THE AUSTRALASIAN

Radio World

DECEMBER 10, 1938
VOL. 3 — NO. 8
PRICE, 1/-

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—See Page 8

- "1939 SKY-KING DUAL-WAVE FIVE" USES LATEST 6K8-G CONVERTER:
- HOME RECORDING FOR THE AMATEUR: DIRECT-READING RESISTANCE AND
- CAPACITY BRIDGE: FIVE-BAND TRANSMITTER: "HI-FI" SPEAKER BAFFLE.

"1939 SKY-KING DUAL-WAVE FIVE"

Makes Kit-Set History !

Features New . . .

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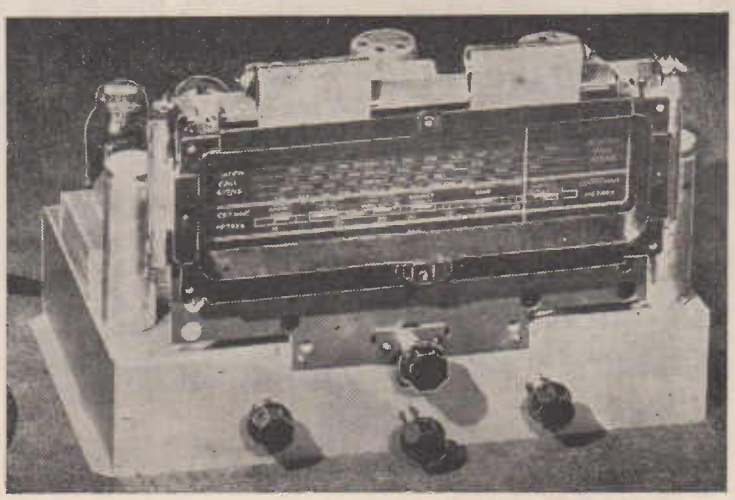
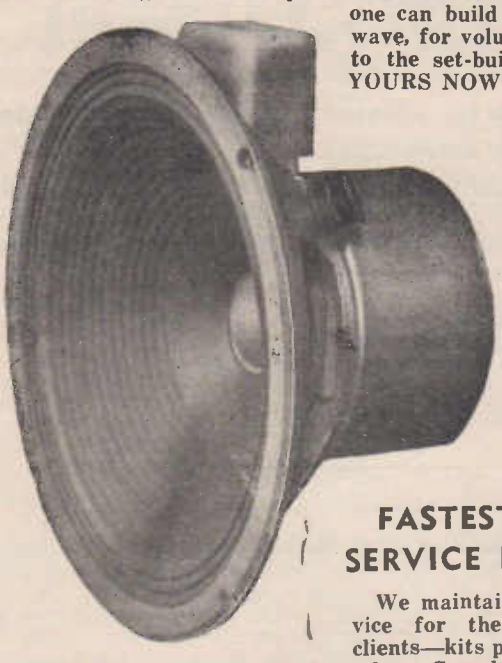
COIL KIT !

The secret of the outstanding success of this new "Sky-King" is the special FOXRADIO Coil Kit developed to match the recently-released 6K8G mixer oscillator.

FOXRADIO Type DK-465 k.c. coil kit comprises dual-wave, aerial and oscillator coils, two high-gain iron-cored 465 k.c. intermediates 65/-



Superior even to last year's model—which broke all records for ease and economy of construction, coupled with amazing all-round performance—this new 1939 version of the "Sky-King Dual-Wave Five" is a set anyone can build with perfect results. For DX work on both broadcast and short-wave, for volume and for tone, it is the finest and most up-to-date 4/5 yet offered to the set-builder. Only finest quality parts supplied with each kit—ORDER YOURS NOW !



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More compact, powerful and efficient than ever, this year's "Outdoor Portable Four" is the greatest portable in years. Outstanding features are full automatic volume control, automatic grid bias, special reflex circuit, exceptionally high sensitivity giving excellent inter-State reception.

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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 DECEMBER, 1938. No. 8.

CONTENTS:

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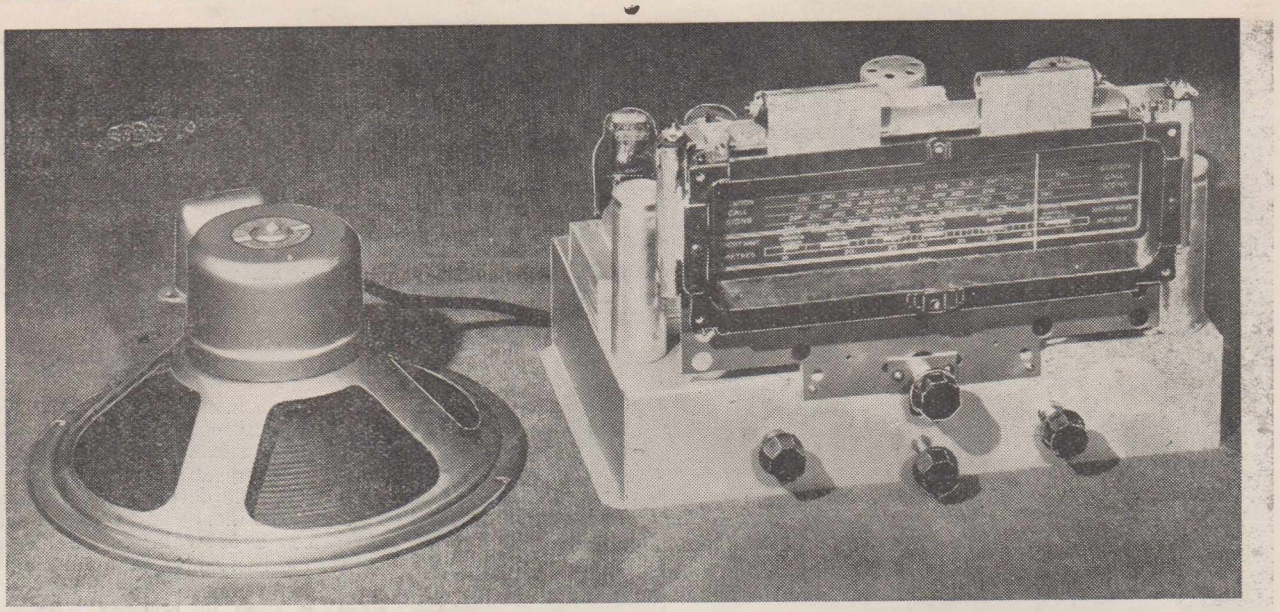


This view shows the completed "1939 Sky King," with a Rola K12 speaker on the left.

The . . . . 1939 Sky-King Dual-Wave Five

This latest improved version of last year's "Sky-King D.W. Five" uses the new 6K8G mixer oscillator. Designed for maximum performance from five valves, this receiver gives high gain on both bands, while excellent tone is ensured by the use of inverse feedback.

FOR some years now valve design engineers have been concentrating their attentions towards improving mixer-oscillator valve performance, particularly on short waves. The latest important advance in this direction has been the recent release of the 6K8G (to which a separate article is devoted elsewhere in this issue).

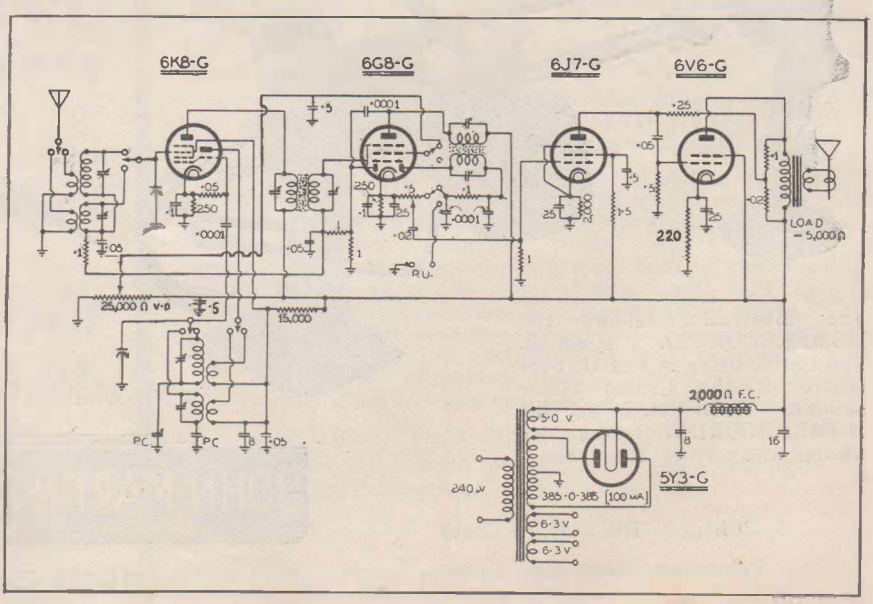
Main features of this new converter valve include greatly-improved oscillator stability on all bands, overcoming frequency drift and flutter, coupled with excellent sensitivity and particularly good all-round performance on the highest frequencies of the shortwave band.

Special Coil Kit Required.

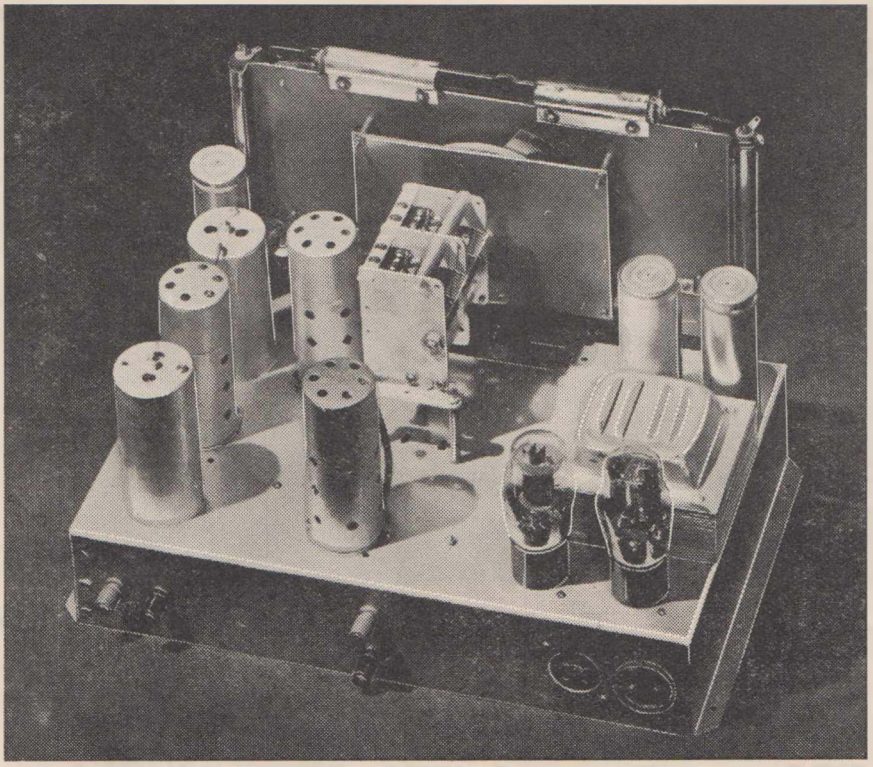
The "1939 Sky King Dual-Wave Five" is a five-valve version of a special six-valve receiver recently developed by A. W. Valve Co.

A particular point to note is that a special coil kit is required to suit the 6K8G. The dual-wave unit used in the original model, together with the two high-gain iron-cored 465 k.c. i.f. transformers, were made available specially for this receiver by "Foxradio" (Messrs. Fox and MacGillycuddy Ltd., of Sydney).

Other important improvements on last year's model comprise the use throughout of octal-based "G" type valves, and the substitution of a 6V6G beam output tetrode for the 42 in the original receiver. Inverse feedback has been applied, giving a fidelity of



The circuit of the "1939 Sky King," which uses the recently-released 6K8G mixer oscillator.



A rear view of the completed receiver, showing the aerial and earth terminals (left), pick-up terminals (centre), and speaker and output sockets (right).

reproduction that is comparable with that obtainable from a power triode. Other alterations made are minor, and have been included only to conform with the circuit developed by A. W. Valve Co.

The shortwave band coverage chosen can be from either 16 to 51 metres or from 13 to 39 metres, coil data being supplied for both.

The Foxradio coil kit supplied is colour-coded and is simple both to mount and wire. The dual-wave unit has been designed to employ a minimum amount of shielding, consistent with stable performance, thus keeping the efficiency high.

Further Circuit Details.

The valve line-up of this new "Sky King" comprises the 6K8G mixer, followed by a 6G8G, with the pentode section acting as i.f. amplifier, one diode as second detector and the other as a.v.c. rectifier. The audio channel comprises a 6J7G high-gain pentode as driver, resistance capacity coupled to a 6V6G beam output tetrode. A 5Y3G is used as rectifier. No tone control is used, as the inverse feedback supplies all the correction that is necessary.

The list of parts published on page 48 will enable builders to assemble the components needed in readiness for the article that will appear next month outlining the assembly, wiring and alignment. A complete under-chassis wiring diagram, together with a separate sketch showing coil unit connections, will also be published, together with further photographs.

A Wonderful Record . .
BREVILLE WINS AGAIN !

Two of the first three International DX (long distance) Contests conducted by the "Australasian Radio World" were won by Breville users. The First Contest was won by Mr. Ern Neill, of Ipswich, Queensland, with the wonderful record of receiving 1825 stations on his Breville Receiver.

Now BREVILLE Receives Over 80 COUNTRIES

Winner of the Third DX Contest, Mr. R. G. Cook, with his Breville receivers.

PERFORMANCE COUNTS

The Breville sets used by Mr. Cook were Model 109—8-Valve Triple-Wave A.C. Electric priced from 38 Guineas, and Model 85—5-Valve Broadcast Vibrator, price 25 guineas.

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First place in the Third Contest goes to Mr. R. G. Cook, of Bowen, Qld., who writes as follows:—

"My main receiver is the latest eight-tube triple-wave Breville, using Radiotrons 6U7 (2), 6A8, 6B6, 6U6, 6C5, 5Y3, 6U6, coupled to a 12in. Rola speaker. This set gives me all the power that is required. I find that it is 100 per cent. efficient, and may add that the climatic conditions of North Queensland are not the best for DX on account of the heat and the heavy atmospheric conditions that prevail at all times of the year. At the present time I can bring in any of the southern commercial stations at R6-7 at mid-day, which is good for this part of the globe.

"My second set is a five-valve Breville vibrator broadcast model, with which I do all broadcast DX and have picked up many foreign stations in the wee small hours.

"Catching the elusive DX is a matter of sitting up late or early, and by doing this I have logged over 80 countries, giving me a total of 500 odd cards, which include Alaska, U.S.A., Germany, Belgium, South Africa, India, England, Scotland, Ecuador, Panama, Malaya, Manila, Hawaii, and others, which, if typed here, would take the entire page. My best reception was from K7ANQ, Alaska."

Send the coupon for full particulars of Breville "Record-Breaking" Sets.

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Without obligation, send me FREE illustrated Catalogue of Breville Radio Receivers.

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TEST EQUIPMENT . . . . . No. 4

Resistance And Capacity Checker

The fourth of a series of articles on test equipment for servicemen, amateurs and experimenters, designed and described by . . .

