THE AUSTRALASIAN

Radio World

JUNE 1, 1938
VOL. 3 — NO. 2
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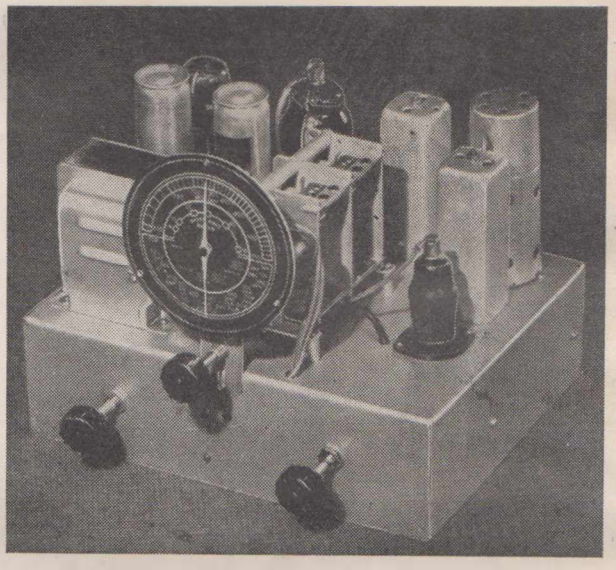
—See Page 8

- PUSH-BUTTON DUAL-WAVE SUPERHET USES PERMEABILITY TUNING THROUGHOUT—WITH BEAM TETRODE OUTPUT: LATEST LIST OF WORLD SHORT-WAVE STATIONS: MORE ABOUT THE "AIR-CELL DUAL-WAVE FOUR".

Superb 5-Valve Performance At 4-Valve Cost!



The "Comet Dual-Wave Four," illustrated alongside and described in last month's "Radio World," is one of the most sensational receivers we have ever tested. Using only four valves, and built around the FOXRADIO Coil Kit illustrated below, the "Comet' in a side-by-side test easily out-performed a standard 4/5 superhet of modern design.

Those wanting an excellent all-round performer at the lowest possible cost could not do better than build this amazing little receiver.

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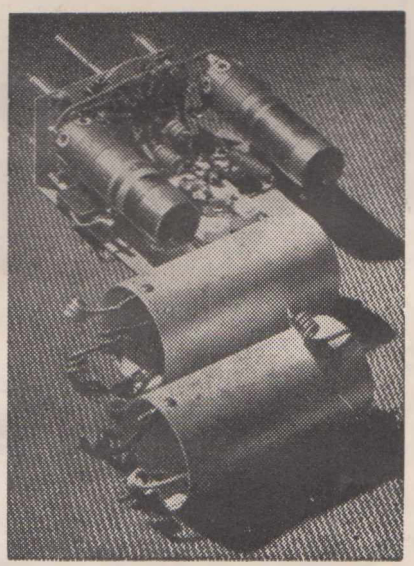

FOXRADIO COILS AND COIL KITS

Above is illustrated the FOXRADIO Coil Kit responsible for the outstanding success of the "Sky-King Five." We also strongly recommend it for use in the "Comet."

An improved type of dual-wave coil kit, it uses a minimum of shielding, resulting in greatly-increased all-round efficiency.

FOXRADIO type DKI 465 k.c. Coil Kit comprises Dual-Wave Aerial and Oscillator Coils, with two-iron-core 465 k.c. intermediates.

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Four of the latest octal-based "G" type battery valves are used in this sensational dual-waver, specially designed for Air-cell operation. Taking only .36 amp. filament current, a single Air-cell will give almost two years of trouble-free service.

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The .. "1938 FIDELITY EIGHT"

IS HERE ! . . . . . incorporating every up-to-the-minute improvement.

Watch next month's "Radio World."

For highest gain, with superior tracking and all-round dependability, insist on . . . . . .

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THE AUSTRALASIAN RADIO WORLD

Incorporating the

ALL-WAVE ALL-WORLD DX NEWS.

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

Vol. 3. JUNE, 1938. No. 2.

CONTENTS:

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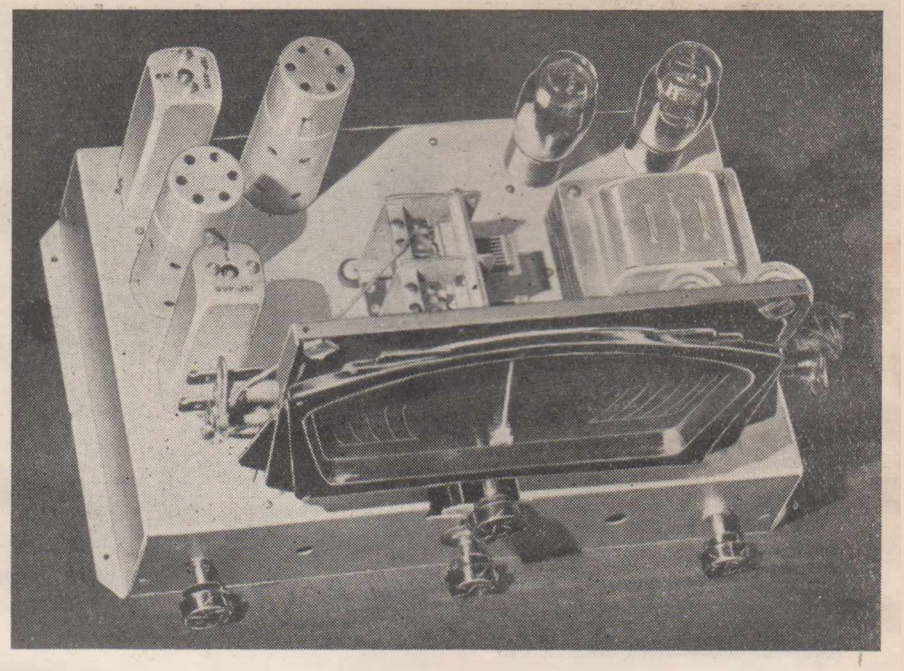
The . . . . .

Auto-Tune Dual-Wave Five



This front view shows the general layout, while below is the circuit, with full constants.

Five-valve dual-wave superhet incorporates push-button tuning, uses latest 6K8 triode-hexode converter, and 6V6G beam tetrode output valve with inverse feed-back.

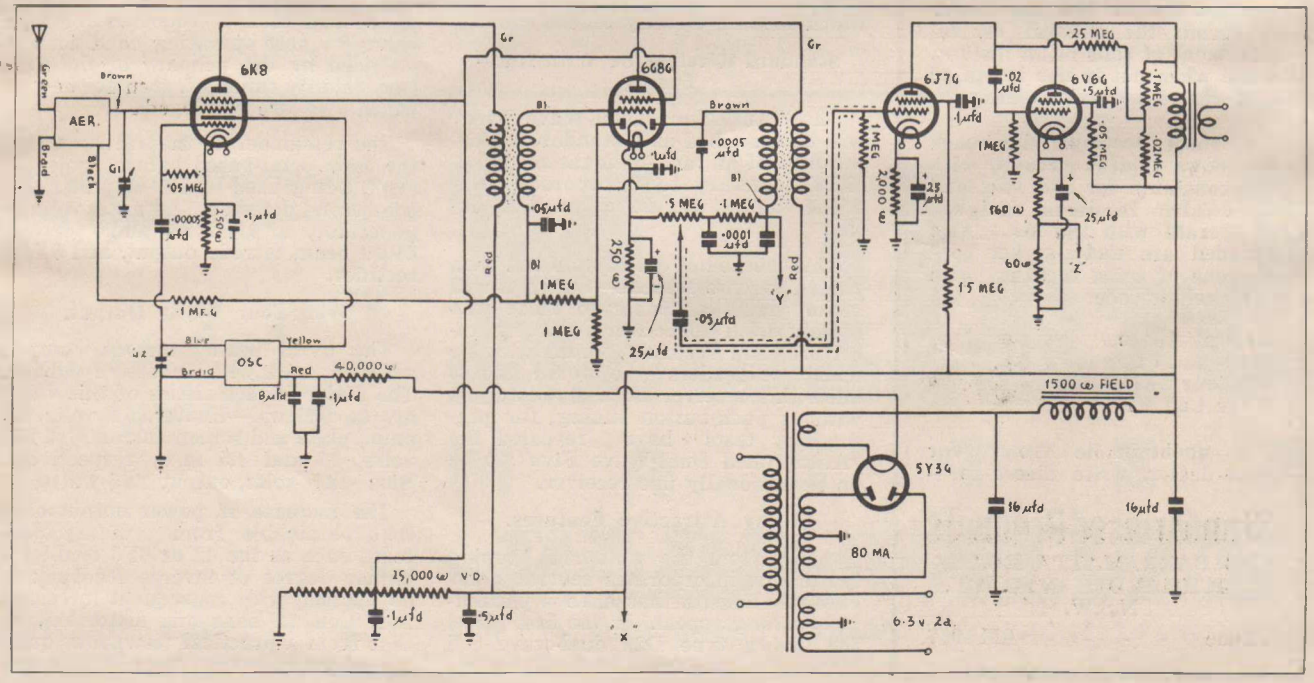
IN the April issue of the "Radio World" a detailed review was published of a new automatic push-button kit for set-builders, released by Crown Radio Products Pty. Ltd., of Sydney.

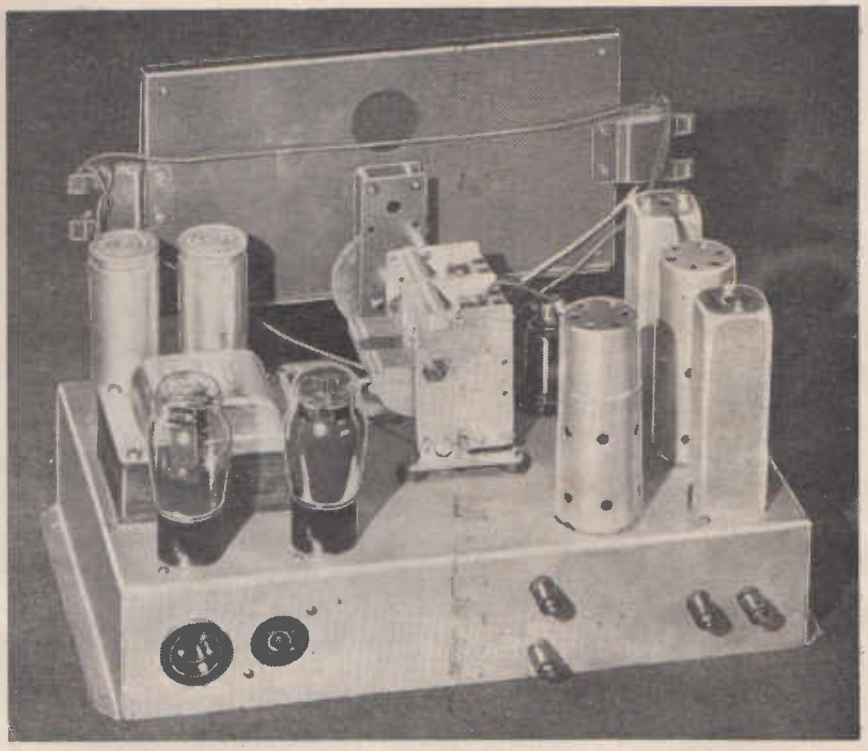
Designed to fit under the chassis, the PB8 tuning unit will give excellent results if the receiver is designed expressly for automatic tuning, though due to space limitations it would not in many cases be possible to use this unit for the conversion to automatic tuning of ordinary 4/5 superhets.

New Unit For External Mounting.

To overcome this difficulty, Crown Radio Products have designed the model PB8SP unit expressly for mounting externally to the chassis, an ideal position being above the tuning dial.

This means that existing receivers can not only be easily converted to provide automatic tuning, but it also makes possible the design of a standard 4/5 dual-wave superhet, with the push-button tuning feature as an optional refinement, as in the "Auto-tune Dual-Wave Five."





A rear view of the "Auto-Tune Dual-Wave Five." The 6K8 metal converter is on the right of the condenser gang.

Sixteen Permatune Coils Used.

The PB8SP push-button unit is permeability-tuned throughout. Sixteen permatuned iron-cored coils are used, eight being mounted on each side of the latest Yaxley push-button switch, which is more compact than that used in the original Crown push-button unit. To keep out dust, the entire unit is built in a sprayed metal box which mounts directly on the cabinet.

Standard Receiver Or With Auto-Tuning.

The "Auto-Tune Dual-Wave Five" will be described as a standard superhet first of all, and then the modifications necessary to incorporate automatic tuning will be outlined in detail.

This method of description has been chosen for two reasons—firstly, it will be of great assistance to those who merely wish to convert existing receivers, and secondly, there will, no doubt, be readers who would like to build this receiver as a standard job without push-button tuning, for preliminary tests have revealed the "Auto-Tuned Dual-Wave Five" to be an exceptionally fine receiver.

Many Attractive Features.

Apart from the automatic tuning feature, it incorporates several other new refinements that have a particularly strong appeal. In the first place, the Crown type D22 dual-wave coil kit used covers from 12 to 35 metres on the short waves, in accordance with the latest trend in commercial receivers. For those who still prefer the ordinary 16 to 50-metre coverage, however, an alternative box is available, type D26.

The mixer-oscillator used is the new 6K8 triode hexode, giving appreciably better performance on the short waves than ordinary converters. The high plate load that is required for this valve for best operating conditions is provided by the primary of the first permeability-tuned i.f. transformer, of which two are employed.

The remainder of the valves are of the new octal-based glass types, a 6G8G being used as i.f. amplifier, diode second detector, and a.v.c. voltage generator, a 6J7G as audio driver, 6V6G beam tetrode output, and 5Y3G rectifier.

Over Four Watts Output.

The 6V6G beam tetrode output valve is used with inverse feedback. The main characteristics of this valve are as follows.—Heater, 6.3 volts .45 amp., plate and screen currents at 250 volts, 45 and 4.5 m.a., respectively. Bias -12.5 volts, output 4.25 watts.

The increase of power output over that obtainable from ordinary pentodes such as the 42 or 6F6 enables a higher degree of inverse feedback to be applied, with consequent increased reduction of harmonic distortion, so that from a practical viewpoint, quality of reproduction very closely ap-

proaches that given by a triode such as the 2A3.

Full Description Next Month.

The photographs give an excellent idea of the layout adopted in the experimental model, which is giving exceptionally fine results.

To effect the conversion to automatic tuning, the volume control is shifted towards the left-hand edge of the chassis, and is balanced by a tone control on the extreme right. This then provides room for a Yaxley 6 x 2 single-bank switch required to make the change-over from ordinary to automatic tuning and vice-versa. A five-wire cable then passes up through the chassis to the push-button unit mounted above the dial.

Next month a step-by-step description of the assembly and wiring of the "Auto-Tune Dual-Wave Five" will be published, together with a variety of photographs and diagrams that will enable even those knowing little of the technicalities of radio to build the receiver successfully. In the meantime, local set builders who wish to hear the receiver in action may do so by calling at Messrs. John Martin Pty. Ltd., of 116 Clarence Street, Sydney, on or after June 24.

Calstan Test Oscillator

Now Available In Kit Form

In addition to some form of multimeter, which is always essential to any radio experimenter, a modulated test oscillator of reasonable accuracy is indispensable not only to servicemen, but to set-builders as well. The performance of any superhet using ganged tuning depends wholly on its alignment, and it is impossible to ensure accuracy in this respect by guesswork.

Of course, there are coil kits on the market that have been pre-tuned to give satisfactory operation, but to those who are constantly encountering receivers that require accurate alignment to give peak results, then doing the job satisfactorily by ear is next to impossible.

Realising this, Messrs. Slade's Radio Pty. Ltd. have released a complete kit of parts covering the construction of an up-to-date and dependable all-wave test oscillator, retailing at the very reasonable figure of seven guineas, including valves and batteries.

Metal Cabinet Provides Ample Shielding.

As shown in the illustration below, the oscillator is housed in an attractive metal cabinet with an engraved panel and precision vernier dial. To give the all-wave coverage needed for servicing modern receivers, and to eliminate the need for laborious coil-changing every time a different wave-band is required, a compact coil assembly and switch are provided.

Position 1 of the three-position switch covers from approximately 150 to 500 k.c. (taking in all intermediate frequencies in common use in Australia). Position 2 covers from 525 to 1600 k.c. (filling all broadcast band requirements), while position 3 covers from approximately 6 to 18 m.c. (for shortwave work).

Two 30's Used.

A type 30 valve is used as r.f. oscillator with a further 30 a.f. oscillator for use when a modulated signal is required. The attenuator is simple but very efficient in its action, providing the very low minimum of output needed for precision alignment of high-gain receivers.

Battery requirements are two 22.5-volt light duty "B" batteries, and two 1.5-volt "A" cells.

No Extras To Buy.

The kit of parts is supplied with ready-drilled chassis, panel and cabinet, and is complete down to the last nut and bolt. The construction of the oscillator, together with full details of a simple but satisfactory method of home calibration, are outlined in detail in a 12-page pamphlet that is lavishly illustrated throughout with photographs and diagrams. Copies of this pamphlet are available free and post free to "Radio World" readers writing Slade's Radio Pty. Ltd., Lang Street, Croydon, N.S.W.

Calstan Combination Valve-Tester and Multi-Tester.

A sample of the Model 223 Calstan combination valve-tester and multimeter has just been received for test from Slade's Radio Pty Ltd., N.S.W. This instrument is particularly flex-

(Continued on page 48.)

Radio Ramblings

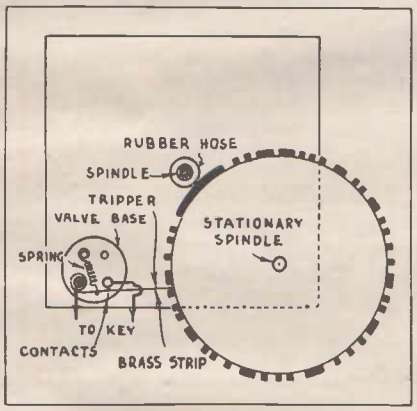
A page for letters from readers. A prize of 2/6 will be awarded for every technical contribution published.

★ ★ ★

Calling CQ Automatically

For the amateur who does most of his transmitting in morse code, it is very handy to be able to fill in the log book, or do some other little job in the shack while the station is automatically calling CQ. An old gramophone can easily be made to do this job, and still be used for playing records. This is how the idea was put to work at VK2UJ:

First take the turntable off and push a piece of tyre pump hose about half an inch long on the spindle; this is to drive the turntable by friction. If it is found that the rubber hose is not true on the spindle it will be necessary to wind up the motor and true it up lathe fashion, using a coarse file as a cutter. Now another stationary spindle should be fixed in one corner of the top of the gramophone, so the turntable is turned without slipping by the rubber covered spindle. Washers may be required on the stationary spindle to raise the turntable to the correct level.



For the make and break unit an old four-pin valve base is used. It is clamped down by a screw through a hole bored in the centre. One end of a piece of sheet brass 2in. long and ½in. wide is bent to form an eye and fitted to one pin on the valve base. This is held against the next pin by a little coil spring, one end of which hooks on to a pin on the opposite side and the other on to the brass strip by means of a small hole bored through it half way between the two valve pins. A small bead of solder on the brass strip where it touches the pin and also on the pin itself will make good contact points.

One end of a length of twin flex long enough to reach from the gramophone to the regular key is soldered to contact and pivot pins inside the base and the other end goes across the key.

The morse characters are burned into the edges of the gramophone records, but they can still be played as usual as the notches are only about an ⅛in. deep. For this job two flat pieces of iron at least a foot long are needed, one for the dots $\frac{1}{16}$in. wide and one three times as wide for the dashes. Possibly a piece can be found three times as wide as it is thick. The irons should be heated less than red hot or else they will burn too quickly. Care should be exercised with the spacing, but this is not difficult, as it can easily be guessed with a little practice. It takes only about ten or fifteen minutes to go around the record, which is much quicker than filing. The record will now present a very rough appearance, but after cleaning off the charred material with a knife, quite a neat finish will be obtained.

The tripper should be adjusted so that it makes contact as it enters the gaps and brakes it as it comes out by loosening the screw holding down the valve base and turning the unit a little either way until the right position is found and then tightening the screw. The diagram will explain everything not clear in this description.

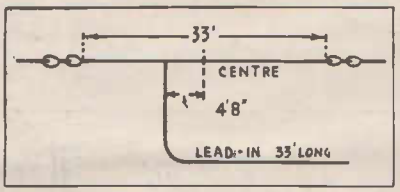
One record in use here sends out CQ three times followed by "de VK2UJ," and another the word "test" three or four times, followed by "de" and call-sign. Others could be made to send a series of "V's" for test purposes. Don't forget to send the "K" or "go ahead" signal by hand after switching off the CQ record when going "over."—H. W. Unger (VK2UJ), Alectown, via Parkes, N.S.W.

★

Tuned Aerial For 20 M. Band.

I am enclosing details of a tuned antenna I am using for reception on the 20-metre amateur band. It increases the signal strength considerably, and when no stations can be received with the usual aerial at readable strength they can be received comfortably with this aerial.

The sketch shows the aerial, which is 33ft. long, the 33ft. lead-in being taken from a point 4ft. 8in. from the centre. If 33ft. is too short, use 66ft. or 99ft. If the aerial is made 66ft. long and is tapped 9ft. 4ins. from the centre, and using a lead of 66ft. long,



the antenna can be used on the 40-metre band. — J. K. Sorensen (AW316DX), Gympie, Queensland.

★

Making Galena Crystals.

Galena crystals can be made by melting a piece of lead about the size of a pea, in a teaspoon. Then add one gram of sulphur and stir the mixture with a piece of wire. When cool you will have a crystal ready for use.—Ian L. Griffin (AW285DX), Marong, Bendigo.

★

Inter-Room Communication System.

A good form of home telephone system can be constructed from old pairs of headphones and speakers. If the unit used for the microphone portion be of the permagnetic type, no battery is required, but better results will be obtained if one is used.

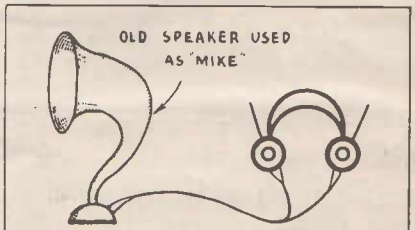


FIG. 1.

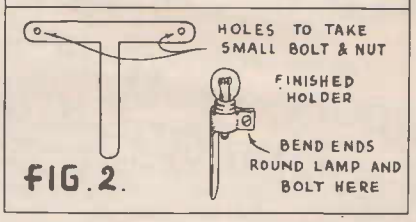


FIG. 2.

Fig. 1 shows the method of connection. These instruments could be mounted in cabinets if desired.

Excellent pea-lamp holders can be made by cutting and bending a sheet

of 26 gauge aluminium to the shape shown in Fig. 2.—Ian L. Griffin (AW-285DX), Marong, Bendigo.

★

"Fidelity Eight" A Fine Set

I have been a reader of the "Radio World" since November, 1937, and have found it a very excellent magazine. I have built the "De Luxe Fidelity Eight" from your circuit and have found it a particularly fine set which has given me the uttermost satisfaction and pleasure.—**Donald A. Ashford, Bowenfels, N.S.W.**

★

Increasing Headphone Sensitivity

Phones can be considerably "pepped up" in the following manner. From an old photographic film cut a disc of the same as the original diaphragm. From the latter cut a disc three quarters of an inch in diameter and glue it to the exact centre of the celluloid disc. This results in greater sensitivity and clarity of tone.—**F. A. Burke, Waverley, Sydney.**

★

Latest Shortwave Loggings.

For the past three weeks, while on vacation in the Woy Woy district, away from the din and strife of the big city, I found that 33ft. of wire attached to a tree 15ft. high gave me wonderful results, but conditions have not been too good. However, I might add that I didn't go out of my way specially to collect "new scalps!"—just to make casual observations.

First of all I found that the May Day broadcast from U.S.S.R. could be heard on almost any band from 19 to 40 metres. On May 1 at 10 p.m. a station was heard on 20.50 m., like African language, didn't get call sign (mass cheering). On May 2 a station was heard on 43 m. speaking Spanish or similar language at 6 a.m.; also 36.50 m. and 38.25 m. like loud-speakers in background. Then I find our old friend CSW, Lisbon, on 27 m. coming in R7 to 8 at 6.30 a.m. On 25.68 m. W1XAL was heard at R7 at 8.15 a.m. on May 2 asking for reports, and referred to sun spots on shortwaves. Also W8XK on 19 m. was a good R8.

On May 3 PCJ2 at 5.30 p.m. on 19 m. came in at a good R8 with a very fine programme, asking for usual reports on reception to be sent to P.O. Box 2703C, Sydney.

On May 4, OLR, Prague, was heard on 25 m., R8, at 7.30 a.m. This station was all over the place; first on 25, then 19.31, then back to 25 m.

May 5, KZRM 31 m. band, R8, 7.30 p.m. A bit of jamming here; VLR or VPD2, I think, otherwise quite good.

May 6, RNE, 25.20 m., 2 p.m., R8. English session—what a good Scotch accent this announcer has! Referred to opening of Arts Exhibition.

On May 8, Japan on 20.5 m. was good R7 at 6.45 a.m. EHQ, National Spain, 6.40 a.m., 30.7 m. good R8. 7 a.m., Russia on 36.2, good R6-7. 7.15 a.m., OXF, Denmark, 31 m. band R7-8, very clear signal. May 9: Radio Colonial, Paris, 9.15 a.m., 19 m. band, R7. Some of the amateurs heard include: LU4BC, YV1AA, XE1GK, VE3MD, VE4JJ, VE5NY, VE5PE, XE2XE, VE5KJ, VE5HU, F8LX, F8LZ, F8XT, F3KH, G6RH, G6KL, G2QT, HK1FC, HH2AK, CO8JK, J2LL, PY2IM, and KA's, K6's, K7's, XU's, and W's by the handful.

My latest QSL's are from W's 1BLO, 8CPC, 8CGU (7BCU 2nd), 9DKU, 9IAC, 9DOP, 9PTY, 9JIE, 9DQD, 9WOW, 5BKV, 4LU, 4AGB, 3ASG, 3FII, 2FHJ; K6MXM, K6BNR, CO7CX, ON4VK, HC1JB, VP5PZ, XE2FC, LU1QA, LU9BV, VU2AU, G8OT.

Mr. H. G. Mepham, of 33 Baladana Road, Derby, England, would like to correspond with a VK "ham." Incidentally, I have a QSL card and would like to exchange with club members or others.—**W. M. Chapman (AW112-DX), 3 Dowling Street, Waterloo, Sydney.**

The Front Cover.

This month's front cover shows the B.B.C.'s mobile television unit in action at the Oval, famous ground of the Surrey Cricket Club. Results were highly successful.

—Photo courtesy B.B.C.

★

5UX Was Clare's First "Ham."

I notice on page 26 of your April issue an announcement stating that Mr. W. H. Scott is Clare's (S.A.) first "ham." I wish to correct this statement, as I was stationed at Clare for four years (1932-36), and during a part of that time had a small T.P.T.G. rig working on 7 m.c. The rig was self-excited, using a TBO/410 and a UX210 in parallel with an input of 12 watts to a half-wave Zepp. Although this was working for only a few months, among some of the hams QSO'ed from that location were: VK's 4PK, 5QR, 5DQ, 3MR, 3EK, 3XK, 6OW, 3LN, 3XF, ZL1CK and others.

The radio club mentioned came into being while I was at Clare, although studies prevented me taking any active part in its activities.—**Leslie W. Wallbridge (VK5UX), Peterborough, S.A.**

MAYBE you don't think of the batteries in your set as the wolf behind the door, but stop and think—how many times a year do you pay £2 or £3 for a new set of "B" batteries? It becomes expensive, this fun, even over 12 months and ever so much more over several years.

Here, then, is one reason why you should install as quickly as possible the Radiokes Vibrator in your present set. After you pay its initial low price, you have no other expenses—no more replacements, nothing to go wrong, or run down. Your accumulator looks after everything. For years to come the Radiokes Vibrator gives you perfect, unvarying service. Never again will you have the troubles you had with run-down batteries — distortion, whistles, squeaks, weak volume. You get the same reliable performance as the owner of an A.C. set in the city. And the beauty of it is that you can fit it yourself..

You too can fit the RADIOKES VIBRATOR to your radio & make it BATTERY-LESS!

List Price £5/5/-

Any handyman can fit his radio with the Radiokes Vibrator and start enjoying perfect, money-saving radio reception. The Radiokes Vibrator is designed to supply "B" voltage up to 130 volts, with a maximum current rating of 25 m.a. It can be used with ANY existing battery set, employing either 2-volt, 4-volt or 6-volt valves. Small in size and neat in appearance. Fully guaranteed for 12 months. Easy-to-follow instructions accompany each unit. You can't go wrong. So why hesitate—the list price of the new Radiokes Vibrator is only £5/5/-. Get it from your nearest high-class radio dealer. Stocks are held by all radio wholesale houses throughout Australia and New Zealand. If you have any difficulty communicate direct with Radiokes Pty. Ltd., cnr. Vine Street and Vine Lane, Redfern, Sydney.

FREE

Radiokes Pty. Ltd.,
Vine Street and Vine Lane,
REDFERN, N.S.W.

Please send me your free folder describing the Radiokes Vibrator, and giving full installation instructions.

NAME.....

