 k.c. Wavelength: 42.89 metres. Send reports to Ing. J. Carlos Millas, Director del Observatorio.

CO9RY relays CMGF.—Owner: Bernabe de la Torre. Address: General Betancourt No. 51, La Playa, Matanzas, Cuba. Frequency: 6,240 k.c. Power: 750 watts. Wavelength: 48.08 m.m. Operating schedule: 6 to 10.00 p.m. daily.

COHB relays CMBH.— Owners: Weiss, Ramirez and Madrigal. Address: Apartado No. 85 Sancti Spiritus, Sta. Clara, Cuba. Frequency: 6,280 k.c. Wavelength: 47.77 m. Operating schedule: 9.00 to 12.00 noon—4.00 to 6.00 p.m., and 9.00 to 11.00 p.m. daily.

CO9JQ relays CMJA.—Owner: Ing. Rafael Grimany Varona. Address: Apartado No. 64 Camaguey, Cuba. Frequency: 8,665 k.c. Power: 150 watts. Wavelength: 34.00 m. Operating schedule: 5.30 to 6.30 and 8.00 to 9.00 p.m. daily.

COKG relays CMKG.—Owners: Hermanos Grau. Address: Apartado No. 137, Santiago de Cuba, Oriente, Cuba. Frequency: 6,200 k.c. Power: 2 k.w. Wavelength: 48.39 m. Operating schedule: 5.00 to 6.00 p.m. and 9.30 to 10.30 p.m. daily.

(All times quoted above are Eastern American Standard.)

American DXer Wants To Swop QSL's

In the last American mail came a letter from an S.W. listener over there asking me if his name and address could be published, as he wants to exchange QSL's with readers in Australasia. His QRA is Bill Matchett (W1KKS), 81 Bissell St., South Manchester, Connecticut, U.S.A. Also, my own QSL will be exchanged with other members.—Maurice Tierney (AW77DX), 62 Connemarra Street, Bexley, N.S.W.

ALL-WAVE ALL-WORLD DX CLUB
Application for Membership

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

Dear Sir,

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

Name.....

Address.....

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

.....

My set is a.....

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

.....

.....

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

(Signed).....

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

Best Reception On Higher Frequencies ★ New South Americans ★ Africans For That 'VAC' ★ Spanish War News ★ Details Of Some "Mystery" Stations.

LOOKING back over reception for the past month, two things stand out. In the first place, conditions have varied considerably from day to day on all bands. These changes from good to bad and vice versa seem to depend largely on weather conditions, a cool change usually bringing a noticeable falling-off in reception.

Secondly, speaking generally, reception has been better on the higher than on the lower frequencies. For example, 13 metres has been very consistent, which is more than can be said for any wavelength above the 31-metre band. On 49 metres, reception has been especially disappointing; however, a slight improvement was noted towards the middle of May, and in the next month or so better things may be confidently expected.

Ultra-High-Frequencies Variable

While conditions between 31 and 13 metres have been fairly consistent, below 13 metres reception has varied considerably (with the exception of **W6XKG**).

On 9.4 metres, little has been audible except a fairly weak heterodyne whistle, above which occasional bursts of music can be heard. It is an impossibility to definitely identify the stations there.

W6XKG have been remarkably good of late. Almost any time during daylight hours reasonably strong signals can be heard—often reaching a steady R8, with almost negligible QSB. By the way, do not be deceived by their Spanish session, which is usually heard around 1.30 p.m.

The other 11-metre transmitter, **W9XAZ**, has been logged only on isolated occasions, and then at weak strength.

Reception on the police bands has fallen right off, and usually only a few weak carriers are audible. **W5XB**, Fort Worth, are occasionally identifiable on 7 metres.

South Americans—Two New Stations

In the May issue of the "Radio World," reference was made to a new Peruvian station heard on the 25-metre band, and whose call was thought to be **OAX4A**. This station has now been definitely identified. Its correct call is **OAX5B**, "Radio Universal," and it is located in Ica. It operates on a frequency of 11,795 kc., 25.4 m.

The other Peruvian station, **OAX4J**, Lima, on 9,330 kc., 32.15 m., is being heard particularly well in the early afternoons. As it signs off with "Goodnight Sweetheart," it can be easily identified.

Chile On 24 Metres

The second South American to make an appearance is a station located in Santiago, Chile. Considerable confusion exists as to its exact call-sign and frequency. It has been variously reported as being on 12,300 and 12,400 kc., but actually it seems to be nearer 12,140 kc., just above the English 'phone **GBS**. It is heard around 8 a.m.

Argentine On 19 And 31 Metres

Having recently increased its power to 10 kw., **LRX**, Buenos Aires, has been heard fairly well on 9,660 kc., 31.06 m. It has been heard best around 2 p.m., but can also be heard opening with a slow musical number at 10 p.m., when **LRU** also come on the air on 15,290 kc., 19.62 m.

Colombia And Brazil

With the approach of winter conditions, **PRF5**, Rio de Janeiro, are beginning to come in well just above **GSB**, on 9,500 kc. They usually open at 7.45 a.m.

Three Colombians are being heard on the 31-metre band. The best of these is **HJ1ABE**, Cartagena, on 9,505 kc., opening at 10 p.m. At the same time, **HJ1ABP**, also in Cartagena, can be logged on 9,600 kc. **HJ4ABH**, Armenia, has been reported on 9,520 kc., just between **GSB** and **W2XAF**.

Central Americans

XBJQ is the outstanding station reported from this section of the globe. It operates irregularly on a frequency of 11,200 k.c., 26.79 m. Two other Mexicans which can now be logged (although not regularly) are **XEWI**, 11,900 kc., just below **TPA3**; and **XEFT**, Vera Cruz, 9,490 kc., between **EAQ2** and **PRF5**. Both are heard in the early afternoons.

Special Short-Wave Section

This issue of the "Australasian Radio World" marks the inauguration of a special short-wave DX section, designed to provide readers with a comprehensive and up-to-date resume of short-wave reception.

If this objective is to be attained, it is essential that readers interested in DX work should co-operate with the Short-wave Editor, by forwarding information concerning reception conditions in their locality; and this applies especially to new stations heard, whether definitely identified or not. A special section of "The World On Shortwave" will be devoted to a discussion of "mystery" stations reported, so that these may be identified as speedily as possible.