W. McGOWAN (VK2MQ)

"C" And "R" Checker : Main Applications.

Measures resistance from 10 ohms to 10 megohms with 1 per cent. accuracy; measures capacity from 10 mmfd. to 10 mfd. with 1 per cent. accuracy; gives rough check over ranges from 5 ohms to 100 megohms and from 5 mmfd. to 100 mfd.; measures power factor up to 60 per cent. of poor condensers from .1 mfd. upwards; compares components, including large inductances, with any suitable standard; provides a continuously variable 50-cycle signal up to 50 volts; provides a continuity test, with neon indication; gives approximate merit test of all condensers from .05 mfd. upwards, including electrolytics.

THE main capabilities of the instrument described in this article are tabulated above, and it will be seen that it is an exceptionally useful piece of gear. It is not intended for extreme accuracy over a narrow range of measurements, but rather for moderate accuracy over the greater part of the whole range of components that have to be dealt with in radio work generally, and experimenting particularly.

Such an instrument is indispensable in the workshop, and in the experimental laboratory encourages the sound practice of checking every component before putting it into use.

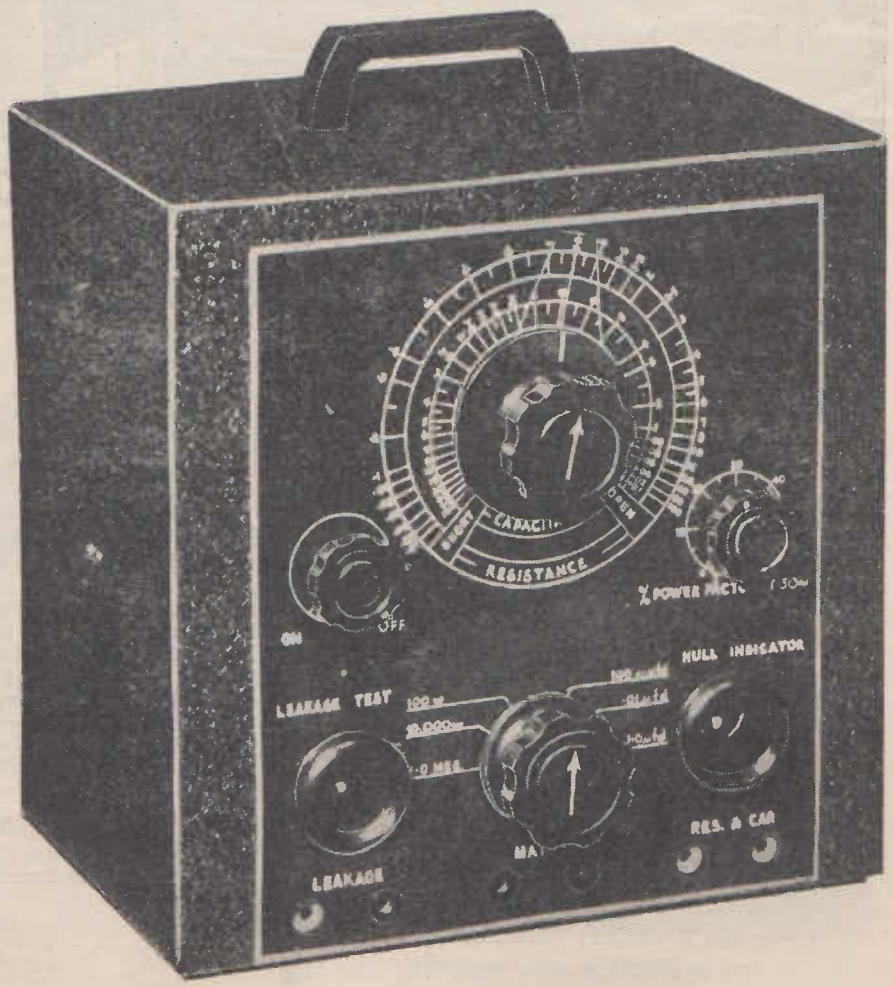
The basic circuit is shown on page 8. The component to be tested is connected at "res. cap.", and is compared with any one of the six standards selected by the range switch.

To avoid the need for continuously variable standards, the ratio arm is made variable, and is composed of an ordinary potentiometer which is calibrated to read ratios directly. The bridge is supplied with a 50-cycle voltage and the balance or "null" point is shown by the 6E5 cathode ray indicator tube.

The reading of the potentiometer at balance, multiplied by the value of the standard in the circuit, gives the value directly, and as in this instrument the standards are all multiples of 10, this process demands only the simplest of mental calculation. For instance, if the potentiometer reading is .4 and the range switch is on 100, the result is 40 ohms, or if on the 10,000 range is 4000 ohms. and so on.

Further Circuit Features.

Referring to the circuit again, some of the other features are as follows: The special mains transformer supplies, as well as 50 volts for the bridge, 150 volts for "B" supply of the indicator tube. The value of the filter resistor should not be increased,



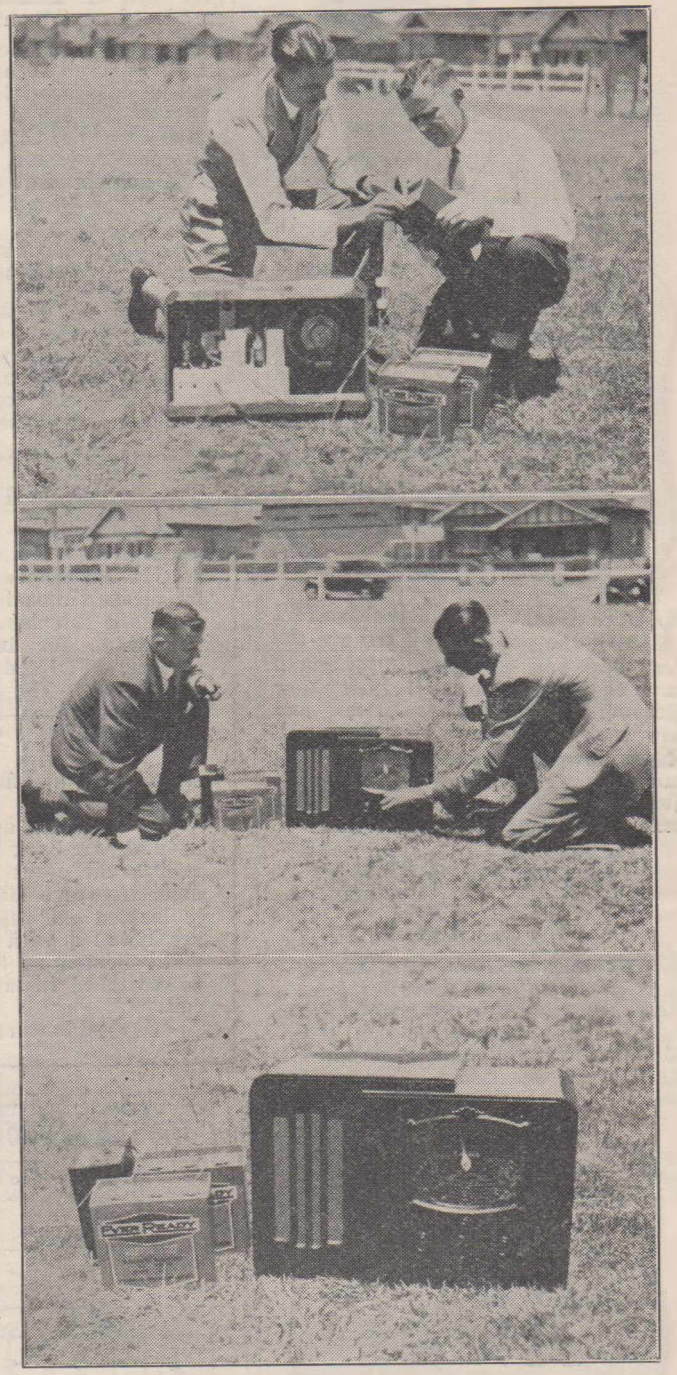
A view of the completed instrument, which is mounted in a crackle-finished steel cabinet. The special scale illustrated will be reproduced full size next month.

TASMA 1.4-VOLT VALVE RECEIVER GIVES OUTSTANDING PERFORMANCE

Special Ever Ready "A" Battery Available Shortly

The three views shown alongside were taken during field tests conducted in Sydney on what is probably the first commercial model receiver using the new 1.4-volt valves to be released. It is a Tasma five-valve dual-wave superhet, using 1N5G's in the r.f. and i.f. amplifier valve sockets, 1A7G pentagrid converter, 1H5G second detector, a.v.c. voltage rectifier and first audio stage, and a 1C5G power pentode in the output socket.

In the top photograph is Mr. Chas. Hart (left) Queensland manager for the Ever Ready Co., and Mr. G. K. Herring, Commonwealth sales manager.



EXCELLENT PERFORMANCE ON BOTH BANDS.

In the brief field and laboratory tests conducted by "Radio World," the receiver put up an excellent performance—actually far better than was expected from these unusually low consumption valves. As regards both selectivity and sensitivity, the receiver compares favourably with some "fives" on the market using two-volt valves throughout. Shortwave sensitivity is excellent—during the evening London on 16 metres could be brought in at full volume using only a dozen feet of wire attached to the aerial terminal.

DEMONSTRATION TRIP TO QUEENSLAND.

The receiver illustrated was taken to Queensland early this month by Messrs. G. K. Herring, Ever Ready sales manager, and D. B. Knock, radio editor of the "Bulletin," for the purpose of demonstrating it to the radio trade in Brisbane and surrounding districts, and also to conduct comprehensive field tests on its performance. It is hoped that a complete report will be available for publication in next month's "Radio World."

SPECIAL EVER READY BATTERY.

Incidentally, the Ever-Ready Company have announced that a new 1½-volt battery, designed to give over 900 hours of service from a five-valve receiver using 1.4-volt valves, is being developed, and will be released shortly.

"R. W." RECEIVER NEXT MONTH.

In the meantime, a five-valve receiver using these new valves is nearing completion in the "Radio World" laboratory, and a full description of its assembly and alignment, accompanied by photographs and diagrams, will be published in next month's issue, which will be a Special 1.4-Volt Valve Number.

for this would appreciably drop the voltage. The bridge voltage should be graduated to suit the impedance being measured, and this is done automatically by the 1000-ohm 3-watt resistor in series with the transformer winding and the ratio potentiometer.

For high impedance such as grid leaks and small condensers, which would be difficult to balance sharply without a high signal voltage, practically the full 50 volts is available, but for low impedances, which at 50 volts would pass too much current for themselves and for the transformer, the voltage is reduced to a suitable value.

The 1000-ohm potentiometer should be a reliable one. In this case it is a Radiokes, and if the panel supplied is to be at all accurate, this make should

be used. (The scale shown in the front view of the instrument will be reproduced next month.—Ed.)

The input resistance to the 6E5 indicator is kept high; otherwise it would not be possible to get defined results with such a high impedance as, for example, that possessed by a 10 mmfd. condenser, which at 50 cycles is no less than about 300 megohms.

Accuracy Of Condensers And Resistors.

The accuracy of the instrument is no better than that of the standards used, but if one is not so particular about expensive shunts and has no chance of getting standards checked, condensers and resistances of the ordinary receiver type would do, provided they are within 5 per cent. limits. IRC precision type resistances can be had with 1 per cent. tolerance, which is excellent for most practical purposes.

Standard condensers are more difficult, and apart from the question of measuring their values, the type most commonly used are liable to vary with age, temperature, etc.

The smallest (.0001 mfd.) should be one of the new 1 per cent. T.C.C. silver-plated ceramic, the .01 mfd. a good quality mica and the largest (1 mfd.) a paper type. It is convenient for them to be slightly low, as the distributed capacity of the wiring will add a certain amount. Incidentally, the calibration of this instrument was done by a series of IRC 1 per cent. precision standards, and is substantially accurate.

(Continued on page 47.)

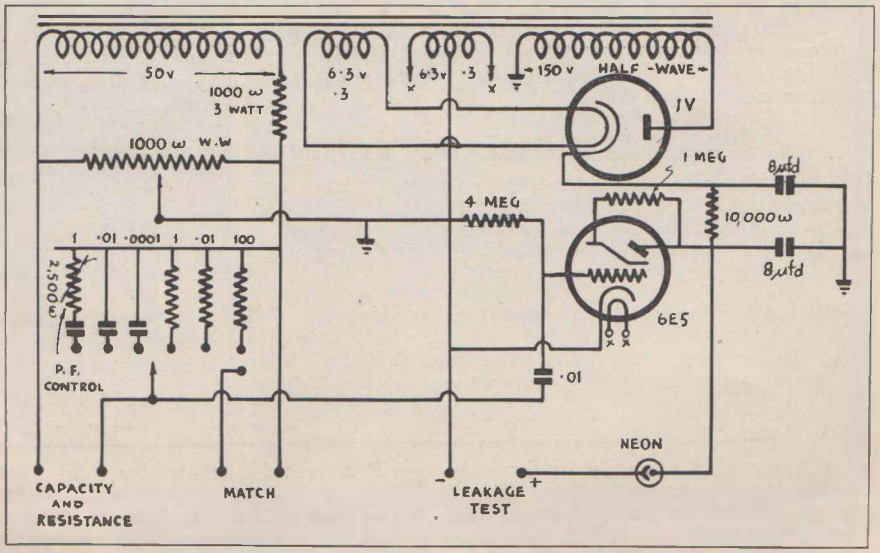
This Month's Front Cover

This month's front cover photo shows the power supply section of the two 10-kilowatt broadcast transmitters built by Standard Telephones and Cables Pty. Ltd., for installation at stations 2FC Sydney and 3LO Melbourne. The power supply equipment shown comprises hot cathode mercury vapour rectifier valves, with high tension transformer and filter choke and condenser unit.

The rectifiers are all provided with arc-back indicators, so that in the event of failure the defective valve may be instantly located and replaced. Spares are installed, with cathodes normally heated so that they can be switched instantly into circuit.

—Photo courtesy S.T.C.

The Editor and Staff of "Radio World" join in wishing every reader the Compliments of the Season.



Circuit of the resistance-capacity bridge described in the accompanying article.

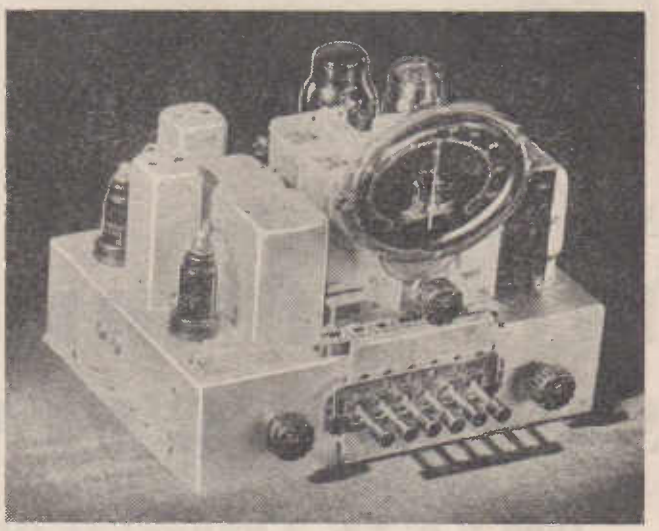
MICRO "ALL WAVE AUTOMATIC FIVE"

This is not just another radio receiver—look over its many features! All-wave coverage from 16 to 150 metres and 200 to 550 metres. Automatic tuning of six broadcast stations. Ultra-modern circuit employs an entirely new output tube. Attractive oval four-colour dial (dial shown is for descriptive purposes only). Dial is accurately calibrated, and all main shortwave bands clearly indicated.