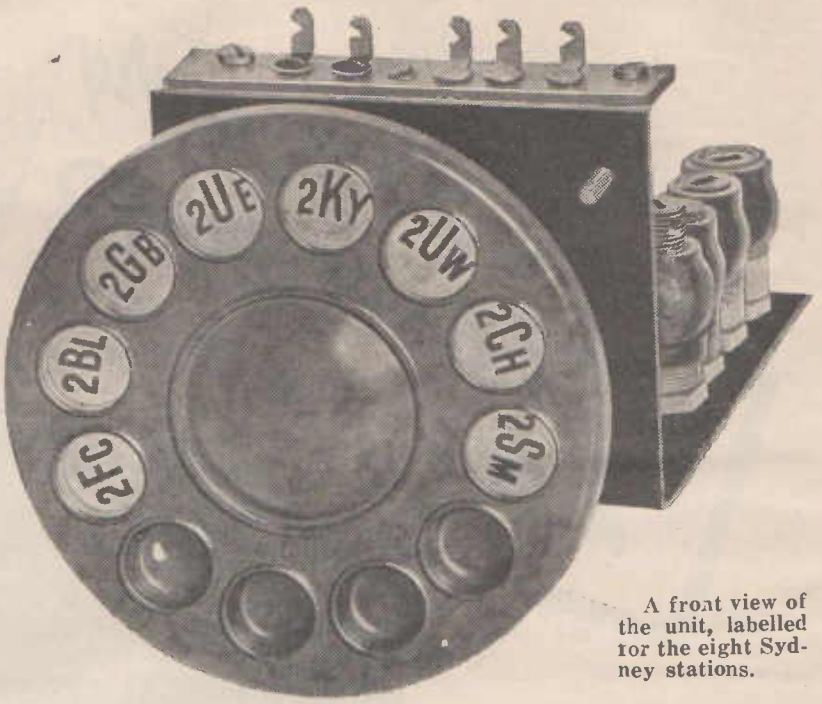
ADDRESS.....

A.R.W. 6/38.

Radiokes release . . . . .

Eight-Station Teletuner

Details of the new Radiokes Teletuner unit, designed to give automatic tuning on up to 8 local stations, are given in the article below.



A front view of the unit, labelled for the eight Sydney stations.

A PARTICULARLY effective reply to the demand for pre-tuned units, for incorporation in automatically tuned receivers, is the release by Radiokes Ltd. of their new Teletuner unit illustrated on this page.

An eight-station pre-set control unit, it has been designed for use as an auxiliary to gang condenser tuning, or as a completely self-contained tuning unit.

Could Be Used In "Comet."

For example, it could, with several minor changes in the locations of the front-of-chassis controls, be incorporated in the "Comet Dual-wave Four" described last month, to provide both automatic tuning on local stations as well as ordinary condenser gang control on broadcast and shortwave. Alternatively, the condenser gang and dual-wave unit could be omitted altogether, and the Teletuner incorporated to provide local station reception only.

To ensure freedom from drift, both aerial and oscillator circuits are permeability-tuned.

Contrary to usual practice, the switch has been incorporated in the earth potential ends of the tuning coils, and by means of a shorting system of switching, all unwanted coils and switch leads are reduced to earth potential.

This makes for extreme stability of alignment; in other words, it is unnecessary to keep moving from coil to coil and then back again to adjust

Due to the coverage of the coils, any eight stations on the broadcast band can be selected.

Sensitivity, under 15 microvolts; selectivity, average 80 k.c. at 104 microvolts; osc. grid current, average 250 microamperes.

VK2ME, 3ME And 6ME — Schedules For June.

The following transmission schedules will be observed by shortwave stations VK2ME, VK3ME and VK-6ME during June.

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

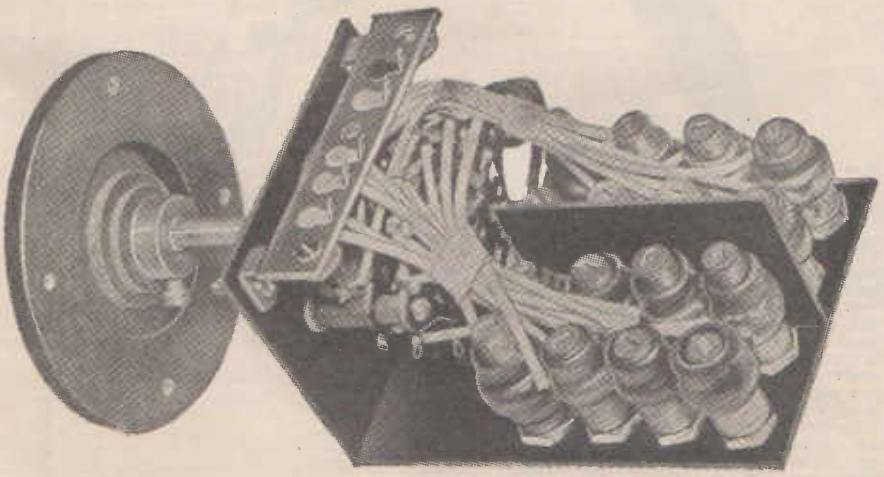
	Sydney Time	G.M.T.
Sundays:	3-5 p.m.	0500-0700
	8 p.m.-Mdt.	1000-1400
Mondays:	2.30-4.30 a.m.	1630-1830

VK3ME (31.5 m., 0510 k.c.)

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

VK6ME, Perth (31.28 m., 9590 k.c.)

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

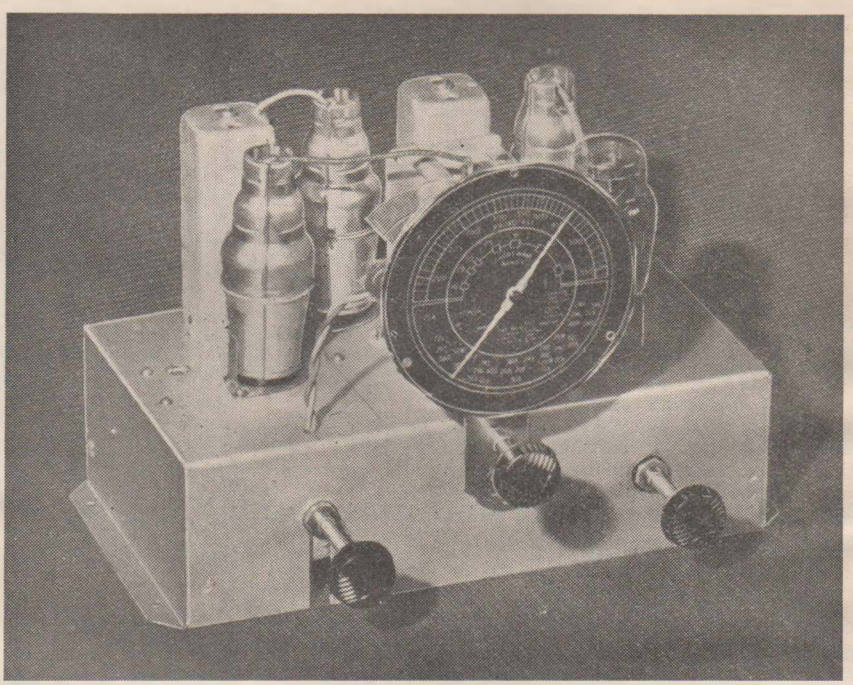


This rear view illustrates the remarkable compactness of the unit, which is permeability-tuned throughout. It could easily be fitted to many existing receivers, with little or no modification.

More About The . .

AIR-CELL D.W. FOUR

Further constructional and alignment pointers are given in this concluding instalment.



THOSE doubtful of their ability to wire the "Air Cell Dual-Wave Four" from the circuit will find below a sketch giving the main under-chassis wiring. To avoid confusion, the filament wiring has been omitted, though this is particularly simple to complete.

Completing The Filament Wiring.

On the four octal valve sockets the filament lugs are indicated by open circles. The "A-" terminals are bonded together with 16-gauge tinned copper wire used as an earth line. The "A+" lead from the battery socket runs through the .720 ohm voltage dropping resistor to a lug on the bakelite strip mounted near the 1C7G socket. The lead from this lug, marked "To Fil.", is taken to the "A+" lug on the 1C7G socket. A further lead runs from this to the corresponding lug on the 1D5G socket, and so on until all four sockets are wired.

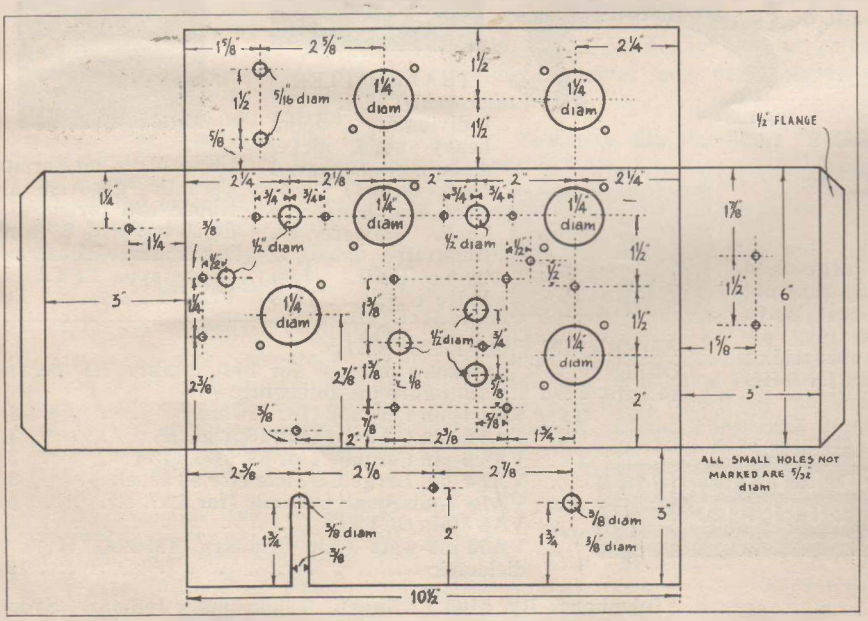
Mounting And Wiring The Coil Unit.

Following this, the assembly can be completed as outlined in last month's issue and the wiring completed as far as possible without the dual-wave unit being mounted. Twelve leads run to this unit, as follows:—

1—Green lead on unit.
2—Red lead on unit (oscillator "B+").
3—Green lead on unit (a.v.c. bottom of aerial grid winding).
4—Blue (padder).
5—To lug on unit to which is attached red lead (oscillator "B+").
6—Green lead on unit (oscillator plate).
7—Yellow lead on unit (oscillator grid).
8—To dial light lug on wavechange switch.
9—To lug on unit to which is attached green lead (aer- sec.).
10—Earth busbar on unit.
11—Yellow lead on unit (aerial section).
12—Yellow lead on unit (oscillator section).

With the unit in place, the wiring should be thoroughly checked over, valve shields can then be fitted and the valves plugged in. Next, connect up the batteries together with the aerial and earth leads and plug to the speaker. Switch the set on, advancing the volume control, and it should be possible to tune in a station.

The alignment procedure is simple. Tune in a station towards the lower end of the broadcast band, and adjust the oscillator trimmer on the unit for maximum response. Now rotate the dial to a station near the other end of the band, and adjust the padder for greatest volume. While the padder screw is being rotated, the



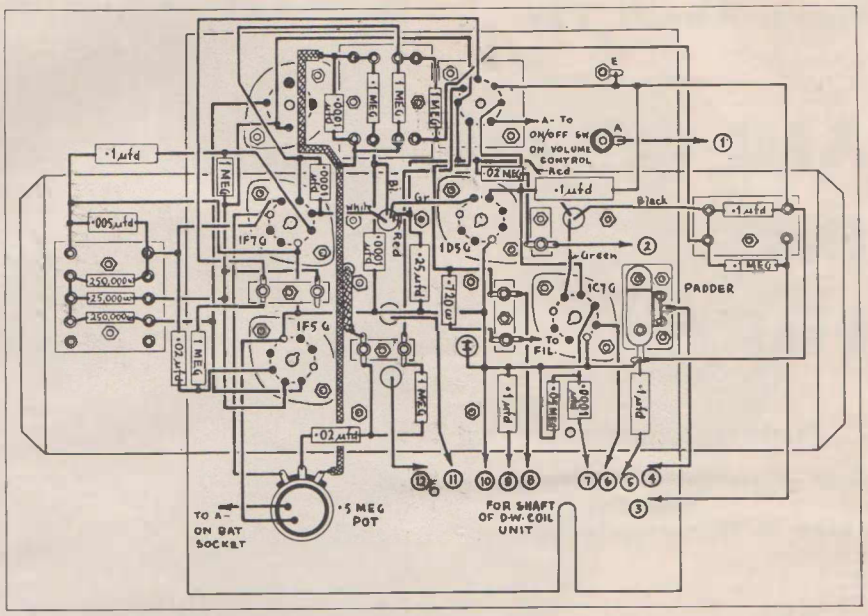
Dimensions for stamping and drilling the 18-gauge steel chassis are given in this sketch.

dial should be rocked backwards and forwards to keep the station tuned in.

These two operations can then be checked, and the trimmers on the i.f. transformers very carefully adjusted for maximum response. It should not be necessary to move these more than a fraction of a turn, and as well the original settings should be marked so that the trimmers can be returned to these positions as desired.

With regard to the alignment, it should not be necessary to move the trimmers more than half a turn, while the shortwave coils require no adjustment whatever.

It will be found that for a four-valve superhet, the "Air Cell Dual-Wave Four" gives excellent results, though, of course, the set should be very carefully wired and aligned. It may be found that with a long aerial there is a slight tendency towards instability with the volume control rotated full on. If this occurs, it can easily be cured by the simple expedient of shielding the lead from the first i.f. transformer to the grid of the 1D5G i.f. amplifier, and earthing the shielding.



The under-chassis wiring of the "Air-Cell Dual-Wave Four" is given in this sketch. The numbered leads shown connect to the dual-wave unit, as indicated in the accompanying article.

Lakemba Club Holds Eighth Annual Re-union

Large Representative Gathering at Enjoyable Function ★ 200th General Meeting ★ Lakemba Radio Club Notes And News.

By W.J.P.

IT is with the deepest regret that we record the passing of "Joe" Buchanan (VK2ABT), who has been a member of Lakemba Radio Club for the past two years. His death occurred in very tragic circumstances last month during the preparation of the evening meal. A sudden heart seizure struck him without warning, and when found a few minutes later he was dead.

Those of us who made personal contact with 2ABT well remember the hospitality always extended by him and his mother to any visitors who called on their way through Yerrinbool. To Mrs. Buchanan the death of her only child, at the age of 25, came as a terrific blow, but the situation is even more tragic in view of the fact that since the death of his father several years ago, Joe had taken over the majority of the work in connection with their large orchard. He spent little time on pleasure, and what few minutes he did have to spare were spent in the radio shack.

In offering Mrs. Buchanan our heartfelt sympathy, we do so in all sincerity, and trust that some consolation will be found in the fact that Joe's fine character and sterling qualities have not gone unnoticed by any of us. If, upon answering the Final Call, our own Log Book of Life contains but a portion of entries like those of 2ABT, then we can safely state we have done well.

★

The Annual Reunion.

The eighth Annual Reunion of the club was held on Tuesday, May 3, at the "Sunrise Hall," Canterbury, there being in attendance the usual large representative gathering. The speech by Mr. Burbury, of the Radio Inspectors' Department, was of special interest, as it contained some good advice to amateurs in general.

In congratulating the Lakemba Club on its remarkable progress, Mr. Burbury stated that he was pleased to see that the club had shared last year's prosperity in the history of amateur radio in Australia. The recent increase in power was an indication that the Federal Government was anxious to extend privileges to amateurs. He recommended that amateurs should not abuse any privileges extended, and should treat the bands with the respect to which they were due. The problem at the moment was the allocation of frequencies. Day by day commercial interests were constantly making applications for frequencies for various services.

With the advent of television, the pressure would be even greater, continued Mr. Burbury, and at the forthcoming world convention, amateur radio would hold what they now possess only by submitting a good case for the retention of all the bands. He did not think that there existed any deliberate lack of co-operation between amateurs and the department, but in conclusion he suggested that in preference to spending money on more power, it should be spent on improving the quality of the signal.

Other speakers included representatives from the Wireless Institute of Australia and leading surburban radio clubs, also Messrs. Haworth (A. W. Valve Co.), McIntyre (Prices' Radio), Hume (Philips' Radio), etc.

The Chanex-Dulytic Cup was won this year by VK2OI, and Slades' Radio Cup was won by VK2AS. The "Booby" Cup was won by VK2EH, and was presented amid much amusement and laughter. Three other prizes were drawn for and presented as follows:—First, an open order for £1/1/- presented by Mr. D. G. McIntyre, of Prices' Radio Service, won by ZL3KX (a visitor); second, 12 months free subscription to "Radio World," presented by "Radio World," won by VK2AEC; third, something to take home to the wife, mother or YL, won by Mr. Mulligan of Zero Beat Club. Mr. Mulligan did not like opening his prize, but it was a very nice piece of lady's handiwork in the form of a woolly poodle dog for milady's table.

The reunion, which practically coincided with the 200th general meeting of the club, was voted by all as a wonderful success.

Owner-operator D. C. Dunn, of Sydney, designed and built this professional-looking rig, which operates under the call-sign of VK2EG.

★

The 200th General Meeting.

On the occasion of the 200th general meeting of the club, a special representative from the W.I.A. in the person of Mr. R. Priddle, VK2RA, was in attendance.

The following members were elected to hold office for the ensuing year:—President, Mr. E. Hodgkins, VK2EH; vice-president, Mr. J. Warren, VK2QX; honorary secretary, Mr. V. Bennett, VK2VA; honorary treasurer, Mr. H. Ackling, VK2PX; publicity manager, Mr. W. Phelps, VK2DL; QSL manager, Mr. L. Hughes, VK2QP. A committee of management, a social committee, and a technical committee were also elected.

Waverley Radio Club Notes And News

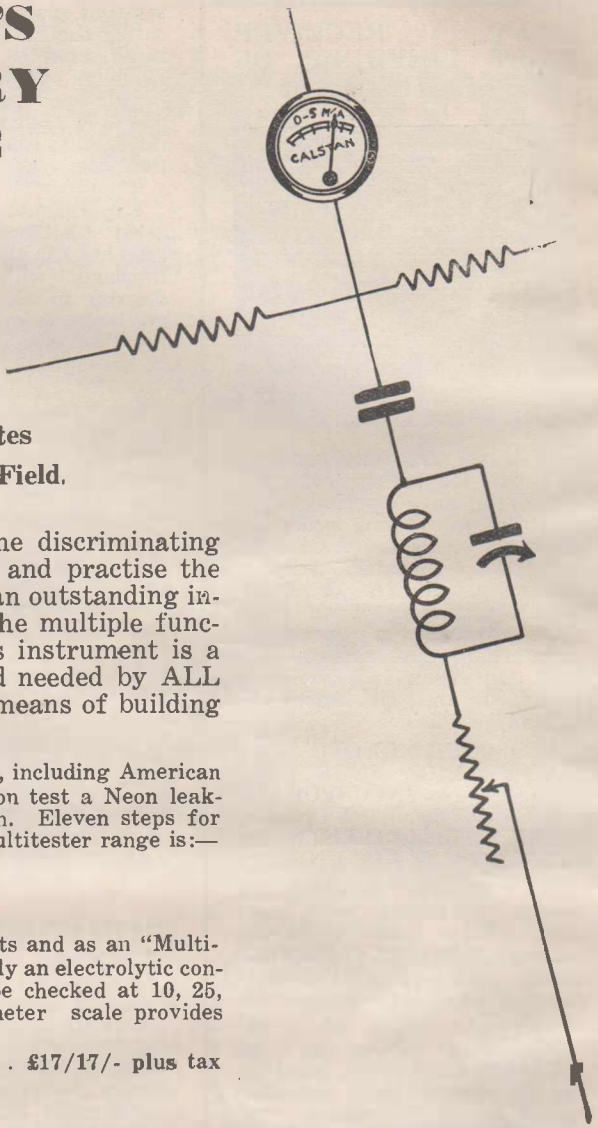
The Club's Annual Field Day will be held on Sunday, June 5, in National Park, and an invitation is extended to all interested shortwave enthusiasts who may desire to attend

A transmitting station, operating on 40 metres, will be concealed in a suitable location, and parties equipped with portable receivers will set out on foot from a pre-determined

. . . the RADIOTRICIAN'S PORTABLE LABORATORY . . . . IS CONTAINED IN THE CALSTAN

(CALibrated to STANdard)

TUBE-TESTER . . . . . MULTI-TESTER which creates yet another Calstan triumph in the Radio Servicing Field.



● Released by **SLADE'S RADIO PTY.** for the discriminating Radio Dealer and Serviceman who appreciate and practise the finer points of efficient Radio Service. Here is an outstanding instrument for all round perfection, combining the multiple functions of a Valve Tester and Multitester. This instrument is a boon to the Radio Serviceman and Dealer, and needed by ALL who rely on **RADIO SERVICE** as an effective means of building up a **MODERN RADIO BUSINESS.**

● AC Model 223 will test every valve used in Australia, including American and European P & V, and in addition to the emission test a Neon leakage indicator is fitted for individual electrode selection. Eleven steps for filament voltage from 1.5 to 30 volts is provided. The multitester range is:—

AC and DC Volts: 5, 10, 50, 250, 1250.
Milliamperes: 5 Ranges, 1, 5, 25, 100, 250.
Ohms: 5 Ranges, from 1 ohm to 5 megohms.

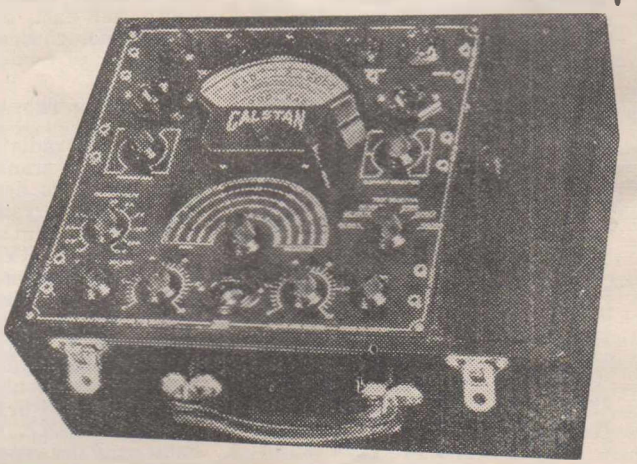
● This is also an excellent instrument for lining up sets and as an "Multimeter" operating in conjunction with the Power Supply an electrolytic condenser leakage test is available and condensers may be checked at 10, 25, 100, 150 and 250 volts, and a "GOOD"—?—"BAD" meter scale provides the necessary indications.

Model 223 (illustrated below) . . . . . £17/17/- plus tax

. . . . and for the Country Radio Dealer.

● The D.C. VALVE TESTER MODEL D223 is also available as a Combination Tube Checker and D.C. Multimeter. As a D.C Valve Tester it operates from a 6 volt battery and tests every type of valve used in Australia. As a D.C. Multimeter it has 5 ranges of D.C. volts, 5 ranges of Milliamperes and 4 ranges of Ohms.

D.C. Model, £18/18/-; Portable Model, £18/16/- both plus tax.



Slade's Radio Pty. Ltd.
Croydon, N.S.W.

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Distributors:
N.S.W.: Australian Radio College Ltd., Broadway and City Road, Sydney; Martin de Launay Ltd., Sydney; Bloch & Gerber Ltd., Sydney; Fox & MacGillycuddy Ltd., Sydney; John Martin Ltd., Sydney; Electric Service Co., Newcastle.

Queensland: J. B. Chandler and Co., Brisbane.

South Australia: Radio Wholesalers Ltd., Adelaide.

West Australia: Carlyle & Co., Pertb; Norman L. Burnell and Co., 13 Queen Street, Perth.

Victoria: Australian General Electric Ltd., Melbourne; Arthur J. Veall Pty. Ltd.

Tasmania: Noyes Bros. (Melbourne) Ltd., Launceston.

New Zealand: New Zealand Electrical Equipment Co.

Stocks available from Turnbull and Jones, all branches.

starting place with the object of locating the hidden transmitter, a prize being awarded to the first operator to do so. Several of the parties will be equipped with portable battery-operated transmitters so that communication can be maintained with the main station en route.

Experimenters will include 2BV, 2EG, 2ABS, 2AFZ, 2AHB, 2TN, 2AHJ, 2MQ, 2AFG, 2WN. All enthusiasts (with or without receivers) desiring to take part are requested to get in touch with the secretary of the Club, so that last-minute details can be arranged.

On Tuesday, May 10, an interesting talkie night was held in the clubrooms, through the courtesy and co-operation of A.W.A. Ltd., who supplied the projection gear and films, operated by Mr. K. Johns. One of the films screened was the A.W.A. film, "Spanning Space," which illustrated in a very entertaining manner various phases of radio communications and receiver manufacture.

Visitors are always welcome at the clubrooms, 13 McPherson Street, Waverley, and meetings are held each Tuesday night at 8 p.m, the morse class for beginners commencing at 7 p.m.—**J. Howes (2ABS). Secretary, 465 Pacific Highway, Artarmon.**

★

VK2EG, Sydney, N.S.W.

VK2EG is situated in a hollow on the Randwick edge of Centennial Park, the aerial swaying unostentatiously between a 40-foot mast and the house. With hills to the north, south, and east, this location was obviously not chosen for its radio possibilities.

First On The Air In May, 1935.

2EG first radiated a signal on May 4, 1935. The transmitter was crystal-controlled, two defaced pennies sandwiching the crystal, and used a 46 amplifier on 7 m.c. The first contact was with W3CRY, much to the operator's satisfaction. Some DX was worked during the following months, despite the unfavourable location. One rare QSO was with Y1IM, of Mongolia. This signal was heard on 7 m.c. two consecutive nights, but has not been heard or heard of since. Late one night w.a.c. was completed unknowingly by working a stranger, FT4AF, who during the QSO mentioned "QRA, Tunis." Dozens of Africans have been worked since then.

In the three years, 1500 QSO's have been effected with 69 countries in 33 zones.

Four-Unit Transmitter.

The transmitter is in four units. The exciter unit uses two type 53 valves as oscillator at 3.5 m.c., and three frequency doublers. These provide excitation at 7, 14, or 28 m.c., for a 46 buffer, which is link-coupled to the next unit. This is the power amplifier, and comprises an 800 and its associated gear. The 800 can be operated at its maximum input of 100 watts.

The two remaining units provide power. They take the form of a 1250-volt pack using 866 rectifiers, a 350-volt supply for oscillator and doublers, one of 500 volts for the buffer. Another pack biases the power amplifier. Relays are used to simplify switching from transmitter to receiver. Of necessity rather than choice the single-wire type of matched impedance feeder is used between transmitter and aerial. This has been adjusted for 20-metre operation, but is quite good at 10 metres.

For reception, nine valves are used in a superhet circuit which is very orthodox up to the audio end where three stages are used, including 2A3 output.

Hurstville Amateur Radio Club

(Affiliated With The W.I.A., N.S.W. Division.)

The lectures on subjects for the A.O.C.P. are now progressing favourably, and members are steadily increasing speed on the code.

The club transmitter is on the air each Thursday and Tuesday nights and some week-ends, telephony being used at present. The line-up is a 46 C.O., 46 doubler, 46 buffer, 210 final. Speech equipment is a 57 resistance-coupled to a 56, transformer-coupled to a 211. Separate power supplies are used for each stage. Mike is a Neophone, antenna a half-wave Zepp.

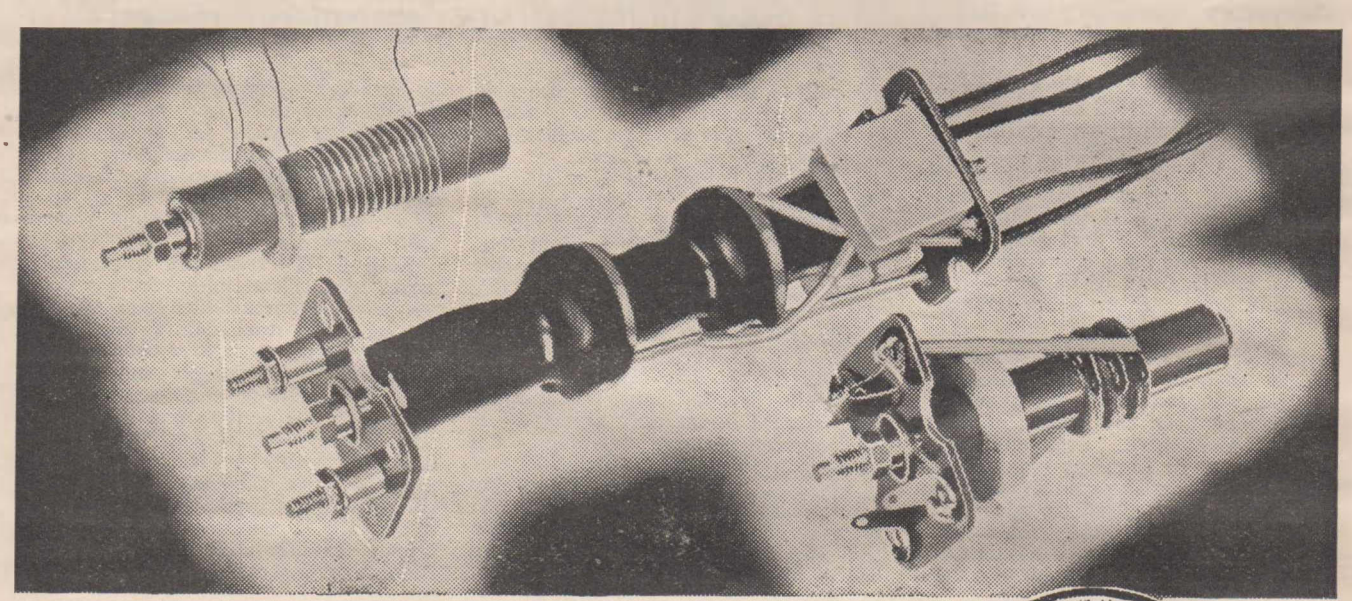
2VT is re-building a new rig, and 2AHF is at present QRL at a regional station. Any reports for these stations may be sent to the club which will acknowledge them. The frequency of 2MZ is approx. 14,370 k.c.