All information supplied will be acknowledged in these columns: and queries regarding the identity of stations heard will be answered either through the "ARW," or direct if so desired. (In the latter cases a stamped and addressed envelope should be enclosed). Moreover, the Short-wave Editor will be pleased to supply the addresses of any amateur (or, for that matter, any commercial) stations, to whom listeners desire to forward reports.

Finally, watch this column next month for an announcement of special interest.—The Editor.

Of the Costa Ricans, TIPG, 6,410 kc., are best. They are one of the few low-frequency stations heard regularly. Opening at 10 p.m., they can be identified by the fact that their first number is a march. TI4NH, Heredia, on 9,670 kc., are best logged on Sunday afternoons, when they extend their hours of transmission to about 4 p.m. A special programme on Sunday, May 2, which continued until 4 p.m., was well received.

HP5K, Panama City, can still be heard on the 49-metre band, 6,005 k.c. Like many other of the South and Central Americans, they open at 10 p.m., their identifying tune being the "Merry Widow Waltz." HP5J, also located in Panama City, are reported to have changed their frequency from 9,590 to 9,600 kc.

TGWA, Guatemala, have been continuing their Sunday afternoon session till as late as 7 p.m. (9,450 k.c.). It is rumoured that this station will verify, even if no I.R.C. is enclosed, as they have governmental franking privileges. Sounds too good to be true!

West Indies—Cuba

A quartette of Habana stations are attracting the attention of dxers at present. They are COCX, 11,435 k.c., COCQ, 9,740 k.c., COCH, 9,428 k.c., and COCD, 6130 k.c. The last-mentioned is to be heard practically every Sunday afternoon around 4 p.m.

Europeans—Spanish War News

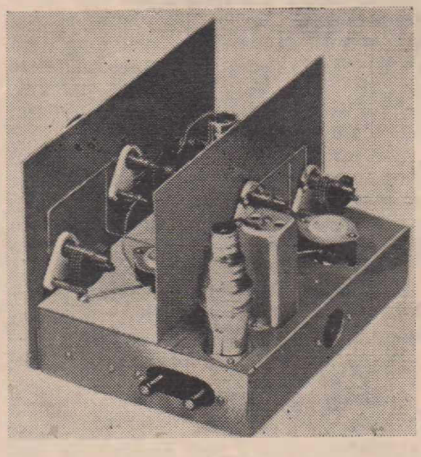
As all amateur and commercial transmitters have been commandeered for propaganda purposes by either the Government or rebel forces, there is no lack of latest war news from Spain. The majority of the transmitters work on the 40-metre amateur band, using an amazing collection of confusing calls.

The following have been reported as being on the air more or less regularly (listen for them in the early mornings):—ECNI (or is it ECN1?), Barcelona, 7,220 k.c.; Seville, on 7,000 k.c.; another station in Barcelona, on 7,020 k.c.

Around 31 metres EAQ2, EAH or UGT, as it has been variously reported, is on the air every morning above GSB, while higher in frequency, on 9,860 k.c., is EAQ, whose sigs. are still fairly loud, even if they are marred by a high noise level.

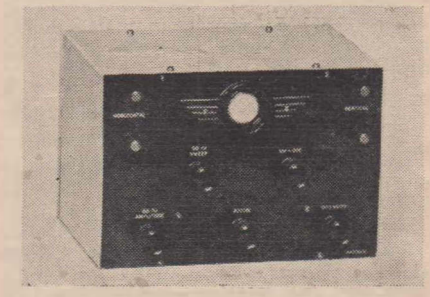
Finally, there is EA9AH in Tetuan, Spanish Morocco, now heard on 14,200 k.c., in the middle of the 20-metre amateur band. The address for this station is Apartado 124.

As the majority of the other European stations are logged more or less regularly by most dxers, there is no need to do moe than just mention them. Listen for OLR4C, Prague, on 25 metres; ORK, Ruysselede, Belgium, 10,330 k.c.; LZA, Sofia, 14,970 k.c.; PHI, Huizen, 17,775 k.c.; CT1AA, Lisbon, 9,650 k.c.; and OER2, Vienna, 6,072 k.c. Incidentally, Daventry were heard with three transmitters on 13 metres at 9.45 p.m. on May 10. These were GST (21,550 k.c.), GSJ (21,530 k.c.) and GSH (21,470 k.c.).



Jones' "Super-Gainer" At This Year's Show

This two-valve superhet and midget cathode ray oscillograph were displayed by Price's Radio Service at this year's Amateur Radio Show, and excited much interest among set-builders and amateurs. The superhet—a modified version of the well-known Jones' "Super-Gainer"—will be described next month. The oscillograph shown below uses a 913 1-inch cathode ray tube, and is designed specially for amateur use.



Some European 'Phones

Unlike many of the 'phone stations in the Eastern hemisphere, those in Europe will still verify. The addresses for the various countries are as follow:—

English 'Phones: Engineer-in-Chief's Office (Radio Branch), G.P.O., Armour House, London, ECI.

French 'Phones: 166 rue de Montmartre, Paris.

Dutch 'Phones: Parkstaat 29, S'Gravenhage, Holland.

German 'Phones (DAN, DAF, etc.): Hauptfunkstelle Nordeich, Norden-Land, Germany.

Listen for these English 'phones after 5.30 p.m.:—GAQ, 18,970 k.c., working ZSS, Capetown; GBS, 12,150 k.c., working New York; GBL, 14,653 k.c., working Tokyo; GAS, 18,310 k.c., working WLA, New York; and GBP, 10,770 k.c., working Sydney.

Of the Germans, DFD, 14;665 k.c., calling Tokyo (JVH) around 5 p.m. is a good bet. Two others heard recently are DAN, 11,340 k.c., and DAF, approx. 17.4 metres (exact frequency unknown).

The two French 'phones most likely to be heard are FTK, 15,880 k.c., working Saigon, and FTA, 11,940 k.c. (near KKQ), who occasionally relay b-c programmes.

Africans—North and South

Whilst listening for GAQ mentioned above as being heard on 18,970 k.c., keep a good lookout for the Cape Town station, ZSS. ZSS are on 18,890 k.c. They will verify all reports, even when only inverted speech is heard. Address is Overseas Communication of South Africa Ltd., P.O. Box 962, Cape Town, Union of South Africa.