Truly an ideal low-priced kit for the "ham," DX enthusiast or for a second set in the home.

Complete with valves and speaker . . £11/18/6
Complete with speaker less valves . . £9/17/6
(Freight paid to your nearest railway station)

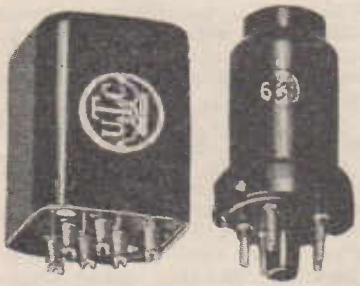
The kit comes to you with the complete r.f. tuner, dial, gang condenser, and first tube socket ready wired and tested.



THE "MICRO" VIBRATOR POWER UNIT.

Special design allows for entirely hash-free operation on any battery receiver using 2, 4 or 6-volt valves. The new "Electronic" synchronous vibrator ensures long, trouble-free performance. Cut out expensive dry batteries now, and give your radio new life.

Complete Kit of Parts £4/1/6
Complete Kit, assembled and tested . . £4/17/6



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MICRO, high - grade English 'phones, used extensively in British Government departments, 18/6

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Spiral Indoor Aerial, with two insulators 1/9
Enamelled Aerial Wire, 100ft. coil 4/9
"Lektrite" Aerial, 100ft., 4/3
Push-button Aerial Earth Switches 2/-

FIVE-BAND TRANSMITTER

Described this month. Write for our special price list. All components as specified.

MIKES FOR AMATEURS.

Now—a high-grade dynamic microphone for amateur or P.A. work. Frequency response 50 to 9000 cycles £5/5/-

ASTATIC, acorn model, T-3, crystal mike. Quality reproduction, ideal for dance band or studio work £6/10/-

ASTATIC, model D-104—the "hams" favourite £5/10/-

SHURE, model 70 SW, crystal, with modern desk stand . . £6/10/-

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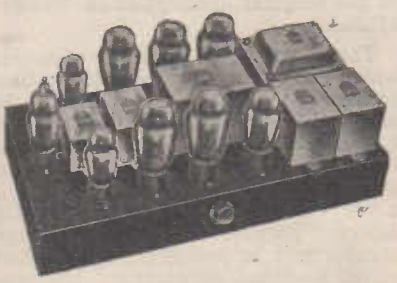
Series "R" transformers are designed for radio set replacement and manufacture. They are entirely universal and specially treated for long service under adverse humidity conditions. The range includes input, line, microphone, output, and many other types of transformers.

Series "S" transformers consist of a range of very attractive and efficient units for amateur and P.A. service. Varimatch modulation and driver transformers—universal output units to line and voice coil, and also power transformers and chokes.

U.T.C. manufacture the most complete range of transformers in the world. WRITE FOR DETAILS



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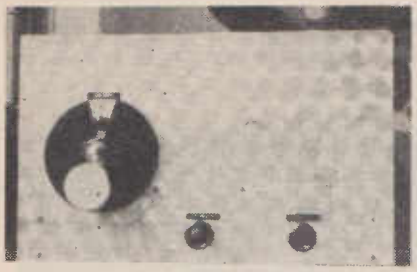


Fig. 1 (left): Front view of the receiver. The two small knobs are for i.f. gain and second detector regeneration.

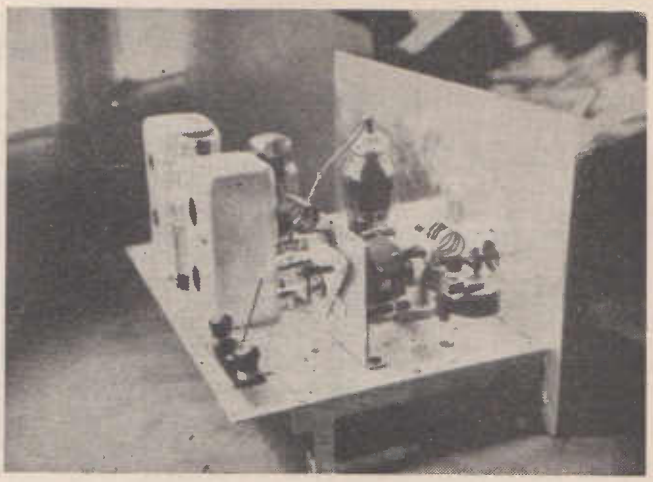


Fig. 2 (right): End-on view, showing the tuning assembly.

More About The . . .

FIVE-METRE SUPER-GAINER

1600 k.c. I.F. Channel Is Of Vital Importance ★ Operational Data

By DON B. KNOCK (VK2NO)

Radio Editor, "The Bulletin."

THIS ultra-short-wave superhet, outlined in "Radio World" for October last, has since been put through its paces by the writer, and a few tips on construction should be of value.

The circuit diagram, with all resistor and capacity values, is again reproduced as a guide. Although the 6H6 twin diode is used as a noise-limiter across the audio output, this is not absolutely essential, unless the receiver is in a particularly bad location for interference from motor-car ignition. Fundamentally, this is a three-valve superhet, but, despite this apparent paucity of valves, it gives the precise results that Jones claimed in his original description in "Radio" (U.S.A.).

There are two important features which need watching, the intermediate frequency channel is provided by high-gain iron-cored I.F.T.s. at 1600 k.c., and the high-C oscillator section is used with a low-C detector. If an attempt is made to use anything but a very small tuning capacity in the detector portion of the 6J8G mixer, results will be indifferent, with lack of the essential sensitivity. Although a sensitive I.F. amplifier is provided with the special I.F.Ts. now available, the mixer plays an equally important part in the overall gain. Hence the necessity for tracking the high-C and low-C tuning circuits. This is by no means difficult, as the receiver is designed to cover only 56 mc. to 60 mc.

Fgure 2 shows the receiver from the oscillator-mixer end, the oscillator section being nearest to the front panel. The coil for the oscillator consists of four turns of 14-gauge copper wire, ½in. inside diameter and spaced to take up ¾in. This is tuned by a Raymart 15mmfd. variable condenser. Normally this low-C ratio would fall short of 56mc., so, in order to cover the band with this small coil and to provide high-C tuning, a 50 mmfd. midget variable condenser is used as a padder or "band-setter" in shunt with the coil and 15mmfd. tuning condenser. This padder can be seen mounted vertically alongside the oscillator coil in Figure 2.

Once the padder is set for the band it must be locked in position, and the shaft can be fixed by running sealing-wax or Chatterton's compound around the spindle where it enters the bearing. Because of the high frequency, it would hardly be possible to set this padder condenser accurately by knob-control, owing to hand-capacity. The condenser spindle is therefore cut short and slotted with a metal saw for bakelite screwdriver operation. As with the tuning condensers, good insulation must be used in the padder condenser. There are several older types of 50mmfd. midgets which can be suitably revamped by using WT/22 insulation material; they are likely to be stiff in action, an advantage in this case.

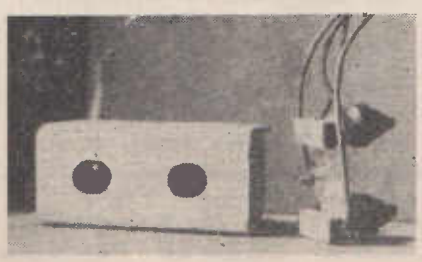


Fig. 3: The new 1600 k.c. i.f. transformers made by Tasma Radio. These are now available to experimenters.

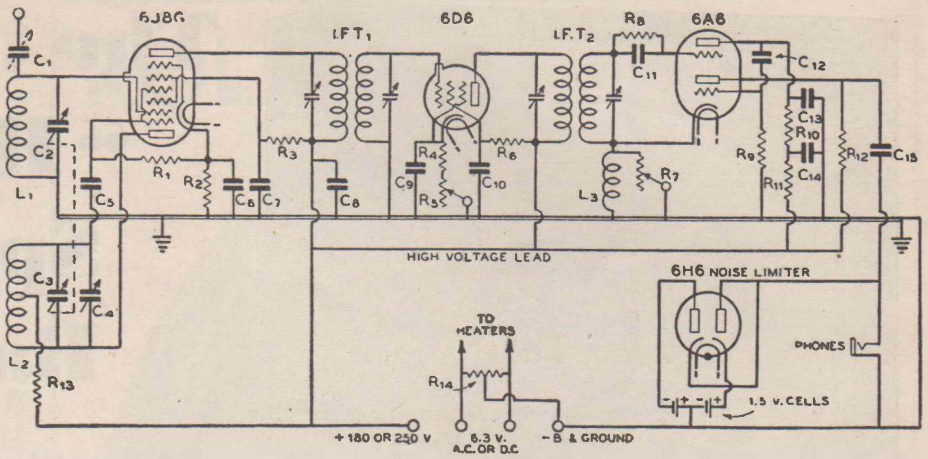
Ganged with the oscillator-tuning condenser, and with its coil on the other side of the small vertical screening partition, is the detector-tuning condenser, which is also a Raymart of originally 15mmfd. capacity. This condenser is doctored to provide a spacing of 3-16 in. between rotor and stator, the capacity then being in the vicinity of 7 mmfd. The grid coil is of 14-gauge copper with seven turns of ½in. inside diameter, with turns spaced a little more than the diameter of the wire. Although on paper it may appear impossible to get detector and oscillator circuits to track with such widely different constants, this is not so. The aerial is coupled through a 3-30mmfd. trimmer condenser, and in practice it is found that variation of this small capacity in series with the aerial has quite a bearing on the tracking.

To ensure that the receiver is covering the band, switch on the crystal oscillator of a 40-metre or 20-metre transmitter near by, and use the harmonic, which should be readily picked up in the receiver. The harmonic will be heard strongly at two points, differing by the intermediate frequency. In the case of the receiver illustrated the circuits were found to track better by using the lower-frequency harmonic. A calibrated absorption meter

can be used as a rough guide to the band in proximity to the oscillator coil.

I.F. Transformers.

The 1600 k.c. I.F.Ts. were made specially by Tasma Radio, and are particularly well designed. Trolitul low-loss material is used for the assembly and the coils are wound with Litz wire on a new type of iron core. Only a small shunt capacity is used, and the windings are peaked at the frequency by the variable permeability screws, which are reached through the holes in the shield can. Remarkable high gain is obtained with these



C_1—3-30-µµfd. coupling condenser
C_2—8-µµfd. tuning condenser Revamped 15-µµfd. midget
C_3—15-µµfd. midget tuning
C_4—50-µµfd. osc. tank condenser
C_5—.0001-µfd. mica coupling
C_6, C_7—.005-µfd. mica by-pass
C_8, C_9—0.1-µfd. 400-volt tubular
C_{10}—.01-µfd. mica by-pass
C_{11}—.0001-µfd. mica coupling
C_{12}—.01-µfd. 400-volt tubular
C_{13}—.002-µfd. 400-volt tubular
C_{14}—0.5-µfd. 400-volt tubular
C_{15}—.25-µfd. 400-volt tubular
R_1—50,000 ohms, ½ watt
R_2—300 ohms, ½ watt
R_3—100,000 ohms, ½ watt
R_4—300 ohms, ½ watt
R_5—50,000-ohm rheostat
R_6—100,000 ohms, ½ watt
R_7—1000-ohm rheostat
R_8—5 megohms, ½ watt
R_9—500,000 ohms, ½ watt
R_{10}—50,000 ohms, ½ watt
R_{11}—20,000 ohms, ½ watt
R_{12}—50,000 ohms, ½ watt
R_{13}—25,000 ohms, ½ watt
R_{14}—50-ohm c.t. resistor
$IFT_{1, 2}$—Midget 1600-kc. iron-core i.f. transformer
L_1, L_2—See text
L_3—40 turns, ½" dia., no. 28 d.s.c. jumble wound

I.F.Ts., and since the first pair was obtained for experimental work on this receiver Tasma has made them available to experimenters at a very reasonable price per pair.

Such I.F.Ts. open up a new field, not only in the construction of ultra-shortwave superhets, but in superhets for general short-wave reception. Main advantage is the freedom from image interference in comparison with 460kc.

Although these 1600kc. I.F.Ts. are lined up accurately in the factory, it must be realised that there will be a difference in the peaking when they are wired into a receiver. This is because of the effect of wiring and valve capacities at the higher frequency. They will, however, be near enough to obtain some kind of a signal from a modulated oscillator, and if any signal is heard at all with the receiver they can easily be lined up. Where there is a somewhat noisy reception background, the I.F. channel can be lined up on the background noise quite easily. First thing to do after completing the receiver to the details given in the October issue of "Radio World" is to get the I.F. channel "on the nose."

BFO and Noise-limiter.

The noise-limiter described by Jones is very effective, but it must be understood that this is not essential to the performance of the receiver. Where there is little or no interference from electrical circuits or car ignition, the noise-silencer can be omitted. In any case, it is found that this form of limiter definitely cuts down on the audio gain, but this would be immaterial if an extra audio stage is incorporated for speaker reception. Without the limiter, local 56mc. signals are so strong that a permag. speaker can be operated comfortably straight from the output of the 6A6 second detector-audio.

No trouble should be experienced with the regeneration in the second detector portion, provided that the I.F. amplifier is correctly peaked. Re generation here is very important, as it contributes materially to the overall sensitivity of the receiver.

A 1000-ohm potentiometer is specified across the cathode coil, but this can be any value from 400 to 2500 ohms. Advancing this potentiometer should put the second detector into oscillation for c.w. reception just as smoothly as with any conventional oscillating detector. Unless this control is smooth, the performance of the receiver will suffer. With the detector oscillating for c.w. the advantages of the high-C oscillator are at once apparent. Crystal-controlled stations show a T9 carrier of rock-steady nature fully comparable with lower frequencies.

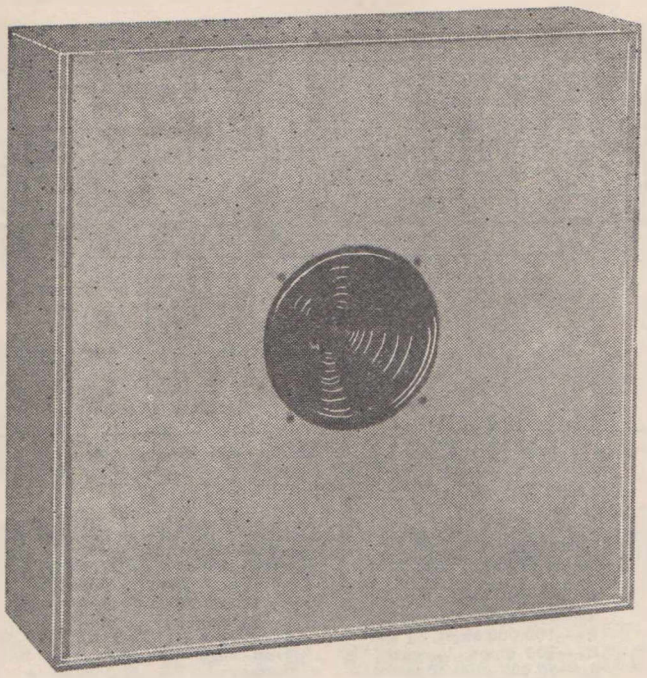
Figure 1 shows the front of the receiver, and it will be obvious that a tuning dial completely free from backlash or slip must be employed. Indifferent dials can be used with super-regenerators owing to the broad frequency characteristics, but not with a receiver of this kind. As may be seen in Figure 2, the dial is insulated from the tuning gang by a length of erinoid rod. This is good practice with any short- or ultra-short-wave receiver, as noises from metal dial mechanisms can be eliminated. The 6J8G mixer-oscillator valve is mounted on a Raymart ceramic octal socket on stand-off pillars 1¾ in. above the chassis. By this means, wiring can be kept very short and rigid.