A visitor from "G" who has joined the club during her vacation in VK is Mrs. Chalk, wife of G31C.

Anyone interested in "ham" radio is always welcome at 316B Forest Road, Hurstville (opp. post office), either as a visitor or prospective member. Particulars of the club's activities may be had from the secretary, 34 Park Road, Carlton.—**P. J. Healy (Publicity Officer).**

CROWN PERMATUNE

IRON CORED COMPONENTS



WITH THE MOST IMPORTANT FEATURES EVER FOUND IN COIL CONSTRUCTION

Now, at last, that bugaboo of set construction—frequency drift—has been laid low, by these newly developed Crown Iron cored components incorporating PERMEABILITY TUNING. Vibration and changing atmospheric conditions invariably cause frequency drift which results in "off-station" tuning, with its resultant distortion.

Crown "Permatune" I.F.'s and coils definitely prevent this drift by the use of permeability tuning! . . . permanence of alignment being obtained by means of an exclusive Crown mechanical locking feature.

Adjustment is obtained by INDUCTANCE variation, the iron core being moved up and down by means of a screw. Once adjusted the screw is locked in position with special LOCKING NUT which ensures permanence of adjustment under the most adverse conditions.

Constructed only with Belden Litz wire and "perthane" insulation and specially moisture-proofed, these new units are compact, easily mounted, and ensure maximum electrical and mechanical efficiency.

The sketch above shows how permeability tuning is obtained by moving the iron core up or down in the coil, permanence of setting being assured by a lock-nut and lock-washer. A special hollow "spin-tight" spanner—available from all distributors—may be used to tighten the lock-nut whilst the trimmer screw is held by the screwdriver.

"PERMATUNE" SHORT-WAVE COILS TYPE C1X. PRICE 4/6.

First-class tracking—always so difficult to obtain on Short-Waves, especially when using an R.F. stage—is now definitely assured with these newly-developed Iron Cored "Permatune" S.W. coils, whilst the "Q" factor is greatly improved.

Measuring 2in. x ½in., the coils are ready for screwing direct to chassis or plate, and are available in two ranges.

Type Nos.: 12 to 35 m.. C1X/12 aer., R.F., and osc.: 16 to 50 m.; C1X/16 aer., R.F., and osc.

"PERMATUNE" BROADCAST COILS TYPE C1V. PRICE 7/6.

These coils are factory set to track with standard Crown dials, and S.C. Type "F" gangs. Matching being obtained by inductance variation with the "Permatune" iron core. Each coil may be readjusted to track with different dial calibrations. High impedance couplings ensure even sensitivity over the whole band—the unit fits into a 2⅝in. x 1⅝in. square can.

Type Nos.: C1V/aer., R.F., and osc./465.

"PERMATUNE" I.F. TRANSFORMERS TYPE 1SP/465. PRICE 12/6.

Adjustment is obtained by the "Permatune" method of inductance variation—a single screw each end being used for adjustment; the usual compression type mica trimmers being replaced by ceramic moulded fixed mica condensers, tested to within plus or minus 2½% of capacity used. The unit is fitted in a 4¾in. x 1⅝in. square can.

32-Watt Amplifier Uses 6L6G's In Pushpull

Over thirty watts of high quality output can be obtained from this r.c.c. amplifier, using a pair of 6L6G's in the output, with negative feedback.

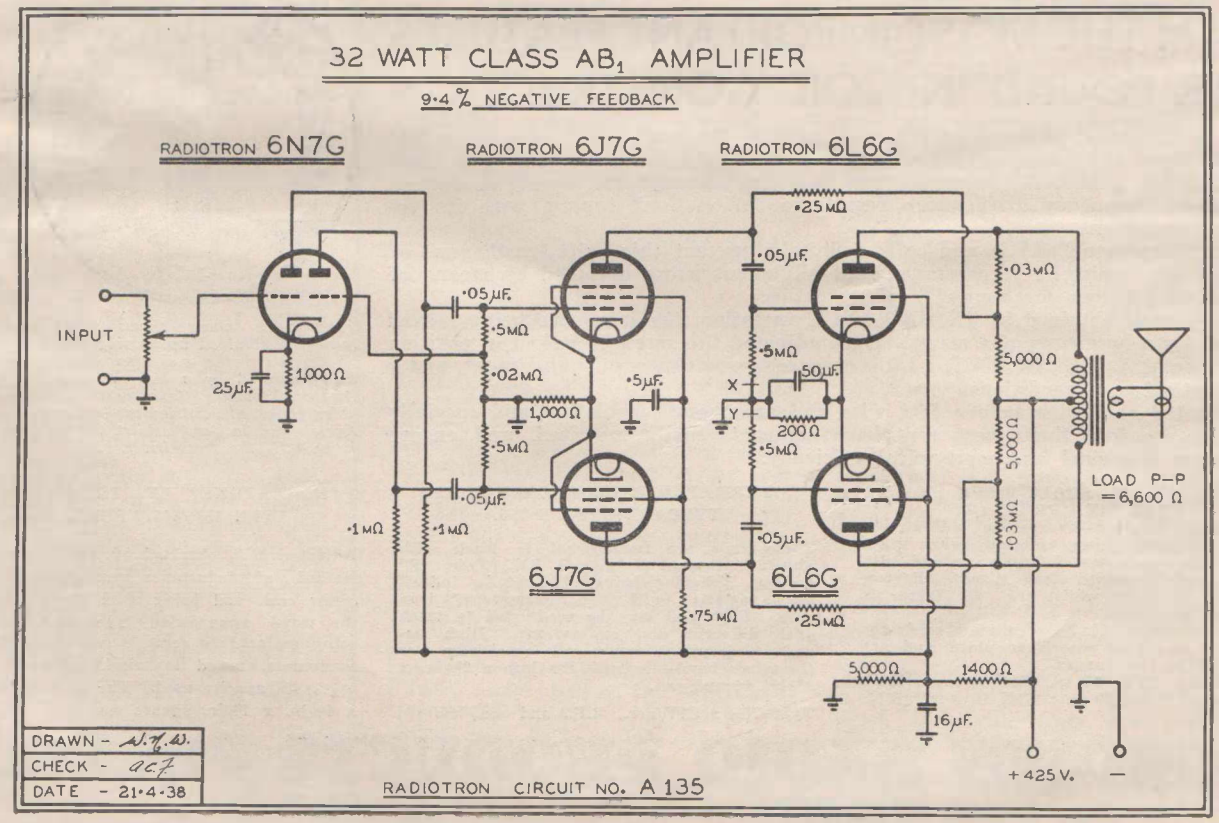
FOR a considerable time past there has been a succession of enquiries for a satisfactory 30-watt amplifier which is free from any tendency towards instability or the development of high voltages in the plate circuit (states "Radiotronics," No. 86). Radiotron Circuit A135, shown on this page, should satisfy this demand and is also both simple and economical.

It will be seen that the circuit employs Radiotron 6N7G as a first stage amplifier and inverter, exciting two 6J7G resistance coupled pentodes in push-pull. These in turn excite the final stage, consisting of two 6L6G valves in Class AB1 push-pull. The input circuit to the first grid may be arranged in the most convenient manner, a simple form of volume control suitable for a pick-up being indicated in the diagram.

The 6N7G cathode bias resistor is by-passed by a condenser, principally in order to reduce hum caused by leakage between the heater and cathode of this valve. In a number of cases it may be found possible to omit this condenser. The grid input to the second unit of the 6N7G is taken from a tapping point on the grid resistor following the first unit. Although this is indicated in the diagram as a fixed tapping point, it is highly desirable for the correct resistances to be found by trial, in order to give perfect balance between the two sides.

Since this balance is also affected by the 6J7G stage, it is desirable to check the balance in the grid circuit of the final stage. The method suggested is to insert a microammeter or 0-1 milliammeter at the points X and Y in turn, and to note the input at which grid current just commences to flow. The input should be identical for each of the two sides and if not so at the first attempt, the tapping point should be suitably adjusted. If so desired, a variable resistance could be used in place of fixed resistors, but in general it is preferable to employ fixed resistors as being less inclined to cause drift or noise. It will be seen that the cathode resistor of the two 6J7G valves is 1000 ohms and is unby-passed, by-passing being normally unnecessary, since any hum present in this stage would not be apparent. The values of screen dropping resistor and cathode bias resistor are exactly half those specified for a single valve under resistance-coupled pentode conditions.

Both 6J7G valves are used with series feedback arranged from a voltage divider across each side of the output load. Each voltage divider is arranged with resistances of 5000 and 30,000 ohms which, in conjunction with the shunting effect in the grid circuit of the valves, gives an effective negative feedback of 9.4%. The load on the 6L6G valves is 6600 ohms, plate to plate, this being the normal load for Class AB_1 operation with self-bias. No resistance capacity filter is necessary across the loudspeaker, owing to the use of feedback,



and for the same reason a tone control on the 6L6G stage will not be effective.

The grid resistors of the 6L6G valves are both 0.5 megohm, this being the maximum permissible with self-bias. The self-bias resistor of 200 ohms is by-passed by a condenser of 50 mfd., the effective bias being 25 volts. The plate voltage is 400 volts and therefore the supply voltage, which provides not only the plate voltage, but also the grid bias must equal 425 volts. The screen voltage should be 300 volts, and this is obtained by means of a heavy voltage divider or bleeder across the 425 volt supply.

It will be seen that this divider draws a current of approximately 65 m.a., this being in addition to the currents drawn by the valves in the receiver. A 16 mfd. condenser is used to give by-passing and stability to the screen voltage. A voltage divider drawing less current will not maintain the screens at such a steady potential, and will therefore introduce distortion and tend to decrease the output. The total current from the 425 volt supply is approximately 213 m.a. with maximum signal.

The power supply should be one giving 425 volts at 213 m.a., and this supply must have good regulation. A simple form of supply would be Radiotron 83 with a transformer 500 volts R.M.S. each side, a choke input filter with 20 henries inductance and a suitable smoothing condenser. The voltage delivered by the 83 valve will be a $0.9 \times 500 =$ 450 volts, less 15 volts drop in the valve or 435 volts actual. From this must be subtracted the drop in the filter choke, and if a choke of 100 ohms resistance is used, this will be about 20 volts.

The output voltage under these conditions would then be approximately 415 volts, a satisfactory approach to the maximum. Due to the slight decrease in voltage, the power output will be somewhat reduced and a further reduction would be caused by any additional resistance in the filter circuit.

Energising Extra Speaker Fields.

In certain circumstances the 5000 ohm resistor forming part of the bleeder could be replaced partly or wholly by the field coil of a loudspeaker, so as to avoid unnecessary waste of power. Two field coils, each of 2500 ohms, should be connected in series and each would then receive approximately 10 watts. Care should be taken in this case to see that the voltage drop from screens to earth is 325 volts maximum.

Since this circuit uses resistance coupling throughout, it is suggested as being a particularly attractive arrangement for a large amplifier, particularly when weight is a consideration. The fidelity and frequency response are considerably better than would be the case in an amplifier without feedback.

Australian-Made Solar Paper Condensers.

Since their introduction last year, Australian-made E.T.C. Solar Sealdtite paper condensers have found ready acceptance by the radio manufacturer demanding a reliable capacitor of proven capabilities.

That these condensers have established an excellent reputation for highest efficiency is due largely to the care taken in their manufacture. All raw materials are laboratory-tested, not only as to chemical quality, but also as regards physical characteristics and dimensions. Manufactured with precision machines by highly trained operatives, they are carefully inspected at every stage of their production, assuring high efficiency and extremely fine tolerances. During manufacture the capacitors are double impregnated by the vacuum process. R.M.A. standards are adhered to, so that ample protection is assured when the capacitors are put into operation at their rated voltages.

E.T.C. Solar Sealdtite condensers are manufactured in a full range of capacities covering all the popular sizes. Working voltages are 200, 400, and 600. Special sizes are constructed to suit individual specifications.

A.O.C.P. Questions & Answers

A.O.C.P. EXAMINATION PAPER
APRIL, 1937.

Published below is the second of a series of six articles comprising questions, with model answers, set in recent A.O.C.P. examinations. Specially written for the "Radio World" by . . . . .

H. WHEELER (VK5HW)

1 (a) Give a schematic diagram of a three stage shortwave C.W. transmitter employing a pentode crystal controlled oscillator.

A.: See January, 1938, issue, diagram on page 10.

(b) Draw also a suitable power supply deriving its primary voltage from A.C. mains.

A.: See January, 1938, issue, diagram on page 10.

2 (a) What is meant by percentage of modulation?

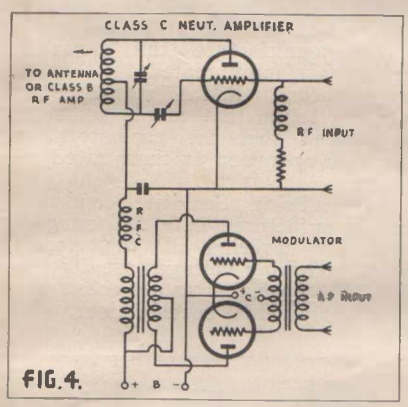


FIG. 4.

A.: In the ordinary process of amplitude modulation with a pure audio note having sinusoidal wave form the amplitude of the transmitted wave varies symmetrically about an average value equal to the amplitude of the carrier wave. With no modulation applied a steady carrier is transmitted. When a modulating signal is introduced having, say, half the carrier amplitude, the modulated wave alternately increases to 1½ times the average value and diminishes to half at the frequency of the modulating signal. In these circumstances the modulation factor is 0.5, or the percentage of modulation is 50%. Thus the maximum departure from the average value of amplitude is a measure of depth of modulation, and can be expressed as a percentage according to the formula

$$\% \text{ M} = \frac{\text{I mod.} - \text{I carr.}}{\text{I carr.}} \times 100$$

It should be noted that the amplitude of a wave is its peak value, and in making calculations the peak currents (or voltages) should be measured. The r.m.s. value of a 100% modulated wave is only 22.6% greater than the r.m.s. value of the carrier current.

The above discussion assumes a pure sine-wave modulating signal. The wave form of speech is very complex, consequently during speech transmission the percentage of modulation is very variable. To avoid overmodulation on speech peaks the average depth of modulation should be well below 100%.

(b) Explain briefly two systems of amplitude modulation. Illustrate your answer by simple diagrams.

A.: Fig. 4 illustrates plate modulation. The a.f. output from the modulator is super-imposed on the plate voltage of the modulated amplifier through the transformer. For 100% modulation the modulator and transformer should be capable of delivering an a.f. peak voltage equal to the plate voltage so that the resultant voltage will vary from zero to double the d.c. value. The class "C" amplifier power output varies directly with its plate power input, so that the envelope of the output wave will have the same shape as the modulating wave.

Fig. 5 illustrates suppressor-grid modulation of a pentode. In this system the modulation is effected by super-imposing the modulating voltage from the modulator through the transformer on to the suppressor bias. The bias and the modulator output are adjusted so that the r.f. output can be varied by modulation from practically zero to double the value obtained with stationary suppressor bias. The screen grid should be connected to the voltage divider as shown, and not to a separate source.

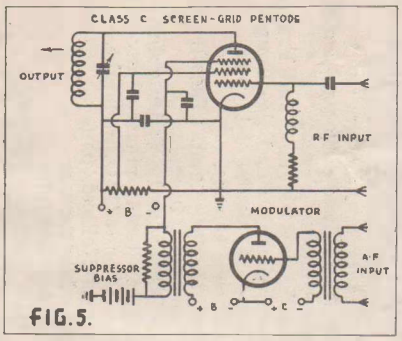


FIG. 5.

3. Given a 0-1 milliameter having a resistance of 99 ohms, what value of shunt resistance would you use to obtain a full scale deflection of 100 milliamps?

A.: The meter requires 1 **milliamp.** for a full scale deflection. If it is to be used to measure 100 milliamps. maximum 99 of the current must be

$$\frac{}{100}$$

shunted past the meter. Since current is inversely proportional to resistance, the shunt must have a resistance 1-99th that of the meter, i.e., 1 ohm.

4. What is the purpose of a "bleeder" or "drain" resistor when placed across the output of a high tension power supply? What approximate value of resistance would you use in any particular case?

A.: See Feb. issue, page 36 (7).

5 (a) What is the primary object of the use of piezo-electric crystal in a radio transmitter, and what precautions are necessary to obtain the best results?

A.: See Feb. issue, page 35 (2).

(b) Give a schematic diagram of a piezo-electric controlled single valve circuit.

A.: See Feb. issue, page 36 (2).

6. What is meant by the following: Current loop; Voltage antinode; fundamental frequency; resonance.

A.: See Feb. issue, page 35 (1).

7. Give a schematic drawing of any receiver incorporating at least a detector and one audio frequency amplifier that would be suitable for reception of C.W. signals. What value of tuning condenser would give a wide band-spread on the 40 and 20-metre band?

A.: See Fig. 6. The value of tuning condenser necessary to give a desired band-spread will depend on the system of band-spreading used. If only one condenser were employed it would need to be extremely small. With the circuit shown, C_2, the band-setting condenser, should have a maximum capacity of .0001 mfd., and C_1, the tuning condenser should have a capacity of .000025 to .0001 mfd., depending on the position of the tap on the coil.

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.

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.
W2XDV	31,600	9.49	New York, U.S.A.—Relays WABC. Daily 9 a.m.-2 p.m.; Sun. and Mon., 4.30-9 a.m., 10 a.m.-1 p.m.
W3XEY	31,600	9.49	Baltimore, U.S.A.—Relays WFBR. Daily, 7 a.m.-3 p.m.
W3XKA	31,600	9.49	Philadelphia, U.S.A.—Relays KYW. Daily 3 a.m.-1 p.m.
W4XCA	31,600	9.49	Memphis, U.S.A.—Relays WMC. Schedule unknown.
W5XAU	31,600	9.49	Oklahoma City, U.S.A.—Mon., 3-4 and 9-10 a.m.
W8XAI	31,600	9.49	Rochester, U.S.A.—Relays WHAM. Daily 10.30-3 p.m.
W8XWJ	31,600	9.49	Detroit, U.S.A.—Relays WWJ. Daily, 9-3.30 p.m.; Sun., 9 p.m.-3 p.m. (Mon.).
W9XPD	31,600	9.49	St. Louis, U.S.A.—Relays KSD. Schedule unknown.
(W9XUY)	31,600	9.49	Omaha, U.S.A.—Relays KOIL. Schedule unknown.
DGE	27,400	10.95	Nauen, Germany. Phone: Irregular.
DGX	26,800	11.19	Nauen, Germany. Phone: Irregular.
W9XJL	26,400	11.36	Superior, U.S.A.—Relays WEBC. Schedule unknown.
W9XAZ	26,400	11.36	Milwaukee, U.S.A.—Relays WTMJ from 4 a.m.
GSK	26,100	11.49	Daventry, England.—Irregular.
CRCX	24,380	12.3	Bowmanville, Canada.—Experimental.
W6XKG	25,950	11.56	Los Angeles, U.S.A.—Relays KGFJ 24 hours daily.
W3XAU	25,750	11.65	Philadelphia, U.S.A.—Experimental.
DGV	24,300	12.35	Nauen, Germany.—Phone: Irregular.
DGT	23,350	12.85	Nauen, Germany.—Phone: Irregular.
DGS	22,800	13.16	Nauen, Germany.—Phone: Irregular.
GST	21,550	13.92	Daventry, England.—Irregular.
W8XK	21,540	13.93	Pittsburgh, U.S.A.—Relays KDKA. Daily exc. Sun., 9.45 p.m.-midnight.
GSJ	21,530	13.93	Daventry, England.—Daily, midnight-1.30 a.m.; 8.45-11.55 p.m.
W2XE	21,520	13.94	New York, U.S.A.—Relays WABC. Daily, 10.30 p.m.-1 a.m.; Sat. and Sun., 11 p.m.-4 a.m.
GSH	21,470	13.97	Daventry, England.—Daily, mid.-1 a.m.; 8.45-11.55 p.m.
W1XAL	21,460	13.98	Boston, U.S.A.—Irregular.
OLR6A	21,450	13.99	Prague, C-slovakia.—Irregular.
WKK	21,420	14.01	Lawrenceville, U.S.A.—Phones S. America, 10 p.m.-10 a.m.
WBU	21,260	14.11	Rocky Point, U.S.A.—Phone: Irregular.
WQA	21,220	14.14	Rocky Point, U.S.A.—Phone: Irregular.
LSL	21,160	14.19	Buenos Aires, Arg.—Phones Europe.
KBI	21,140	14.19	Manilla, P.I.—Tests; irregular.
PSA	21,080	14.23	Rio de Janeiro, Brazil.—Phones WKK.
KWN	21,060	14.25	Dixon, U.S.A.—Phones; irregular.
WKA	21,060	14.25	Lawrenceville, U.S.A.—Phones England.
LSN6	21,020	14.29	Buenos Aires, Arg.—Phones New York, 10 p.m.-10 a.m.
PSB	20,910	14.35	Rio de Janiero, Brazil.—Phones New York; irreg.
EHY-			
EDM	20,860	14.38	Madrid, Spain.—Phones S. America.
PFF	20,830	14.40	Kootwijk, Holland.—Phones Java, p.m.
KSS	20,820	14.41	Bolinas, U.S.A.—Phones Far East.
LSY	20,700	14.49	Buenos Aires, Arg.—Tests irregularly.
DGQ	20,500	14.63	Nauen, Germany.—Phone; irregular.
GAA	20,380	14.72	Rugby, England.—Phones Argentine and Brazil.
DGW	20,140	14.90	Nauen, Germany.—Phone; irregular.
OPL	20,040	14.97	Leopoldville, Belgian Congo.—Phones ORG.
DHO	20,020	14.99	Nauen, Germany.—Phones S. America.
CFA	19,987	15.01	Drummondville, Canada.—Phones U.S.A.
KAX	19,980	15.02	Manila, P.I.—Phones KWU, JVE and DFC.
DLO	19,947	15.04	Rehmate, Germany.—Phone; irregular.
LSG	19,900	15.08	Buenos Aires, Arg.—Tests irregularly.
WKN	19,820	15.14	Lawrenceville, U.S.A.—Phones England.
DFJ	19,700	15.23	Nauen, Germany.—Phone irregular.
CEC	19,680	15.24	Santiago, Chile.—Phones Colombia and Argentine.
LSN5	19,650	15.27	Buenos Aires, Arg.—Phones Europe.
VQG4	19,620	15.28	Nairobi, Kenya Colony.—Phones London, 10.30-11 p.m.
LSF	19,600	15.31	Buenos Aires, Arg.—Tests irregularly.
EDX	19,530	15.36	Madrid, Spain.—Phones S. America.
IRW	19,520	15.37	Rome, Italy.—Phones S. America; tests irregularly.
LSQ	19,500	15.40	Buenos Aires, Arg.—Phone; irregular.
GAD	19,480	15.41	Rugby, England.—Phones VQG4, 10.30-11 p.m.
DFM	19,460	15.42	Nauen, Germany.—Phone; irregular.
FTM	19,355	15.5	St. Assise, France.—Phones S. America.
PMA	19,345	15.51	Bandoeng, Java.—Phones Holland, 8.30 p.m.-2 a.m.
PPU	19,260	15.58	Rio de Janeiro, Brazil.—Phones France.
WKF	19,220	15.6	Lawrenceville, U.S.A.—Phones England and France.
ORG	19,200	15.62	Ruysselede, Belgium.—Phones OPL, Belg. Congo.
GAP	19,161	15.66	Rugby, England.—Phones Australia 4-11 p.m.
LSM	19,140	15.68	Buenos Aires, Arg.—Phones Europe.
HS8PJ	19,020	15.77	Bangkok, Siam.—Mon., 11 p.m.-1 a.m. (Tues.).
GAQ	18,970	15.81	Rugby, England.—Phones S. Africa.
WQD	18,960	15.82	Rocky Point, U.S.A.—Tests with LSY; irregular.
JVA	18,910	15.86	Nazaki, Japan.—Irregular tests; phones Europe.
ZSS	18,890	15.88	Klipheuvel, S. Africa.—Phones GAQ, midnight.
PLE	18,830	15.93	Bandoeng, Java.—Phones Holland, p.m.
TYD3	18,776	15.98	Paris, France.—Phones Madagascar.
DFQ	18,700	16.04	Nauen, Germany.—Phone; irregular.
OCI	18,680	16.06	Lima, Peru.—Tests with Bogota, Colombia.
PSC	18,640	16.09	Rio de Janeiro, Brazil.—Phones N. York & B. Aires.
GAU	18,620	16.11	Rugby, England.—Phones New York.
PCM	18,540	16.19	Kootwijk, Holland.—Phones Java.
HBH	18,480	16.23	Geneva, Switzerland.—Irregular.