The Portugese East African station in Lourenco Marques is reported to have settled down to regular transmissions as follows—on 11,710 k.c. (a fraction above TPA4) with the call CR7BH; and on 6,137 k.c. (just near COCD), with the original CR7AA call.

Since the Italians took control of Ethiopia, there has been a considerable amount of activity among their African 'phone stations. About a month or so ago Asmara were heard extremely well on 14,500 k.c., being easily identified by a 5-note musical call. Recently, however, they have not been logged.

Watch out for these other African stations:—IUC, Addis Ababa, 11,955 k.c., calling Rome (IAC) at 3 p.m.; IUG, 15, 450 k.c., also calling Rome, around midnight; ITK, 16,385 k.c., Mogadiscio, Italian Somaliland, calling Rome after midnight; and IUC, this time on 11,955 k.c., calling Rome in the very early morning.

Reports on all these stations (and the Rome station whom they contact) will be verified if forwarded to the Ministry of Marines in Rome.

More 'Phones—This Time In China

Several Chinese 'phone stations have been coming in at good strength during recent months. The loudest and most consistent of these is XOJ, Shanghai, on 15,800 k.c. Usually XOJ use inverted speech, but they call the station they want in

clear speech, and will, of course, verify on this. The stations they work most often are London and Tokyo.

XGW, Shanghai, 10,420 k.c.; XPC, 9,285 k.c.; XTV, 9,490 k.c.; and XTB (or G?) on approx. 11,400 k.c., have been reported.

Send reports to Mr. T. C. Loo, Chinese Govt., Radio Administration, Sassoon House, Jinkee Rd., Shanghai, China.

May Day—And Some New Russians

As in previous years, May 1st proved a good day for reception of some new U.S.S.R. transmitters. The May Day celebrations were heard from 9 p.m. on no less than seven frequencies.

Some of the stations heard were regulars—RKI (15,090 k.c.), ROU Omsk, Siberia (14,790 k.c.), RNE (12,000 k.c.), and RV15 (4,250 k.c.). The three others were on the following approximate freqs.:—12,800 k.c. (23.4 m.), 12,230 k.c. (24.5 m.), and 8,500 k.c. (35.2 m.).

The calls of these last-mentioned stations are not yet known, but reports have been forwarded through the Foreign Bureau of the All-Union Radio Committee, Moscow.

Incidentally, the 35-metre station just mentioned seems to go fairly regularly in the evenings.

The Americans

At present the Americans are "just ordinary." W1XAL is the best on 25 metres; W1XK and W2XAF are fair on 31; W9XF and W8XAL can be logged on 49 m. some afternoons; and W3XAL are quite good on 16 metres after midnight.

A number of American 'phones have been heard lately. Most of these, especially those owned by R.C.A., will not verify. One exception to this rule is that the stations at Dixon, Calif., do still verify. Address is 140 Montgomery St., San Francisco, Calif. The best of these Dixon stations are KWO, KWU and KWE. The two first-mentioned are regulars on 15,415 and 15,355 k.c. respectively.

KKP, KKQ and KKZ in Bolinas, Calif., have been on point-to-point transmission for Hawaii on 16,030, 11,950 and 13,690 k.c. They will not verify.

A Couple Of Ship Stations

Readers are advised to keep tuned to 17,310 k.c. around 1 p.m. for ship station WMEF. Fair signals were heard from this source on May 6th, when WMEF was located in Honolulu, Hawaii. On the 14th, very strong sigs. were logged, WMEF having moved south to the Phoenix Is. in the South Pacific. The station is a N.B.C. transmitter on the U.S.S. ——— (?), conveying some expedition to a number of the uninhabitated Pacific groups, presumably for scientific purposes.

The Japanese s.s. "Chichibu Maru"—call letters JFZC—has also been heard on the 17-metre ship band, calling KWO.

On The Amateur Bands—10 And 20 Metres

As many listeners are very much interested in reception on the amateur bands, a certain amount of space will be devoted each month to some of the more unusual amateurs heard, especially on 20 metres, which seems a happy hunting ground for dxers.

Reception on 10 metres has been rather good, taken all round. A large number of American and Hawaiian calls have been heard, in addition to some very loud ZL sigs. 10-metre 'phone veries to hand include the following:—WIDEY, W3DRA, W5DLC, W6DTB, W7FQK (acknowledging first S.W.L. report from Australia), W8QDU; K6MVX, K6EXP; and ZL4FW.

On 20 metres North and South Americans continue to be most plentiful, with a few Europeans and Easterns to make good measure.

Calls heard include:—LU1CA, LU6KE; OA4B, OA4AB, OA4N, OA4R; CE3DW; YV5AK; XE1LK, XE1AX, XE2AH; VE1DT, VE2DC, VE3HX, VE3LL, VE3QZ, VE4AW, VE5BF, VE5JB; CO2AY, CO2WW, CO2JG, CO7CX; XU8HW; J2KJ, J2MI; KA1AP, KA1MD, KA1MM; PK3WI, PK6HI; F3CP, F3JD, F8KW, F8MG; G6XN, G2XV, G6GF, G5JO, G2PU, G5RV, G6DH, G6LK, G6XM; and LA1G.

20-metre veries from VR2FF, PK1MX, PK3ST, HI7G, VS2AK, KA1MD, VS6AB, VE2JJ and VE2DC. The last-mentioned, VE2DC, is particularly anxious to contact some VK hams—his frequencies are 14,106 and 14,145 k.c.

Some "Mystery" Stations

1. A South American just above TIPG, on approx. 46.9 m. May be one of the Venezuelans in Caracas—YV5RH or YV5RF.

2. A French speaking station on 9,520 k.c. (31.51 m.). Is heard in the mornings between GSB and W2XAF, closes just on 8 a.m. May be Radio Tananarivo in Madagascar, or perhaps Saigon.

3. Another French station on approx. 7,470 k.c., or 40.1 m. Heard on Sunday nights at 9.30 p.m.

4. A foreigner, almost certainly a Russian, on approx. 18,060 k.c. or 16.6 m. Heard in the early evening of May 7th, closing down at 8.30 p.m.