It is planned in the near future to build another version of this receiver employing an R.F. stage with an 1851 or 1852 valve, plus extra audio for loudspeaker operation. Such a receiver should represent the last word in modern 56m.c. receiver practice.

D. B. K.

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.



The . . . "HI - FI" Speaker Baffle

A special and highly-successful application of the infinite baffle principle, designed and described by . . .

W. McGOWAN (VK2MQ)

TOO few experimenters have experienced the thrill of wide range musical reproduction, principally because there are limitations set up by speaker and baffle. Apart from the acoustical labyrinth and similar type of baffle, very little is available except in the most expensive receiver, and even then, reproduction cannot be classed as true wide range. It is next to impossible to obtain wide range reproduction unless the equipment has been specifically designed for that purpose.

What Wide Range Means.

The use of the term wide range includes more than mere reproduction from radio or record source of the complete band of musical frequencies. It includes as well as a comparatively flat reproduction of the frequencies, so that certain tones are not amplified out of proportion to others, a high safety factor to guard against distortion due to mechanical or electrical overloading, and lastly provision for eliminating the bad effect of both tone and volume level of the "back-door" acoustics of the average loudspeaker when used in the conventional way.

By using a special type of cabinet, uniform and flat response is obtainable, irrespective of where the speaker is located.

A radio transmitter is best designed working backwards from the antenna. This also applies to any audio system, the speaker system being constructed first. A determination of the required output is necessary, and it was decided that for ordinary home use, eight watts is simple.

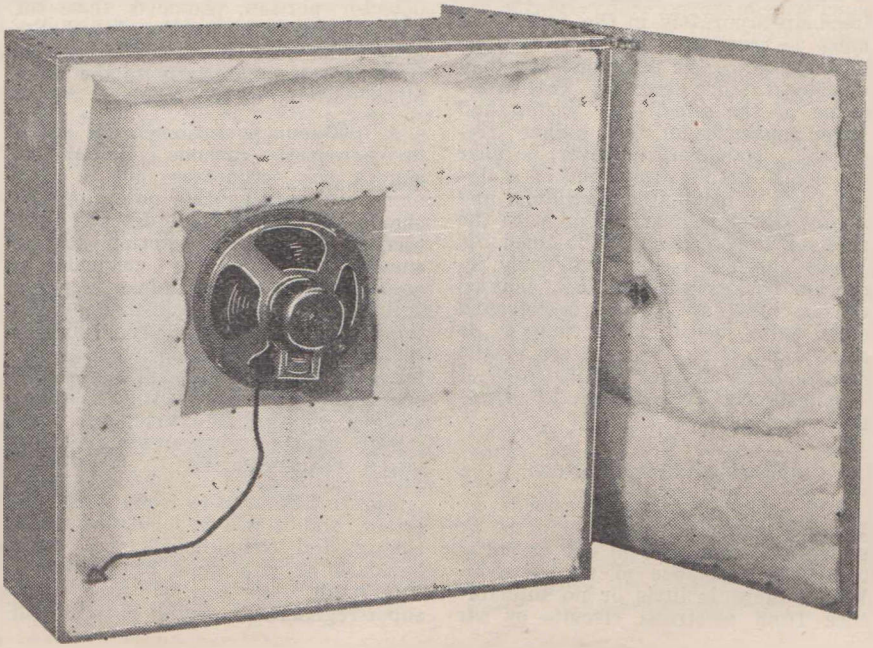
Rola K-12 Chosen.

The speaker is one of the new Rola K-12 electro-dynamics. It is rated to handle ten watts, so does the job without any overloading, and the frequency response is comparatively flat from 40 to 9000 cycles.

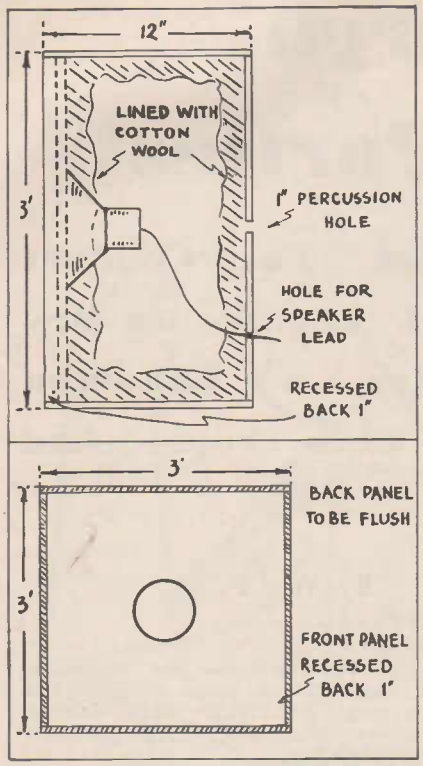
The speaker is used in conjunction with an infinite baffle as illustrated in the photographs.

This is merely an enclosed space, airtight except for a one-inch precussion hole at rear centre. The greater the volume of air space contained in the infinite baffle, the greater the low frequency response. The baffle illustrated cuts off at approximately 45 cycles.

The idea of the one-inch percussion hole at the rear, incidentally, is to relieve the cushioning effect that results as the speaker diaphragm moves backwards.



The view above shows the appearance of the baffle from the front, while the photo on the right shows an internal view, with back removed. The baffle is assembled using 1in. screws, spaced approximately 4in. apart.



Full dimensions of the baffle are given in these sketches, showing front and side views.

The material utilised in the infinite baffle is a recently-released cane fibre material which is called "Caneite" and is marketed here by the Colonial Sugar Refining Co.

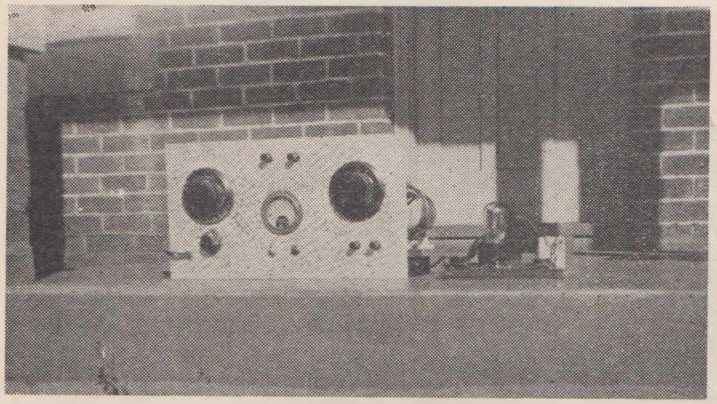
Cotton Wool Padding Absorbs Sound

It has excellent absorbing qualities so far as sound is concerned, and provides a really good response. As the infinite baffle is for all practical purposes airtight, means must be provided to prevent reflection of the sound waves from the inside walls back to the speaker diaphragm.

While the "Caneite" absorbs an appreciable amount, due to its porous, non-resilient nature, some sound does find its way reflected back. To prevent this, the entire cabinet was lined with cotton wool, fastened to the inside walls with drawing pins. Other material available would do just as well, such as hair felt or rock-wool obtainable from any upholsterer.

Results both on radio and records far exceeded expectations, and more than compensated for the time and cost involved in making the baffle. The most striking feature of the quality of reproduction is the realism obtained—piano and organ records being startlingly life-like, while on orchestral selections and dance band music, every instrument appears to stand out in what can be termed "audioscopic" relief.

Radio For Bush Search Parties



The rig at VK2YA, consisting of a 2A5 crystal-oscillator with either one or two 46's as p.a. Originally riddled with holes, the aluminium panel shown has been rejuvenated according to the process described on page 16 by owner-operator R. C. Black.

Members To Conduct Tests ★ Lecture On Dry Batteries ★ Lakemba Radio Club Notes And News.

By W.J.P.

AT the meeting of the Lakemba Radio Club on Tuesday, November 22, a representative from the Bushwalkers' Club was present for the purpose of discussing the possibility of equipping bush search parties with radio receivers and transmitters. In the course of his address, Mr. W. G. Morris stated that during past years the Bushwalkers' Clubs have rendered valuable assistance to the police and community by sending out parties of their own members to search for persons who have become lost in treacherous and mountainous country.

These organisations are entirely voluntary, and the members are expert bushmen who have an excellent knowledge of the country in general. Parties from their ranks may be summoned within 24 hours, the members being prepared to stay away a week or more if necessary, at no small cost to themselves.

The main difficulty in the past has been the matter of communication between the parties and civilisation. Smoke signals, fires and homing pigeons have been tried, and although pigeons have provided a link from the search parties to headquarters, there has still been no satisfactory means of getting return messages to the searchers.

It will be obvious what a saving of time and expense would result from direct two-way communication. At the present time many parties continue their search for a week or so before returning. It very often happens that the missing persons are located perhaps a day after the commencement of the search. The other inland searchers being unaware of this, often go through unnecessary hardships, privations and useless travelling, only to return and find their efforts for the greater part of the time have been wasted.

Radio communication would mean that the parties could keep in constant touch with the outside world, and at the same time receive instructions from headquarters. Immediately the lost persons were located an order would be issued for all parties to return, thus effecting a considerable saving in time, energy and expense.

Test Suggested By President.

Having outlined all details, Mr. Morris was given an assurance by the Lakemba Club that apparatus of this nature was a practical possibility, as in the past satisfactory communication had been obtained by members from extremely difficult mountain locations. The Club President, Mr. E. P. Hodgkins, then suggested that a test be conducted early in February under actual working conditions, before any permanent apparatus is installed.

The arrangements will be as follows: A fairly rough stretch of country will be selected where a party will become "lost"; three search parties will go out each equipped with small receivers and transmitters or transceivers; a semi-portable unit using as high power as possible will be driven as near as possible to the area being searched; and this unit will endeavour to maintain communication with the search parties and also with another station in a populated area connected with the telephone, thus completing the link between headquarters and the inland parties.

Obviously, the apparatus will be as simple, compact and light as possible. Those who have had the experience of carrying their packs over some of the rough country for which Australia is renowned will readily appreciate this necessity.

Past tests have revealed that wavelengths from 40 to 5 metres are useless for this type of work, due to skip effects and absorption. For reliability over short distances, 80 and 160 metres appear to be the most satisfactory, these wavelengths permitting a signal to travel a few miles from the depths of some mountain gully. The maximum distance of transmission and reception under normal conditions probably will not exceed 10 miles, and if necessary the mobile unit could change its location as the search progresses.

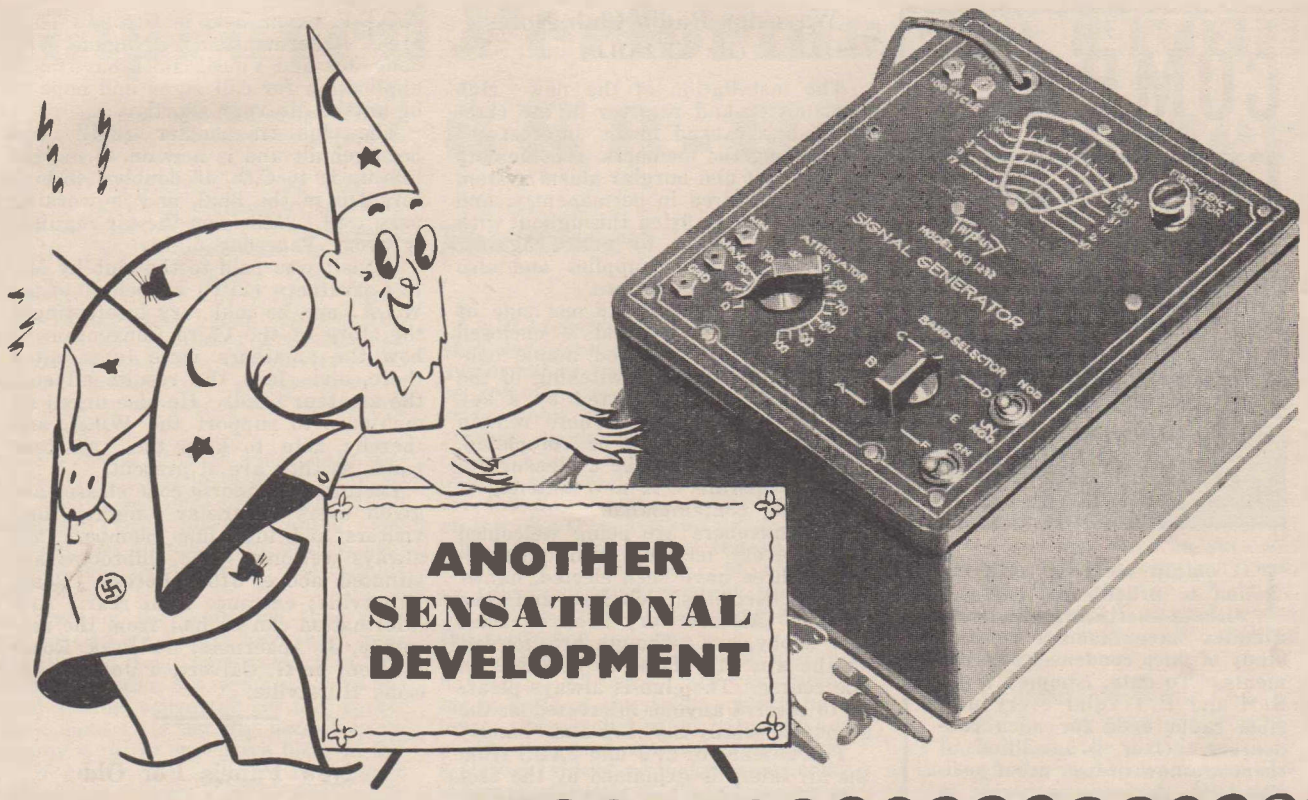
However, the test early in February should prove most interesting, and no doubt many difficulties will be encountered, as conditions will be entirely different from those existing on ordinary field day or portable work.

★

Lecture On Dry Batteries

In keeping with its policy of presenting a series of interesting lectures, a talk will be delivered by Mr. A. Luciano, chief chemist of the Ever Ready Battery Co., at the clubrooms early in the new year. Lectures of interest during the past month have included the talk by Mr. Morris (detailed above) and a lecture on crystal oscillators, by Mr. J. Read, VK2JR.