Call.	Kc.	M.	Location. Schedule, etc.
HBF	18,450	16.26	Geneva, Switzerland.—Irregular.
HJY	18,440	16.27	Bogota, Colombia.—Phones CEC and OCI.
PCK	18,405	16.30	Kootwijk, Holland.—Phones Java (PLE and PMC).
FZS	18,345	16.35	Saigon, Fr. Indo-China.—Phones Paris.
WLA	18,340	16.36	Lawrenceville, U.S.A.—Phones England.
GAS	18,310	16.38	Rugby, England.—Phones New York.
YVR	18,299	16.39	Maracay, Venezuela.—Phones Germany.
IUD	18,270	16.42	Addis Ababa, Ethiopia.—Irregular.
FTO	18,250	16.43	St. Assise, France.—Phones S. America.
KUS	18,220	16.46	Manila, P.I.—Phones U.S.A.
GAW	18,200	16.48	Rugby, England.—Phones New York.
JVB	18,190	16.49	Nazaki, Japan.—Phones Java and U.S.A.
CGA	18,180	16.51	Drummondville, Canada.—Phones GBB, Rugby.
PMC	18,135	16.54	Bandoeng, Java.—Phones Holland.
LSY3	18,115	16.56	Buenos Aires, Arg.—Tests; broadcasts Sat., 8-9 a.m.
TYE1	18,090	16.58	Paris, France.—Phones New York.
PCV	18,070	16.60	Kootwijk, Holland.—Phones PLE.
KUN	18,060	16.61	Bolinas, U.S.A.—Phones Manila.
GAB	18,040	16.63	Rugby, England.—Phones Canada.
KQJ	18,020	16.65	Bolinas, U.S.A.—Phone; irregular.
WQB	17,940	16.72	Rocky Point, U.S.A.—Phones LSY, Arg.
WLL	17,900	16.76	Rocky Point, U.S.A.—Tests with Geneva and Berlin.
LSN	17,850	16.81	Buenos Aires, Arg.—Phone; irregular.
PCV	17,810	16.84	Kootwijk, Holland.—Phones Java, 9-11 p.m.
TGWA	17,800	16.84	Guatemala City, Guat.—Irregular.
GSG	17,790	16.86	Daventry, England.—Daily, mid.-1 a.m.; 4-6.15 p.m.; 8.45-11.55 p.m.
JZL	17,785	16.87	Tokyo, Japan.—Irregular.
W3XAL	17,780	16.87	Bound Brook, U.S.A.—Daily exc. Mon., mid.-9.45 a.m.
W9XAA	17,780	16.87	Chicago, U.S.A.—Irregular.
PHI	17,770	16.88	Hiuzen, Holland.—Daily exc. Wed., 10.25 p.m.-12.30 a.m.; Sun., 9.25-10.25 p.m., 11.30 p.m.-12.30 a.m.
DJE	17,760	16.89	Berlin, Germany.—Daily, 11.10 a.m.-1 p.m.; 3.5 p.m.-8.50 a.m.; Sun., 2.10-3.25 a.m.
W2XE	17,760	16.89	New York, U.S.A.—Daily, 9.20 a.m.-3 p.m.
ZBW5	17,755	16.9	Hong Kong, China.—Irregular, 7 p.m.-1 a.m.
IAC	17,750	16.91	Pisa, Italy.—Phones ships.
HSP	17,741	16.91	Bangkok, Siam.—Phones Germany, 11 a.m. and 6 p.m.; phones JVE, 2 p.m.
CJA3	17,710	16.94	Drummondville, Canada.—Phones Australia and Far East.
IAC	17,699	16.95	Pisa, Italy.—Phones ships.
XGM	17,650	17.00	Shanghai, China.—Phones London, 10 p.m.
IBC	17,620	17.03	San Paolo, Italy.—Phone; irregular.
VWY	17,545	17.10	Poona, India.—Phones England (GAU, GBC, GBU).
DFB	17,520	17.12	Nauen, Germany.—Phones S. America, 12.15 a.m.; phones Siam, 11 a.m. and 6 p.m.
VWY2	17,480	17.16	Poona, India.—Phones England, 10.30 p.m.
DGR	17,341	17.30	Nauen, Germany.—Phone; irregular.
W2XGB	17,310	17.33	Hicksville, U.S.A.—Tests exc. Sun., Mon., 12.30-2.30 a.m.
W3XJU	17,310	17.33	College Park, U.S.A.—Experimental station for Washington Institute of Technology.
FZE8	17,280	17.36	Djibouti, Fr. Somaliland.—Irregular.
DAF	17,263	17.38	Norddeich, Germany.—Phones ships.
CMA5	17,260	17.39	Habana, Cuba.—Phones and tests irregularly.
DAN	17,260	17.39	Nordenland, Germany.—Phones ships; p.m.
WOO	17,120	17.52	Ocean Gate, U.S.A.—Phones ships.
GBC	17,080	17.56	Rugby England.—Phones ships.
JZD	16,910	17.59	Nazaki, Japan.—Phones ships.
ITK	16,385	18.32	Mogadiscio, It. Somaliland.—Phones IAC around 12.30 a.m.
PCL	16,305	18.39	Kootwijk, Holland.—Special relays & phones irreg.
WLK	16,270	18.44	Lawrenceville, U.S.A.—Phones S. America.
WOG	16,270	18.44	Ocean Gate, U.S.A.—Phones England.
KTO	16,240	18.47	Manila, P.I.—Phones Japan and U.S.A., 8 a.m.
FZR3	16,233	18.48	Saigon, Fr. Indo-China.—Phones Paris.
GBA	16,140	18.59	Rugby, England.—Phones S. America.
IRY	16,177	18,62	Rome, Italy.—Phones IDU, ITK.
JVC	16,050	18,69	Nazaki, Japan.—Phones Hong Kong.
KKP	16,030	18.71	Kahuku, Hawaii.—Phones Dixon, U.S.A., 6 a.m.
FTK	15,880	18.90	St. Assise, France.—Phones Saigon, 11 p.m.
CEC	15,865	18.91	Santiago, Chile.—Phones Lima.
JVD	15,860	18.91	Nazaki, Japan.—Phones Shanghai and U.S.A.
LSL	15,810	18.98	Buenos Aires, Argentine.—Phones London & Paris.
XOJ	15,800	18.99	Shanghai, China.—Phones London & U.S.A.
JYT	15,760	19.04	Kemikawa-Cho, Japan.—Tests with Dixon, U.S.A.
JIA	15,740	19.06	Chureki, Japan.—Tests; irregular.
WJS	15,700	19.11	Hicksville, U.S.A.—Phones Africa.
JVE	15,660	19.16	Nazaki, Japan.—Phones Java & Siam, 6-8 p.m.
OCJ	15,625	19.20	Lima, Peru.—Phones CEC.
JVF	15,620	19.21	Nazaki, Japan.—Phones Dixon, 11 a.m. and 8 p.m.
CO9XX	15,550	19.29	Tuinucu, Cuba.—Broadcasts irregularly.
HSC2	15,530	19.32	Bangkok, Siam.—Phones JVE.
HS8PJ	15,530	19.32	Bangkok, Siam.—Broadcasts occasionally Mons.
CMA3	15,505	19.36	Habana, Cuba.—Phones and tests irreg.
KEM	15,490	19.37	Bolinas, U.S.A.—Phones Java and China.
KKL	15,475	19.39	Bolinas, U.S.A.—Phones Manila and Japan.
KKR	15,460	19.41	Bolinas, U.S.A.—Phones Far East.
IUG	15,450	19.42	Addis Ababa, Ethiopia.—Phones Rome, 12.15 a.m.
XEBM	15,440	19.43	Mazatlan, Mexico.—Irregularly 10 p.m.
KWE	15,430	19.44	Bolinas, U.S.A.—Phones Far East.
KWO	15,415	19.46	Dixon, U.S.A.—Phones Japan and Hawaii.
HAS3	15,370	19.52	Budapest, Hungary.—Sundays mid.-1 a.m. (Mons.).
DZG	15,360	19.53	Zeesen, Germany.—Irregular.
KWU	15,355	19.53	Dixon, U.S.A.—Phones Pacific Isles and Japan.
DJR	15,340	19.56	Berlin, Germany.—Daily, 7.50 a.m.-1.45 p.m.; 11 p.m.-mid.
W2XAD	15,330	19.56	Schenectady, U.S.A.—Daily, 2 a.m.-midday.
W6XBE	15,330	19.56	Belmont, Calif., U.S.A.—New G.E. station soon in use
OLR5B	15,320	19.58	Prague, Cz-Slovakia.—Daily exc. Sun., 9.30-10.30 p.m.; Suns., 9-10.30 p.m.
GSP	15,310	19.60	Daventry, England.—Daily, 4.45-7 a.m.; 9.20-11.30 a.m.
YDB	15,300	19.61	Soerabaia, Java.—Not in use at present.
LRU	15,290	19.62	Buenos Aires, Argentine.—Daily, 9-11 p.m.
HI3X	15,280	19.63	Ciudad Trujillo, D.R.—Relays HIX, 3.10-4.10 a.m.; Sundays, 10.40 p.m.-1.40 a.m. (Mons.).
DJQ	15,280	19.63	Berlin, Germany.—Daily, 7.50 a.m.-1.45 p.m., 3.5 p.m.-7.30 a.m.; Suns., 2.10-3.25 a.m
W2XE	15,270	19.65	Daventry, England.—Not in use at present.
GSI	15,260	19.66	New York, U.S.A.—Daily exc. Sun., Mon. 4-5.15 a.m.
RIM	15,252	19.67	Tachkent, U.S.S.R.—Works Moscow 10 p.m.
W1XAL	15,250	19.67	Boston, U.S.A.—Daily 5.15-7 a.m.; Mons., 1.15-3 a.m.
TPA2	15,245	19.68	Paris, France.—Daily 9 p.m.-2 a.m.
HS8PJ	15,230	19.70	Bangkok, Siam.—Irregularly Mons., 11 p.m.-1 a.m.

Call.	Kc.	M.	Location. Schedule, etc.
OLR5A	15,230	19.70	Prague, Cz-Slovakia.—Daily 9.30-10.30 p.m.
PCJ	15,220	19.71	Huizen, Holland.—Tues., 5-6.30 p.m.; Wed., 12.30-2 a.m.
W8XK	15,210	19.72	Pittsburgh, U.S.A.—Daily mid.-10 a.m.
DJB	15,200	19.74	Berlin, Germany.—Daily 7.50 a.m.-1.45 p.m.; 3.5 p.m.-2 a.m.; Sundays, 2.10-3.25 a.m.
ZBW4	15,190	19.75	Hong Kong, China.—Irregular, 2.30 and 7 p.m.
RV96	15,183	19.75	Moscow, U.S.S.R.—Irregular.
GSO	15,180	19.76	Daventry, England.—Daily, mid.-1 a.m.; 4-6.15 p.m.; 8.45-11.55 p.m.
TGWA	15,170	19.77	Guatemala City, Guat.—Irregular, 2.30-5 a.m.
12RO5	15,170	19.77	Rome, Italy.—Testing.
	15,170	19.77	Lima, Peru.—Testing: "Radio National."
XEWW	15,165	19.78	Mexico City, Mexico.—Irregular, 3 a.m.-3 p.m.
OLR5C	15,160	19.79	Prague, Cz-Slovakia.—Irregular.
JZK	15,160	19.79	Nazaki, Japan.—Irregular.
SM5SX	15,155	19.79	Stockholm, Sweden.—Daily 2 a.m.
YDC	15,150	19.80	Bandoeng, Java.—Daily, 9-10.30 a.m.; 1.30-5 p.m.; Sats., 10.30 a.m.-5 p.m.; 8.30 p.m.-1.30 a.m.
GSF	15,140	19.82	Daventry, England.—Daily, 1.45-3 a.m.; 7.15-9 a.m.; 4-6.15 p.m.; 8.45-11.55 p.m.
HVJ	15,120	19.83	Vatican City, Italy.—Daily, 1.30-1.45 a.m.; Sun., Mon., 1-1.45 a.m.
DJL	15,110	19.85	Berlin, Germany.—Daily 1.40-7.25 a.m.; 3-5 p.m.; 11 p.m.-mid.
WNC	15,055	19.92	Hialeah, U.S.A.—Calls Central America.
RKI	15,038	19.95	Moscow, U.S.S.R.—Broadcasts 3.15 p.m. (Mons.); phones Tachkent, 10 p.m.
HIR	15,038	19.95	Ciudad Trujillo, D.R.—Phones WNC.
YSL	14,985	20.02	San Salvador, Salvador.—Phone; irregular.
KAY	14,980	20.03	Manila, P.I.—Phones Pacific Isles.
LZA	14,970	20.04	Sophia, Bulgaria.—Tues., Wed., Fri., Sat., 2.30-5.45 a.m.; Thurs., 2.30-7.45 a.m.; Sun., 2.30-8 a.m. Sun., 5 p.m.-8 a.m. (Mon.); daily, exc. Sun., 8-9.30 p.m.
PSF	14,960	20.05	Rio de Janeiro, Brazil.—Phones Buenos Aires.
HJB	14,950	20.07	Bogota, Colombia.—Phones WNC.
HII	14,940	20.08	Ciudad Trujillo, D.R.—Phones WNC.
HJA3	14,940	20.08	Barranquilla, Colombia.—Phones WNC.
PSE	14,935	20.09	Rio de Janeiro, Brazil.—Phones U.S.A. and Madrid.
KQH	14,920	20.11	Kahuka, Hawaii.—Tests irreg.
JVG	14,910	20.12	Nazaki, Japan.—Phones Formosa.
OCJ2	14,845	20.21	Lima, Peru.—Phones other S. American stations.
WQV	14,800	20.27	Rocky Point, U.S.A.—Phones Europe.
ROU	14,790	20.28	Omsk, Siberia, U.S.S.R.—Phones Moscow, 10 p.m.
WEB	14,770	20.31	Rocky Point, U.S.A.—Phones Europe.
IQA	14,730	20.37	Rome, Italy.— Broadcasts 9-11 a.m.
PSF	14,690	20.42	Rio de Janeiro, Brazil.—Phones Arg. and U.S.A.
DFD	14,665	20.46	Nauen, Germany.—Phone; irreg.
GBL	14,653	20.47	Rugby, England.—Phones JVH 4-10 p.m.
TYF	14,640	20.49	Paris, France.—Phones Saigon and Cairo, 3 a.m., 6 p.m.
EHY-			
EDM	14,620	20.52	Madrid, Spain.—Phones S. America.
DGZ	14,605	20.54	Nauen, Germany.—Phone; irreg.
JVH	14,600	20.55	Nazaki, Japan.—Broadcasts irreg., 8 a.m.-2.30 p.m.; phones Europe 7 p.m.
WMN	14,590	20.56	Lawrenceville, U.S.A.—Phones England.
HBJ	14,536	20.64	Geneva, Switzerland.—Sunday, 9.45-11 a.m.
LSN	14,530	20.65	Buenos Aires, Arg.—Phones New York.
	14,500	20.69	Asmara, Eritrea.—Phones Rome and Addis Ababa, 9.30 p.m.
LSM2	14,500	20.69	Buenos Aires, Arg.—Phones Rio and Europe.
TIR	14,485	20.71	Cartago, Costa Rica.—Phones C. America & U.S.A.
YSL	14,485	20.71	San Salvador, Salvador.—Irregular.
YNA	14,485	20.71	Managua, Nicaragua.—Phones WNC.
HPF	14,485	20.71	Panama City, Panama.—Phones WNC.
HRF	14,485	20.71	Tegucigalpa, Honduras.—Phones WNC.
HRM	14,484	20.71	Tela, Honduras.—Phones WNC.
TGF	14,485	20.71	Guatemala City, Guat.—Phones WNC.
HRL5	14,485	20.71	Nacaome, Honduras.—Phones WNC.
PLX	14,480	20.72	Bandoeng, Java.—Phones Europe.
WMF	14,470	20.73	Lawrenceville, U.S.A.—Phones London and Paris.
DZH	14,460	20.75	Zeesen, Germany.—Irregular.
GBW	14,440	20.78	Rugby, England.Phones U.S.A.
RAEM	14,410	20.82	North Pole Base U.S.S.R. Scientists.—Irregular.
DOT	14,410	20.82	Koenigs Wusterhausen, Germany.—Phone; irregular.
IBC	14,410	20.82	San Paolo, Italy.—Phone; irregular.
EA7BA	14,284	20.96	Cadiz, Spain.—Nationalist station.
W1OXDA	14,250	21.00	Schooner "Morrissey."—Irregular.
EA9AH	14,200	21.13	Tetuan, Sp. Morocco.—Daily exc. Sun., 5.15-8 a.m.; 10 a.m.-noon.
FET5	14,200	21.13	Burgos, Spain.—Nationalist station.
PI1J	14,166	21.15	Dordrecht, Holland.—Saturdays, 3-3.30 a.m.
EA8AE	14,080	21.30	Las Palmas, Canary Is.—Nationalist station.
EA2BA	14,031	21.38	Jaca, Spain.—Nationalist station.
GBA	13,990	21.44	Rugby, England.—Phones Buenos Aires.
LSB	13,950	21.5	Buenos Aires, Arg.—Testing around 10.30 a.m.
SUZ	13,820	21.71	Abou Zabal, Egypt.—Phones Europe, 2 a.m.
OX2QY	13,700	21.90	Reindeer Pt., Greenland.—Irregular.
KKZ	13,690	21.91	Bolinas, U.S.A.—Irregular.
HJY	13,667	21.98	Bogota, Colombia.—Phones CEC.
SPW	13,635	22.00	Warsaw, Poland.—Daily 9-10 a.m.; Tues., Thurs., Sat., 3.30-4.30 a.m.
JYK	13,610	22.04	Kemikawa-Cho, Japan.—Irregular.
ZMBJ	13,600	22.06	TSS "Amatea."—Daily around 4 p.m.
GBB2	13,595	22.07	Rugby, England.—Phones Canada.
GBB	13,585	22.08	Rugby, England.—Phones Egypt and Canada.
JVI	13,560	22.13	Nazaki, Japan.—Phones Manchukuo.
WKC	13,465	22.28	Rocky Point, U.S.A.—Tests and relays irreg.
WKD	13.435	23.33	Rocky Point, U.S.A.—Tests and relays irreg.
GCJ	13,415	22.36	Rugby, England.—Phones Japan (JVH) and China.
WCT	13,410	22.37	San Juan, Porto Rico.—Phones Miami, U.S.A.
YSJ	13,410	22.37	San Salvador, Salvador.—Phones WNC.
WMA	13,390	22.40	Lawrenceville, U.S.A.—Phones England.
IDU	13,380	22.42	Asmara, Eritrea.—Phones Rome, p.m.
WOJ	13,370	22.44	Hialeah, U.S.A.—Phone; irregular.
YVQ	13,345	22.48	Maracay, Venezuela.—Phones WNC.
CGA3	13,285	22.58	Drummondville, Canada.—Phones London and ships.
DAF	13,275	22.60	Norddeich, Germany.—Phones ships.
KHJ	13,240	22.66	Manila, P.I.—Phones; irregular.
IRJ	13,220	22.70	Rome, Italy.—Phones Tokyo, 8 p.m.-mid.
DGG	13,180	22.76	Nauen, Germany.—Phone; irregular.
DAF	13,100	22.90	Norddeich, Germany.—Phones ships.
VPD	13,075	22.94	Suva, Fiji Is.—Not in use at present.
JZE	13,020	23.04	Nazaki, Japan.—Phones ships.

Call.	Kc.	M.	Location. Schedule, etc.
TYC	13,000	23.08	Paris, France.—Phones CNR, Morocco.
DFC	12,985	23.10	Nauen, Germany.—Phones Cairo and Manila.
IAC	12,865	23.32	Pisa, Italy.—Phones ships.
W1OXAB	12,862	23.33	Reindeer Pt., Greenland.—Phones WEL.
W2XGB	12,862	23.33	Hicksville, U.S.A.—Testing.
RKR	12,860	23.33	Novosibirsk.—U.S.S.R.—Phones daily, 10 p.m.
WOO	12,840	23.36	Ocean Gate, U.S.A.—Phones ships.
HJC	12,830	23.37	Barranquilla, Colombia.—Phones HJB, HPF & WNC.
HJA3	12,830	23.37	Barranquilla, Colombia.—Phones WNC.
CNR	12,825	23.39	Rabat, Morocco.—Phones Paris.
IAC	12,800	23.45	Pisa, Italy.—Phones ships.
GBC	12,780	23.47	Rugby, England.—Phones ships.
HIN	12,500	24.00	Ciudad Trujillo, D.R.—Broadcasts, exc. Mon., 2.40 and 10.10 a.m.
DAF	12,325	24.34	Norddeich, Germany.—Phones ships.
PLM	12,300	24.39	Bandoeng, Java.—Phones Sydney.
CG615	12,300	24.39	Santiago, Chile.—Daily 2-4 and 7-11 a.m.; Mondays, 7 a.m.-1 p.m.
ZLU	12,295	24.40	Wellington, N.Z.—Irregular.
GBU	12,290	24.41	Rugby, England.—Phones New York.
KUV	12,280	24.43	Manila, P.I.—Phones; irregular.
TYB	12,250	24.49	Paris, France.—Phones Far East and ships.
TFJ	12,235	24.52	Reykjavik, Iceland.—Broadcasts Mon. 4.40-5.30 a.m.; phones England.
TYA	12,215	24.56	Paris, France.—Phones ships.
GBS	12,150	24.69	Rugby, England.—Phones New York.
DZE	12,130	24.73	Zeesen, Germany.—Tests irregularly.
TPZ2	12,120	24.75	Algiers, Algeria.—Phones Paris, 3-9.30 p.m.
CJA	12,100	24.79	Drummondville, Canada.—Phones Australia (VIY).
PDV	12,060	24.88	Kootwijk, Holland.—Phones D.E.I.
DGL	12,035	24.93	Nauen, Germany.—Phone; irregular.
VIY	12,020	24.95	Rockbank, Australia.—Phones Canada.
RNE	12,000	25.00	Moscow, U.S.S.R.—Daily 3.15-4 a.m.; 11.30 a.m.-2 p.m.; 9-10 p.m.; Sundays, 9 p.m.-4 a.m.
FZS2	11,991	25.02	Saigon, Fr. Indo-China.—Phones Paris.
HI2X	11,960	25.08	Ciudad Trujillo, D.R.—Relays HIX Wed., Sat. 11.10 a.m.-1 p.m.
IUC	11,955	25.09	Addis Ababa, Ethiopia.—Phones IAC around 3 p.m.
KKQ	11,950	25.10	Bolinas, U.S.A.—Tests irregularly.
FTA	11,940	25.13	St. Assise, France.—Phones Morocco & Argentine.
YNA	11,935	25.14	Managua, Nicaragua.—Phones C. and S. America.
CB1190	11,910	25.20	Valdivia, Chile.—Relays CB69 2 a.m.-2 p.m.
XEW1	11,900	25.21	Mexico City, Mexico.—Wed., Fri., 10.30 a.m.-3 p.m.; Sat., noon-3 p.m.; Mon., 3.30-5 a.m.
IUY	11,900	25.21	Rome, Italy.—10.30 a.m.-noon.
OLR4D	11,900	25.21	Prague, Cz-Slovakia.—Irregular.
XEXR	11,895	25.22	Mexico City, Mexico.—Daily, 9 a.m.-2.30 p.m.
HP5I	11,895	25.22	Aguadulce, Panama.—Daily 10.30 a.m.-12.30 p.m.
TPA3	11,880	25.23	Paris, France.—Daily, 3.15-9 a.m.; 5-8 p.m.
XEXA	11,880	25.23	Mexico City, Mexico.—Not in use at present.
OLR4C	11,875	25.26	Prague, Cz-Slovakia.
W8XK	11,870	25.26	Pittsburgh, U.S.A.—Daily 10 a.m.-2 p.m.
YDB	11,860	25.29	Soerabaia, Java.—Daily, 1.30-5 p.m.; Sun., 10.30 a.m.-5.30 p.m.
GSE	11,860	25.29	Daventry, England.—Not in use at present.
DJP	11,855	25.31	Berlin, Germany.—Not in use at present.
CB1185	11,850	25.32	Santiago, Chile.—New station soon on air.
TPB	11,845	25.33	Paris, France.—Testing around 8-11 a.m.
KZRM	11,840	25.34	Manila, P.I.—Irregular noon-1 a.m.
CSW	11,840	25.34	Lisbon, Portugal.—Irregular, 2.30-4.30 a.m.
OLR4A	11,840	25.34	Prague, Cz-Slovakia.—Daily 12.10-1.50 a.m.; 9.15 a.m.-1.35 p.m.; 9.30-10.30 p.m.
W9XAA	11,830	25.36	Chicago, U.S.A.—Irregular, 10 p.m.-9 a.m.
W2XE	11,830	25.36	New York, U.S.A.—Daily, 5.30-9 a.m.
XEBR	11,820	25.38	Hermosilla, Mexico.—Relays XEBH, 5-7 a.m.; noon-3 p.m.
GSN	11,820	25.38	Daventry, England.—Not in use at present.
I2RO4	11,810	25.40	Rome, Italy.—Daily, 8 p.m.-3.15 a.m.
COGF	11,805	25.41	Matanzas, Cuba.—Relays CMGF daily, 11 p.m.-3 p.m.
OZG	11,805	25.41	Skamleboaek, Denmark.—Irregular.
OER3	11,801	25.42	Vienna, Austria.—Irregular 1-8 a.m.
JZJ	11,800	25.42	Tokyo, Japan.—Daily, 5.30-7 a.m.; 7.30-8.30 a.m.; 9-9.30 a.m.; 3.30-4.30 p.m.; 10-10.30 p.m.; 11 p.m.-12.30 a.m.
DJO	11,795	25.43	Berlin, Germany.—Not in use at present.
OAX5B	11,795	25.43	Ica, Peru.—Daily, 2-3 a.m., 7 a.m.-2.15 p.m.
W1XAL	11,790	25.45	Boston, U.S.A.—Daily, 7.45-9.30 a.m.; Sun., 4.45-8.15 a.m., 9-9.30 a.m.; Mon., 6-9.30 a.m.
DJF	11,780	25.47	Berlin, Germany.—New transmitter for Africa.
DJD	11,770	25.49	Berlin, Germany.—Daily, 7.50 a.m.-1.45 p.m., 3-5 p.m.
XETA	11,760	25.51	Monterrey, Mexico.—Testing new freq.
TGWA	11,760	25.51	Guatemala City, Guat.—Mon., Wed., Fri., 11 a.m.-3 p.m.
OLR4B	11,760	25.51	Prague, Cz-Slovakia.—Daily, 12.10-1.50 a.m., 9.15 a.m.-1.35 p.m., 9.30-10.30 p.m.
GSD	11,750	25.53	Daventry, England.—Daily, 3.20-9 a.m., 9.20-11.30 a.m., 12.20-2.20 p.m., 4-6.15 p.m.
HP5L	11,740	25.55	David, Panama.—Daily, 7-10 a.m.
	11,730	25.57	Saigon, Fr. Indo-China.—"Radio Philco." Daily, 2-4 p.m., 8.30 p.m.-12.30 a.m.
PHI	11,730	25.57	Huizen, Holland.—Not in use at present.
CJRX	11,720	25.60	Winnipeg, Canada.—Daily, 7 a.m.-1 p.m.
CR7BH	11,718	25.60	Laurenco Marques, Port East Africa.—Daily, 3.5-7 a.m., 3.5-4 p.m., 7.30-9.30 p.m., mid.-2 a.m.; Sun., 8-10 p.m.; Mon., 1-4 a.m.
TPA4	11,715	25.61	Paris, France.—Daily, 9.15-11.15 a.m., 1-4 p.m.
SBG	11,710	25.63	Motala, Sweden.—Daily, 2-4.30 a.m., 4.20-5.5 p.m., 11 p.m.-mid.
XEWB	11,710	25.63	Guadalajara, Mexico.—Irregular.
YSM	11,710	25.63	San Salvador, Salvador.—Irregular, 4.30-5.30 a.m.
HP5A	11,700	25.65	Panama City, Panama.—Daily, 1 a.m.-1 p.m.
CB1170	11,700	25.65	Santiago, Chile.—Relays CB89 daily, 9 a.m.-3 p.m.
KIO	11,680	25.68	Kahuku, Hawaii.—Phones Far East.
PPQ	11,670	25.70	Rio de Janeiro, Brazil.—Phones U.S.A. & Argentine.
JVL	11,660	25.73	Nazaki, Japan.—Irregular.
VRR4	11,595	25.87	Stony Hill, Jamaica.—Phones WNC.
HH2T	11,570	25.93	Port-au-Prince, Haiti.—Irregular.
CMB	11,560	25.95	Habana, Cuba.—Phones New York.
VIZ3	11,560	25.98	Fiskdale, Australia.—Tests irregularly.
XGR	11,538	26.00	Shanghai, China.—Phone; irregular.
SPD	11,530	26.01	Warsaw, Poland.—Test around 9 a.m.
XAM	11,500	26.09	Merida, Mexico.—Irregular around 4 a.m.
PMK	11,500	26.09	Bandoeng, Java.—Tests irregularly.
COCX	11,435	26.21	Habana, Cuba.—Relays CMX daily, 9.55 p.m.-4 p.m.
CJA4	11,413	26.28	Drummondville, Canada.—Phones Australia.

Call.	Kc.	M.	Location. Schedule, etc.
HBO	11,402	26.31	Geneva, Switzerland.—Sundays, 9.45-11 a.m.; Mon., 3.40-4.40 p.m.
DAF	11,340	26.46	Norddeich, Germany.—Phones ships.
HIN	11,280	26.60	Cuidad Trujillo, D.R.—Irregular.
ZLT4	11,050	27.15	Wellington, N.Z.—Phones Australia and England.
CSW2	11,040	27.17	Lisbon, Portugal.—Daily, 4.30-9 a.m.
PLP	11,000	27.27	Bandoeng, Java.—Relays YDB, 8.30 p.m.-2 a.m.
OCI	10.970	27.35	Lima, Peru.—Phones Bogota.
JZB	10,960	27.36	Nazaki, Japan.—Irregular.
	10,960	27.36	Tananarive, Madagascar.—Daily, 1-2 a.m., 3.30-3.45 p.m., 6.30-7.30 p.m.
HSG	10,955	27.38	Bangkok, Siam.—Irregular.
FTH	10,940	27.43	St. Assise, France.—Phones S. America.
KTR	10,910	27.50	Manila, P.I.—Phones Berlin.
DFL	10,850	27.66	Nauen, Germany.—Tests irregularly.
KWV	10,840	27.68	Dixon, U.S.A.—Phones Hawaii.
GCL	10,795	27.79	Rugby, England.—Phones Japan.
YNA	10,790	27.80	Managua, Nicaragua.—Phones S. America.
GBP	10,770	27.85	Rugby, England.—Phones Australia.
JVM	10,740	27.93	Nazaki, Japan.—Phones U.S.A., 5-10 p.m.
PLQ	10,680	28.09	Bandoeng, Java.—Phones Malaya and D.E.I.
WNB	10,675	28.10	Lawrenceville, U.S.A.—Phones Bermuda.
CEC	10,670	28.12	Santiago, Chile.—Daily, 10-10.15 a.m.
PSG	10,660	28.14	Rio de Janeiro, Brazil.—Phones U.S.A., Arg. & Eur.
JVN	10,660	28.14	Nazaki, Japan.—Broadcasts daily, 5-11 p.m.; phones Europe irreg.
WEF	10,620	28.25	Rocky Point, U.S.A.—Tests irregularly.
EHX	10,620	28.25	Madrid, Spain.—Phones S. America.
ZIK2	10,600	28.27	Belize, BR. Honduras.—Wed., Fri., Sun., 10.30-10.45 a.m.
WOK	10,550	28.44	Lawrenceville, U.S.A.—Phones S. America.
JIB	10,535	28.48	Taihoku, Taiwan.—Broadcasts, relaying JFAK mid.-1.25 a.m., 4-5.30 p.m.; phones Japan.
VLK	10,520	28.51	Sydney, Australia.—Phones England, 4-9 p.m.
CFA4	10,520	28.51	Drummondville, Canada.—Phones U.S.A.
ITK	10,480	28.63	Mogadiscio, It. Somaliland.—Phones Rome; irreg.
DGH	10,440	28.74	Nauen, Germany.—Phones Bangkok.
YBG	10,430	28.76	Medan, Sumatra.—Daily, 8.30-9.30, 10.30-11.30 p.m.
TYE3	10,430	28.76	Paris, France.—Phones U.S.A.
XGW	10,420	28.79	Shanghai, China.—Phones Japan, 3 p.m.
PDK	10,410	28.80	Kootwijk, Holland.—Phones Java, 10.30 p.m.
KES	10,410	28.80	Bolinas, U.S.A.—Phones S. America and Far East.
WCG	10,380	28.90	Rocky Point, U.S.A.—Tests irregularly.
JVO	10,370	28.93	Nazaki, Japan.—Broadcasts irreg. around 8 p.m.
EHZ	10,370	28.93	Teneriffe, Canary Is.—Relays EAJ4 daily, 5.15-8.15 a.m., 9.15-11.55 a.m. Relays Salamanca, 11.55 a.m.-1 p.m.
LSX	10,350	28.98	Buenos Aires, Arg.—Tests irregularly.
ZFD	10.335	29.03	Hamilton, Bermuda.—Phones U.S.A.
ORK	10,330	29.04	Ruysselede, Belgium.—Daily, 5.30-7 a.m.
PPM	10,310	29.10	Rio de Janeiro, Brazil.—Phones New York and Buenos Aires.
LSL2	10,300	29.13	Buenos Aires, Arg.—Phones Europe.
DZC	10,290	29.16	Zeesen, Germany.—Irregular.
HPC	10,290	29.16	Panama City, Panama.—Phones C. and S. America.
PMN	10,260	29.24	Bandoeng, Java.—Relays YDB, 8.30 p.m.-2 a.m.
LSK3	10,250	29.27	Buenos Aires, Arg.—Phones U.S.A. and Europe.
CED	10,230	29.33	Antofagastan, Chile.—Tests 10 a.m.-12.30 p.m.
PSH	10,220	29.35	Rio de Janeiro, Brazil.—Broadcasts 10 a.m.-noon.
DGD	10,210	29.38	Nauen, Germany.—Phone; irregular.
RIO	10,170	29.50	Bakou, U.S.S.R.—Phones Moscow, 1-8 p.m.
OPM	10,140	29.59	Leopoldville, Belg. Congo.—Phones ORK 4-7 a.m. and around 6 p.m.
RJR	10,080	29.76	Tiflis, U.S.S.R.—Phones Moscow.
EDM-EHY	10,070	29.79	Madrid, Spain.—Phones S. America.
JZB-TDB	10,065	29.81	Shinkyo, Manchukuo.—Phones Tokyo, 9.30-10 p.m.
ZFB	10,055	29.84	Hamilton, Bermuda.—Phones New York.
SUV	10,055	29.84	Abou Zabal, Egypt.—Phones Europe.
DZB	10,042	29.87	Zeesen, Germany.—Irregular.
HJA3	10,040	29.87	Barranquilla, Colombia.—Tests irregularly.
KAZ	9,990	30.03	Manila, P.I.—Phones Java.
IRS	9,966	30.08	Rome, Italy.—Tests irregularly.
COCU	9,950	30.15	Habana, Cuba.—Relays CMCU 10 p.m.-3 p.m.
GCU	9.950	30.15	Rugby, England.—Phones New York.
WCU	9,940	30.18	San Juan, Porto Rico.—Phones Miami.
TIZ2	9,940	30.15	San Jose, Costa Rica.—Phone; irregular.
HPF2	9,940	30.18	Panama City, Panama.—Phone; irregular.
HRF5	9,940	30.18	Tegucigalpa, Honduras.—Phone; irregular.
YSG	9,940	30.18	San Salvador, Salvador.—Phone; irregular.
HKB	9,930	30.21	Bogota, Colombia.—Phones Rio de Janeiro.
CSW	9,930	30.21	Lisbon, Portugal.—Daily, 8-10 a.m.
JDY	9,925	30.23	Dairen, Manchukuo.—Relays JQAK, 9.50-11 p.m.
DGM	9,920	30.24	Nauen, Germany.—Phone; irregular.
LSN	9,890	30.33	Buenos Aires, Arg.—Phones New York.
WON	9,870	30.40	Lawrenceville, U.S.A.—Phones England.
EAQ	9,860	30.43	Madrid, Spain.—Irregular.
IRF	9,835	30.5	Rome, Italy.—Testing; relays 2RO.
COCM	9,833	30.51	Habana, Cuba.—Relays CMCM, 10 p.m.-3 p.m.
IRM	9,830	30.52	Rome, Italy.—Phones Egypt.
XGOX	9,800	30.61	Nanking, China.—Reported off air.
LSI	9,800	30.61	Buenos Aires, Arg.—Test irregularly.
GCW	9,700	30.64	Rugby, England.—Phones New York.
VLJ-VLZ2	9,760	30.74	Sydney, Australia.—Phones Java & New Zealand.
WOF	9,750	30.77	Lawrenceville, U.S.A.—Phones London and Paris.
COCQ	9,740	30.78	Habana, Cuba.—Relays CMCQ, 9.55 p.m.-4 p.m.
TGZ	9,720	30.86	Guatemala City, Guat.—Phone; irregular.
GCA	9,710	30.90	Rugby, England.—Phones S. America.
LQA	9,700	30.93	Buenos Aires, Arg.—Tests irregularly.
TGWA	9,685	30.96	Guatemala City, Guat.—Irregular.
FZF6	9,680	30.97	Fort de France, Martinique.—Daily 2.30-3.30 a.m., 9.15-10.50 a.m.
DZA	9,675	31.01	Zeesen, Germany.—Irregular.
TI4NRH	9,670	31.02	Heredia, C. Rica.—Daily, 11.30 a.m.-1 p.m., 2.30-3 p.m.
CR6AA	9,666	31.04	Lobito, Port. West Africa.—Uncertain (Sun., Thurs.. 5.45-7.30 a.m. (?).
LRX	9,660	31.06	Buenos Aires, Arg.—Daily, 11.30 p.m.-1.30 a.m.
PSJ	9,660	31.06	Rio de Janeiro, Brazil.—Phones Argentine.
CS2WA	9,650	31.09	Lisbon, Portugal.—Sun., Wed., Fri., 7.30-10 a.m.
DGU	9,650	31.09	Nauen, Germany.—Phones Egypt.
HH3W	9,645	31.10	Port-au-Prince, Haiti.—Daily, 4-5, 10-11 a.m.
YNLF	9,645	31.10	Managua, Nicaragua.—Daily, 3.30-5.30 a.m., 9.30 a.m.-1 p.m.