Station News From Overseas

A new Canadian has just come on the air. This is CFRX. 6.070 k.c. It relays the Canadian Radio Corporation's station, CFRB. Schedule at present is irregular.

CSW now operates on three frequencies—11,875 k.c., 11,040 k.c., and 9,930 k.c., which corresponds to 25.5, 27.1 and 30.2 metres.

ZBW will shortly change over to its summer-time frequency. Either 11,755 or 15,190 k.c. will be used.

"La Voz de Chiclayo" is the slogan of another new Peruvian, OAX1A on 6,125 k.c.

Revised calls of the Venezuelan stations are now as follow:—YV1ORSC is now YV3RC; YV8RB is now YV3RA; YV7RMO is now YV1RE; YV11RB is now YV6RB; YV4RC is now YV5RF, and YV3RC is now YV5RD.

Belgrade is planning a new 5 k.w. station. In the meantime, arrangements have been made to relay the Belgrade programmes through the Philips stations on 31 and 19 m. (PCJ).

Stop Press News

REGARDING the second "mystery" station mentioned above, it was thought that this was a French station, but it now appears that it is a Norwegian. The call-sign is uncertain—LCJ1 or LKJ1.

A new transmitter, located in Rangoon, Burma, is being heard on 6,006 k.c. (49.94 m.). At present there are two transmissions: trans. 1 is from 12.10-12.40 a.m.; and trans. 2 begins at 10.10 a.m.

Expedition To Study Solar Eclipse

Here is some further "dope" concerning station WMEF referred to above. An expedition of scientists—sponsored by the National Geographic Society and the United States Navy, in co-operation with the National Bureau of Standards, Carnegie Institution, and Cornell, Georgetown and Virginia universities—will attempt to capture secrets of the sun by recording the drama of the solar eclipse on June 8. The expedition will be located on Enderbury and Canton Islands, in the Phoenix group.

Further Signals On 7 Metres

Despite unsettled weather conditions, which usually have a damping effect on high-frequency reception, some further signals were heard on the 7-metre police band. Two new stations were logged: W4XAG, Rome, Georgia, and W5XAW (?), location unknown.

Verifications To Hand

A further batch of verifications are to hand:—Commercials: W9XPD, 9.494 metres, station of the St. Louis Post-Dispatch, relays KSD. They acknowledged my report of March, mentioning that it was the first that

(Continued at foot of col. 1 opposite)

DX News and Views

A page for letters from DX readers

★ ★ ★

New Central American S.W. Stations

Two new Peruvian s.w. stations, both owned by the Government, can be heard early in the evenings. OAX4Z on 9.562 m.c., 10 k.w. and OAX4Y, on 6.092 m.c., 15 k.w. Both are located in Lima.

The new Mexican XEPW on 6,110 m.c. can be heard in the afternoon till 6.00 p.m. It is owned by Jose G. Garga, Apartado Postal 8403, Mexico City. Another new Mexican, XEBM, has been heard on 15.4 m.c. from 7-9 a.m. and 2-5 p.m., A.E.S.T. The station is known as the "El Pregonero Del Pacifico"—"The Crier of the Pacific."

A new Panama station, HP51, 11.900 m.c., announces as "La Voz del Interior," and operates from 2-6 p.m. It is located in Aguadulce, Panama. Times are A.E.S.T.—W. T. Choppen (AW61DX), Timaru, N.Z.

Club Stationery Wanted

I have been in your radio club since June last year, and wish to congratulate you on the fine club badge, certificate, report forms, and above all that excellent magazine, the "Radio World." I have bought all the copies up to date and wish to say that the information given in them is great, and also the call-signs of Australian and N.Z. amateurs, as before it was hard to get the address of any amateurs logged.

I would also like to make a suggestion. Members would, I am sure, appreciate club stationery, i.e., writing paper and perhaps envelopes.—Maurice Tierney (AW77DX), Bexley, N.S.W.

[Glad to know you like "R.W." Re your suggestion for club stationery, this can easily be made available if there is sufficient demand for it. Perhaps other members would let us have their ideas on the subject.—Ed.]

"Flying Doctor" Station Logged

VK8SC, the Flying Doctor station at Port Hedland on 6.95 m.c., was heard here at Q4; R6-7 on Sunday, April 18. I think this station should come in quite all right in other eastern States. I also heard two pedal stations talking to VK8SC, but they were only Q2, R3-4.

DX on 20 metres has been poor lately, but it is beginning to pick up now. Yesterday I heard the following:—GM6RG, TI2KT, YV5AK, F3UI, FBBU, OA4AI, CO2LY, KA1MD, VE's 5OT, 4AW, 3HP, 5JB, and the usual W's and K6's.

Dxer Eliot A. Glenie (AW21DX), of Melbourne, Vic., with his home-made Reiss microphone (top right). AW21DX operates a five-valve dual-wave Stromberg-Carlson, using the loop aerial shown in the lower photograph.

My receiver is a 4-valve t.r.f.—r.f. e.c. det., and two audio. The aerials are a vertical 20-metre half-wave, and a 20-metre Bruce directional, S.E. and N.W.—Jamie Ferrier (AW129DX), Coleraine, Vic.

20-Metre DX Excellent

Amateurs on 20-metre 'phone still continue to provide plenty of interesting DX, new countries logged being SM7YA, OK3VA, LY1V, FA8HQ, GI2KN, VO1T, CT2AG, VS7JW, VP6YB, LAIG, while several V's (2KJ, 2MI and 2MG) have also been heard, together with HI1C, F8KG, ON4JB, G's, 2QF, 5XR, 5TZ and 2SM. QSL's received here have been SU1KG, PK3WI, W3AHR and CX3BL. Of the commercials, HJ4ABD, HJZABA, OAX4G, TIEP, TG2X, OAX5A and HJ4ABH have been logged.

In the early mornings about 6.30 a.m. (N.Z.S.T.) foreign 'phones are audible on 40 metres, but so far have defied identification. I would appreciate any hints on when and where to look for South African 'phones on the 20-metre band.—B. Russell (AW201DX), Taumarunui, N.Z.

VK's Logged In New Zealand

During the last fortnight I have logged the following stations on the 20-metre band:—VK's, 2IQ, 7YL, 7CL, 2OB, 4VJ, 3RW, 4VD, 2HF and CE1AH, HI7G (all "hams"). Commercial stations were DGQ, LRU, ZBW (3), GZG, COCQ.