The club would welcome offers to deliver talks or demonstrations of general interest, and those interested are invited to communicate with the Secretary, 14 Park Avenue, Burwood, or Publicity Manager, 14 Watkin Street, Canterbury.



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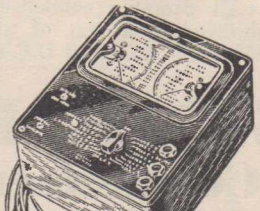

Price, £9/-/-

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Waverley Radio Club Notes

(By VK2AHJ.)

The installation of the new club transmitter and receiver in the clubroom has caused much interest of late among the members. The remote control unit and burglar alarm system have been wired in permanently, and the rig itself is fitted throughout with protective devices to guard against overload of power supplies and also against grid bias failure.

The rig is mounted to one side of the operating table and is enclosed in a beautifully-polished maple cabinet. Control of the switching of the power supplies is effected by a key switch on the table. There remain still a few details to be completed. The new station will be a pleasure to see and operate. A new antenna is also being contemplated.

New members are being welcomed almost every meeting, and quite recently three have been elected, namely, Dick Griffiths, Bob Ball and Geo. Preece. All are very keen on their new hobby, and although are not yet on the air, they hope to be there in due course. The club is always pleased to receive anyone interested in the game, especially S.W.L.'s and "hams."

The absence of 2FJ and 2ABS from the air lately is explained by the fact that the former has been rebuilding and the latter holidaying at Orange. Jack reports having a good holiday and a very interesting visit to 2CR, Orange.

2MQ has also been rebuilding, but Bill's attention is centred on five metres, and he is never heard on the lower frequencies.

2TN is making firm friends around the neighbourhood by tieing antennas to the neighbours' chimneys!

The half-yearly election of officers took place on November 15, and most of the office-bearers were returned to their positions. The offices of President, Secretary and Treasurer were again filled by Gordon Wells, Jack Howes and Eric Johnson, with Ivan Bailise (2TN) as W.I.A. representative and the writer as publicity officer. Bill Stanley has accepted the task of getting and keeping the club's books in shipshape order, and has made a good start at doing so.

Code practice is to be held at 7.30 p.m. every Tuesday evening, and it is hoped that this will encourage anyone interested in getting started in their code to come along and do so "en masse." The clubroom is situated at the rear of "Almont," 13 Macpherson Street, Waverley, and meetings are held every Tuesday night.

★

The Hurstville Amateur Radio Club.

By VK2MZ.

During November two members of the club received notification from the R.I. that they had passed the A.O.C.P. exam. held in October. They are J. Ackerman and V. Nugent. Well done, Joe and Vince! Both have made application for call signs and hope to be on the air very shortly.

The club transmitter (2MZ) has been rebuilt and is now on 40 m., the line up is 46 C.O., 46 doubler, 46 buffer, 210 in the final, and is working very well. 2MZ is on the air regularly every Thursday night.

A visit was paid to the club by Mr. F. Carruthers (2PF) on behalf of the W.I.A., and he told very interestingly the story of the Cairo Convention of how the amateurs were represented there, and how the results affected the amateur bands. He also urged all amateurs to support the W.I.A. and thereby help to keep the amateur bands as they are at present.

Lectures and morse code classes are given every Thursday night, and visitors and intending members are always welcome. The clubrooms are situated above 316 Forest Road, Hurstville; entrance is at rear. Any information can be had from the secretary, J. Ackerman, 34 Park Road, Carlton, or G. Calvert, 4 Jolleys Arcade, Hurstville.

New Panels For Old

Most experimenters and "hams" acquire a considerable number of discarded aluminium panels during the years, and frequently a piece of sheet aluminium of the dimensions desired for a new piece of gear is discarded because of the large number of holes resulting from previous experiments.

Even the most "sieve-like" piece can be restored to service by filling the holes with "Tarzan's Grip"—the silvery type, not the colourless, of course. Gum a piece of paper at the rear of each hole, and apply the "Grip" from the front of the panel, until the hole is completely filled and an outward bulge is left.

After all holes have been treated like this, allow to dry, and then sandpaper to level.

At this stage the repairs will be most painfully obvious, but the mottled effect as seen in the photo of my own rig will effectively conceal this. This effect is secured by placing a small piece of medium sandpaper on the thumb and rotating on one spot of the panel until circular scratches appear. Admittedly, it takes considerable time, but to unfinancial persons like myself the expenditure of some time and energy is preferable to the outlay of five or six shillings.

For the benefit of those who may be interested, the rig is a two-stage job, with 2A5 crystal oscillator and either one or two 46's as P.A.

No, that's not the family rat-trap next to the rig, it's the power supply!

—R. C. Black (VK2YA), Trangie, N.S.W.

Improved Performance From 6K8-G Converter

Increased Gain — Excellent Stability

THE advent of Radiotron 6K8-G has made possible the construction of receivers of quite a simple character which nevertheless have extremely good performance, particularly on short waves (states "Radiotronics" No. 92, published by A. W. Valve Co. Pty. Ltd.). The special characteristics of the 6K8-G which have the greatest appeal are the stability of the oscillator frequency on all bands, and the sensitivity and general satisfactory performance on the highest frequencies of the short wave band.

As a result of these good characteristics, it is possible to apply a.v.c. to the 6K8-G without suffering from frequency drift due to fading and without any likelihood of flutter, provided that reasonable precautions are taken.

Valves of the pentagrid type such as the 6A7 or 6A8-G have high sensitivity and good performance on the broadcast band, but when a.v.c. is applied to the converter on the short-wave band it is usually necessary to employ a fairly expensive filter in the anode-grid circuit in order to prevent flutter and, while this is reasonably effective as an anti-flutter device, it does not assist in any way towards preventing the receiver from coming off-tune when the signal fades severely.

This effect on the short-wave band is well known to all who have handled such receivers, and in the past, good performance could only be achieved by removing a.v.c. from the converter for short waves. For satisfactory receiver performance this would necessitate the use of an r.f. stage, not only as an amplifying stage, but also for the a.v.c. control. The stability of the 6K8-G makes the r.f. stage no longer essential in this regard, since ample a.v.c. action may be obtained on the short-wave band by applying the controlling voltage to the grid of the converter.

Receivers of the five-valve variety, having no r.f. stage, are very popular in spite of the defects which have been enumerated, but the 6K8-G avoids the most serious of these defects, and therefore makes a considerable contribution to the performance of a typical small receiver.

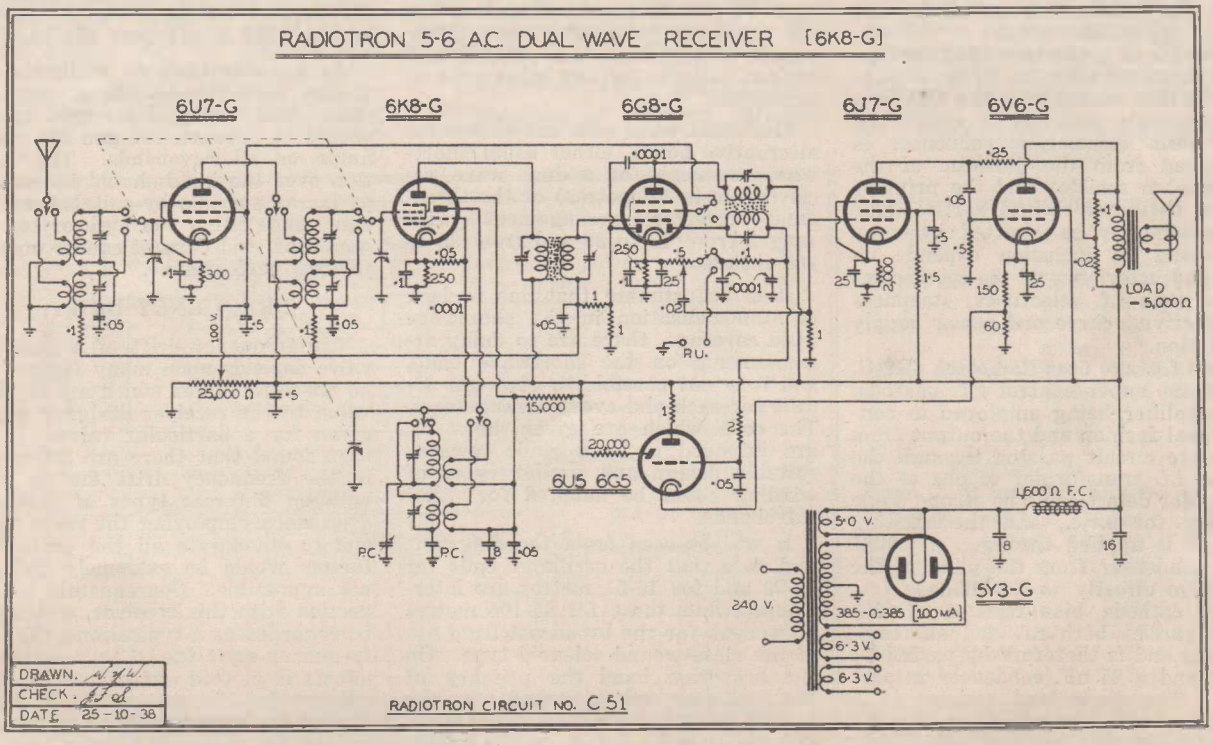
At the same time it must be realised that the addition of an r.f. stage to any receiver improves its performance very markedly in many directions such as the reduction of background noise for a given sensitivity, improved a.v.c. characteristic, improved image ratio, and lessened liability to suffer from cross modulation. The receiver which is described in this issue is therefore shown with an r.f. stage using Radiotron type 6U7-G as the r.f. amplifier.

This r.f. stage may, however, be omitted entirely and the remainder of the receiver will have an excellent performance when compared with other receivers having no r.f. stage. No additional circuit diagram has been shown, since the parts to be omitted are so obvious.

Tuning Indicator.

A Magic Eye tuning indicator has been included in the circuit for ease of tuning and may be either type 6U5 or 6G5 as may be desired. Radiotron 6U5 is fitted with a space-charge grid in the target section which provides better uniformity of performance and longer life due to the elimination of excessively high target currents.

The newer types of Radiotron 6G5



The six-valve circuit developed by A. W. Valve Co. Pty. Ltd., and discussed in the accompanying article.

are also fitted with a space charge grid, but the earlier construction 6G5's will not have such a satisfactory performance. A resistor of 20,000 ohms has been shown in the target circuit of the tuning indicator and this is intended only for use with the more modern type of tuning indicator employing a space charge grid.

With the older type of tuning indicator it is advisable to decrease this resistance to 10,000 ohms, and to decrease the target supply voltage to about 200 or 220 volts.

Circuit Arrangement.

Radiotron 6U7-G is used as the r.f. amplifier and its screen supply is obtained from a 25,000 ohm voltage divider having a tapping at 100 volts, which is used to supply the screens of the r.f. and i.f. stages.

Radiotron 6K8-G converter is operated with normal voltages on all electrodes. As recommended in the published data on this valve type, the screen grid of the mixer and the plate of the oscillator are supplied through a common 15,000 ohm dropping resistor from "B+."

The reason for this particular arrangement is that there is a slight frequency drift in one direction with a change of voltage applied to the oscillator plate, and in the reverse direction with the same change of voltage applied to the mixer screen. Consequently by combining these two in a common dropping resistor the tendency to drift is very much reduced and, since the drift in each section is of approximately the same dimensions, the net drift very closely approaches zero.

In order to make sure that no flutter occurs even with the slight amount of drift that occurs with the 6K8-G, a comparatively small filter employing an 8 mfd. electrolytic condenser is connected from the junction of the 15,000 ohm resistor and the primary of the oscillator coil to earth. This condenser may be omitted in many cases and its inclusion depends on such characteristics of the receiver as audio gain, i.f. selectivity, steepness of selectivity curve and power supply regulation.

The i.f. stage uses Radiotron 6G8-G, duo-diode super control r.f. pentode, the amplifier being employed in conventional fashion and the output from the plate circuit passing through the second i.f. transformer to one of the diodes for detection. The second diode is used for a.v.c., and the exciting voltage is applied through a .0001 mfd. condenser from the plate of the i.f. valve directly to the diode.

The cathode bias resistor of this stage carries both r.f. and a.f. components and is therefore by-passed by a 0.1 and a 25 uF. condenser in parallel. The diode load resistor is .5 megohm, and the r.f. filter consists of a .1 megohm resistor and .0001 mfd. filter as with preceding Radiotron circuits.

Due to the special a.v.c. arrangement which has been adopted, the increase of distortion due to the operation of a.v.c. is quite small, and occurs only at a very low input voltage to the aerial. There is no shunting of the diode load by the a.v.c. network, although there is a slight loading due to the 2-megohm resistor to the grid of the tuning indicator.

The audio system comprises Radiotron 6J7-G as a resistance coupled pentode feeding into the grid of a 6V6-G beam tetrode, with negative feedback applied by the series method. Although the percentage of output voltage which is applied to the plate circuit of the 6J7-G is 16.6 per cent., the effective percentage at the grid of the 6V6-G is 10.7 per cent., giving a gain reduction factor of 2.93.

The cathode of the 6U5 is returned to a tapping on the 6V6-G cathode bias resistor in order that the deflection of the tuning indicator may occur even with small signals and on short waves. The same effect could be obtained quite readily by returning the cathode to a suitable point on a separate voltage divider.

The power supply comprises a standard 385-385 volt 100 m.a. transformer and Radiotron 5Y3-G rectifier. The filter system incorporates a 1600-ohm field coil and condensers of 8 and 16 mfd. capacitance.

B.C. AND S.W. COIL DATA

THE coils which were used in this receiver are of conventional pattern, and are regarded merely as examples of average design. It is not claimed that the highest possible efficiency has been obtained, especially since this might result in difficulties in other directions.

In order to assist designers in obtaining a satisfactory conventional type of coil for use with the Radiotron 6K8-G, the data on the coils is tabulated in full and two diagrams are shown, illustrating the aerial and r.f. coils on one and the oscillator coils on the other diagram. The aerial and r.f. coils may be used with any type of converter or r.f. valve, but the oscillator coils are particularly suited to the Radiotron 6K8-G and are not suitable for any other type of converter.

The short wave coils are shown for alternative bands, either usual short-wave coverage for a dual wave receiver (16 to 51 metres) or the three-band receiver arrangement with ranges from 13 to 39 and from 35 to 105 metres.

It is unfortunate that due to lack of standardisation in the shortwave band coverage, there are so many arrangements on the shortwave band, and it is not possible to give coil details for each and every arrangement. The coils which are given, however, are intended to be a guide towards suitable design and similar types of winding could be adopted for other wavebands.