Call.	Kc.	M.	Location. Schedule, etc.
CXA8	9,640	31.12	Colonia, Uruguay.—Relays LR3, Buenos Aires, 9 p.m.-2 p.m.
I2RO3	9,635	31.13	Rome, Italy.—Daily, 3.30 a.m.-noon.
CFA5	9,630	31.15	Drummondville, Canada.—Phones U.S.A.
HJ7ABD	9,630	31.15	Bucaramanga, Colombia.—Testing 11 a.m.
JIB	9,630	31.15	Taihoku, Taiwan.—Relays JFAK around midnight.
FZR	9,620	31.19	Saigon, Fr. Indo-China.—Phones Paris.
OAX5C	9,620	31.19	Ica, Peru.—Changed from 9580 k.c. Daily 9 a.m.-1 p.m.
HJ1ABP	9,620	31.19	Cartagena, Colombia.—Daily 2-4 a.m., 8 a.m.-2 p.m.; Mon., 1-4 a.m., 6-9 a.m.
HP5J	9,615	31.22	Panama City, Panama.—Daily 3-4.30 a.m., 9 a.m.-1.30 p.m.
ZRK	9,606	31.23	Klipheuval, S. Africa.—Daily exc. Sun., 2.45-3.40 p.m., 6.20-10.20 p.m., mid.-2.40 a.m.; Sun., 7-8.30 p.m., 11 p.m.-2.40 a.m.
RAN	9,600	31.25	Moscow, U.S.S.R.—Daily from 10 a.m.-12.15 p.m.
XEYU	9,600	31.25	Mexico City, Mexico.—Daily, 10 a.m.-1 p.m.
CB960	9,600	31.25	Santiago, Chile.—Not in use at present.
HBL	9,595	31.27	Geneva, Switzerland.—Sundays, 8.30-9.30 a.m.
PCJ	9,590	31.28	Huizen, Holland.—Sun., 4.25-4.40, 5-6 a.m.; Mon., 10.15-11.15 a.m., 11.25 a.m.-12.25 p.m.; Tues., 11.15 a.m.-12.45 p.m., 4.45-6.40 p.m.; Wed., 10-11.30 a.m., 11.45 a.m.-1.15 p.m.; Thurs., 10.15-11.15 a.m.
	9,590	31.28	Delhi, India.—12.30-1.30 p.m.
VK6ME	9,590	31.28	Perth, Australia.—Exc. Sun., 9-11 p.m.
VK2ME	9,590	31.28	Sydney, Australia.—Sun, 4-6 p.m., 8 p.m.-2 a.m. (Mon.).
W3XAU	9,590	31.28	Philadelphia, U.S.A.—Relays WCAU, 3 a.m.-10 or 11 a.m.
GSC	9,580	31.32	Daventry, England.—Daily, 9.20-11.30 a.m., 12.20-2.20 p.m.
VLR	9,580	31.32	Melbourne, Australia.—Daily, 6.30-11.30 p.m. (Sun. till 10.30); daily, exc. Sunday., 12.35-5.15 p.m.
KZRM	9,570	31.35	Manila, P.I.—Daily, 7.30-9 a.m., 8 p.m.-mid.; Sun., 7 p.m.-1 a.m.
W1XK	9,570	31.35	Springfield, U.S.A.—Relays WBZ, 10 p.m.-4 p.m. (Sun. from 11 p.m.).
DJA	9,560	31.38	Berlin, Germany.—Daily, 7.50 a.m.-1.45 p.m., 3.05 p.m.-2 a.m.
TPB	9,550	31.41	Paris, France.—Testing.
OLR3A	9,550	31.41	Prague, Cz-Slovakia.—Daily, 4.55-8.40 a.m., 11 a.m.-1.35 p.m.
XEFT	9,550	31.41	Vera Cruz, Mexico.—Daily, 2.30-7 a.m., 10 a.m.-3 p.m.
YDB	9,550	31.41	Soerabaia, Java.—Daily, 9-10.30 a.m., 8.30 p.m.-2 a.m.
HH2R	9,545	31.44	Port-au-Prince, Haiti.—Irregular.
DJN	9,540	31.45	Berlin, Germany.—Daily, 7.50 a.m.-1.45 p.m.
VPD2	9,540	31.45	Suva, Fiji Is.—Daily, 8.30-10 p.m.
JZI	9,535	31.46	Tokyo, Japan.—Daily, 5.30-7 a.m., 7.30-8.30 a.m., 3.30-4.30 p.m.
HB9D	9,535	31.46	Zurich, Switzerland.—Mon., 12.1-2 a.m.; Fri., 4-6 a.m.
W2XAF	9,530	31.48	Schenectady, U.S.A.—Daily, 7 a.m.-4 p.m.
W6XBE	9,530	31.48	Belmont, U.S.A.—New G.E. transmitter.
	9,530	31.48	Tananarive, Madagascar.—Daily, 1-2 a.m., 3.30-3.45 p.m., 6.30-7.30 p.m.
ZBW3	9,525	31.49	Hong Kong, China.—Daily, 2.30-4 p.m., 7 p.m.-1 a.m.; Sun., noon-4 p.m., 6 p.m.-12.30 a.m.
LKJI	9,525	31.49	Jeloy, Norway.—Daily, 8-11 p.m.
ZRH	9,523	31.50	Roberts Heights, S. Africa.—Daily, exc. Sun., 2.45-3.45 p.m., 8-10.30 p.m.; Sun., 6 or 6.30-7.30 or 8 p.m.
HJ6ABH	9,520	31.51	Armenia, Colombia.—Daily, 9 a.m.-1 p.m., 11 p.m.-2 a.m.
OZF	9,520	31.51	Skamleboaek, Denmark.—Daily, 5-9.40 a.m.
YSH	9,520	31.51	San Salvador, Salvador.—Irregular, 9 a.m.-1 p.m.
XEDQ	9,520	31.51	Guadalajara, Mexico.—Irregular, 10.30 a.m.-3.30 p.m.
VK3ME	9,610	31.55	Melbourne, Australia.—Exc. Sun., 7-10 p.m.
GSB	9,510	31.55	Daventry, England.—Daily, 3.20-7 a.m., 9.20-11.30 a.m., 12.20-2.20 p.m., 4-6.15 p.m.
HS8PJ	9,510	51.55	Bangkok, Siam.—Thursdays, 11 p.m.-1 a.m. (Fri.).
HJ1ABE	9,505	31.57	Cartagena, Colombia.—Daily, 8 a.m.-1.30 p.m.
XEWW	9,500	31.58	Mexico City, Mexico.—Daily, 9 a.m.-3 p.m. Relays XEW.
HJU	9,500	31.58	Buenaventura, Colombia.—Tues., Thurs., Sat., 11 a.m.-2 p.m.
PRF5	9,500	31.58	Rio de Janeiro, Brazil.—Irreg., 7.45-8.45 a.m.
EAR	9,478	31.65	Madrid, Spain.—Irregular, 10.30 a.m.
PLW	9,478	31.65	Bandoeng, Java.—Phones Australia.
KET	9,478	31.65	Bolinas, U.S.A.—Phones New York.
WET	9,478	31.65	Rocky Point, U.S.A.—Phones S. America & Bermuda.
ICK	9,460	31.71	Tripoli, N. Africa.—Phones Rome, 8.30-10 p.m.
TGWA	9,450	31.75	Guatemala City, Guat.—Not in use at present.
HC2RA	9,440	31.78	Guayaquil, Ecuador.—Irregular around noon.
YVR	9,430	31.80	Maracay, Venezuela.—Tests.
COCH	9,428	31.80	Habana, Cuba.—Daily, 10 p.m.-4 p.m.
PLV	9,415	31.87	Bandoeng, Java.—Broadcasts, 9 a.m.-8.30 p.m.; phones Holland, 12.45 a.m.
XDR	9,400	31.92	Mexico City, Mexico.—Phones XAM, Merida, Yucatan.
PGC	9,375	32.00	Kootwijk, Holland.—Phones D.E.I.

ADDENDA.

W9XHW	31,600	9.49	Minneapolis, U.S.A.—Relays WCCO. Schedule unknown.
JZM	21,520	13.94	Nazaki, Japan.—Irregular.
JIB	19,820	15.14	Taihoku, Taiwan.—Relays JFAK around mid.
I2RO6	15,300	19.61	Rome, Italy.—Testing.
EA1AV	15,000	20.00	Salas, Spain.—Nationalist station.
KKW	13,780	21.77	Bolinas, U.S.A.—Special relays.
TYE2	13,760	21.80	Paris, France.—Phones U.S.A.
CGA2	13,745	21.83	Drummondville, Canada.—Phones Europe.
RIS	13,738	21.84	Tiflis, U.S.S.R.—Phones Moscow.
	10,700	28.04	Milan, Italy.—"Radio Milano," till 9 a.m.
	10,630	28.22	Salamanca, Spain.—"Radio Pizarrales," Nationalist station.
JYS	9,840	30.49	Kemikawa-Cho, Japan.—Irregular.
HJ7ABD	9,630	31.14	Bucaramanga, Colombia.—Daily 1-3 a.m., 7 a.m.-2 p.m.
OLR3B	9,504	31.57	Prague, Cz-Slovakia.—Not in use at present.

Tracking Down Power Interference . . (3)

This third and concluding instalment deals with the suppression of specialised types of interference, and outlines the general procedure to adopt in locating sources of electrical noise.

Motor Car Interference.

Internal combustion engines, as used in cars, electric lighting plants and motor-driven ships or boats, often give rise to considerable direct radiated interference, and if radio is required close to the engine, as in the case of the car, means must be employed for reducing the amount of radiation and also preventing conducted and re-radiated disturbances.

The main sources of disturbance on a car are the battery charging generator, and the ignition circuit. The former causes interference because of its commutator, and the latter because there are regular surges in both the high tension and the low tension circuits. The generator is satisfactorily suppressed by fitting a .5 mfd "Chanex" contact suppressor, type H.17, capable of resisting the engine temperature, close to it on the engine frame with the pigtail lead connected to the unearthed brush of the generator.

If ignition is obtained from a coil, the circuit has to be suppressed in three places. A spark plug suppressor of 10,000 to 15,000 ohms, of which there are several makes now on the market, is connected in the high tension lead very close to each plug—a distributor suppressor, with a resistance of 10,000 to 15,000 ohms is connected in the high tension lead as it enters the distributor—the "Chanex" contact suppressor, type H.17, completes the equipment when fitted so that its case is connected to the engine frame, and its pigtail leads connected to the side of the coil not connected to the contact breaker.

With magnetic ignition the distributor suppressor is not fitted as the disturbance is not so pronounced, and the added resistance tends only to impair engine performance unless the magneto is exceptionally good. In this case the contact suppressor is fitted so that its case is at frame potential, and its pigtails connected on to the lead as it leaves the magneto on its way to the ignition switch.

The above particulars apply in general to the suppression at short wavelengths. The interference from petrol engines is more pronounced at high radio frequencies and tends to radiate hundreds of feet, but the suppressors mentioned above are still effective, and can be relied upon to give almost uniform suppression.

Any electrical contrivance such as a horn, petrol pump, self-starter, etc., can be suppressed by fitting a "Chanex" contact suppressor, type H.17, as fitted on the generator.

If the car radio receiver is required to pick up very weak signals or short wave signals, the following greater precautions may become necessary:—

1. The sparking plug leads may need a suppressor or resistance at each end.
2. The windscreen wiper, if electric, may need a 25 mfd. electrolytic condenser across it, and a choke connected in series with the windscreen wiper. If these cannot be fitted next to the wiper, the leads from the wiper to suppressors must be screened and the screening earthed.

Adding Machines And Cash Registers.

These machines are a frequent source of interference, since they contain relays which are continually making and breaking. The best method of suppression is using a circuit as shown in Fig. "H." Alternately, a

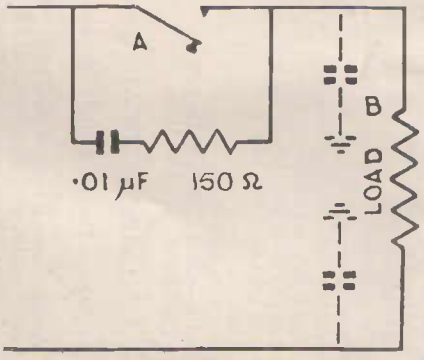


Figure "G."

somewhat simpler condenser suppressor can be used, as shown in Fig. "G," the choice depending largely upon the severity of the interference. It is important to note that leads between the switch and equipment, including the lead to the suppressor, should be properly screened, i.e., enclosed in metal casing, which is thoroughly bonded together and connected to earth.

Refrigerators.

Electrically driven refrigerators often cause disturbance, particularly when operating on D.C., or when employing A.C. commutator motors, in which cases the interference has two separate components—due to commutator and to switch contact. The former usually is the main cause of complaint, and is satisfactorily suppressed with a "Chanex" type H.11 unit if an earth lead is taken to the machine, and a Type H.12 if there is no earth. As long as the suppressor is fitted with short leads to the actual brushes, it will usually be found that short wave interference will be considerably reduced in addition to that on the broadcast band.

The disturbance due to contacts, i.e., on thermostatic switch and on door-operated light switch, is greatly reduced by fitting a suppressor across the mains supply lead at a point immediately after where they enter the cabinet. In many cases one standard "Chanex" unit, type H.11, alone fitted at this point has been entirely satisfactory in suppressing both forms of disturbance, and this should be tried before more elaborate tests are made.

Door Bells.

These are an excellent example of a vibrating contact. They will give a sharp burr in the set every time the bell is operated. Interference may be suppressed by the use of the circuit shown in Fig. "G."

Multi-Contact Electric Signs.

These cause interference by reason of the continual make and break of the numerous circuits. It is, of course, possible to suppress each contact individually by using the methods just outlined, but a simpler remedy is to enclose the whole contact mechanism inside a metal box and run the leads to the lamp in lead-covered cable. The lead casing and box are earthed either direct or through an H.F. choke according to local conditions, whilst suppressors across the main may be fitted with advantage inside the metal box. A type H.11 "Chanex" condenser suppressor, connected across the main, is sufficient, the centre point being connected to the metal casing.

Neon Signs.

Electric signs of the high tension gas-discharged type are in common use to-day, and may cause interference under certain conditions. The current in these signs is of a ragged character, for actually the discharge ceases momentarily and restrikes every half cycle.

The sudden changes will give rise to high frequency oscillations, which will be radiated by the high tension wiring, including the sign itself, but fortunately the wave length of the disturbance is usually outside the broadcast band, so that interference is small. It is definitely possible to effect a cure of interference being generated by neon signs. It should be pointed out, however, that in the majority of cases, neon signs are being maintained by the manufacturers of the signs, and, where interference is traced to a neon sign, it is advisable to get in touch with the manufacturers of the sign, who are most anxious to assist in the reduction of interference generated by signs, rather than attempt to make any alteration to the actual sign.

Medical Apparatus.

High frequency equipment is used to an increasing extent by the medical profession, and also in the form of ultra-violet apparatus by hairdressers. For such plant, damped waves are generated by a small spark transmitter, and the voltage is kept up to a very high value by a high frequency transformer. This voltage is applied to the patient, via one terminal, the other being connected either directly or capacitatively to the mains. The high frequency current thus flows through the patient to earth and back via the supply mains.

An arrangement more calculated to induce interference is difficult to conceive, particularly as the heavily damped wave has a considerable spread, just like an old-fashioned spark transmitter.

The remedy is to enclose the whole equipment in a shielded room so that the capacity currents go to the screen and not to earth. "Chanex" type H.11 condensers across the main lead will enable the H.F. currents to return to the apparatus without going outside the screen.

The screening need not be solid, and a fairly wide mesh gauze is adequate in most cases. The whole of the apparatus, including the patient, must be housed within this screen, which must be complete, doors and windows being screened as well as the walls, floors and ceiling. Any other outgoing leads, such as telephone wires, must also be condensed just inside the screen. An alternative to the wire screen, and considerably cheaper, is to paper the room throughout with metal covered paper, which is not only cheap but quite an effective decoration.

Sewing Machines And Dental Drills.

The high speed of the motor in such equipment causes a pronounced commutator ripple, and "Chanex" type H.14 suppressors should be fitted. Note should be made as to whether the motor is earthed by means of a three-core flex, or is of the un-earthed type. The addition of the condenser suppressors should be in accordance with the foregoing conditions. These motors are generally equipped

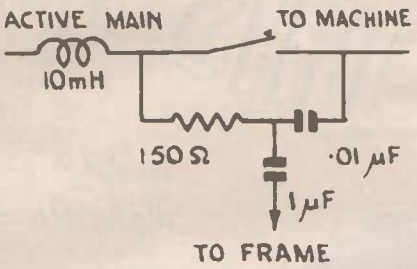


Figure "H."

with a foot starter, which gives rise to clicks, as it is brought into use. A .1 mfd. type F.11 "Chanex" condenser, across the first part of the switch to earth or the switch arm, is usually effective.

Mercury Arc Rectifiers.

Interference from mercury arc rectifiers has two components—high frequency and low frequency.

The low frequency component is a ripple on the D.C. output and is very expensive to suppress at the source. It is troublesome on three and six phase rectifiers, but not so serious on twelve phase plants, and is worse with grid control types. It cannot be radiated and therefore enters the set only by its mains leads, hence it is best suppressed at this point by the listener by using a type H.11 "Chanex" interference suppression unit connected at the point of entry of the mains to the house.

The high frequency component can be suppressed quite easily and inexpensively at the source. It is propagated and radiated from both the A.C. and the D.C. sides of the rectifier.

The usual cure is 1 mfd. condensers from every electrode to earth. The type H.11 unit is convenient for dealing with every two electrodes providing the R.M.S. volts do not exceed 240 to earth. If 500 volts to earth the H.11 unit must be used with its two condenser units in series to earth, i.e., an electrode to one main terminal, earth the other main lead and the earth connection is cut off at the entry to the condenser unit and is left unconnected. If condensers do not suffice, 250 or 500 M.H. chokes must be inserted in each electrode.

Lifts.

The interference caused by lift installations is picked up by the mains or any other conductors passing close to the control panel and the motor. Considerable disturbance is conducted by the electric mains and re-radiated, but in many cases more trouble is caused by high frequency current proceeding along the flexible control cable and radiating from there.

If the lift is over 20 yards away fit a "Chanex" type H.11 2 x .1 mfd. suppression condenser unit to the listener's main switch at the point of entry to the house. If the lift is nearer than 20 yards, we suggest that the P.M.G. Department be notified, and no work should be carried out without first notifying the firm responsible for the maintenance of the lift.

Noisy Wiring.

If the lead-covered wiring or the metal conduit of the house wiring is making contact with any other conductor such as the water or gas pipe or iron girder or another cable or conduit, there will be violent radio crackling noises, when people walk about the house, or "motor cycles" noises in the loud speaker when a certain water tap is turned on, and the cure, obviously, is to separate or to bond the rubbing conductors, but if the seat of the disturbance cannot be found, a partial cure is to fit a type H.11 "Chanex" suppressor at the power point and by-pass the interfering component to ground before entering the set.

Manufacturer's Type Suppressors.

Manufacturers of certain appliances, i.e., vacuum cleaners, hair dryers, refrigerators, sewing machines, etc., are already fitting suppressors inside their machines, and "Ducon" offer a comprehensive service to manufacturers of this type of apparatus, whereby they test the machine and design the most economical and efficient skeleton type suppressors for internal fitting, and at all times they are pleased to advise and assist in problems inherent with the design of similar apparatus.

General Hints For Locating Interference Sources

A summary of the procedure to adopt in analysing interference is as follows:—

(1) Disconnect the aerial and earth and short circuit the aerial and earth terminals. With the battery set this will remove all trace of interference. With the mains operated set some interference may remain. If so, this is due to direct conduction through the mains, and is usually in the form

of hum. If not, suitable condenser suppressors, pending the location of the actual source of trouble, should be fitted at the mains entry to the house.

(2) Obtain a battery set of approximate sensitivity to the existing set. Switch off the house mains at the main switch. If the interference remains it is due to direct radiation or re-radiation. If it disappears it is due to mains radiation.

(3) If evidence points to direct radiation, or re-radiation, examine the surroundings to decide which is the most likely. The presence of power, telephone or tram lines in the vicinity would indicate that re-radiation is the most likely source, necessitating an alteration to the position of the aerial.

(4) Direct radiation can be located by inspection, as a general rule, assisted, if necessary, by the use of a portable set. If this is present, the interfering source should be suppressed with "Chanex" condenser suppressors, and shielded aerial system will also assist the suppressing work.

THE EFFECT OF A.V.C.

It is generally found that the interference is strongly of one particular type, and the location of the source of trouble and the fitting of appropriate "Chanex" condenser suppressors will therefore remove the great part of the trouble. With the modern type of receiver, however, it may be found that the result would be little, if any better.

This is because most of the up-to-date receivers are fitted with A.V.C., which automatically adjusts the amplification of the set to the strength of the incoming signals. Therefore, any reduction in the interference signal may cause an increased amplification which will bring up interference from other sources which were previously masked, whilst in extreme cases the valve noises in the set itself may be increased by the added amplification so that the total noise is just as bad.

Due allowance must therefore be made for this factor. Where possible a receiver without A.V.C. should be used when testing the effect of any particular suppressing device, or the A.V.C. in the existing set thrown out of action temporarily. The sources of interference can then be located and cures effected one by one in order of magnitude. In some cases completely quiet working is only obtainable by fitting several different forms of suppressors, each dealing with its own share of the disturbance.

IMPORTANCE OF GOOD AERIAL SYSTEM.

It must be emphasised that the receiving aerial itself has a marked influence on the strength of the interfering signals, and on reception. In particular the indoor-aerial, so popular because of the high sensitivity of modern receivers, is a great aid to interference. It is right in the interference zone, and picks up disturbance far more than it does the signals. In tests conducted by the B.B.C., and detailed in a paper entitled "RECEIVING AERIALS AND ELECTRICAL INTERFERENCE" it was pointed out that with an indoor aerial the interference can be much greater than with an outdoor aerial properly located.

Types Of Interference.

The following is not intended to be a complete list of the various apparatus that may create interference, but only to serve as a general guide in locating interference of the generated type. Before endeavouring to locate generated interference, tests should be made to ensure the interference is not borne by the mains, in which case the cure is simply a "Chanex" Type H.11 suppression condenser at the point of entry to the building.

Heavy Buzzing Or Rushing Sounds.

Air purifiers; battery chargers; diathermy machine and medical apparatus; neon signs; flour bleachers; oil burner ignition systems; violet ray and X-ray equipment.

Clicking.

Lift control; flashing signs; ovens; mercury arc rectifiers; traffic signals; sign flashers; electric typewriters; incubators; telegraph relays.

Whirring Or Whining Noises.
(often accompanied by crackling).

Adding machines; barbers' clippers; beauty parlor equipment; cash registers; dental machines; dictaphones; dish washers; dough mixers; electric fans; home lighting plants; floor polishers; generators; humidifiers; small blowers; electric addressographs; lifts; refrigerators; telephone magnetos; toy electric mains; vacuum cleaners; valve grinders; washing machines; hair dryers; massage machines; motor generators; portable electric drills; printing presses; sewing machines.

Rattles, Buzzes And Rapid Clicking Noises.

Buzzer and trembler bells; vibrating rectifiers; dental machinery; dial telephones; lift controls; motor car ignition systems; sewing machines.

Crackling Or Spluttering Noises.

Bad connections; defective light or power sockets; lift controls; high tension lines; tramcars; loose connections in house wiring; partially earthed power line.

Direct radiation from interfering plant is in two parts. The first is the radiation from the machine itself, and the second is radiation from the wiring immediately adjacent to the machine.

In most cases complete cures can be effected by the connection of "Chanex" condenser suppressors or condenser choke suppressors at the terminals of the machine, which will not only minimise the direct radiation to a large extent, but it will prevent mains-borne interference being carried from the machine along the supply network.

Round the Shacks 8

- VK 3PB -

Owner-Operator: J. P. Boyd, 40 Grant St., East Malvern, S.E.5, Victoria.

THE transmitter valve line-up at 3PB at present is a 59 tritet with an 80m. crystal, 6L6G buffer on 40 (doubler on 20) and a pair of 46's in push-pull in the final P.A. These are plate-modulated by another pair of 46's in class "B." The input to the r.f. final stage is varied between 20 and 45 watts.

There is, I think, a point of interest regarding the modulation transformer system being used at present at 3PB. There is nothing new in using a power transformer for modulating; VK3SO does very well indeed with this coupling; in that he gets 13½ watts out of a single 6L6 modulator. However, at 3PB I have utilised two inexpensive 100 mill. power transformers hooked up as shown in the sketch. The expense of the system is only a fraction of the cost of a tapped modulation transformer.

"T1" is an ordinary 100 mill. power transformer with 385v. each side of the centre tap in the secondary. One side only of this secondary is used in the plate supply to the r.f. final. A filament winding is used to monitor the quality of the modulator. The primary is connected to the primary "T2," which is another power transformer with a standard 200v.-240v. primary and a secondary with 160v. a side. The normal secondary of "T2" is here used as the primary, being in the plate circuit of the modulating valves.

In order to get a good match to the r.f. load, it is only necessary to adjust the taps on the (normal) primaries of each transformer until the total turns ratio is about right to reflect the correct impedance into the modulator valves for a given r.f. load resistance.

Of course, as the d.c. plate currents of the modulator and r.f. stages pass through different transformers, there is little likelihood of either core becoming saturated. I have no doubt that audio power is lost by this method and that peaks are plenty, but while using this system I have had some really excellent reports on the quality.