I now have a new QSL card, and would like to exchange with other readers.—A. Green (AW181DX), 16 Chester St., Mt. Eden, S.2., Auckland, N.Z.

DX-ing With A Stromberg-Carlson

May I again congratulate "A.R.W." upon the excellent standard that has been maintained over the past twelve months. I find the articles on "Breaking Into the Amateur Game" invaluable to me, as I intend to try for an A.O.C.P. at the W.I.A., which commences its course at the end of the month.

I have had very little time for DX lately, but logged some 50 Americans and 35-40 Australian amateurs during a total of six hours. I was listening for two nights between 8 and 10 p.m. during the American DX Contest and heard the above stations at speaker strength on a new Strom-

Stop Press News

(Continued from opposite page)

they had received from "Australia, or even from that part of the world."

XEWI, 25.2 metres, "My Voice to the World from Mexico," mention that they may be transmitting on their other frequency, 6,015 k.c. (49.88 metres).

DFB, German 'phone on 17,520 k.c. (17.12 metres). Address of German DF—'phones is Schonebergerstr, 11/15, Berlin-Tempelhof.

Amateurs:—10 m.: W2ITL, W7FDL, W8ANO, ZL3KZ and ZL4AO. 20 m.: VE3ACK.

Incidentally, W2ITL and W8ANO are anxious to receive further reports on their 10 or 20 m. 'phone signals.

berg-Carlson eight-valve A.C. receiver.

I have erected a 35-foot aerial pole and will instal a 125-foot inverted aerial when I finish building a small three-valve A.C. set and the code practice oscillator described in the February "Radio World."

I have the "Two-Band Crystal-Controlled Transmitter" in mind if I am successful in respect to the A.O.C.P. licence.—Reg Veall (AW-26DX), Melbourne, Vic.

Recently-Received Verifications

Conditions have not been too good lately, but I have been logging stations fairly freely. I have received QSL cards from the following since I last wrote:—HI7G, DJE, DJB, VU7FY, JVN, PCJ, W4DBC, W6LLQ, OA4R, W4DLH, W6LIP, ZL's, 4CU and 4AD, and about 10 to 15 locals. —Ern. Neill (AW64DX), Q'land.

Amateur S.W. Superhet Wanted

Could you design a shortwave set of the type outlined below, and describe it in your useful journal? I am sure it would supply a much-felt need.

It can best be described by reference to the "1937 International Six" you have featured. It would be like that set (perhaps without the broadcast band coils, or even without switching for changing coils), but with (1) band-spreading, and beat oscillator on 2nd detector; (2) tuning down to 9 m.; (3) perhaps a separate oscillator for stability; (4) 'phone jack which cuts out the 42 valve.

Such a seven-valve set (without complications as in the 13-v. Radiotron Senior Amateur Receiver) would satisfy both the enthusiast for DX work and his family for S.W. programme entertainment.—"Hopeful," (Bendigo).

[An article describing a receiver of this type appears elsewhere this month. Constructional details will be published in our next issue.—Ed.]

"Eaglet" On 20 Metres

DX has not been too bright here lately—it is spoiled by QRM. However, about four weeks ago I wound a new 20-metre coil for my "Eaglet Two" and was surprised by results, as I logged Germany on 19.63 m. and London on 19.82 m., besides VK6FL and about 20 other "hams" (VK5's, 2's and 4's).

In case anyone wants to try it, the coil consists of five turns of 24-gauge d.c.c. wire wound on an old valve base. Cathode tap is taken about ¾-turn from earthed end; spacing between turns is about 3-16 in.

I have been endeavouring to get the "Eaglet" working on the 10 m. band, but have had no luck so far. Incidentally, if anyone else has succeeded in doing the above, I would be pleased to hear from them. Wishing the magazine every success.—W. N. Black (AW251DX), Chelsea, Vic.

Radio In N.Z.—New Station On The Air

(By "THE SOUTHLANDER")

The second of the State-owned commercial stations is now on the air. This is 2ZB, Wellington, which made its bow to listeners at the end of April, on a frequency of 1,120 k.c. Its sister station, 1ZB, Auckland, is on 1,190 k.c. The Director of Commercial Broadcasting (the Rev. C. G. Scrimgeour) has been in the South Island arranging for the commercial station at Christchurch. Dunedin will then follow.

2YA, Wellington, the 60-kilowatt National Broadcasting Service station, is operating from Titahi Bay on 570 k.c. Station 2YC, which was the neighbour of 2YA when on Mt. Victoria, has also removed to Titahi Bay, and is using the old 2YA transmitter tuned up to radiate 5 k.w. on a frequency of 840 k.c. The old 2YC on Mt. Victoria has become 2YD, on 990 k.c. Professor Shelley, Director of National Broadcasting, says this is in accordance with his policy to have three national stations in each of the four main cities.

The particulars of the night sessions of the above stations are:—

CALL	K.W.	K.C.	SCHEDULE
2YA	60	570	Mon. to Sat. 4.30-9-30 p.m. Sunday 4.30-8.30 p.m.
2YC	5	840	Mon. to Sat. 5.30-9 p.m. Sunday 4.30-8.30 p.m.
2YD	.2	990	Daily 5.30 - 8.30 p.m.
2ZB	1	1,120	Mon. to Sat. 3.30-10.30 p.m. Sunday 3.30 - 9 p.m.

(Schedules are given in East Aust. Standard Time)

Breaking Into The Amateur Game

(Continued from page 31)

cillator depends on the tuning of the i.f. stages.

Essentially, the oscillator or signal generator consists of a calibrated oscillator tuning over the popular intermediate frequencies, the broadcast band, and the various amateur bands. A system of modulating this oscillator signal (which is actually the equivalent of a small "carrier" with a controlled intensity) must be provided.

The modulation is usually applied direct to the oscillator, and is provided by another oscillator operating at some convenient audio frequency. By convenient is meant an audio frequency that will be as pleasant

as possible to listen to, as it appears at the output of the receiver under test.