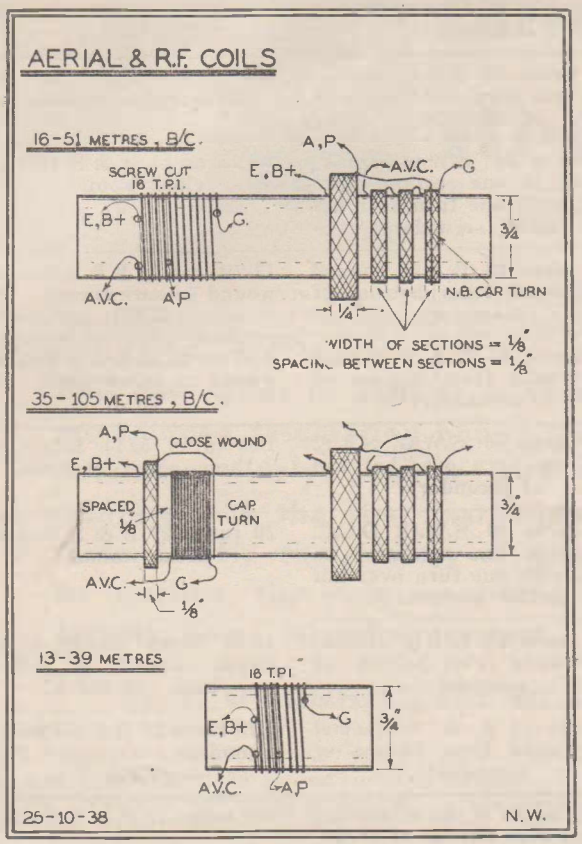
It will be seen from the diagrams and data that the oscillator coils for 13-39 and for 16-51 metres are interwound, while those for 35-105 metres as well as for the broadcast band are of the close-wound solenoid type. On the broadcast band the primary of the oscillator coil is wound over the bottom end of the secondary winding. The aerial and r.f. coils on the broadcast band employ high impedance primaries and sectional Litz-wound secondaries. The aerial coil for the 35-105-metre band is also of the high impedance type, although the secondary is a single layer close-wound solenoid. In all cases where high impedance primaries are employed a capacitance turn is added to improve the gain at the high frequency end of the band.

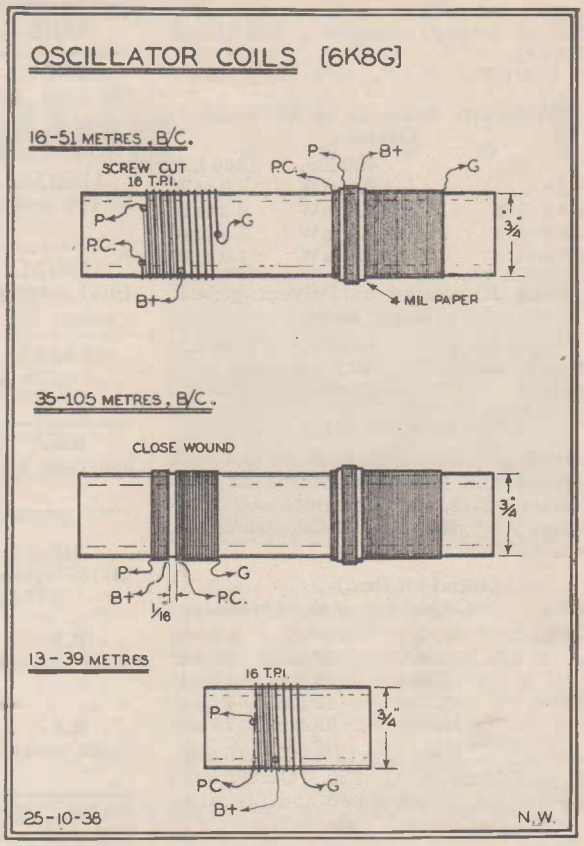
In the design of the coils for the receiver it is necessary to consider the effects of variation of gain over the wave band, the coil gain, and the necessity for matching the high impedance primary to an aerial; also for the oscillator coil the production of the desired oscillator grid current within fixed limits over the band.

As a guide towards oscillator coil design with the 6K8-G, it may be stated that the oscillator grid current should be between 100 and 200 micro-amps. on all wavebands. The variation over the band should be reduced as far as possible by suitable coil design, since either too high or too low oscillator grid current causes unsatisfactory performance.

FREQUENCY DRIFT.

The frequency drift of a converter valve depends upon many factors and no absolute curves which are of much value to the receiver designer can be given for a particular valve. It has been found that there are differences in the frequency drift due to a.v.c. between different types of receivers, even when employing the same valve, and to enumerate all the controlling factors would be extremely tiring if not impossible. Consequently in connection with this receiver, which may be regarded as a typical one, the total frequency drift due to a.v.c. and other effects is plotted against aerial input voltage for the receiver as a whole. On the diagram are shown two curves giving the upper and lower limits of individual 6K8-G valves and any

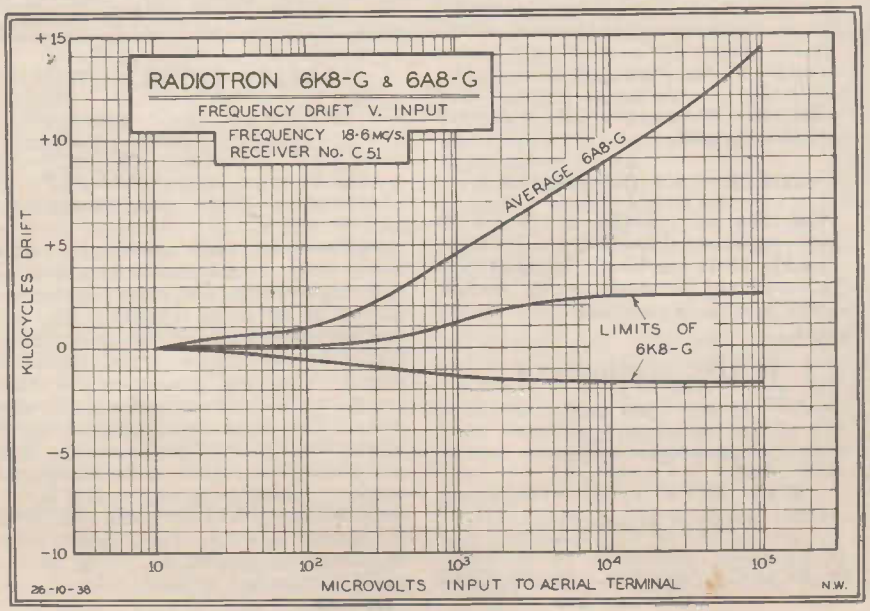




Radiotron 6K8-G should be within these limits. It will be seen that the upper limit is +2.5 k.c. and the lower limit —1.8 k.c. For the purposes of comparison the curve for an average 6A8-G is shown and the improvement due to the use of the 6K8-G is evident. These curves were taken at a frequency of 18.6 megacycles.

RECEIVER TEST RESULTS.

Comparison of receiver measurements at the Aerial Terminal, using Radiotron receiver No. C51 with representative samples of 6K8-G and 6A8-G, both working under optimum voltage and oscillator conditions.



ABSOLUTE SENSITIVITY.

BAND.	FREQUENCY OR W'LENGTH	6K8-G	6A8-G
550-1500 k.c.	1400 k.c.	1.5 uV	1.0 uV
	600 k.c.	1.3 uV	1.1 uV
35-105 metres	37.5 m.	6.0 uV	3.0 uV
	90 m.	6.5 uV	4.5 uV
16-51 metres	17 m.	6.3 uV	9.0 uV
	45 m.	8.5 uV	6.0 uV
13-39 metres	14 m.	3.5 uV	22 uV
	35 m.	6.4 uV	7.5 uV

IMAGE RATIO.

Band.	Frequency or W'length.	6K8-G.	6A8-G
550-1500 k.c.	1400 k.c.	10,000:1	10,000:1
	600 k.c.	100,000:1	80,000:1
35-105 metres	37.5 m.	260:1	190:1
	90 m.	1,560:1	1,200:1
16-51 metres	17 m.	100:1	80:1
	45 m.	330:1	240:1
13-39 metres	14 m.	22:1	12:1
	35 m.	330:1	260:1

NOISE LEVEL.

Measurements made in Radiotron receiver No. C51 with signal fed to

aerial terminal at 600 k.c. and 1400 k.c. on average samples of 6K8-G and 6A8-G.

INPUT = 5 uV., 30% Modulation.

Milliwatts Noise in 50 Milliwatts Output.

	600 k.c.	1400 k.c.
6A8-G/1	3.5 mW	3.0 mW
6A8-G/2	3.8 mW	3.2 mW
6K8-G/1	3.8 mW	3.5 mW
6K8-G/2	4.5 mW	4.0 mW

Noise Expressed as Percentage on Voltage Basis.

	600 k.c.	1400 k.c.
6A8-G	27.2%	24.8%
6K8-G	28.6%	27.3%

BANDWIDTH.

Comparison of Bandwidth between 6K8-G and 6A8-G measured at converter grid, at Intermediate Frequency = 465 k.c., with various i.f. transformers.

I.F. Transf.	(Input off Res.) (Input at Res.)	Bandwidth. 6K8-G	6A8-G
A	1,000	47 k.c.	65 k.c.
	10,000	120 k.c.	117 k.c.
B	1,000	42 k.c.	43 k.c.
	10,000	69 k.c.	76 k.c.

A.—Zd=0.25 m., Q=125. C=115 uuF.
B.—Zd=0.25 m., Q=220. C=200 uuF.
Second i.f. transformer and i.f. stage identical in each case.

OSCILLATOR GRID CURRENT.

Oscillator Grid Current of average sample 6K8-G having Oscillator Gm = 3000 umhos. over the four bands and using coils as specified.

BAND.	Point	Osc. Grid Current.
	550 k.c.	130 uA
550-1500 k.c.	1000 k.c.	150 uA
	1500 k.c.	150 uA
	35 metres	*250 uA
35-105 metres	50 metres	*210 uA
	90 metres	130 uA
	105 metres	110 uA
	16 metres	180 uA
16-51 metres	30 metres	180 uA
	51 metres	110uA
	13 metres	180 uA
13-39 metres	20 metres	190 uA
	39 metres	110 uA

* Although these values are above those normally recommended, no appreciable loss of sensitivity or other defect was found in this particular case.

Frequency Drift.

The frequency drift of a converter valve depends upon many factors and no absolute curves which are of much value to the receiver designer can be given for a particular valve. It has been found that there are differences in the frequency drift due to A.V.C. between different types of receivers, even when employing the same valve.

(Continued on page 46.)

COIL.	PRIMARY.	SECONDARY.
AERIAL. 550-1500 k.c.	375 turns 40 S.W.G. S.S.E. with one turn over hot end of secondary.	120 turns 5/44 Litz in three equal sections.
AERIAL. 35-105 metres.	55 turns 40 S.W.G. D.C.C. wound in one section ⅛in. wide, with one turn over hot end of secondary.	20 turns 27 B & S Enam. close wound.
AERIAL. 16-51 metres.	4.25 turns 34 B & S enamel interwound from bottom of secondary.	11.7 turns 22 B & S Enam. wound in screw cuts. 16 T.P.I.
AERIAL. 13-39 metres.	3.2 turns 34 B & S enamel interwound from bottom of secondary.	7.75 turns 22 B & S Enam. wound in screw cuts. 16 T.P.I.
R.F. 550-1500 k.c.	950 turns 40 S.W.G. S.E.E. with one turn over hot end of secondary.	120 turns 5/44 Litz. in three equal sections.
R.F. 35-105 metres.	110 turns 40 S.W.G. D.C.C. wound in one section ⅛in. wide, with one turn over hot end of secondary.	20 turns 27 B & S Enam. close wound.
R.F. 16-51 metres.	8.75 turns 34 B & S enamel interwound from bottom of secondary.	11.45 turns 22 B & S Enam. wound in screw cuts. 16 T.P.I.
R.F. 13-39 metres.	6 turns 34 B & S enamel interwound from bottom of secondary..	7.75 turns 22 B & S Enam. wound in screw cuts. 16 T.P.I.
OSCILLATOR. 550-1500 k.c.	10 turns 34 B & S enamel wound over bottom of secondary.	100 turns 31 B & S Enam.
OSCILLATOR. 35-105 metres.	8.5 turns 34 B & S enamel wound ⅛in. from cold end of secondary.	18.25 turns 27 B & S enam. Close wound.
OSCILLATOR. 16-51 metres.	4.5 turns 34 B & S enamel interwound from bottom of secondary.	10.9 turns 22 B & S enam. wound in screw cuts. 16 T.P.I.
OSCILLATOR. 13-39 metres.	3.25 turns 34 B & S enamel interwound from bottom of secondary.	7.5 turns 22 B & S enam. wound in screw cuts. 16 T.P.I.

COIL FORMERS.

All coils wound on ¾in. diameter bakelite former.

SHIELD CAN DIMENSIONS.

550-1500 k.c., 35-105 m.: SHIELD CAN—Internal diameter 2⅛ inches.
16-51. 13-39 metres: NO SHIELD CAN—Placed between gang switch shield plates, which are 2⅜ inches apart.

TUNING CONDENSER.

A: 10 — 390 uuF
or B: 9 — 398 uuF
(See note below)

MAX. EFFECTIVE STRAY CAPACITANCES.

A: 34 uuF.
B: 35 uuF.
Including valve input, trimmer, wiring, and coil capacitances.

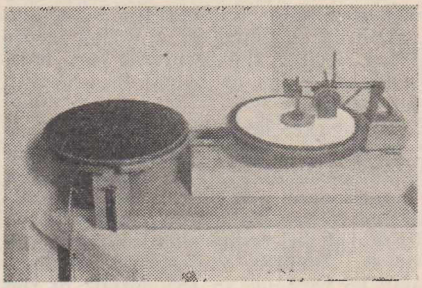
PADDING CONDENSERS.

550-1500 k.c.	410 uuF
35-105 m.	2000 uuF
16-51 m.	4000 uuF
13-39 m.	4500 uuF

N.B.—Note that these coil data apply only to particular conditions, and adjustment will normally be required in differing layouts. The effective inductance of the coils is affected by the length of the leads, the shield cans, and proximity to other components in the case of unshielded coils. The band coverage is affected by the total stray capacitances as well as by the capacitance of the gang condenser. Using gang condenser B, the band-coverage will be wider than with condenser A. Any minor adjustment in the coils should be made in the same proportion to both primary and secondary.

Home Recording I

Above: One of the early Edison phonographs, which played a cylindrical recording. Right: Some of the experimental equipment used by the authors in making home recordings.



This new series of articles is devoted to home recording—a fascinating hobby that is rapidly becoming widely popular with radio experimenters. In the first instalment the authors trace briefly the history of sound recording an outline the main requirements of a satisfactory home recording system.

By T. O'DONNELL and W. J. PHELPS.

IN December of the year 1877, Thomas Edison obtained patent rights for the first direct sound recording machine, known as the phonograph. This machine used a revolving cylinder covered with thick tinfoil. It was moved sideways past a fixed cutting head, this head in turn being utilised to reproduce the recorded sounds.

Shortly afterwards, the phonograph was placed on the market as a reproducing instrument using wax cylindrical records. (A photograph of such a machine is shown on this page.) As will be evident, this type of phonograph with its associated records had many disadvantages, and some years later was superseded by the flat disc type of machine, later known as the gramophone.

It must be remembered that purely mechanical methods of recording and reproducing were employed during these early stages; that is, the sounds were concentrated by means of a large horn upon a diaphragm, which in turn directly activated the cutting needle. When placed on the phonograph or gramophone, the sounds were then reproduced from the records by reversing the process.