And quite by the way, I would like to point out that before rushing to complainants of B.C.L. QRM with one's hands full of comparatively expensive wave-traps, it is a good idea to try first an old style choke, made up of about 2½in. of close-wound 35 s.w.g. on a ½in. wooden dowel. I have to date found this entirely adequate, as it is effective in cutting out the popular amateur bands yet leaving the broadcast band unscathed.

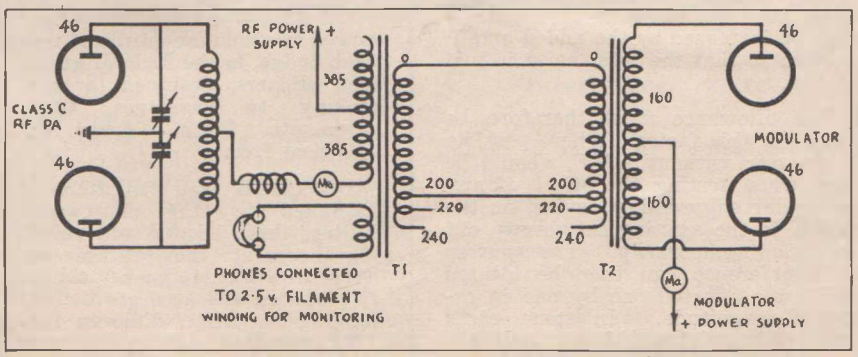
I am most interested in low definition (for a start) television, and would be very glad to hear of others who are also experimenting with this phase of the game.—J. P. Boyd (VK3PB), Burdes, 40 Grant Street, East Malvern, S.E.5, Victoria.

Electro-Technical Journal: Overseas Publication Available.

The knowledge that is gained by the performance of many interesting experiments at Philips research laboratory is available to the readers of "Philips Technical Review," which is published at Eindhoven, Holland.

The Review covers a wide field of scientific research, light and illumination; radio and television, sound, recording and reproduction; X-rays; cathode rays; telephony; electro-technical apparatus; materials and their research—all come within its scope. The material is concisely written and, while sponsored by scientists, is set out in such lucid and simple form as to be readily applicable.

The subscription (10/- per annum) may be paid to Philips, Sydney, but subscribers will receive their copies direct from the laboratory at Eindhoven. A volume consists of 12 monthly issues, January being the commencing issue.



Two power transformers are used in 3PB's modulator stage.

What's New In Radio

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

Price's Radio Service Releasing 1938-39 Catalogue Shortly.

Messrs. Price's Radio Service, of 5 Angel Place, Sydney, advise that their 1938-39 catalogue is now in the course of preparation, and will be released within several weeks.

For some years past this firm has specialised in catering for the requirements of amateur transmitters and shortwave fans, and in consequence has now a range of up-to-date American, English and Australian lines that for variety must be unequalled anywhere else in Australia. In addition, a wide range of Radiomac components, designed and manufactured specially to meet local requirements, will be included in this year's catalogue, several of the most important of these being featured for the first time.

Containing more pages and more illustrations than last year's catalogue, this latest edition is to be printed on better quality paper, and is altogether a more expensive production. Readers wishing to obtain copies at the earliest possible moment are invited to write in immediately to the address given above. Copies will then be posted to applicants free and post free the moment the catalogue is released.

★

Ever Ready Sponsor "Critical Moments" Over 2UW.

One of the newest features to be released by 2UW last month was the first of a series of dramatic real-life incidents entitled "Critical Moments." Sponsored by the Ever Ready Co. (Aust.) Pty. Ltd., Rosebery, N.S.W., and scheduled for 7.50 every Sunday night, the episodes are particularly entertaining, and as the series develops should enjoy a large following.

★

Compact Delta A.C./D.C. Multi-meter.

A new test equipment release by Messrs. W. G. Watson and Co. Pty. Ltd. is the Delta model D 666 a.c./d.c. multi-meter. Particularly compact—the overall dimensions are 6½in. x 4in. x 3⅞in. deep—the instrument is particularly well-finished, and is housed in a lacquered box with an engraved metal panel.

The meter employed in this instrument is a Triplett type 321 incorporating a knife-edged anti-parallax pointer to ensure accurate readings. The same scale calibrations are employed for both a.c. and d.c. readings, a separate pair of connections being provided for a.c. measurements, together with a two-way change-over toggle switch.

Ranges comprise 0-10-50-250-125 volts a.c. or d.c., 0-1-10-50-250 d.c. milliamperes and two resistance ranges, 0.2 to 500 ohms and 100 to 100,000 ohms. On the low range, very accurate indications are obtainable down to a fraction of an ohm. A single heavy duty cell serves both ranges.

Altogether, this new multi-meter forms a particularly attractive proposition for servicemen and set-builders, as it is compact, accurate and low-priced, as well as possessing a high degree of flexibility.

Further details may be obtained on request to Messrs. W. G. Watson & Co. Pty. Ltd., 279 Clarence Street, Sydney.

★

Philips Valve Works Inspection.

Although many of those engaged in the Sydney radio trade have inspected the Philips Australian valve works, Camperdown, many have not yet had an opportunity of doing so.

In future, inspection will be by invitation only, and those who have not yet seen over the factory, but who are desirous of doing so, are advised to write or ring Mr. R. Fitzgerald or Mr. G. Hume [Philips Lamps (A/asia Pty. Ltd., Philips House, 69-74 Clarence Street, Sydney, BW2121] and leave their name and address.

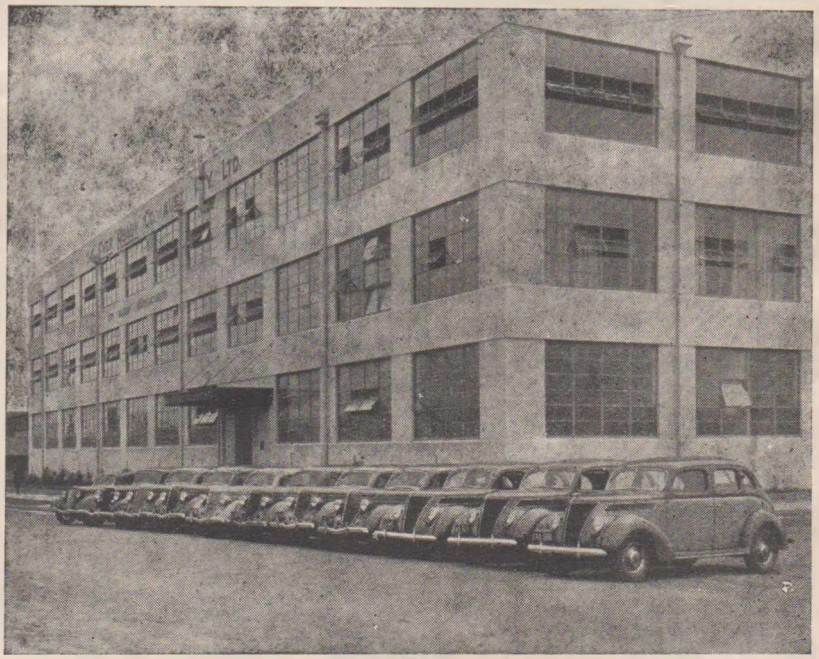
They will then be forwarded an invitation card enabling them to inspect the valve works at 7.30 p.m. on June 21. The factory will be under normal working conditions, and dealers, servicemen and others will be able to observe every progressive detail of modern valve manufacture.

★

Schick Electric Dry Shavers

Radio and electrical dealers will be interested to note the introduction to the Australian market of the Schick electric dry shaver, for which Messrs. Martin de Launay Pty. Ltd., corner Clarence and Druitt Streets, Sydney, are N.S.W. distributors to the trade.

The Schick shaver has proven itself an immense success, nearly 2,000,000



A portion of the Ever Ready fleet of cars used by the company's country and metropolitan representatives. It is by providing their men with such up-to-the-minute transportation that the Ever Ready Co. (Aust.) Pty. Ltd. maintains friendly contact with retailers throughout the Commonwealth.

of them now being used all over the world. Anticipated sales of electric dry shavers this year in the United States alone are approximately 4,000,000, which gives an idea of the possibilities of the line.

The Schick shaver completely eliminates the use of water, soap, brush or razor blades, consumes scarcely enough electricity to turn a meter, and plugs into a 240-volt A.C. or D.C. power-point or electric light socket. Obviously the Schick proves itself to be very economical, and quite apart from the time saved and the added convenience, will very soon pay for itself. In addition, the Schick is guaranteed for twelve months against any faulty materials and workmanship.

Martin de Launay Pty. Ltd. have available a 2-colour folder which sets out full details of the Schick electric dry shaver, and which will be sent post free on request to readers writing the address given above.

★

New Astatic Pick-Ups And Microphone.

Three new Astatic lines of which stocks have lately been landed by the Australian representatives, E.T.C. Industries Ltd., comprise the Tru-Tan B10 and B16 crystal pick-ups, and the Astatic D104 crystal microphone.

In the new Tru-Tan pick-ups, Astatic engineers have developed a design that assures finer reproduction and longer record wear.

(1) The exclusive off-set head design which, by holding the needle practically true to tangent throughout the entire playing surface of a record, assures finer reproduction and longer record life.
(2) The handy Astatic reversible action of this same off-set head which allows it to be turned completely around so that needle can be dropped in from above.
(3) The exclusive Astatic double row ball bearing in the base swivel.

The Tru-Tan has a maximum tracking error not exceeding 1.5° from true tangency, in comparison with the average 8in. straight arm pick-up error of 15° and the average straight arm pick-up error of 10°. This unusually low deflection from perfect alignment is accomplished by the unique, off-set head design.

The Astatic type B-10 Crystal Pick-up

The Astatic D104 Crystal Microphone.

Due to continued research work and new and improved methods of design, the Astatic D104 crystal microphone possesses many features in advance of competing microphones.

Possessing superior frequency response, there is absolutely no background noise and the response is not affected by movement of the microphone while in use. Economy of installation is also evident, as there is no button current, no field current or polarising voltage, and due to its high impedance it may be connected direct to the grid, thus saving the cost of an input transformer.

In the Astatic D104 all sensitive parts have been carefully protected from deterioration due to humid atmosphere, all materials are absolutely stable and each microphone carries with it a one-year guarantee against failure due to defective workmanship or material.

Further information on the above lines is available free on request from E.T.C. Industries Ltd., 470-480 Elizabeth Street, Sydney.

★

In Latest "Radiotronics."

The circuit, with application data, of a 32-watt amplifier using push-pull 6L6G's in the output is published in Radiotronics No. 86, lately released by Amalgamated Wireless Valve Co. Pty. Ltd.

Also included are characteristics and ratings of the Radiotron type 902 2in. cathode ray tube, together with a circuit showing a typical application in an oscillograph.

Other articles of interest are entitled "Mixing Systems," "R.C.A. Application Note On Wide Angle Tuning Indicators," and "Radiotron 1851-Television Amplifier Pentode."

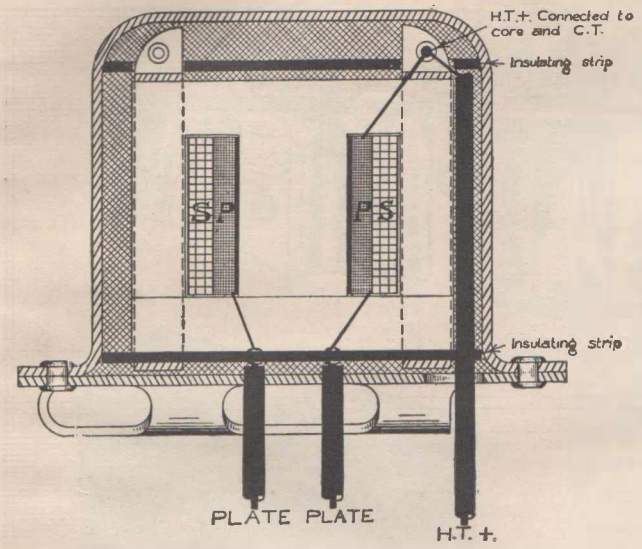
Accompanying this latest issue is a further batch of characteristics charts covering the 6A8G, 6B8G, 6F6G, 6J7G, 6U7G and 5Y3G.

★

Rola Isocore Transformer Eliminates Electrolysis

Designed primarily to eliminate electrolysis—a common cause of receiver break-down—the new Rola Isocore speaker transformer is now fitted as standard equipment on all permagnetic speakers having a 1in. voice coil, and is optional equipment on all electro-dynamic speakers with a 1in. voice coil.

Input transformer breakdowns have



A cross-sectional view of the new Rola Isocore input speaker transformer, designed to eliminate breakdowns due to electrolysis.

★

been traced, in almost every instance, to electrolysis, caused by minute leakage of current from the primary winding of the transformer to the speaker frame itself. This effect is cumulative and is therefore more evident with battery receivers, because unless special precautions are taken, the primary winding is maintained at a positive potential with respect to the frame for twenty-four hours per day, whether the receiver is in use or not.

Under normal conditions, transformers which are carefully insulated, vacuum impregnated and then sealed, will give long and satisfactory service. There is no wax, however, which will not absorb moisture to some slight degree, and under conditions of extreme humidity such as is encountered in tropical parts of Australia, sufficient moisture may be absorbed to considerably accelerate the effects of electrolysis. The effect of moisture is multiplied many times by the presence of acid battery fumes, if the speaker transformer is in close proximity to the accumulator.

The laminations and windings of the Isocore transformer are clamped together in one complete assembly unit that is sealed into a drawn steel can, from which it is insulated electrically. The laminations and clamp are connected internally to the "B" positive end (or centre tap) of the primary winding. Thus. as these metal parts are at the same electrical potential as the primary winding, leakages, and consequent electrolytic action are obviated.

The drawn steel can and sealing compound with which it is filled offer further protection, in that they are designed to offer maximum exclusion of accumulator fumes, and at the same time afford mechanical protection and attractive appearance.

Core Section And Windings.

Isocore transformers have a core section of 11/16in. x 13/16in. and a suitable winding can be supplied to match any regular output valve or valves, or to match transmission lines of any specified load.

★

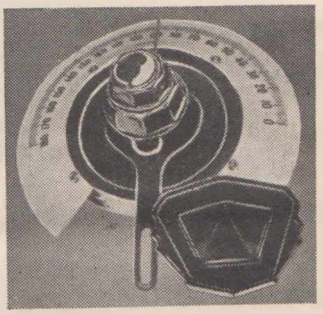
Raymart Octal Ceramic Sockets Now Available.

New Raymart lines of particular interest to amateurs and shortwave enthusiasts recently landed by the Australian representatives, Messrs. John Martin Pty. Ltd., of 116 Clarence St. Sydney, include the type VA8 octal ceramic valve socket illustrated below.

Widely recognised as one of the finest insulations in general use, the "RMX" ceramic used in these sockets ensures highest efficiency for short-wave and ultra shortwave work.

Many other lines also landed recently included ceramic feed-through bushes, which will supply a long-felt need for high frequency or high voltage use. They will also be found particularly useful for mounting components above the metal chassis, where adequate insulation from the latter is essential. There are two types available—FTS for a 4BA hole and FTL for a 2BA. Raymart type FS feeder spreaders, designed for a 600-ohm line, are also now available. Highly glazed, these are light in weight and ensure minimum losses even when exposed to atmospheric influences. They are ideal for zepp transmitting serials.

Illustrated below is the Raymart type SMD dual-speed micro-disc dial



Raymart type SMD dual-speed vernier dial.

incorporating the well-known Utility micro movement. Concentric knobs ensures easy reading. These dials are particularly smooth in action, and are free from any trace of back-lash.

A catalogue containing further details of these and the many other Raymart lines is available free on request from the address given above.

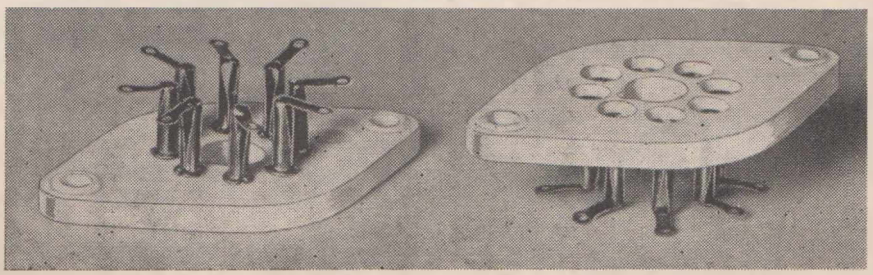
★

E.T.C. Industries Ltd. Introduce Latest Push-Button Switches.

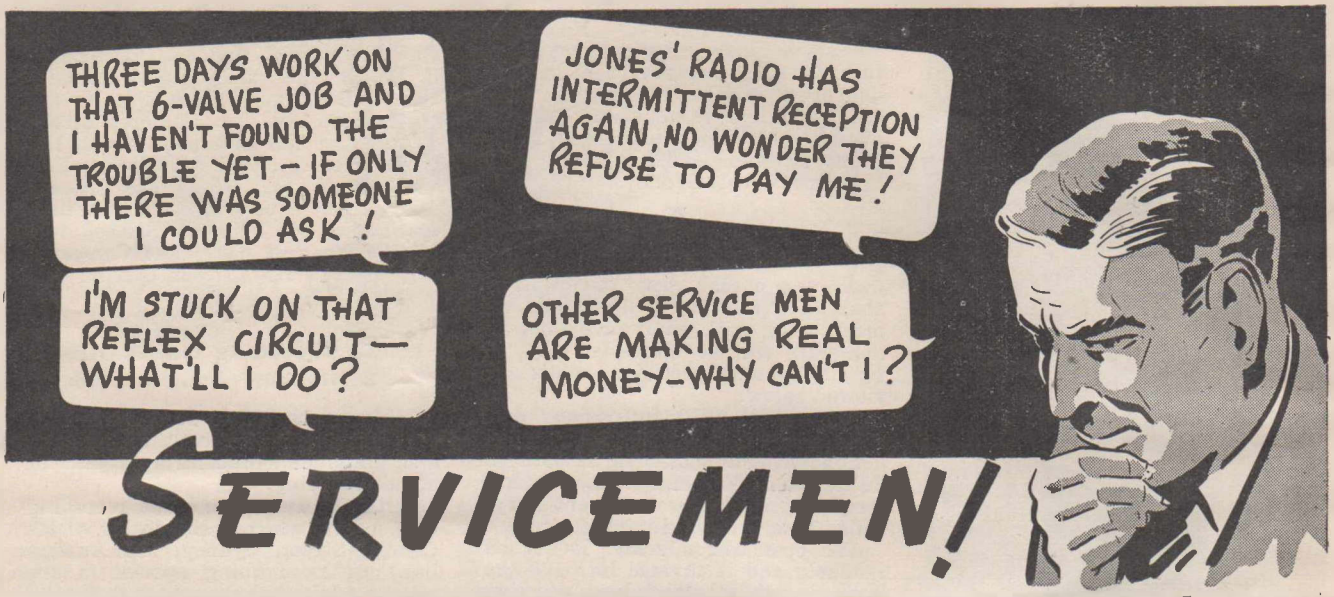
Notable as a strongly advertised feature in the new season's radio receivers, and as one of the much-publicised innovations overseas, is the trend from dial-tuning to push-button tuning.

The consistent demand for push-button units has been met by E.T.C. Industries Ltd. by the introduction of the E.T.C. Yaxley push-button tuning unit.

Two basic types of switches are produced, those intended for r.f. operation and those designed for use with a small specially-constructed motor to operate the tuning condenser. The more popular type at present is the



The new Raymart type VA8 octal ceramic socket.



. . Here Is The Help You Need . .

TRIPLETT

MASTER UNITS

still the simplest, fastest and most versatile instruments made . . . .

MODEL 1200-E UNIT.

25,000 OHMS PER VOLT D.C. measurements and resistance readings to 40 megohms with this new super sensitive Volt-Ohm-Milliameter. Instrument reads D.C.: 10-50-250-500-1000 volts at 25,000 ohms per volt; 0-50 microamperes; 1-10-50-250 milliamperes; low ohms, backup circuit, ¼ to 1000; 40,000 ohms, 4 and 40 megohms; A.C. 10-50-250-500-1000 volts. PRICE, £11/15/-.

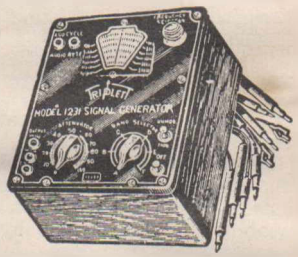
MODEL 1220-A UNIT.

For servicing sets using metal, glass-metal or glass tubes. ..Has five sockets—with standard RMA markings. Panel also includes eight automatic switch type and ten single action jacks. Makes all series and parallel meter connections through the set sockets to all parts of the circuit. Automatic in operation. Used in conjunction with any Triplett Volt-Ohm-Milliammeter. Extra connections may be added, where necessary, at a very slight cost. PRICE, £4/5/-.

Write for the new illustrated catalogue giving full details of the complete Triplett range of test equipment and measuring instruments. ..(This catalogue also features a comprehensive range of the well-known Readrite portable test equipment.)

MODEL 1231 UNIT.

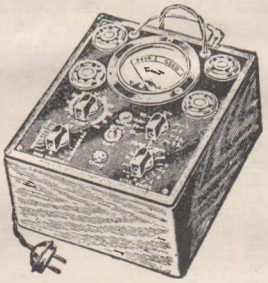
Model 1231 All-Wave Direct Reading D.C. Signal Generator now has built-in trimmer calibrated coils for accuracy of 1% on broadcast, intermediate and shortwave bands. Six bands cover 120, 30,000 D.C.—all fundamentals. PRICE, £10/10/-



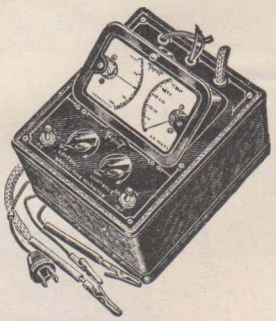
Model 1231 Unit.

MODEL 1210-A UNIT.

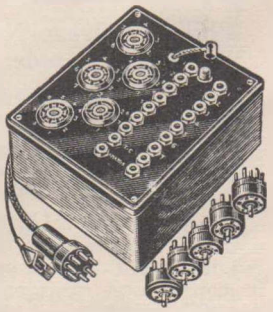
Tests all types of tubes. Direct reading. Coloured GOOD and BAD scale. Line voltage regulation. All short tests. Cathode leakage test. Individual tests on diodes and full wave rectifiers. PRICE, £10/5/-.



Model 1210-A Unit.



Model 1200-E Unit.



Model 1220-A Unit.

Exclusive Factory Representatives for Australia and New Zealand:—

W. G. WATSON & CO. PTY. LTD.

279 Clarence Street, SYDNEY
King & Bolton Streets, NEWCASTLE
91a Currie Street, ADELAIDE
398 Post Office Place, MELBOURNE
and at PERTH, HOBART, LAUNCESTON and WELLINGTON, N.Z.

The new Philips EL3G high slope pentode. reviewed on this page.

r.f., which selects any one of a number of pre-tuned circuits as desired. These circuits can be tuned by means of a semi-fixed compression type condenser, or by the variation of the permeability of the circuit by means of an adjustable iron core.

Designed with inter-locking contacts so that it is possible to have only one contact at a time, the switches are noiseless, positive in their action and low r.f. resistance is assured under all conditions.

The standard switch has eight positions which allows for tuning any one of eight stations, while a wide variety of circuit arrangements is obtainable by the use of various contact shoes. Full particulars regarding these switches are available from E.T.C. Industries Ltd.

★

Philips Release New EL3G Pentode.

The production of high slope pentodes is an important achievement in Australian valve manufacture. Philips valve factory has recently released stocks of the high slope power pentode type EL3G. It is electrically equivalent to the EL3, but it is fitted with an octal base in order to meet the demands for a h.s. pentode for use in conjunction with other valves of the "G" series.

An input of 3.6 volts provides sufficient drive for an output of 4.3 watts when using the EL3G in a conventional circuit arrangement. This valve has a mutual conductance (slope) of 9.5 m.a./v. Fixed bias operation is not recommended for this valve. For socket connections and other ratings, readers are referred to Philips Valve Chart, which is available upon application to Philips Radio Division, Philips House, 69-73 Clarence Street, Sydney.

★

Eddystone Vernier Dials.

As one of the first essentials in shortwave work is a high-grade vernier tuning dial, shortwave fans and amateurs will be interested in the two Eddystone precision dials reviewed below.

The model 1070 full-vision dual-speed dial is beautifully smooth in action without back-lash at both the 20 to 1 and 100 to 1 speeds. For high frequency work the movement is specially designed to eliminate noise.

The open vision scale is clearly readable and is divided into 100 graduations, while half-division markings ensure accurate settings of the indicator pointer.

The movement can be mounted either on the panel or baseboard. The dial face fits on the front of the panel, so that unless it is desired to illuminate the scale from the back, no large opening has to be cut. The dial can be used on panels up to a ¼in. thick and takes a standard ¼in. spindle. The escutcheon is finished in oxidised silver.

Type 1085 Precision Slow Motion Dial

A high-grade precision dial with slow motion ratio of 6.1 and vernier indicator, the model 1085 provides an accurate and powerful drive for high-class test and laboratory equipment or transmitters. The brass scale is 4in. in diameter, is nickel-finished, and has machine-patterned markings with black filling. A 2½in. instrument control knob gives positive finger grip.

These two dials, and in fact all Eddystone products, are available from the Eddystone distributors listed below:—

Eddystone Distributors.

N.S.W.: Price's Radio Service 5 and 6 Angel Place, Sydney; United Radio Distributors Pty. Ltd., 234 Clarence Street, Sydney. **Queensland:** J. B. Chandler and Co., 43 Adelaide Street. Brisbane. **Tasmania:** W. and G. Genders Pty. Ltd., Cameron Street, Launceston and Liverpool Street, Hobart. **Victoria:** P. & L. Wireless Services Pty. Ltd., Hardware Street, Melbourne. **South Australia:** Flinders Radio, 102 Flinders Street, Adelaide. **Western Australia:** Carlyle & Co., 915-917 Hay Street, Perth.

★

Home Recording Outfit Offers Fascinating Possibilities.

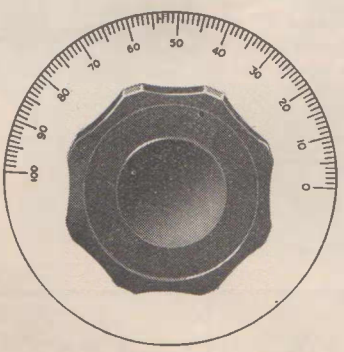
A fascinating field for experimenting that is new to most set-builders and amplifier enthusiasts is that of home recording.

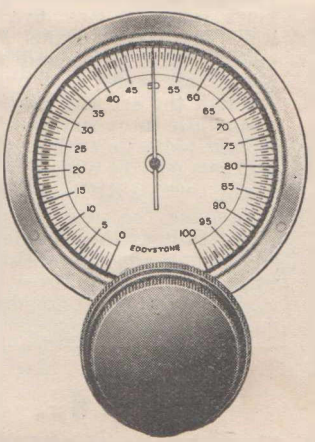
With the Permarec home recording unit, for which Murdoch's Ltd., George Street, Sydney, are Australian agents, nothing special in the way of additional apparatus is required in order to make first-class recordings that have an estimated life of several thousand playings. Designed for use with any standard radio receiver or amplifier, the unit can be used with a spring or electrically-driven gramophone motor with complete success, as the recorder requires very little more power to give satisfactory operation than would be absorbed, for example, by playing a 12-inch record.

The traversing mechanism is driven from the spindle of the gramophone motor by a flexible coupling and two bevel gears. With a reduction ratio of about 1 to 2.25, and normal turntable speed, this gives about 90 threads to the inch on the record.

For recording broadcast matter, practically no additional apparatus other than the recording unit is required, for the cutting head is of the high resistance type and can be connected across the primary winding of the speaker output transformer, with a fixed condenser in one of the leads. For recording speech and music in the home, a microphone is needed, the Reiss unit described in the "Radio

(Continued on page 47.)





★

Left: The Eddystone 1085 precision slow-motion dial. Right: The model 1070 full-vision dual-speed dial.

★

The All-Wave All-World DX News

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

★ ★

Experimenting With The "Fidelity Broadcast Five"

I feel sure that readers of the "A.R.W." will be interested in an account of my experiences with the "Fidelity Broadcast Five," and a few improvements I have effected. I gave the circuit a try-out some time ago, and I am very pleased with the results.

There is no doubt that the 2A3 can give delightful reproduction, due to its very small percentage of 3rd and 2nd harmonic distortion, and to its very low impedance, which flattens out cone resonances in the speaker, especially when the field of the speaker is well energised. I am using an Amplion S.A. speaker attached to a baffle board which is screwed across the fanlight over a door between two rooms, the fanlight having been taken out.

Entire Partition Becomes Baffle.

Thus, when the door between the two rooms is shut, the whole partition becomes a large baffle, and it is possible to hear the reproduction just as well in either room, as it sounds the same from either the front or the back of the speaker. This allows an excellent reproduction of low notes.

I am using a standard 385-volt 100 mill. power transformer and I have omitted the resistor used in the original circuit, in the first stage of the filter. Thus I get about the same voltage on the plate of the 2A3, and the hum, using the field of the speaker alone for filtering, is not noticeable, although I must state that I am using two 8mfd. condensers on the rectifier side of the field, and an 8 and a 4 mfd. on the other side.

Also, instead of self bias on the 2A3, I am using back bias, which seems to allow a slightly greater undistorted power output, probably approaching 4 watts. Although this method of obtaining bias is not recommended by the valve makers when using a .5 meg. resistor in the grid circuit, I have had no trouble with it and I have two 2A3's and have used both of them in the set alternately for some time, so evidently they contain little or no gas.