To combine these features, we usually have the r.f. signal or carrier generated in the conventional oscillator circuit, and fed to an attenuator, thence through a "dummy aerial" to the aerial input of the receiver. The attenuator is a non-inductively constructed control for varying the output voltage from the generator. A "dummy" aerial is simply inductance and capacity inserted between the attenuator and the output terminal of the signal generator so that the instrument, when coupled to the receiver on test, will be equivalent to the average aerial.

Audio frequency oscillations may be generated, using the same circuit as that for the r.f. section, with the exception that only two or three different "notes" are needed by way of a change. The audio frequency oscillations can be made to modulate the r.f. energy, or sometimes a separate modulator valve is used.

Brief Appreciations From Readers

I wish to congratulate you once more regarding the "Radio World." In the past twelve issues the standard has not dropped a scrap, and the way in which you cater for all classes in the radio game is I think your main success. It certainly holds one to the magazine till he has read it, and then he can't wait for next month to come. Congratulations on your first year of publication.—G. O. La Roche (AW155DX), Sth. Perth, W.A.

Just a few words to tell you how much I appreciate the "Radio World." It is the best radio magazine available, and I think all the articles are QSA5, R max! For the past eighteen months I have been getting an American magazine, as there was not a decent one available in Australia, but since the "Radio World" has been published I have been buying it regularly.—Ronald Paul (AW 232DX), Kerang, Victoria.

VK AMATEUR STATIONS . . . Additions and Amendments

Additions.

CALL SIGN.	NAME.	ADDRESS.
VK3SS	Scott, K. V.,	Stratford Road, Maffra, Vic.
VK2AFY	Davis, J.,	20 Northland Road, Bellevue Hill, N.S.W.
VK6DF	Du Feu, M. A. J.,	110 Heytesbury Road, Subiaco, W.A.
VK3CU	Wilson, J. T.,	79 Park Road, South Camberwell, S.E.6, Victoria.
VK9LW	White, N. L.,	Rabaul, New Guinea.
VK9KO	Blue, H. W.,	Rabaul, New Guinea.
VK6LW	Peterson, W. M.,	112 Charles St., West Perth, W.A.
VK2AEO	Polmear, O. S. R.,	92 Thorne St., Wagga Wagga, N.S.W.
VK2DC	Sellenger, D. C.,	9 Cecil St., Hurstville, N.S.W.
VK2AFZ	Johnson, J. E.,	338 Birrell St., Bondi, N.S.W.
VK5JT	Kilgariff, J.,	70 Stanley St., Burnside, S.A.
VK5TW	Welling, T.,	106 Hill St., North Adelaide, S.A.
VK4RX	Blades, R. A.,	Hursley Road, Glenvale, Queensland.
VK4PX	Johnson, A.,	Croker Avenue, Hendra, N.E.2, Queensland.
VK2AFV	Templeman, G. J.,	"Roseleigh," Bellarive, N.S.W.

Alterations to Call Signs.

VK3KQ	Miles, G. T.,	9 Joyce St., Elwood, S.3, Vic.	Now VK7KQ. (See also Changes of Address).
VK3WO	Hall, G. G.,	8 Mowbray St., Hawthorn, E.3, Vic.	Now VK2AGH. (See also Changes of Address).
VK6CM	Matheson, C. R.,	Aeradio Station, Forrest, W.A.	Now VK3CS. (See also Changes of Address).
VK2MW	Manley, W. M.,	153 Woodville Road, Merrylands, N.S.W.	Now VK2XH. (See also Changes of Address).
VK2LF	Bracken, L. C.,	8 Parraween St., Cremorne, N.S.W.	Now VK2FF.
VK3KK	Kilsby, K. W.,	4 McIntyre St., Hamilton, Vic.	Now VK5PR. (See also Changes of Address).
VK2XL	Collett, M. E.,	Excelsior Road, Lisarow, N.S.W.	Now VK2RU.
VK3SG	Hourigan, J. B.,	23 Jordan St., Malvern, S.E.4, Vic.	Temporarily VK8DA, operating in Northern Territory.

Changes of Address.

VK3BK	Baker, S. C.,	44 Mowbray St., Albert Park, S.C.6, Vic.
VK5MV	Barber, S. G.,	505 North Esplanade, Henley Beach, S.A.
VK5KX	Bulling, W. J.,	617 Esplanade, Grange, S.A.
VK3VB	Hughes, E. W.,	5 Marwal Avenue, North Balwyn, E.9, Vic.
VK6CY	Young, C. A.,	73 Marine Terrace, Fremantle, W.A.
VK2AES	Wilson. D. D.,	Blair St., Teralba, N.S.W.
VK4GW	Ham, G. W.,	248 Cavendish Road, Coorparoo, S.E.2, Queensland.
VK2AET	Havyatt, A.,	"Orion," Court St., Double Bay, N.S.W.
VK2AFS	Wilson, R. V.,	Oak St., East Moree, N.S.W.
VK3KQ	Miles, G. T.,	"Wight Cottage," York St., Bellerive, Tas. (See also Alterations to Call Signs).
VK2WN	Lusby, M. M.,	10 Leeton Avenue, Coogee, N.S.W.
VK3GK	McLean, S. C.,	14 Stewart St., Brunswick, N.10, Vic.
VK2XR	Halloran, A. T.,	"The Kraal," Whitton & Sutherland Roads, Chatswood, N.S.W.
VK2ABP	Broken Hill Amateur Radio Club,	499 Radium Street, North Broken Hill, N.S.W.
VK2ABD	Galbraith, C. C.,	43 Bulkara Road, Bellevue Hill, N.S.W.
VK3WO	Hall, G. G.,	15 Rosebery Avenue, Five Dock, N.S.W. (See also Alterations to Call Signs).
VK6CM	Matheson, C. R.,	2 Richardson St., Essenden, W.5, Vic. (See also Alterations to Call Signs).
VK2CN	Moginie, C. K.,	"Chezales," Jacobson Avenue, North Brighton, N.S.W.
VK5KG	Brooks, A. H.,	13 Surrey St., Grange, S.A.
VK5GX	Phillips, A. W. A.,	3 Anzac Highway, Golflands, Glenelg, S.A.
VK2QA	Russell, G. J.,	Nyngan, N.S.W.
VK3KV	Solomon, C. C. H.,	113 Clarendon St., South Melbourne, S.C.5, Vic.
VK3KW	Keillor, W.,	4 Pakington St. Extension, Geelong West, Vic.
VK2MW	Manley, W. M.,	16 Gladesville Road, Gladesville, N.S.W. (See also Alterations to Call Signs).
VK3TP	Prentice, T. F.,	158 Wattletree Road, Malvern, S.E.4, Victoria.
VK2AEC	Anthony, T. R.,	1A Clifton Avenue, Burwood, N.S.W.
VK2WJ	Peell, W. J.,	49 Alma Road, Maroubra, N.S.W.
VK6AB	Buckie, A. C.,	14 Kinninmont Avenue, Nedlands, W.A.
VK6RK	Choat, R. S.,	37 Hanbury St., Kalgoorlie, W.A.
VK2HE	Miller, H. E.,	7 Kent St., Belmore, N.S.W.
VK3UD	Denholm, I. H.,	36 Royal Parade, Coburg, N.13, Vic.
VK2YF	Caldwell, F. D.,	46 Gipps St., Concord, N.S.W.
VK4LR	Thomas, R. H.,	Vine St., Bulimba, N.E.1, Qld.
VK4RM	Meadows, R. C.,	60 George St., Mackay, Qld.
VK2PM	McLeod N. J.,	107 Artarmon Road, Artarmon, N.S.W.
VK4YM	Cohen, D.,	City Hall, Brisbane, Qld.
VK2YB	Lewis, W. J.,	C/o J. B. Corbin, 39 Mitchell St., McMahon's Point, N.S.W.
VK3KK	Kilsby, K. W.,	Birdwood, S.A. (See also Alterations to Call Signs).
VK2JF	Newport, T. I.,	49 Northrook St., Bexley, N.S.W.