These methods of necessity restricted the frequency quite considerably, and in spite of gradual improvements over a number of years, no great advance was made in this regard until the advent of electrical amplification.

Methods of Present Day Recording.

The three main methods of recording in present day commercial practice are (i) the disc method, (ii) the steel tape method, and (iii) the film method.

The sound-on-film system requires very costly recording and reproducing equipment, although its frequency range is extremely good. The steel tape system, which, incidentally, is a fairly old one, has a much more restricted frequency range, and also requires special equipment. In both cases the initial cost would prohibit their use as a home recorder.

The Disc Method.

The disc method is available in several different forms. In the manufacture of commercial gramophone records, the sound is cut upon a soft, warm wax disc, after which the impression on the wax disc is transferred through a number of involved processses to a negative metal disc, which in turn presses the plastic into the finished article.

Of much greater interest to home recording enthusiasts, however, are the instantaneous play-back recordings cut on aluminium or soft acetate discs.

Types of Discs.

Probably the cheapest recording blank is the plain aluminium disc, which is generally used in the soft, polished state. This type of disc has been found to be restricted in frequency range, but is satisfactory when used for recording at speech frequencies.

Instead of using a sharp cutting point ploughing a furrow in the material of the disc, it has been observed that a more rounded cutting point produces better results, because it pushes the material to either side, leaving a better-shaped groove from one to two thousandths of an inch deep. Because of the softness of the material, fibre needles must be used when playing back this type of record, but despite this precaution the playing life is comparatively short.

Another material which has also been tried as a recording blank is copper, and when recording on this material (or aluminium), the cutting is materially assisted by lubricating the blank before recording.

Search For Ideal Disc.

Realising the serious disadvantages of the metal type disc, considerable research has been conducted the world over to develop a disc surface material having three essential qualities, e.g., the property of being easily cut, long playing life and wide frequency range.

Undoubtedly, the most suitable materials of this nature are those of the synthetic resin group. There are numerous variations of this synthetic resin group, many being quite suitable for sound recordings. Some of these materials, however, while being quite satisfactory in all other respects, have the unfortunate disadvantage of either hardening too quickly when exposed to the air, or a tendency to partial disentegration of the material itself into other compounds with disastrous effects upon the sound track.

In blanks of this nature, the compound is deposited by various means upon a suitable base, generally of aluminium, although glass, zinc and other materials have been used. For the production of first grade discs, it is essential that the base should be perfectly finished, as the slightest flaw or imperfection upon it will cause corresponding imperfections on the surface of the finished blank, and

will definitely increase the scratch level.

These synthetic resin or soft acetate discs, while possessing a frequency range which is slightly inferior to the present day gramophone record, have the great advantage of a scratch level which is definitely below that of the commercial wax product.

The "Baked" Disc.

Another type which is perhaps not yet available in Australia, is one which is supplied in a rather soft form. After the recording has been made, the disc is baked in order to harden it.

Great care must be exercised before conducting the baking process. All small particles must be removed from the grooves, as, should they be allowed to remain behind, they will be hardened in conjunction with the rest of the surface, and their presence will be revealed in the output of the amplifier as scratch and other objectionable noises.

Certain American discs are supplied with a special liquid which is applied after recording in order to harden the surface without affecting the frequency characteristics.

In America for some time there was also available a pre-grooved disc on which the track or groove was already cut with smooth (unmodulated) sides. Its advantage was that it obviated the necessity for a special tracking device such as is required with all other types. However, it had the great disadvantage of possessing a very limited frequency range.

Playing Time Considerations.

Before concluding the subject of discs, their playing period is of special interest. Operating the turntable at the standard speed of 78 r.p.m., the 8" disc runs for 2½ minutes, the 10" for 3½ minutes, and the 12" for 5 minutes for each side.

The Stylus.

At this stage it would be as well to deal with the cutting needle or stylus, which plays an extremely important part in the quality of the finished recording.

Two types are generally available for recording purposes, namely, the steel and the jewel. The latter type, which is generally a sapphire, produces a slightly better recording, and in addition has a much longer life than the steel needle, although the initial cost is proportionately high. The steel type is comparatively cheap, and reproduction is quite good, but the needle must be given constant attention to ensure that its cutting edges remain sharp and clean.

As an example of the care necessary with the steel stylus, in the course of experiments an unused stylus which was left exposed to moist air conditions, was found on examination under a powerful magnifying glass to have acquired a considerable amount of rust on its cutting edges. This oxidisation was proved to have a definite detrimental effect on the quality of the recording as well as increasing the scratch level. The sapphire, of course, is unaffected by atmospheric conditions, its disadvantage being in its brittle nature.

The direct recording stylus has a very sharp point, as the two sides meet at about 90° and the set-off angle (from the point to the back of the needle) is about 45°. (See sketch). In order to maintain the cutting needle in first-class condition an essential piece of equipment is a powerful magnifying glass, with which each cutting edge is carefully examined for the detection of any imperfections.

Before any important recordings were cut, an additional check was also made by cutting an unmodulated track in a test disc. This was then played back through the amplifier with the gain control well advanced. In this way any scratch or other defect was readily discernible, and as only about a quarter of an inch of disc was used, many such tests could be made on each side of the blank.

The Swarf.

When an immediate playback blank is being cut correctly, the stylus scoops out a thin shaving or thread, known as the swarf. This thread should be continuous from the beginning of the disc to the very end, and any break should be regarded as a definite indication of either an inferior disc, a cutting needle incorrectly inserted, or faulty tracking mechanism. Whatever the cause, the results will inevitably be disappointing until the trouble is rectified.

When the swarf is being removed correctly in an unbroken thread, it tends to follow the disc and collect around the stylus. By using a soft brush this swarf may be caused to collect around the centre of the record, it being quite important to keep the cutting point clear, as the action

(Continued on page 40.)

World Shortwave Stations

Below is published a comprehensive list of world short-wave stations, giving call-signs, locations, frequencies (and wavelengths) 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.
W9XUY	35,600	3.42	Omaha, U.S.A.—Unknown.	
W1XKA	31,600	9.49	Boston, U.S.A.—Relays WBZ 9 p.m.-4 p.m.; Sundays, 11-4 p.m.	
W1XKB	31,600	9.49	Springfield, U.S.A.—Relays WBZ as W1XKA.	
W9XHW	31,600	9.49	Minneapolis, U.S.A.—Relays WCCO midnight-3 p.m.	
W2XDV	31,600	9.49	New York, U.S.A.—Relays WABC daily, 9 a.m.-2 p.m.; Sun. & 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, midnight-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.; also irreg. other days.	
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., 11-3 p.m. (Mon.).	
W9XPD	31,600	9.49	St. Louis, U.S.A.—Relays KSD. Schedule unknown.	
DGE	27,400	10.95	Nauen, Germany. Phone; irregular.	
W9XH	26,800	11.19	South Beno, U.S.A.—Relays WSBT, WFAM irreg.	
DGX	26,800	11.19	Nauen, Germany. Phone; irregular.	
W9XTA	26,500	11.32	Harrisburg, U.S.A.—Will be on air soon.	
W9XA	26,450	11.33	Kansas City, U.S.A.—Testing.	
W9XAZ	26,400	11.36	Milwaukee, U.S.A.—Relays WTMJ from 4 a.m.	
W2XJI	26,300	11.4	New York, U.S.A.—Relays WOR, 11 p.m.-4 p.m.	
W9XJL	26,100	11.49	Superior, U.S.A.—Relays WEBC daily.	
GSK	26,100	11.49	Daventry, England.—Irregular.	
W9XTC	26,050	11.51	Minneapolis, U.S.A.—Relays WCTN, midnight-4 a.m., 10 a.m.-3 p.m.	
W6XKG	25,950	11.56	Los Angeles.—Relays KGFJ 24 hours daily.	
W9XUP	25,950	11.56	St. Paul, U.S.A.—Relays KSTP, mornings.	
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.	
DJK	21,640	13.88	Berlin, Germany.—New station.	
DJJ	21,565	13.91	Berlin, Germany.—New station.	
PCJ	21,550	13.92	Hiuzen, Holland.—Evenings.	
GST	21,500	13.92	Daventry, England.—Irregular.	
W8XK	21,540	13.93	Pittsburgh, U.S.A.—Relays KDKA daily, 9.45 p.m.-midnight; Mondays, 9 a.m.	
GSJ	21,530	13.93	Daventry, England.—Daily, 8.45-11.55 p.m.	
W2XE	21,520	13.94	New York, U.S.A.—Relays WABC daily exc. Sat., Sun., 10.30 p.m.-1 a.m.; Sat. and Sun., 11 p.m.-4 a.m.	
JZM	21,520	13.94	Nazaki, Japan.—Irregular.	
W2XE	21,515	13.94	New York, U.S.A.—New freq.	
W2XAD	21,500	13.95	Schenectady, U.S.A.—Daily 11 p.m.-3 a.m.	
GSH	21,470	13.97	Daventry, England.—8.45 p.m.-3 a.m.	
W1XAL	21,460	13.98	Boston, U.S.A.—Irregular.	
OLR6A	21,450	13.99	Prague, C-slovakia.—Irregular.	
DJS	21,450	13.99	Berlin, Germany.—Daily 3.05 p.m.-2 a.m.	
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 Janeïro, 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.—Phones irregular.	
GAA	20,380	14.72	Rugby, England.—Phones Argentine and Brazil.	
DGW	20,140	14.90	Nauen, Germany.—Phones 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.—Phones irregular.	
LSG	19,900	15.08	Buenos Aires, Arg.—Tests irregularly.	
WKN	19,820	15.14	Lawrenceville, U.S.A.—Phones England.	
JIB	19,820	15.14	Taihoku, Taiwan.—Relays JFAK, midnight.	
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.—Phones irregular.	

Call.	Kc.	M.	Location. Schedule, etc.
GAD	19,480	15.41	Rugby, England.—Phones VQG4, 10.30-11 p.m.
DFM	19,460	15.42	Nauen, Germany.—Phones 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.
HS6PJ (or 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 KAQ, 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.—Phones 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.—Mons., 1.45-2.30 a.m.
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.—Phones 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.—Phones irregular.
DJH	17,845	16.81	Berlin, Germany.—New station.
HVJ	17,840	16.82	Vatican City, Italy.—New freq.
PCV	17,810	16.84	Kootwijk, Holland.—Phones Java, 9-11 p.m.
	17,810	16.84	Rome, Italy.—Relays 2RO till 9 a.m., irreg.
TPB-3	17,810	16.84	Paris, France.—Daily 12.30-2 a.m.
TGWA	17,800	16.84	Guatemala, City, Guat.—Irregular.
GSG	17,790	16.86	Daventry, England.—Daily, 3.20-7 a.m., 8.45 p.m.-3 a.m.
JZL	17,785	16.87	Tokyo, Japan.—Irregular.
W3XAL	17,780	16.87	Bound Brook, U.S.A.—Daily mid.-11 a.m.
W9XAA	17,780	16.87	Chicago, U.S.A.—Irregular.
PHI-2	17,770	16.88	Hiuzen, Holland.—Daily, 10.40-11.40 p.m.; Tues., Thurs., 10.25-11.40 p.m.
DJE	17,760	16.89	Berlin, Germany.—Daily, 3.05-8.50 p.m., 9-10.50 p.m., 11 p.m.-2 a.m.; Sun., 2.10-3.25 a.m.
	17,760	16.89	Buenos Aires, Argentine.—"Radio Splendid." Schedule unknown.
W2XE	17,760	16.89	New York, U.S.A.—Irregular.
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.—Phones 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.
HI1X	17,400	17.24	Ciudad Trujillo, D.R.—Relays HIX.
DGR	17,341	17.30	Nauen, Germany.—Phones 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.
DJG	17,185	17.46	Berlin, Germany.—New station.
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.
DJH	16,810	17.84	Berlin, Germany.—New station.
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	15,650	19.16	Nazaki, Japan.—Phones Java & Siam, 6-8 p.m.

Call.	Kc.	M.	Location. Schedule, etc.
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, mornings.
HSC2	15,530	19.32	Bangkok, Siam.—Phones JVE.
HS8PJ	15,530	19.32	Bangkok, Siam.—Broadcasts occasionally Mon.
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.
	15,360	19.53	Berne, Switzerland.—Irreg., 9.45-10.45 a.m.
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, 3.15-9 a.m.
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.—Tues., Wed., Fri., Sat., 9.55 a.m.-12.55 p.m.; Sun., Mon., Thurs., 8-8.15 a.m.
GSP	15,310	19.60	Daventry, England.—Daily, midnight-3 a.m., 3.20-7 a.m., 7.15-9 a.m., 9.20-11.30 a.m.
XEBM	15,300	19.61	Mazatlan, Mexico.—Irreg. midnight-1 a.m., 4-5 a.m., 11 a.m.-1 p.m.
	15,300	19.61	Rome, Italy.—Relays 2RO till noon, irreg.
YDB	15,300	19.61	Soerabaia, Java.—Daily 10.30 a.m.-5 p.m.
LRU	15,290	19.62	Buenos Aires, Argentine.—Daily, 10 p.m.-midnight.
VUD-4	15,290	19.62	Delhi, India.—New 5KW station soon on air.
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. (Mon.).
DJQ	15,280	19.63	Berlin, Germany.—Daily, 7.50 a.m.-2 p.m., 3.5 p.m.-7.30 a.m.
W2XE	15,270	19.65	New York, U.S.A.—Daily, 3.20-7 a.m., 12.20-2.25 p.m., 5-7.15 p.m.
GSI	15,260	19.66	Daventry, England.—Daily exc. Sun., Mon., 4-9 a.m.; Sun., Mon., 5.30-9 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.—Mon., 1-3 a.m.
TPA2	15,245	19.68	Paris, France.—Daily, 9 p.m.-2 a.m.
HS8PJ	15,230	19.70	Bangkok, Siam.—Irregularly Mon., 11 p.m.-1 a.m.
OLR5A	15,230	19.70	Prague, Cz-Slovakia.—Irreg. at 11 a.m.
PCJ-2	15,220	19.71	Huizen, Holland.—Daily exc. Sun., 9.15-9.45 a.m.; Sun., 10.15-10.45 a.m.; Tues., 5-6.30 p.m.; Thurs., 12.30-2.30 a.m.
W8XK	15,210	19.72	Pittsburgh, U.S.A.—Daily, 11 p.m.-9 a.m
DJB	15,200	19.74	Berlin, Germany.—Daily, 3.05 p.m.-2 a.m., 7.50-1.50 p.m.; Sun., 2.10-3.25 a.m.
TAQ	15,195	19.75	Ankara, Turkey.—Daily, 4.20-8 a.m.
—	15,190	19.75	Rome, Italy.—Relays 2RO till 9 a.m., irreg.
—	15,190	19.75	Lahti, Finland.—Daily, 3.5 a.m.; Mon., 3-4 p.m.
OER-5	15,190	19.75	Vienna, Austria.—New freq.
ZBW4	15,190	19.75	Hong Kong, China.—Irregular, 2.30 and 6 p.m.
RV26 (or RV96)	15,183	19.75	Moscow. U.S.S.R.—Irregular.
GSO	15,180	19.76	Daventry, England.—Daily, mid.-3 a.m., 5-7.15 a.m., 7.15-9 a.m., 9.20-11.30 a.m.
TGWA	15,170	19.77	Guatemala City, Guat.—Daily, 1.45-2 a.m.; Mon., 1.45-9 a.m.
I2RO5	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.
VPD	15,160	19.79	Suva, Fiji.—New freq.
VUD-3	15,160	19.79	Delhi, India.—Daily, 4.30-7.30 p.m., 11.30 a.m.-1.30 p.m.
XEBR	15,160	19.79	Hermosillo, Mexico.—Irregular.
SM5SX	15,155	19.79	Stockholm, Sweden.—Daily 2 a.m.-8 a.m.; Mid. Sun., 8 a.m. Mon.
YDC	15,150	19.80	Bandoeng, Java.—Daily, 9-10.30 a.m., 1.30-5 p.m., 8.30 p.m.-1.30 a.m.; Sat., 10.30 a.m.-5 p.m.
GSF	15,140	19.82	Daventry, England.—Daily, 8.45 p.m.-3 a.m.
TPB-6	15,130	19.83	Paris, France.—Irreg.
W1XAL	15,130	19.83	Boston, U.S.A.—Tues.-Sat., 1-2 a.m.
SP19	15,120	19.83	Warsaw, Poland.—Relays SPW, SPD, 9 a.m.-noon.
HVJ	15,120	19.83	Vatican City, Italy.—Wed., Thurs., Fri., 1.30-1.45 a.m.
DJL	15,110	19.85	Berlin, Germany.—Daily 1.40-7.25 a.m., 3-5 p.m., 11 p.m.-mid.; Sun., 9 p.m.-11 p.m.
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. (Mon.); phones Tachkent, 10 p.m.
HIR	15,038	19.95	Ciudad, Trujillo, D.R.—Phones WNC.
EA1AV	15,000	20.00	Salas, Spain.—Nationalist station.
YSL	14,985	20.02	San Salvador, Salvador.—Phones 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.—Phones 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.—Phones irreg.