57 Driver Gives Tremendous Gain.

The first thing I noticed about the set was the terrific gain obtained with the 57 pentode as audio amplifier, as it was never necessary to advance the volume control further than about a quarter of the full travel to fully load the grid of the 2A3. But, as I was using a 2000 ohm bias resistor for the 57, instead of the 3000 specified, I was probably getting greater gain. This made the .5 meg. volume control too sudden in its action, and also slightly noisy when being turned, so I decided to make an alteration to remedy these two defects. Of course, I could have reduced the gain of the 57 by using a larger bias resistor, or a smaller value of load resistor, but I decided to retain the high gain as it was a good thing to have, since it meant that only a very small portion of the full diode load was shunted by the grid leak of the 57, about 50,000 ohms, on full volume, shunted by 1 megohm. Thus the A.C. resistance of the diode load was practically the same as its D.C. resistance, and harmonic distortion on heavily modulated passages is avoided.

So, to retain this advantage, and yet get rid of the too sudden and noisy action of the .5 meg. volume control, I shunted it with a 50,000 ohm resistor, and replaced the 100,000 ohm r.f. filter resistor with a 500,000 ohm, thus keeping the total resistance of the diode load about the same as before, but greatly reducing the a.f. voltage appearing across the volume control.

I now found that the 2A3 could be nicely driven to full volume on most stations with the control full on. and the action was much smoother and noiseless. I am using air core i.f.'s,

(Continued on page 46.)

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.] .....

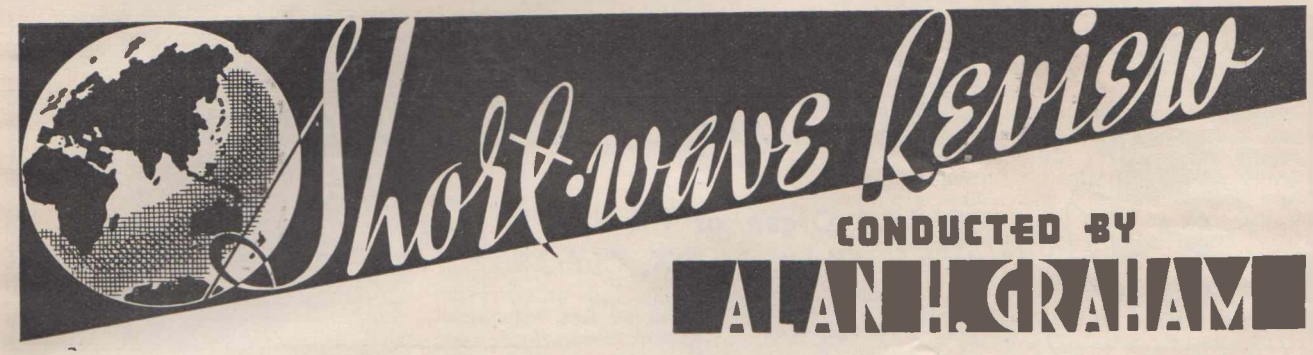
.....

.....

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.]



Conditions Falling Off ★ B.B.C. Plans For Tests ★ Many New Stations ★ Latest Information On Cubans.

Conditions Falling Off.

Both from personal observations and from the reports of the "Radio World" official observers, it is obvious that reception conditions have fallen off quite considerably during the past month. This generalisation applies equally to almost all wavelengths. Most readers will also have noted that conditions have been very erratic; some days being well up to standard, others almost a complete blank.

Ultra high frequency reception has practically ceased—at least, as far as the writer is concerned. This merely duplicates the experience of last year, and it may be as late as August before the police transmitters are again coming in. The 9.49 m. broadcast band is not likely to stay "out" so long, but it is also very poor during the winter months.

★

B.B.C. And The Tests.

Information from London indicates that the B.B.C. has completed plans for the Australian relay of the Test matches. One of the five frequencies devoted to the Australian service will be exclusively devoted to the relay, which will commence at midnight. The frequency used will be determined just prior to the transmission, and will be selected in accordance with the conditions prevailing at the time.

It has been proved that the Empire transmissions are not satisfactory before midnight, and therefore it was thought advisable to commence the broadcasts with a resume of the play before the lunch adjournment, followed by a ball-to-ball description of the remainder of the play for the day.

★

News Of Many New Stations.

Turkey.

Yet another station for 19 m. This time located at Ankara, Turkey. Frequently, 15,195 k.c., wavelength 19.75 m. The station will be on the air in a few months, using th call TAQ.

Uruguay.

As the Argentine government has refused to issue licenses for any additional S.W. transmitters, many Buenos Aires companies are planning stations in Montevideo, Uruguay, across the Rio de la Plata. Details of the calls, etc., of these new transmitters are:—

CXA-1	25.1 m.	CXA-13	48.75 m.
CXA-3	49.38 „	CXA-14	19.79 „
CXA-5	31.61 „	CXA-15	30.82 „
CXA-6	31.41 „	CXA-16	19.51 „
CXA-7	25.56 „	CXA-17	16.85 „
CXA-9	31.78 „	CXA-18	19.61 „
CXA-10	25.22 „	CXA-19	25.65 „
CXA-11	50.68 „	CXA-20	30.97 „
CXA-12	25.1 „	CXA-21	11.48 „

British West Indies-St. Kitt's.

A new station of the Caribbean Broadcasting Co. is now transmitting on 46.99 m. Reports are requested. Best times to log this newcomer are from 7-7.45 a.m. daily, or from 1-1.45 a.m. on Mondays.

Latest on the Cubans.

So much confusion has been caused of late by the antics of the Cuban stations, in their rapid transition from one frequency to another, that most S.W.L.'s will appreciate an attempt to list the Cuban stations now on the air. Part of the following must necessarily be guesswork, but here goes, anyway.

Call.	K.C.	M.
COCO	6010	49.92
COCD	6130	48.94
COHB	6280	47.77
COCW	6330	47.36
COJK	8665	34.64
COKG	8965	33.44
COBZ	9020	33.26
COCA	9100	32.95
COBX	9200	32.59
COBC (?)	9350	32.06
COCH	9430	31.80
COCQ	9750	30.78
COCM	9790	30.64
or	9865	30.41
COBC	9980	30.04
COCX	11420	26.25
COGF	11800	25.42

Guatemala.

A new station at Ciudad de Quezaltenango (whew!); uses the call TGQA when relaying B.C.B. TGQ. It operates on 6400 k.c., 46.88 m., with a power of only 200 w. Schedule to hand is: Daily except Monday, noon-2 p.m.; Saturday, midnight-4 p.m. (Sunday); and Monday, 4-6 a.m.

Italy.

Rome is now broadcasting the Syrian or Arabic hour daily from 3.10-3.55 a.m. The programme consists of news in Arabic, then music and songs of Abdul Waheb and Em Keltoon on records. The transmitters used are 2R04, 25.4 m., and IRF. 30.52 m.

Because of QRM from HJ7ABD and CXA8 interfering with reception of 2RO3, Rome has been testing new frequencies on 17,820 and 15,300 k.c. (16.8 and 19.6 m.).

Egypt.

Several powerful shortwave transmitters are just about ready to take the air. They are located in Cairo. Details of calls and frequencies are expected to be to hand in the future.

India.

VUD-2 is the call of the new Delhi transmitter operating on 9590 k.c., 31.28 m. Schedule is 12.30-3 and 5 p.m.

Calls, etc., of other Indian stations are:—

Call.	K.C.	M.
VUD-4	15,290	19.62
VUE-3	15,160	19.79
VUD-3	11,870	25.26
VUE	6,085	49.3

French Somaliland.

FZE-8 at Djitbouti, French Somaliland, on 17.3 m., is now scheduled to broadcast test transmissions on the first Thursday in each month, at 11-11.30 p.m. Being situated off the regular bands, this station should be fairly easy to identify.

★

Reports From Observers.

Mr. G. O. La Roche (West Australia).

DX here is now only fair, and it makes one start checking up all the

soldered joints on the antenna, thinking of better antennae systems, and also retrimming the set in an endeavour to squeeze one more "R" out of it.

Generally speaking, conditions have been falling off steadily. The outstanding characteristic of reception has been its erraticness. To make matters worse, the noise-level above 49 m. is getting worse; chiefly man-made static and leaking H.T. lines during damp evenings and foggy mornings. The only period during which conditions have shown any improvement is between 8 and 10 a.m., when the Americans are coming in well.

Reviewing the various bands, the best stations are:—

16 m.: W3XAL and PHI.
19 m.: HAS3, LRU, TPA2, OLR5A, W8XK and YDC.
25 m.: CR7BH, TPA4, JZJ, OLR4A, W8XK and RNE.
31 m.: 2RO4, KZRM, ZBW3, HS8PJ, XEWW, COCH and W1XK.
49 m.: COCD, YDA2, W3XAL, VQ7LO, W3XAU, CR7AA, COCO, Rangoon.
Also SPW (22), SPD (26), COCX (26), EHZ (28), ORK (29), COBC (30), COCM (30), PMH (44) and 90-100 m. N.I.R.O.M. stations.

Fair results have also been obtained on the amateur bands, chiefly at the beginning of the month; for lately, conditions have fallen off considerably. Best loggings include the Africans ZS2AX, ZS5CL, ZS1AX and SU1WM.

Mr. J. C. Linehan (South Australia).

DX conditions have been very poor here in Adelaide. During the last two weeks there has been practically nothing audible. The best station logged of late has been LLR, 30.95 m., who have been heard testing on several occasions around 6.30 a.m. They announce as the "Voice of the Argentine."

Another good station is EAR on 30.43 m. (the call is not EAQ as formerly). They are on the air at 8.45 a.m. and 9.40 p.m., Spanish time (corresponding to 7.40 a.m. and 6.45 p.m. A.E.S.T.). Last Sunday I heard them at 6.45 p.m. at great strength. They open with the Spanish National Anthem and the following announcement: "This is the voice of Republican Spain on 30.43 m. broadcasting at 8.45 a.m. and 9.40 p.m. Spanish time, and bringing you the latest news from Spain regarding the war. Write us at Box 951, Madrid, etc." They then give the news, sounding a gong with each item.

Amateur conditions are just fair. On 10 m. a few Americans and K6's are to be logged; while the 20 m. band has fallen away badly.

Mr. V. D. Kemmis (New South Wales).

Conditions this month have been quite poor; one being extremely lucky to drag in any signal above the high noise-level. A bad power leak has been a great handicap these past weeks, and so far all efforts to overcome the trouble have failed.

Just at present the best time for reception is between 6 and 6.30 a.m., when all bands are good. One of the best signals is from CSW on 27 m. COCO on 49.9 m. have "gone silly" during the last couple of days. They have been on the air without a break in their transmission for the last 48 hours, to my knowledge. Their signals are very powerful, too.

Best stations on the various bands are:—

13 m.: W2XE and GSJ.
16 m.: W3XAL and DJE.
19 m.: PCJ, DJL, DJR and YDC.
25 m.: JZJ, W8XK, TPA3, GSD, RNE and 2RO.

26-30 m.: CSW (27), JVN, PLP, COCX, ZLT and PMN.

30-31 m.: LLR, W2XAF, EAR, CSW (30), T14NRH, VPD2, KZRM, XEWW, HS8PJ, W1XK, JDY, YDB, COBC, COCQ and CXA8.

QSL Card Contest Closes On August 15.

Members of the All-Wave All-World DX Club with QSL cards of their own are invited to send in samples to headquarters as entries in a special QSL Card Contest, for the most attractive QSL card design.

The suggestion for the contest was made by Mr. J. C. Linehan, of Adelaide, S.A. (AW323-DX), Official Shortwave Observer for South Australia. Mr. Linehan has also generously donated a trophy to the value of two guineas to be awarded to the winner. The form this will take has not yet been decided upon, but probably the winner will be given his choice of a suitably-inscribed cup or a Replogle Combination World Globe and Time Converter.

Members are advised that all entries must reach the "Radio World" office, 214 George St., Sydney, no later than Monday, August 15. The result will be published, together with a reproduction of the winning card, in the September "Radio World."

Entries should be endorsed "QSL Card Contest," but the cards should be left blank.

Mr. A. R. Payten (recently appointed as second N.S.W. Observer).

Conditions have undergone a great change during the past two weeks: Indeed, I at first suspected that something had gone wrong with the receiver. Night conditions have taken a very definite change for the worse —on several occasions VK6ME was the only station worth anything.

Over a period of, say, two weeks, VPD2, 31.4 m., has been the outstanding station during the evenings, both for strength and quality.

In the early mornings EAQ are excellent, especially during the English news session. CSW on 27 m. have been even better; QSA5 on 27 m. have up to closing at 7.30 a.m.

Daylight reception is fairly good. After midday TPA4 are good, especially after 1 p.m., when the news is given in English. RNE are even stronger when they come on the air at 1.45 p.m. Their male announcer speaks slowly and clearly with a slight American accent, and is 100% copy. This 1.45 p.m. transmission comprises news in English, together with long discussions of recent developments in foreign affairs.

At 3.30 p.m. Daventry arrive in full force on both 25 and 31 m.; if anything, the former band is the better of the two. Later in the evening they are best on 16 m.; while the early morning transmissions are best on 31 m.

On the 11th, at 5.50 a.m., I heard PCJ on 31 m. giving a description of the new trans-Atlantic liner, "City of Amsterdam," together with interviews with various passengers who were on her for her maiden voyage.

The new Argentine station, LLR, 30.95 m., came through yesterday (14th) at 6.46 a.m. On Saturday at 7 a.m. they give a series of interesting talks regarding the Argentine. Five languages are used—Spanish, French, German, Italian and English. The English (?) announcer has a very pronounced American accent, and as he frequently exceeds the speed limit, he is very difficult to follow.

Two Japanese stations logged are JVT on 44 m., and JIB, 28.4, relaying JFAK. The latter is very good after midnight.

I nearly forgot to mention a Spanish station on 29 m. Signals are very strong, but are rather distorted. It was obviously a Nationalist station. (Undoubtedly EAJ43 (or EHZ, as it is listed occasionally), Teneriffe, Canary Is. on 28.93 m.—S.W. Ed.)

The amateur bands have been very good, the Americans on 20 m. being outstanding.

Mr. J. K. Sorensen (Queensland).

The most noticeable feature of the month's reception has been the falling off on 20 m., where the amateurs have been much less numerous.

On the higher wavelengths static has been very troublesome. Only 9MI is consistent on the 49 m. band.

The stations heard at midnight are gradually weakening. The German stations are barely audible on 19 and 31 m. KZRM is weakening a trifle, but JZJ is steady.

In the late afternoons both Zeesen and Daventry are good, especially on 19 m. On the same band PCJ is fair in the early evenings, though fading out after 7 p.m.

Mr. E. Neill (Queensland).

I have been able to DX only from 6-8 a.m. during recent weeks, and have found conditions very good during this period. EAQ is very strong at 6.45 a.m., with news of the Spanish war, often reaching "R" max.

Two new Italian stations have been logged recently, relaying programmes from 2RO. These are IQA and IRW, operating on 20.3 and approximately 25 m. respectively.

Since the beginning of the month XEWW (31.5 m.) have improved considerably. Most of the regular American stations are very good at present.

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Amateur Review : Calls Heard

(Except where otherwise stated, all the calls listed below were heard on 20 m. All are 'phone stations.)

EUROPE.

France: F3DI, F3OO, F3GR, F8XT, F8DC, F8LX (Kemmis, La Roche, Sorensen).

England: G2PU, G2TI, G2TR, G2WD, G2CZ, G2DV, G5RV, G5KA, G5QN, G5ZG, G5OV, G5UF, G5DR, G6DT, G6BY, G6WX, G6XR, G8MX, G8LP, G8VJ (Kemmis, La Roche, Linehan, Sorensen).

Belgium: ON4MZ, ON4VK (Kemmis, Linehan).

Holland: PAUN, PAEO (Kemmis, La Roche).

AFRICA.

Egypt: SU1WM (La Roche).

South Africa: ZS2AX, ZS3F, ZS5CL (Kemmis, La Roche).

ASIA.

Ceylon: VS7GJ (La Roche).

China: XU8AC, XU8UF, XU8RB (Kemmis, La Roche, Linehan).

Japan: J2M1, J2NF, J2OI, J2KG, J2LL, J2NG, J2SA, J2MJ, J5CC (Kemmis, La Roche, Linehan, Payten, Sorensen).

Malaya: VS1AI, VS1AO (Kemmis, La Roche, Linehan).

Philippine Is.: KA1HP, KA1MG, KA1ZL, KA1JZ, KA1FX, KA1BH, KA1AF, KA1ME, KA1HS, KA1AR (Kemmis, La Roche).

Dutch East Indies: PK1ZZ, PK1MJ, PK1JR, PK1JZ, PK1RK, PK1MX, PK1VY, PK2WL, PK3AA, PK3VL (Kemmis, La Roche).

Hawaiian Is.: 10 m., K6LCV, K6OQM, K6OQE (Linehan); 20 m., K6BNR, K6GQF, K6KGA, G6NZQ, K6OQE, K6NCO (Kemmis, La Roche, Linehan, Sorensen).

Hong Kong: VS6AG (Sorensen).

Burma: XZ2EZ (Linehan).

AUSTRALASIA and OCEANIA:

New Zealand: 10 m., ZL3BJ, ZL3KZ, ZL3AJ, ZL2BE (Linehan).

Pitcairn Is.: VR6AY (Kemmis, Sorensen).

NORTH AMERICA.

Alaska: K7FBE (Kemmis).

Canada: VE3ME, VE3YF, VE4JJ, VE4LX, VE5OT, VE5ACN, VE5HI, VE5VP, VE5ABD, VE5PE, E5BF, VE5NY, VE5VO (Kemmis, La Roche, Linehan, Payten).

U.S.A.: 10 m., W6ASJ, W6NCR, W6GCX, W6LBZ (Linehan).

Newfoundland: VO6D (Kemmis).

CENTRAL AMERICA.

Mexico: XE2FC, XE1K, XE1HV (Kemmis, Linehan, Payten).

SOUTH AMERICA.

Chile: CE3AC (Kemmis).

Argentine: LU1FC, LU1HI, LU4BC, LU5ZZ (Kemmis, Linehan).

Ecuador: HC1FG, HC1FK (Kemmis).

Peru: OA4C, OA4AF, OA4AI, OA4R (Kemmis, Linehan, Sorensen).

Venezuela: YV4AB (Linehan).

WEST INDIES.

Cuba: CO2OY, CO2CC, CO2WY, CO2SH, CO2LY, CO2HY (La Roche).

Jamaica: VP5PZ (Linehan).

Porto Rico: K4SA (Linehan).

Dominican Republic: HI7G (Kemmis).

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Amateur Frequencies.

The following list of 20 m. amateur frequencies will be of interest to dxers:—

14,060	YV5AG, Caracas
14,065	G5RV, Chelmsford
14,080	CO2XX, Habana
14,080	CO2LY, Habana
14,080	CO7VY, Camaguey
14,080	F3HM, Riom
14,080	J2MI, Tokyo
14,090	ZE1JR, Salisbury
14,090	G5KH, London
14,090	CO2EG, Habana
14,100	CO2RH, Habana
14,100	HI3N, San Pedro de Macoris.
14,100	XE1BT, Pachuea
14,100	EA9AH, Tetuan
14,100	PK4JD, Billiton
14,110	XU8RB, Shanghai
14,120	CO2JJ, Habana
14,130	G6XR, Coventry
14,135	G5YB, Plymouth
14,135	G6LK, Guildford
14,140	J2NG, Tokyo
14,280	TI2HP, San Jose
14,280	G6BY, London
14,310	VP4GA, Trinidad
14,340	G5SY, Torquay
14,395	YV1AQ, Maracaibo

HOURLY TUNING GUIDE

When And Where To Search

Compiled by ALAN H. GRAHAM.

In order to assist beginners and less experienced dxers, it is intended to publish monthly a special tuning guide, setting out at what times to listen for the more easily logged stations. ..It should be noted that the guide is not intended to cover all stations audible; for full details as to when and where to look for the best catches are given elsewhere. Moreover, the fact that a station is shown as being on the air at a particular time is no guarantee that reception must follow as a matter of course.

All times are given in Australian Eastern Standard Time.

Key to abbreviations used: S, Sundays only; M, Mondays only; T, Tuesdays only; W, Wednesdays only; Th, Thursdays only; Sat, Saturdays only.

Midnight to 1 a.m.

13.93....GSJ
13.97 GSH
13.99 DJS
16.86 GSG
16.88 PHI
16.89 DJE
19.63 DJQ
19.68 TPA2
19.71 PCJ (Th.)
19.74 DJB
19.8 YDC
19.82 GSF
25.4 2RO4
25.45 JZJ
27.27 PLP
28.48 JIB
29.24 PMN
30.61 XGOX
30.78 COCQ
31.38 DJA
31.28 VK2ME (M)
31.45 DJN
31.49 ZBW3
31.55 HS8PJ (F)
31.8 COCH
32.9 COCB
32.59 COBX
33.2 COBZ
48.7 VPB
49.9 COCO
49.98 Rangoon
58.3 PMY
70.2 RV15

1-2 a.m.

13.93 GSJ
13.97 GSH
13.99 DJS
16.86 GSG
16.88 PHI
19.63 DJQ
19.68 TPA2
19.71 PCJ (Th)
19.74 DJB
19.8 YDC
19.82 GSF
19.84 HVJ
19.85 DJL
25.0 RNE
25.34 TPA3
25.4 2RO4
25.49 DJD
27.27 PLP
28.48 JIB
29.24 PMN
31.4 OLR3A
48.7 VPB
49.83 DJC
49.9 COCO
58.3 PMY
70.2 RV15

2-3 a.m.

13.97 GSH
16.86 GSG
16.88 PHI (Th)
16.89 DJE (M)
19.63 DJQ (M)
19.74 DJB (M)
19.71 PCJ (Th)
19.82 GSF
19.85 DJL
25.24 TPA3
25.4 2RO4
25.49 DJD
25.53 GSD
48.7 VPB
49.31 VQ7LO
49.83 DJC

3-4 a.m.

16.86 GSG
16.88 PHI (Th)
16.89 DJE (M)
19.63 DJQ (M)
19.71 PCJ (Th)
19.74 DJB (M)
19.85 DJL
25.2 TPA3
25.49 DJD
25.53 GSD
31.13 2RO3
31.55 GSB
49.31 VQ7LO
49.59 GSA
49 83 DJC

4-5 a.m.

16.86 GSG
16.88 PHI (Th)
19.65 W2XE
19.71 PCJ (Th)
19.85 DJL
24.52 TFJ
25.2 TPA3
25.49 DJD
25.53 GSD
29.04 ORK
31.13 2RO3
31.4 OLR3A
31.55 GSB
49.31 VQ7LO
49.7 OLR2B
49.83 DJC

5-6 a.m.

16.86 GSG
16.87 W3XAL
19.56 W2XAD
19.6 GSP
19.65 W2XE
19.67 W1XAL
19.72 W8XK
19.85 DJL
22.0 SPW (T, Th, Sat)
24.52 TFJ
25.23 TPA3
25.48 DJD
25.53 GSD
27.17 CSW
28.93 EAJ43
29.04 ORK
31.13 2RO3
31.28 PCJ (M, W)
31.41 OLR3A
31.46 JZI
31.55 GSB
39.95 JVP
49.59 GSA
49.7 OLR2B
49.83 DJC

6-7 a.m.

16.86 GSG
16.87 W3XAL
19.56 W2XAD
19.6 GSP
19.65 W2XE
19.67 W1XAL
19.72 W8XK
19.85 DJL
22.0 SPW (T, Th Sat)
25.0 RNE
25.24 TPA3
25.49 DJD
25.53 GSD
27.17 CSW
31.13 2RO3
31.28 PCJ (W)
31.28 W3XAU
31.35 W1XK
31.41 OLR3A
31.46 JZI
31.55 GSB
39.93 JVP
49.59 GSA
49.7 OLR2B
49.83 DJC

7-8 a.m.

19.56 DJR
19.56 W2XAD
19.63 DJQ
19.65 W2XE
19.72 W8XK
19.74 DJB
19.76 GSO
19.82 GSF
19.85 DJL
25.0 RNE
25.2 TPA3
25.42 JZJ
25.45 W1XAL
25.49 DJD
25.53 GSD
27.17 CSW
31.09 CS2WA
31.13 2RO3
31.28 W3XAU
31.32 GSC
31.35 KZRM
31.35 K1XK
31.38 DJA
31.45 DJN
31.46 JZI
31.48 W2XAF
31.55 GSB
31.58 PRF5
49.75 OLR2B
49.83 DJC

8-9 a.m.

19.56 DJR
19.63 DJQ
19.65 W2XE
19.72 W8XK
19.74 DJB
19.76 GSO
19.82 GSF
25.0 RNE
25.2 TPA3
25.42 JZJ
25.45 W1XAL
25.49 DJD
25.53 GSD
25.60 TPA4
30.31 CSW
31.09 CS2WA
31.13 2RO3
31.27 HBL (S)
31.28 W3XAU
31.32 GSC
31.35 KZRM
31.35 W1XK
31.48 W2XAF
31.49 LKJ1
31.55 GSB
31.58 PRF5
38.48 HBP (S)
31.46 JZI

9-10 a.m.

19.56 DJR
1956 W2XAD
19.6 GSP
19.63 DJQ
19.72 W8XK
19.74 DJB
19.8 YDC
22.0 SPW
25.42 JZJ
25.45 W1XAL
25.49 DJD
25.53 GSD
25.61 TPA4
30.31 CSW
31.09 CS2WA
31.13 2RO3
31.27 HBL (S)
31.32 GSC
31.35 W1XK
31.38 DJA (M)
31.41 OLR3A
31.45 DJN
31.49 LKJ1
31.48 W2XAF
31.55 GSB
38.48 HBP (S)
49.1 GSL

10-11 a.m.

19.56 DJR
19.6 GSP
19.63 DJQ
19.74 DJB
19.8 YDC
25.26 W8XK
25.49 DJD
25.53 GSD
25.61 TPA4
31.13 2RO3
31.25 RAN
31.28 PCJ (M, T, Th
31.32 GSC
31.38 DJA
31.41 OLR3A (M)
31.45 DJN
31.48 W2XAF
31.49 LKJ1
31.55 GSB

11 a.m.-noon.

19.56 DJR
19.6 GSP
19.63 DJQ
19.74 DJB
25.26 W2XK
25.49 DJD
25.53 GSD
25.61 TPA4
31.13 2RO3
31.25 RAN
31.28 PCJ (M, T, Th)
31.32 GSC
31.38 DJA
31.41 OLR3A (M, T, Th, Sat)
31.45 DJN
31.48 W2XAF
31.55 GSB

Noon-1 p.m.

19.56 DJR
19.63 DJQ
19.66 GSI
19.74 DJB
25.26 W8XK
25.49 DJD
25.53 GSD
25.60 TPA4
31.28 PCJ (F)
31.32 GSC
31.38 DJA
31.41 OLR3A (T, Th, Sat)
31.45 DJN
31.48 W2XAF
31.55 GSB

1-2 p.m.

19.56 DJR
19.63 DJQ
19.66 GSI
19.74 DJB
25.49 DJD
25.53 GSD
25.61 TPA4
31.28 PCJ (F)
31.32 GSC
31.38 DJA
31.41 OLR3A (T, Th, Sat)
31.45 DJN
31.48 W2XAF
31.55 GSB

2-3 p.m.

25.61 TPA4
31.48 W2XAF

3-4 p.m.

13.99 DJS
16.86 GSG
16.89 DJE
19.63 DJQ
19.74 DJB
19.76 GSO
19.85 DJL
19.82 GSF
25.42 JZJ
25.53 GSD
31.28 VK2ME (S)
31.38 DJA
31.45 DJN
31.55 GSB
49.18 W3XAL
49.5 W8XAL

4-5 p.m.

13.99 DJS
16.86 GSG
16.89 DJE
19.63 DJQ
19.74 DJB
19.76 GSO
19.85 DJL
19.82 GSF
25.24 TPA3
25.42 JZJ
25.53 GSD
31.28 VK2ME (S)
31.38 DJA
31.45 DJN
31.55 GSB
49.5 W8XAL

5-6 p.m.