Cancellations.

VK2ABW	Pearson, E. H.,	C/o Mrs. Ellis, 31 Great North Road, Five Dock, N.S.W.
VK6WJ	Leyden, F. M.,	1 Sayer St., Swanbourne, W.A.
VK2YI	Blue, H. W.,	328 Parramatta Road, Petersham, N.S.W.
VK2LY	Warren, T. F.,	C/o K. G. Harris, Kennedy St., Kingston, Canberra F.C.T.
VK3MQ	Setford, H. R.,	11 Percy St , Balwyn, E.8, Vic.
VK3GN	Selman, H. G.,	43 Balliang St., Geelong, Vic.
VK3RY	Pace, R. Y.,	Hammill St., Donald, Vic.
VK4PR	Allen, R. K.,	28 Crowther St., West End, S.1, Qld.
VK7TY	Murden, W. H.,	89 Brisbane St., Launceston, Tas.
VK2FA	The Royal Aero Club of N.S.W.,	16 Barrack St., Sydney, N.S.W.
VK2FB	The Royal Aero Club of N.S.W.,	16 Barrack St., Sydney, N.S.W.
VK5DM	Adelaide University Engineers' Radio Club,	University, Adelaide, S.A.
VK2WO	Breville Radio Pty. Ltd.,	486 Elizabeth St., Sydney, N.S.W.
VK2XC	Cuffe, I. D.,	21 Redan St., Mosman, N.S.W.
VK3YR	McLeod, H. A.,	320 Victoria St., Richmond, E.1, Vic.

Amendments.

VK2WG	Gronow, W. R., formerly shown as 2 Anthony St., Malvern East, S.E.5, Vic. Now 2 Anthony St., Glen Iris, S.E.6, Vic.
VK5YL	Appeared in December, 1936, Supplement as B. A. Geisel, Charles St., Murray Bridge, S.A.. Should be Miss B. A. Geisel.

Eaglet All-Wave Two

(Continued from page 4)

long, by the way, or there will be too much voltage drop in the heater leads.

The "B+" connection can be made to any convenient point—to the positive terminal of the electrolytic on the output side of the smoothing filter, to the "hot" end of the voltage divider, or by means of an adaptor to the screen pin of the output pentode.

If 2.5-volt valves are used in the main set, however, then the heater supply for the "Eaglet" can be obtained from batteries or from a step-down filament transformer delivering 6.3 volts from the mains.

Bandspread Tuning Provided

For easy tuning on the short waves, bandspread tuning has been incorporated by connecting a 23-plate midget variable "band-setter" in parallel with the 7-plate "band-spreader." The latter is the main tuning condenser, and is controlled by the small vernier dial. The band-setter is used to select the portion of the waveband required, the actual serching for the station being done with the vernier control.

For example, if a station on about 31 metres is required, the band-setting condenser is adjusted to roughly 30 metres. Then the searching is done on the vernier dial, but as the capacity of the condenser it controls is very small, only a few metres will be covered in one complete rotation from zero to full capacity. This means that stations that would occupy only a few dial divisions on a set without bandspread, in this receiver are spread nearly all over the dial. In this way tuning is not only made much easier, but more certain too, for some bands are very congested, and stations in them are easily missed.

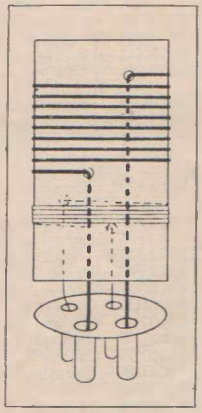
The band-setter is controlled by a pointer moving over a small indicator plate divided into 100 divisions.

The latter is not shown in the photographs, and is not absolutely essential, but it provides a useful means of locating previously-logged stations.

One of the most important components in the set is the 100,000-ohm potentiometer controlling the detector screen voltage. This must be of high quality, or otherwise it will be noisy, making the set difficult to operate. There should be no trace of "scratchiness" when the shaft is rotated.

As regeneration takes place between the detector screen and cathode, the r.f. choke in the plate lead is not essential to obtain oscillation. It has been included, together with the small by-pass condensers on either side of it, to keep r.f. out of the audio system, and if a test shows that all three are unnecessary, they can be omitted. It may be found that the set is livelier with the choke out, so it can be omitted if any difficulty is experienced in obtaining oscillation.

The audio choke is of the high-impedance type, though if an ordinary audio transformer is on hand, it can be used instead. Either the primary or secondary, or both connected in series, is satisfactory.



This sketch shows the method of winding the coils, and the pin connections. Details of the number of turns needed for each of the five coils are given in a panel elsewhere.