13.99 DJS
16.86 GSG
16.89 DJE
19.63 DJQ
19.74 DJB
19.76 GSO
19.82 GSF

25.23	TPA3	29.24	PMN
25.52	GSD	30.23	JDY
28.14	JVN	30.61	XGOX
31.28	VK2ME (S)	31.28	VK2ME (S)
31.38	DJA	31.28	VK6ME
31.45	DJN	31.38	DJA
31.55	GSB	31.45	DJN
		31.45	VPD2
6-7 p.m.		31.49	ZBW3
13.99	DJS	31.55	VK3ME
16.89	DJE	34.0	VPD3
19.63	DJQ	44.64	PMH
19.31	PCJ (Th)	48.7	VPB
19.74	DJB	49.5	W8XAL
25.23	TPA3	58.3	PMY
28.14	JVN	70.2	RV15
31.28	VK2ME (S)		
31.38	DJA	10-11 p.m.	
31.45	DJN	13.93	GSJ
		13.97	GSH
7-8 p.m.		13.99	DJS
13.99	DJS	16.86	GSG
19.71	PCJ (Th)	16.88	PHI (S)
19.74	DJB	16.89	DJE
25.57	Saigon	19.58	OLR5B
28.14	JVN	19.63	DJQ
31.38	DJA	19.68	TPA2
31.45	DJN	19.74	DJB
31.49	ZBW3	19.8	YDC
31.55	VK3ME	19.82	GSF
		19.7	OLR5A
8-9 p.m.		19.85	DJL (S)
13.93	GSJ	25.4	2RO4
13.97	GSH	25.45	JZJ
13.99	DJS	25.57	Saigon
16.86	GSG	27.27	PLP
19.68	TPA2	28.14	JVN
19.71	PCJ (W)	29.24	PMN
19.74	DJB	30.23	JDY
19.8	YDC	30.61	XGOX
19.82	GSF	30.78	COCQ
25.4	2RO4	31.28	VK6ME
25.57	Saigon	31.28	VK2ME (S)
27.27	PLP	31.35	W1XK
28.14	JVN	31.38	DJA
29.24	PMN	31.45	DJN
31.28	VK2ME (S)	31.49	ZBW3
		31.8	COCH
31.38	DJA	32.09	COBC
31.45	DJN	32.59	COBX
31.49	ZBW3	44.64	PMH
31.55	VK3ME	48.7	VPB
31.45	VPD2	49.5	W8XAL
34.0	VPD3	49.98	Rangoon
44.64	PMH	58.3	PMY
70.2	RV15	70.2	RV15
9-10 p.m.		11 p.m.-midnight.	
13.93	GSJ	13.93	GSJ
13.97	GSH	13.97	GSH
13.99	DJS	13.99	DJS
16.86	GSG	16.86	GSG
16.89	DJE	16.89	DJE
19.58	OLR5B	16.88	PHI
19.63	DJQ	19.56	DJR
19.68	TPA2	19.63	DJQ
19.7	OLR5A	19.68	TPA2
19.71	PCJ (W)	19.74	DJB
19.74	DJB	19.8	YDC
19.8	YDC	19.82	GSF
19.82	GSF	19.85	DJL
19.85	DJL (S)	25.4	2RO4
25.0	RNE (W)	25.42	JZJ
25.4	2RO4	25.57	Saigon
25.57	Saigon	27.27	PLP
27.27	PLP	29.24	PMN
28.14	JVN	30.61	XGOX
30.78	COCQ	32.09	COBC
31.28	VK2ME (S)	32.59	COBX
		33.2	COBZ
31.35	W1XK	44.64	PMH
31.38	DJA	48.7	VPB
31.45	DJN	49.5	W8XAL
31.49	ZBW3	49.9	COCO
31.51	HS8PJ (Th)	49.98	Rangoon
		58.3	PMY
31.8	COCH	70.2	RV15

American Police Radio Calls

Contributed by ALAN H. GRAHAM.

(Note: In the following list, the abbreviation "P" indicates "portable.")

W1XAO—Boston, Mass.
W1XAA—Brookline, Boston, Mass.
W1XBL—Quincy, Mass.
W1XBM-W1XBR—Quincy, Mass (P.)
W1XBY-W1XBZ—Medford, Mass. (P.)
W1XCA-W1XCC—Medford, Mass. P.)
W1XCU—Sharon, Mass.
W1XCA—Sharon, Mass. (P.).
W1XCX-W1XCZ—Massachusetts State Police (P.).
W1XDA-XDB—Massachusetts State Police (P.).
W1XDG—Quincy, Mass. (P.).
W1XDH—Cohasset, Mass.
W1XDK—West Hartford, Conn.
W1XDL-W1XDM—Hull, Mass. (P.).
W1XDT—Manchester, N.H.
W1XDU-W1XDV—Manchester, N.H. P.).
W1XDW—Hull, Mass.
W1XDX-W1XDZ—Hull, Mass. (P.).
W1XEA—Hull, Mass. (P.).
W1XHC—Hartford, Conn.
W1XHD-W1XHH—Hartford, Conn. (P.).
W2XAJ—Port Jervis, N.Y. (P.).
W2XCA—Union City, N.J.
W2XCB-W2XCF—Union City, N.J. P.).
W2XCG—Bayonne, N.J. (P.).
W2XCJ—Bayonne, N.J.
W2XCS—Eastchester, N.Y.
W2XCT—Eastchester, N.Y. (P.).
W2XDD—Deal, N.J.
W2XDE-W2XDF—Deal, N.J. (P.).
W2XEA-W2XEH—Bayonne, N.J. (P.).
W2XEL—Eastchester, N.Y. (P.).
W2XEM—Newark, N.J.
W2XEN—Roselle, N.J.
W2XES—Englewood, N.J.
W2XFA—Jersey City, N.J.
W2XFB-W2XFK—Jersey City, N.J. (P.).
W2XFL-W2XFT—Elizabeth, N.J.
W2XFU—Plainfield, N.J.
W2XFV-W2XFZ—Plainfield, N.J. (P.).
W2XGC—Ploughkeepsie, N.Y. (P.).
W2XGG—Bayonne, N.J. (P.).
W2XGH—Roselle Park, N.J. (P.).
W2XGJ—Roselle Park, N.J. (P.).
W2XGK—Harrison, N.Y.
W2XGL-W2XGO—Harrison, N.Y. (P.).
W2XGP—Kenilworth, N.J. (P.).
W2XGQ-W2XGZ—Jersey City, N.J. (P.).
W2XHA-W2XHB—Jersey City, N.J. (P.).
W2XHK—Scarsdale, N.Y.
W2XHL—New Rochelle, N.Y.
W2XHM—Harrison, N.Y. (P.).
W2XHP—Kingston, N.Y.
W2XHQ—Millburn, N.J.
W2XHR-W2XHT—Millburn, N.J. (P.).
W2XHU—Newark, N.J. (P.).
W2XHW—Union, N.J.
W2XHX-W2XHZ—Union, N.J. (P.).
W2XI—Kenilworth, N.J.
W2XIA—Harrison, N.Y. (P.).
W2XIC—Woodbridge, N.J.
W2XQ—Elizabeth, N.J.
W3XAC—Abington, Pa.
W3XAG—Elkins Park, Pa.
W3XAQ—Camden, N.J.
W3XAR—Brookline, Pa.
W3XAV—Suffolk, Va.
W3XBA—Bethelem, Pa.
W3XBB-W3XBC—Bethelem, Pa. (P.).
W3XBD—Atlantic City, N.J.
W3XBE-W3XBF—Atlantic City, N.J. (P.).
W3XBG—Norfolk, Va.
W3XBJ—Harrisburg, Pa.
W3XBK-W3XBO—Harrisburg, Pa. (P.).
W3XBP—Wilmington, Del.
W3XBQ—Atlantic City, N.J. (P.).
W3XBR—Sharon Hill, Pa.
W3XBS—Ventnor, Atlantic City, N.J. (P.).
W3XDA—North Plainfield. N.J.
W3XDB-W3XDC—North Plainfield, N.J. (P.).
W3XDN-W3XDQ—Bethelem, Pa. (P.).
W3XDU-W3XDV—Atlantic City, N.J. (P.).
W3XED—Longport, N.J. (P.).
W3XF—Ventnor, Atlantic City, N.J.
W3XG—Ventnor, Atlantic City, N.J. (P.).
W3XH—Ventnor, Atlantic City, N.J. (P.).
W3XS—Ardmore, Pa.
W3XT—Lansdowne, Pa.
W3XU—Philadelphia, Pa. (P.).
W3XZ—Danville, Va.
W4XAC—Salisbury, N.C.
W4XAE-W4XAF—Birmingham, Ala. (P.).
W3XAG—Rome, Ga.
W4XAH—Columbia, S.C.
W4XAI—Kingsport, Tenn.
W4XAK—Charlotte, N.C. (P.).
W4XAL—Charlotte, N.C.
W4XAM—Savannah, Ga.
W4XAN—Tallahassee, Fla.
W4XAP—Kinston, N.C.
W4XAQ—Brunswick, Ga.
W4XG—Miami Beach, Fla.
W4XI—St. Petersburg, Fla.
W4XJ—Winston-Salem, N.C.
W4XK—Durham, N.C.
W4XL—Hickory, N.C.
W4XM—Chattanooga, Tenn.
W4XR—High Point, N.C.
W4XS—LaGrange, Ga.

Fourth S.W. DX Contest

Won by W. T. Choppen of N.Z.

A LARGE and exceedingly high-class entry of over 50 verifications was received for the "Radio World" fourth DX Contest, which closed on May 1. The task of determining the winner of the handsome Replogle Globe was again very difficult.

After taking into account all the relevant factors, the judges decided in favour of Mr. W. T. Choppen, of Timaru, New Zealand. The winning verification was from TG2X, Guatemala City, Guatemala, operating on 5940 k.c., or 50.47 m. Several factors led to the decision in favour of Mr. Choppen's entry. The time of reception of TG2X was most remarkable when the wavelength of the station is considered: Mr. Choppen logging them at 12.10 p.m. Aust. E.S.T. In addition, Mr. Choppen used only a small receiver—a three-valve Super-Gainer; the antenna was a 50ft. vertical.

In addition to the winning verification, Mr. Choppen submitted cards from CR7BH, YV4RB, COCD and YDA7 (91.7 m.).

Honourable Mention.

Honourable mention goes to two competitors, Messrs. La Roche and Simpson—the latter having carried off the Globe awarded in the third contest.

Mr. La Roche (Perth, W.A.) entered a card from the South African amateur, ZU5AC. This verified reception on 40 m. of ZU5AC's 'phone signals. As the power used was only 18 watts, the card represented a fine feat of DX. Mr. La Roche uses a five-valve receiver.

Mr. Simpson (Concord West, N.S.W.) entered a fine collection of verifications, three of which were selected by the judges for honourable mention. These were from CFRX, Toronto, 49.4 m.—first report from Australia; YSD, San Salvador, 37.99 m.; and FZE8, Djibouti, 17 m.

W4XT—Tuscaloosa, Ala.
W4XU—Raleigh, N.C.
W4XV—Greensboro, N.C.
W4XW—Greenville, S.C.
W5XB—Fort Worth, Tex.
W5XF—Amarillo, Tex.
W6XAQ—Phoenix, Ariz. (P.).
W6XBF—Piedmont, Calif.
W6XBG-W6XBJ—Piedmont, Calif. (P.).
W6XCN—San Diego, Calif. (P.).
W6XBR-W6XBS—Highland Park, Detroit, Mich. (P.).
W6XBT—Springfield, Ohio.
W6XBU—W6XBZ—Springfield, Ohio. (P.).
W6XCA-W6XCD—Springfield, Ohio (P.).
W6XCK-W6XCL—Springfield, Ohio (P.).
W6XDL—Modesto, Calif.
W6XDM-W6XDP—Modesto, Calif. (P.).
W6XDZ—Modesto, Calif.
W6XEG—Salt Lake City, Utah (P.).
W6XEH—Long Beach, Calif.
W6XEI-W6XER—Long Beach, Calif. (P.).
W6XFE—Alhambra, Calif.
W6XFF-W6XFH—Alharbra, Calif. (P.).
W6XFX—Merced, Calif. (P.).
W6XFY—Merced, Calif. (P.).
W6XFZ—Visalia, Calif.
W6XGA—Visalia, Calif. (P.).
W6XGB—Fresno, Calif. (P.).
W6XGC—San Gabriel, Calif.
W6XGD-W6XGF—San Gabriel, Calif. (P.).
W6XGG—Turlock, Calif.
W6XGN—Santa Barbara, Calif. (P.).
W6XGQ—Salinas, Calif.
W6XGR-W6XGX—Salinas, Calif. (P.).
W6XGY-W6XGZ—Turlock, Calif. (P.).
W6XHA—Watsonville, Calif.
W6XHB-W6XHC—Watsonville, Calif. (P.).
W6XHD-W6XHE—San Bernardino, Calif. (P.).
W6XHG—San Anselmo, Calif.
W6XHH-W6XHI—San Anselmo, Calif. (P.).
W6XHJ-W6XHM—Pittsburgh, Calif. (P.).
W6XHN—Pittsburgh, Calif.
W6XHO—Santa Rosa, Calif.
W6XHP-W6XHQ—Santa Rosa, Calif. (P.).
W6XHR—Monrovia, Calif.
W6XHS-W6XHT—Monrovia, Calif. (P.).
W6XHU—San Buenaventura, Calif.
W6XHV-W6XHY—San Buenaventura, Calif. (P.).
W6XHZ—Long Beach, Calif. (P.).
W6XIA—Oceanside, Calif.
W6XIB-W6XIC—Oceanside, Calif. (P.).
W6XID—Beverly Hills, Calif.
W6XIE-W6XIP—Beverly Hills, Calif. (P.)
W6XIQ—Antioch, Calif.
W6XIR—Antioch, Calif. (P.).
W6XIS—Alhambra, Calif.
W6XIT-W6XIV—Alhambra, Calif. (P.).
W6XM—Stockton, Calif.

(To be continued.)

DX News and Views

A page for letters from DX readers

★ ★ ★

Good DX Despite Interference.

Just a few lines to let you know how DX is getting on down here. My aerial does not aid good reception, as it is near a power transformer, flashing neon sign, frigidaires, etc., which cause intereference, but my new 1938 all-wave Radiolette settles the matter, and so far I have quite a number of verifications.

The following is a list of my latest loggings: VE5VO, VK3PB, KZRM, VK3KY, VK5DI, VK5KX, VK4GG, K6AGA, K6LKM, KA1AP, VK7CL and K6KGA. I think some of the amateurs must collect unused stamps, as they do not reply.

Wishing the "Radio World" the best of success.—**W. A. Shaw (AW-297DX), Devonport, Tasmania.**

Latest Shortwave Loggings.

Just a few lines to report on last month's loggings. The conditions here during this month have been much better, and I have heard the following broadcast stations on shortwave:—JZJ, XEWW, CSW, PCJ, COCQ, COCM, and the Empire stations. All were very good, with JZJ, PCJ and XEWW the strongest. Amateurs: VK6WS, K6's KGA, BNR, KGS, MXM, ..MVP, ..KA1AP, ..W2HFS, XU6TL, VE5's VO, HU, EF, OT, W4's KT, BMR, W5BEE, 8 W6's and 1 W7. I have just received a very nice card from DJB, Berlin.

Best wishes to the 'Radio World"—it is a great book.—**Mervyn Tippett (AW380DX), Koongal, Queensland.**

'Two-Day "Fade-Outs" Last Month.

My DX on the 20-metre band last month was not too good, as there were a few fade-outs lasting for about two days. Following are my loggings:—

W1's HKK, GR, FMP, W3's GQG, GDX, TWN; W4's DRZ, EP; W5's BZF, FNY, ATB; W6's BOS, IXZ, KKG, AHP, LAJ, BYR, JPW. BUT, JYH, NKP, MPS, NMI; W7's DAA, DX, ARK, DNP, AMQ; W8's FDF, LVE, AAJ, BWC; W9's EMI, MM, CIH, TSR, ELX, UJS, TGX, SBV, EOZ, TB, VE4ZK, VE4KF, VE5CD; K6's KPF, KEF, LKN; F8's IQ, AM, KW; PK's 1VY, 2AY, 4JD; G2NM, G5NI, G8LP, ZL2BI, LU1HI, CT1AY, HC1FG, J5CC, XU8EF, CE3AA, SU1RD, YR5AA, HH5PA (all on 'phone).

I have received verifications from VK's 4RH, 5LW, 5TR, 6WS, 4LK, 7RZ, 2AFE, 5KX, 4GE, and a very nice card from PCJ for which I waited eight months. I sent a report to J2MI and received the same letter back five months later from the Dead Letter Office. The letter had been to Japan and I have been informed since that some European "hams" refuse letters from S.W.L.'s, so it is a waste of time reporting to them.—**Charles H. Thorpe (AW342), North Rockhampton, Queensland.**

May Loggings And Veries.

I received five more verifications this month from VK's 6ME, 3EF, 5FL, 5DC and 3TR, and have only two more to receive from VK's 5RL and 2TM. The "Shortwave Review" for May had plenty of information of stations and amateurs. Stations logged during May include the following 20 m. amateurs:—

11 W1's, 11 W2's, 2 W3's, 6 W4's, 5 W5's, 13 W6's, 1 W7, 10 W8's, 8 W9's, 2 PK1's, 1 PK3. Commercials: W1XK (31.55 m.), W2XE (25.36 m.), VPD2 (31.45 m.), PLP (27.27 m.), JVN (28.14 m.), JZJ (25.45 m.), ZBW (31.49 m.), ZLT (27. 15 m.), OLR4A (25. 34 m.), CS2WA (31.09 m.), and COCH (31.8 m.).—**Wm. Bantow (AW-353DX), Victoria.**

ROUND THE SHACKS

Amateur operators desirous of having their transmitters and activities featured under this heading are requested to forward details to "Reporter," C/- "Radio World," 214 George St., Sydney. Articles should be similar in style to those already appearing in the series, and should, where possible, be accompanied with photographs of operator and transmitter.

Latest Shortwave News.

CBII70, 11,700 k.c., in Chile, broadcasts an Anglo-American programme at 11 to 11.45 a.m., A.E.S.T., daily, and verifies with a very attractive card.

TI4NRH on 9698 k.c. with his tenth anniversary programmes dedicated to various radio clubs, etc., is being clearly received with good volume in New Zealand.

Listeners in the Dutch East Indies pay the N.I.R.O.M. each month a licence fee which decreases as the number of listeners increases, e.g.—

Jan., 1935, 10,000 listeners=3 guilders
" 1936, 24,000 " =2½ "
" 1937, 40,000 " =1½ "
" 1938, 53,000 " =1½ "

Programmes of the Brazilian Hour go on the air through the auspices of the Federal Government of Brazil over shortwave station PSH, 10,220 k.c., and PSE, 14,935 k.c. Every Tuesday this department broadcasts an English programme between 11 and 11.30 a.m. A.E.S.T. Both stations are located in Rio de Janeiro and verify with card, showing picture of city, in yellow and black.

Radio Tananarive, Madagascar, broadcasts simultaneously on the following frequencies:—10,500, 9510, 6073 k.c.; every Wednesday, Friday and Saturday at 3.30 to 3.45 p.m., 6.30 to 7.30 p.m., 1 a.m. to 2 a.m., A.E.S.T. The above schedule was received on their verification card.—**W. T. Choppen (AW61DX), Timaru, N.Z.**

DX "Scoop" For 353DX.

Just a few lines to let you know that the QSL forms are still successful, and I have now received 24 verifications by using them. During April cards were received from VK's 4UY, 7RZ, 3BZ, 3EH, 3FB, 5LB, and a letter from ZLT saying that they do not usually verify, but being a special occasion they advised that the times and particulars quoted in my report agree with the station log. They also stated that the station is engaged in the public commercial service and is not intended for general reception.

Reports are out to VK's 3JR, 3LN, 3TW, 3ME, 3JQ, 3EF, 6ME; TI4NRH and KZRM. During April the following 20 m. amateurs were heard:—W2ZC, 2EVI, 2AZ, 3ER, 3CZJ, 6BKY, 6AH, 6IKQ, 6MCW, 6AT, 6IDY, 6EUW, 6CQG, 6MHL, 8CMA, 8PL, 9TOO, 9MCA, 9IPA, 9UJS, ZL2CJ, ZL2QL, OA4AI, KA1JZ, KA1MH, PK1MX, PK1ZZ, VS1AI, XU8RB,

(Continued on page 48.)

"Fidelity B.C. Five."

(Continued from page 39.)

but found that these were rather too selecfive for good high-note response, so I moved the coils $\frac{1}{16}$in. closer, which brought them to the point where they just commenced to double peak, passing a band about 8 k.c. wide with fairly sharp cut-off beyond. This adjustment allows a delightfully natural reproduction on local stations, which are often a pleasure to listen to.—**J. P. Stewart, Bundainba, Q.**

Ex-Fingerprint Expert Conducts PCJ Session

Schedule Now Changed To 3.30-5 p.m. On Tuesdays.

PCJ "fans" have all been very busy lately making a note on their Radio Charts of PCJ's altered transmission time, for the usual Tuesday night Australian broadcast now takes the air from 3.30-5 p.m. each Tuesday. It is conducted by L. G. Wybrands, one of the most popular announcers connected with Philips experimental transmitter.

Visitors to PCJ who have met Mr. Wybrands say he is nearly always to be found busily engaged reading Australian newspapers and magazines, and he admits that it is one of his greatest ambitions to make a trip to Australia. Judging by his immense popularity with European listeners, however, his ambition has little chance of being realised.

Wybrands was originally a fingerprint expert who had become an authority on this branch of criminal work by studying the systems used by the principal nations of the world. One day, while he was still attached to the Dutch police department, he was invited to give a talk at the Philips station at Hilversum. Directors of the studio who happened to be listening to the speaker were impressed by his fine voice and diction. He was offered a position in the studio, and, rather to their surprise, he gave up his police career and became a radio announcer.

Since taking over his new position he has exhibited the same enterprise which has characterised Australian and American programme impresarios. In spite of his police training he believes that "red tape" is something to be cut. He doesn't hesitate to go to his objective in the most direct way, an attribute that is not always credited to Continentals.

One of his episodes was related recently by Hans Merx, a well-known singer who has since returned to America after a concert and radio tour abroad.

When the Oxford Group was holding a meeting in Utrecht, it occurred to Mr. Wybrands that the speakers of the movement should be given a chance to talk to the world over short wave PCJ. He commandeered a huge motor-bus, drove to Utrecht, convinced the Oxford Group leaders of the value of the event, and within a few minutes was on his way back to Hilversum with a loaded bus. The members spoke in turn, and were immediately rushed by car to the Hook of Holland, from which port they were sailing for London.

Such spontaneous features are not unusual in Australia and America, but Europeans are more leisurely in their movements. Under ordinary conditions and with someone less energetic than Announcer Wybrands at the helm, it might have taken days and perhaps weeks to have made the broadcast possible.

Announcer L. G. Wybrands, who conducts the Australian session over PCJ.

VK2ME, 3ME And 6ME—Schedules For July

The following transmission schedules will be observed by shortwave stations VK2ME, VK3ME and VK-6ME during June:—

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

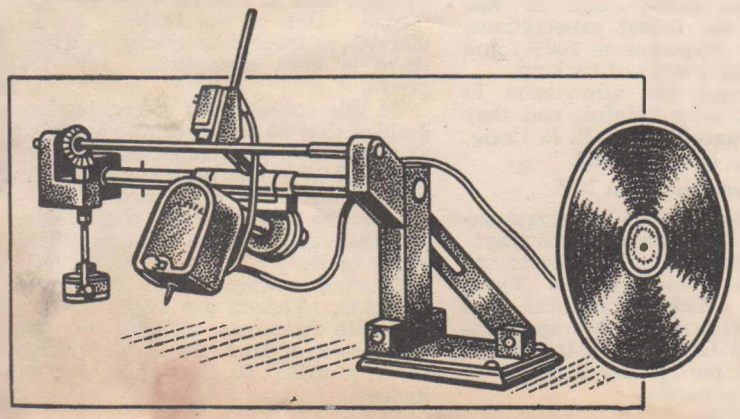
	Sydney Time.	G.M.T.
Sundays:	3-5 p.m.	0500-0700
	7.30-11.30 p.m.	0930-1330
Mondays:	2.30-4.30 a.m.	1630-1830

VK3ME (3.15 m., 0510 k.c.)

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

VK6ME, Perth (31.28 m., 9590 k.c.)

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



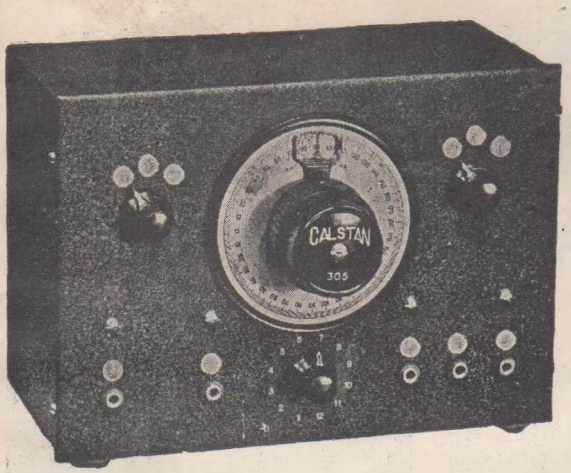
Permarec Home Recording System.

(Continued from page 38.)

World" for December, 1937, being ideal, as it is inexpensive and has excellent sensitivity.

In next month's "Radio World" an article will be published describing in detail the process for making records using this equipment, and constructional details will be given of an inexpensive amplifier designed to be used in conjunction with the recorder.

Left: The Permarec home recording outfit.



The Calstan all-wave test oscillator, which is now available in kit form.

Calstan All-Wave Oscillator Available In Kit Form.

(Continued from page 5.)

ible in its applications, and should prove invaluable to servicemen and dealers requiring a comprehensive instrument built in portable form. A detailed review will be published in next month's "Radio World."

Incorrect Price In Calstan Advertisement.

The attention of readers is drawn to the fact that the price listed for the Calstan D.C. multimeter valve-tester combination in the advertisement inserted by Slade's Radio Pty. Ltd. on page 15 of this issue is incorrect. Shown as £18/18/-, it should be £18/6/-.

DX News And Views.

(continued from page 46)

K6CMP. K6BNR. Commercials:—W2XAD (19.56 m.), W8XK (19.72 m. and 25.26 m.), NIROM (31 m.), JVN (28.14 m.), OLR3A (31.41 m.), KZRM (31.35 m.), and WBCA, WBCB (31 m.).—**Wm. Bantow (AW353DX), Edithvale, Victoria.**

Says Club QSL Forms Are Excellent.

I wish to acknowledge receipt of my certificate, badge and report forms. I think they are excellent, particularly the QSL's. Any station which would not verify after receiving a report on one of the forms would be the reverse of courteous.—**T. Johnston-Lord (AW336DX), Port Kembla, N.S.W.**

Thirty Americans Logged On May 1.

The 20-metre band is picking up now, and on May 1 it was jammed with amateurs, mostly Americans, and the following stations were logged:—30 Americans, K6FAB, K6BNR, K6OQE, K6ISG, KALMH, KA1ZL, VE5CT, VE5ACN, VE4VD, VE4MO, G2NA, J2MI, GM2UU, XU8ET and VR6AY. VK's 2-8, W's 1-9, G6DT, G2AK. K6's MPU, OGN, KRG, DCK; F3JD, PA1AP, KA's 1YL, 1ER, 2AB, 2OV, 1PH, X3QA, PK's 1MX, 2WL, 3GD; HK1Z, HA7G, VP5JS, ON4VK, NY2AE; XU's 8OI. 8RB, 8MC, 8HB, CO7CZ, CO2RA, HI5X, HI7G, CE1AX, CE1AH, TI2IC, VS7GJ, CN8TK. FI8AC; ZL's 2NP, 2OQ, GM5NW and VO7GJ. I have reports out to 17 stations, and since joining the Club have received 31 verifications.—**F. Combe (AW365DX), Victoria.**

Is Using Equivalent Of All-Wave Bandspread Two.

Enclosed please find membership application form. I have been taking "Radio World" each month from the word "go," and eagerly look forward to every issue. I think it one of the very finest radio magazines published, as it is of interest to everyone. It is to be congratulated on its consistently interesting articles and circuits.

I have been studying radio with the A.S. of R.E., also I.C.S., for the last 5½ years—the further one goes into radio the more interested one becomes.

I am at present experimenting with s.w. coils on a small job, using a 19 as detector and first audio, and 1F4 in the output, and it certainly has me amazed at the outstanding performance on the b.c. and s.w. bands, also the volume on b.c. loud speaker. The sensitivity is very good and selectivity very fair indeed. With my superhet I am also adding an r.f. stage and "B" class audio, which should lift it up quite a lot. I have used sirufer intermediates and they certainly made it a lot livelier.

I have also to congratulate you on your Club and its activities, and think it a wonderful idea from many points of view indeed, particularly for the friendships one may make with other members. Hearty congratulations and a prosperous future to "Radio World."—**Don Fowler (AW385DX), Beerburrum, Queensland.**

"Empire" A Fine Performer.

I have built the set described in your December issue—the a.c. "Empire All-Wave Three"—and it has come up to the fullest expectations. I think your magazine is 100%, and is the best publication of its kind.

I have found the advertisers in your journal very helpful, and they fulfil orders excellently.—**R. B. Craig, Christchurch, New Zealand.**

A Bouquet From N.Z.

May I extend hearty congratulations to you for your excellent magadine. For the money I've yet to see a magazine containing so many worthwhile articles, technical and otherwise. Also my sincere appreciation of Alan Graham's notes, which have enabled me to keep right up to the minute.

My rig consists of a six-tube super tri-wave, and a two-tube s.w. set. The antenna is an inverted "L," 100ft. overall and 37ft. high, N.N.E./S.S.W. I've just completed a coil to take my two-valve down to 10 metres.—**Con. A. Stiglish (AW335DX), Dunedin, New Zealand.**

★

QSL Exchange Bureau.

The following readers would like to exchange QSL cards with other readers:—

Merton M. Heath, P.O. Box 7, Dryden, Washington, U.S.A.

Charles H. Thorpe (AW342DX), 25 Charles Street, North Rockhampton, Queensland.

Alan Thomas Berry (AW394DX), Hawthorne Street, Roma, Queensland.

Radio Industry Ball On Saturday, July 2.

For the seventh consecutive year the Radio Industry Ball, under the auspices of the R.I.F. Club, of Sydney, will be held on Saturday, July 2, at David Jones' Ballroom. This is an annual event in the radio trade of Sydney, and is always very well attended. One of the features is the marvellous trade decorations, in which there is keen competition for the prizes.

On this occasion the committee has decided that no tables can be accepted as an entry in the competition if more than £12/10/- has been spent on the decorations. There are two prizes—one for the most effective trade table, and the other for the most beautiful trade table.

Dancing continues from 8.30 until 1.30 a.m. Tickets are 10/6, and are available from any member of the committee, or from the honorary secretary's office, 30 Carrington Street, Sydney.

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