A rotary on/off switch is included in the "B+" line so that the plate supply can be turned off while minor adjustments are being made to the set.

Winding The Coils

Three coils are needed to give continuous coverage of the shortwave bands between 18 and 90 metres. All are wound on four-pin plug-in formers. The two smallest secondaries should be double-space wound, i.e., so that the turns are separated by a distance approximately equal to twice the diameter of the wire. The largest grid winding is close-wound.

Two extra coils are needed to cover the major portion of the broadcast band. Details of the number of turns for all coils are shown elsewhere.

The reaction windings are all close-wound, and are put on below the grid windings (and in the opposite direction), so that ⅛ in. separates the two. If the set fails to oscillate over the whole of any waveband, the reaction winding can be Conversely, it can be shifted away a moved closer to the grid winding. little if oscillation is too fierce.

The original "Eaglet" was tested using a kit of coils supplied to the editor's specifications by Messrs. Standardised Products.

Marketed under the trade name of "Rayway," these coils are a first-grade product, and are recommended to those who prefer to purchase a kit rather than wind their own.

Next month a description will be given of the assembly of the "Eaglet All-Wave Two," together with an under-chassis wiring diagram.

Radio Ball On July 3

The sixth annual Radio Ball, conducted this year by the Radio Industry Functions Club of Sydney, will be held on Saturday, July 3, at David Jones' ballroom. Reservations can be made with the Secretary, Mr. O. F. Mingay, 30 Carrington St., Sydney ('phone B 7188).

"Empire Shortwaver" A Real DX Getter

I recently completed the "Empire Shortwave Three" described in the August, 1936, "Radio World," and during the Easter W VK DX contest heard the following 20-metre stations (from 6.51 to 8.13 p.m. on March 26).

Station.	QSA	R	TIME
VK4JU	5	9	6.51 p.m.
W2IXY	5	7	6.54 p.m.
W4AH	5	6	6.57 p.m.
W6BKY	5	8	6.59 p.m.
W4CBY	5	9	7.3 p.m.
(This "ham" rattled the 'phones)			
W3EML	5	8	7.14 p.m.
K6JLY	5	7	7.19 p.m.
W9ARA	5	9	7.29 p.m.
W9CI	5	7	8.13 p.m.

Many local VK's were heard as well, and most of this DX was brought in through very heavy static. The quality of signals on most of the "W's" is excellent. The coils, by the way, were wound by Standardised Products, and are an excellent job.

The 20-metre band is by far the best for good results. The 40 and 80-metre bands are good, though both have powerful harmonics from 3AW and 3DB in two places. As for tuning the receiver, the only slight drawback lies in keeping the dials in step; otherwise the DX is very easily missed.

The aerial I am using is by no means a "hot affair," consisting of a 60ft. length of single strand copper wire, 32 feet high, with a 34ft. lead-in of 7-strand covered copper wire taken from the centre. A 4ft. earth lead attached to a 5ft. steel pipe is used.

For all round DX performance, the "Empire Shortwaver" is a real DX getter, and I can certainly recommend it to other readers.—Eliot A. Glenie (AW21DX), Albert Park, Vic.

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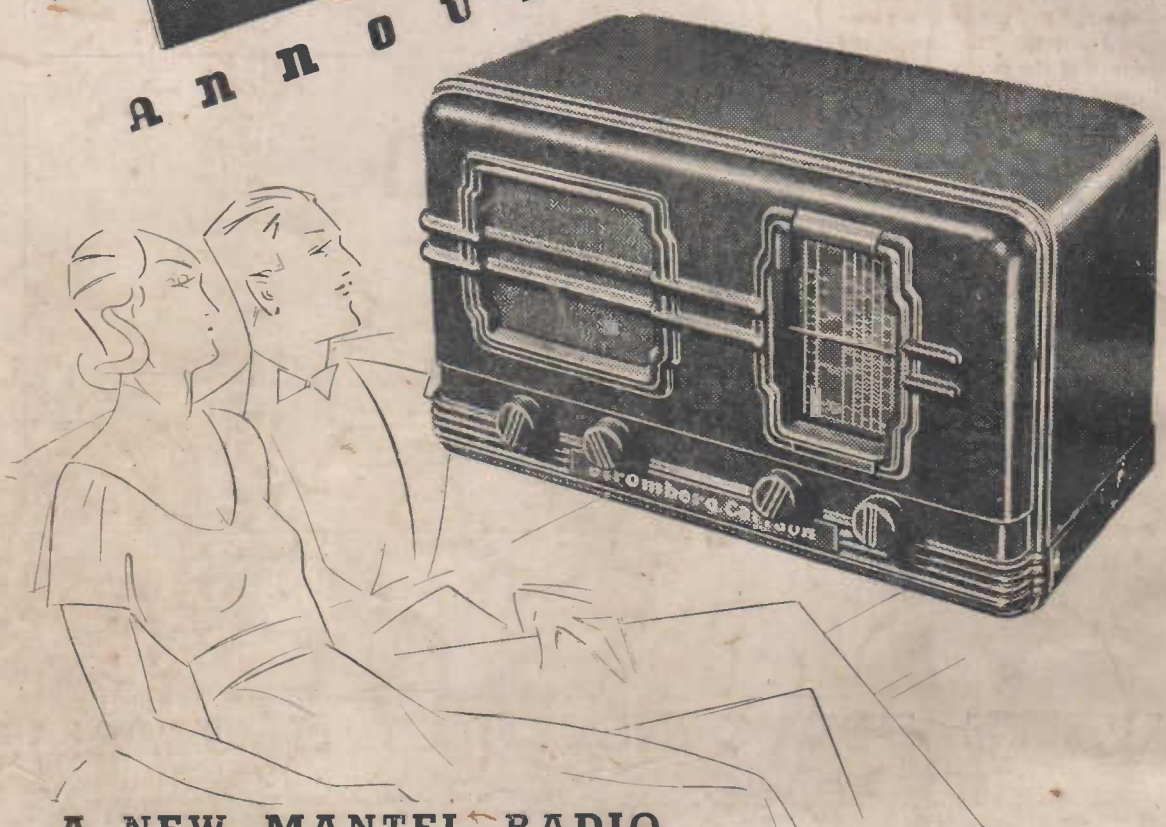

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