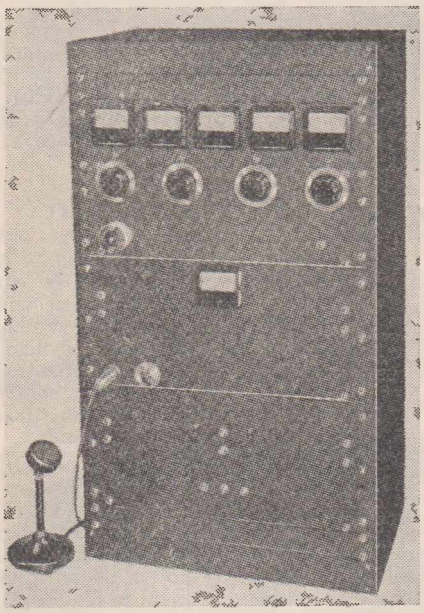
Call.	Kc.	M.	Location. Schedule, etc.
JVH	14,600	20.55	Nazaki, Japan.—Broadcasts irreg., 8 a.m.-2.30 p.m.; phones Europe, 7 p.m.
WMN	14,590	20.56	Lawrenceville, U.S.A.—Phones England.
HBJ	14,536	20.64	Geneva, Switzerland.—Mon., 4.45-5.30 a.m.; Tues., 10-11.30 a.m.
LSN	14,530	20.65	Buenos Aires, Arg.—Phones 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.
—	14,440	20.78	Malaga, Spain.—Nationalist station; relays Salamanca, 5 a.m. and 11.15 a.m.
RAEM	14,410	20.82	North Pole Base U.S.S.R. Scientists.—Irregular.
DOT	14,410	20.82	Koenigs Wusterhausen, Germany.—Phones irregular
IBC	14,410	20.82	San Paolo, Italy.—Phones irregular.
EA7BA	14,284	20.96	Cadiz, Spain.—Nationalist station.
W1OXDA	14,250	21.00	Schooner "Morrissey."—Irregular.
FET5	14,200	21.13	Burgos, Spain.—Nationalist station.
PI1J	14,166	21.15	Dordrecht, Holland.—Sundays, 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.
EA9AH	14,004	21.4	Tetuan, Sp. Morocco.—News at 7.30 & 10.15 a.m. Relays Salamanca 8.40 a.m.
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.
KKW	13,780	21.77	Bolinas, U.S.A.—Special relays.
TYE-2	13,760	21.80	Paris, France.—Phones U.S.A.
CGA-2	13,745	21.83	Drummondville, Canada.—Phones Europe.
RIS	13,738	21.84	Tiflis, U.S.S.R.—Phones Moscow.
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 9-11 a.m.; Sun., Mon., 9 a.m.-noon.
JYK	13,610	22.04	Kemikawa-Cho, Japan.—Irregular.
ZMBJ	13,600	22.06	TSS "Awatea."—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.—Phones 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.—Phones 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.
CR6AA	13,000	23.08	Lobito, Angola.—Sun. and Thurs., 5.45-7.30 a.m.
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.
W9XDH	12,862	23.33	Elgin, 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.
HCJB	12,460	24.07	Quito, Ecuador.—New Freq.
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.
ZLT-5	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.
—	12,200	24.58	Trujillo, Peru.—Irregular.
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.
RNE	12,060	24.88	Moscow, U.S.S.R.—Daily, 3.15-4 a.m., 6-9 a.m., 11 a.m.-12.15 p.m., 1-2 p.m., 9-10 p.m.; Sun., 9 p.m.-4 a.m.
DGL	12,035	24.93	Nauen, Germany.—Phones irregular.
VIY	12,020	24.95	Rockbank, Australia.—Phones Canada.
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.
—	11,950	25.10	Victoria, Spain.—Around 7 a.m.
KKQ	11,950	25.10	Bolinas, U.S.A.—Tests irregularly.

Call.	Kc.	M.	Location. Schedule, etc.
FTA	11,940	25.13	St. Assise, France.—Phones Morocco & Argentine.
YNA	11,935	25.14	Managua, Nicaragua.—Phones C. and S. America.
TI2XD	11,920	25.19	San Jose, Costa Rica.—Daily 2-5 a.m., 8 a.m.-2 p.m. (exc. Mon.).
CB1190	11,910	25.20	Valdivia, Chile.—Relays CB69, 1-4 a.m., 5 a.m.-2 p.m.
XEWI	11,900	25.21	Mexico City, Mexico.—Sun., noon-3 p.m.; Tues., Thurs., Sat., 6-7 a.m., noon-3 p.m.; Wed., Fri., 10.30 a.m.-3 p.m.
—	11,900	25.21	Hanoi, Fr. Indo-China.—Daily, 3-5 a.m., 9 p.m.-1 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.
VPD	11,895	25.22	Suva, Fiji.—New freq.
HP5G	11,895	25.22	Panama City, Panama.—Daily 12.30-4 a.m., 9 a.m.-2 p.m. (see 11780 k.c.).
TPB-7	11,885	25.23	Paris, France.—Daily 10 a.m.-12.15 p.m., 12.30-3 p.m.
TPA3	11,880	25.23	Paris, France.—Daily, 2.15-9 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, 9-11.45 a.m.
—	11,865	25.28	Berne, Switzerland.—Irreg. at 11 a.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.—5-7.15 p.m.
DJP	11,855	25.31	Berlin, Germany.—Not in use at present.
CB1185	11,850	25.32	Santiago, Chile.—Relays CB138.
KZRM	11,840	25.34	Manila, P.I.—Irregular, noon-1 a.m.
CSW-4	11,840	25.34	Lisbon, Portugal.—Daily, 9-11 a.m.
OLR4A	22,840	25.34	Prague, Cz-Slovakia.—Daily 3.55-7 a.m.; Mon., 8.55-11.55 a.m.; Tues., Wed., Fri., Sat., 10.55 a.m.-1.55 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, 9.30 a.m.-2 p.m.
XEBR	11,820	25.38	Hermosilla, Mexico.—Relays XEBH, 4-7 a.m., noon-3 p.m.
GSN	11,820	25.38	Daventry, England.—Not in use at present.
12RO4	11,810	25.40	Rome, Italy.—Daily, 1 a.m.-noon, 7.40-11.45 p.m.
COGF	11,805	25.41	Matanzas, Cuba.—Relays CMGF daily, 5-6 a.m., 7-8 a.m., 9 a.m.-2 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., 11-11.30 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.; Wed., Fri., 7.40-9.30 a.m.; Sun., 4.45-9 a.m.; Mon., 8-9.30 a.m. See also 11730 k.c.
HPSG	11,780	25.47	Panama City, Panama.—Testing; see also 11895 k.c.
OFD	11,780	25.47	Lahti, Finland.—Daily, 4.05-5.05 p.m.
DJF	11,780	25.47	Berlin, Germany.—New transmitter for Africa.
DJD	11,770	25.49	Berlin, Germany.—Daily, 1.35-7.35 a.m., 7.50 a.m.-1.45 p.m.
XETA	11,760	25.51	Monterrey, Mexico.—Relays XET, 4-6.30 a.m.
TGWA	11,760	25.51	Guatemala City, Guat.—Irregular at 1 p.m.; Mon., 9 a.m.
OLR4B	11,760	25.51	Prague, Cz-Slovakia.—Irregular.
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., 5-7.15 p.m.
COCX	11,740	25.55	Habana, Cuba.—Relays CMX, 11 p.m.-4 p.m.
HVJ	11,740	25.55	Vatican City, Italy.—Testing.
HP5L	11,740	25.55	David, Panama.—Daily, 7-10 a.m.
W1XAL	11,730	25.57	Boston, U.S.A.—Daily exc. Sun., Mon., noon-2 p.m.; see also 11790 k.c.
PHI	11,730	25.57	Hiuzen, Holland.—Not in use at present.
CJRX	11,720	25.60	Winnipeg, Canada.—Daily, 9 a.m.-3 p.m.; Mon., 8 a.m.-1 p.m.
TPB-9	11,720	25.60	Paris, France.—Heard around 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, 10 a.m.-12.15 p.m., 12.30 p.m.-3 p.m.
SBP	11,710	25.63	Motala, Sweden.—Daily, 2-4 a.m., 4.20-5.05 p.m., 9 p.m.-mid.; Sat., 4.20-5 p.m., 9 p.m.-4.30 a.m.; Sun., 6 p.m.-4.30 a.m.; Thurs. and Sun., 11 a.m.-noon.
—	11,710	25.63	Saigon, Fr. Indo-China.—Daily 9 p.m.-12.15 a.m.
XEWB	11,710	25.63	Guadalajara, Mexico.—Irregular.
YSM	11,710	25.63	San Salvador, Salvador.—Irregular, 4.30-5.30 a.m.
DJZ	11,701	25.65	Berlin, Germany.—New station
SP25	11,700	25.65	Warsaw, Poland.—Relays SPW, SPI, 9 a.m.-noon.
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.
XGJ	11,691	25.67	Hankow, China.
KIO	11,680	25.68	Kahuku, Hawaii.—Phones Far East.
IQY	11,676	25.7	Rome, Italy.—Relays 2RO, 4.35-5.25 a.m., 9 a.m.-noon.
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.—Phones irregular.
SPD	11,530	26.01	Warsaw, Poland.—Daily 9 a.m.-noon.
XAM	11,500	26.09	Merida, Mexico.—Irregular around 4 a.m.
PMK	11,500	26.09	Bandoeng, Java.—Tests irregularly.
CJA4	11,413	26.28	Drummondville, Canada.—Phones Australia.
HBO	11,402	26.31	Geneva, Switzerland.—Mon., 10-10.45 a.m., 4-4.15 p.m.; Tues., 10-11.30 a.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.
CSW-7	11,040	27.17	Lisbon, Portugal.—Daily, 4.30-6 a.m.
PLP	11,000	27.27	Bandoeng, Java.—Relays YDB, 9-10.30 a.m., 1.30-5 p.m., 7.30 p.m.-1.30 or 2 a.m.
ZLT-4	10,980	27.33	Wellington, N.Z.—Phones Australia & England.
OCI	10.970	27.35	Lima, Peru.—Phones Bogota.
JZB	10.960	27.36	Nazaki, Japan.—Irregular.

Call.	Kc..	M.	Location. Schedule, etc.
—	10.960	27.36	Tananarive, Madagascar.—Daily, 1-2 a.m., 3.30-3.45 p.m., 6.30-7.30 p.m.; Sun., 5.30-7. 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.
—	10,700	28.04	Milan, Italy.—"Radio Milano"; till 9 a.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.
—	10,630	28.22	Salamanca, Spain.—Nationalist station.
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., 4.30-5 a.m., 11.30 a.m.-noon.
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.
YSP	10,400	28.82	San Salvador, Salvador.—Around 1.30-2 p.m.
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.
EAJ43	10,370	28.93	Teneriffe, Canary Is.—Relays Salamanca, 5-7 a.m., 8 a.m.-12.45 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, 4.30-6 a.m.; works OPM 6 a.m. and 4 p.m.
PPM	10,310	29.10	Rio de Janeiro, Brazil.—Phones New York and Buenos Aires.
LSI.2	26,300	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.
JZO	10,270	29.22	Nazaki, Japan.—Relays JZJ, 11 p.m.
PMN	10,260	29.24	Bandoeng, Java.—Relays JDB, 9-10.30 a.m., 1.30-5 p.m., 7.30 p.m.-1.30 or 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 9 a.m.-noon.
DGD	10,210	29.38	Nauen, Germany.—Phones 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.
TIEM	10,050	29.85	San Jose, Costa Rica.—Irregular, a.m.
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.
COBC	9,980	30.04	Habana, Cuba.—Relays CMBC 9.55 p.m.-3 p.m.
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.—Phones irregular.
HPF2	9,940	30.18	Panama City, Panama.—Phones irregular.
HRF5	9,940	30.18	Tegucigalpa, Honduras.—Phones irregular.
YSG	9,940	30.18	San Salvador, Salvador.—Phones 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.—Phones irregular.
CP-1	9,892	30.33	Sucre, Bolivia.—"Radio Chuquisaca," 2 a.m.-3 a.m.
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 around 11 a.m.
JYS	9,840	30.49	Kemikawa-Cho, Japan.—Irregular.
IRF	9,835	30.5	Rome, Italy.—Relays 2RO 9 a.m.-noon; phones Egypt.
COCM	9,833	30.51	Habana, Cuba.—Relays CMCM, 11 p.m.-4 p.m.
IRM	9,830	30.52	Rome, Italy.—Phones Egypt.
IRF	9,810	30.58	Rome, Italy.—Irregular around 11 a.m.
XGOX	9,800	30.61	Nanking, China.—Reported off air.
LSI	9,800	30.61	Buenos Aires, Arg.—Tests irregularly.
GCW	9,700	30.64	Rugby, England.—Phones New York.
VLJ-VLZ2	9,760	30.74	Sydney, Australia.—Phones Java and New Zealand.
—	9,760	30.72	Saigon, Fr. Indo-China.—Testing 9 p.m.-12.15 a.m.
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.—Phones irregular.
CSW-5	9,710	30.90	Lisbon, Portugal.—Daily, 8-11 a.m.
GCA	9,710	30.90	Rugby, England.—Phones S. America.
LQA	9,700	30.93	Buenos Aires, Arg.—Tests irregularly.
LRA	9,690	30.95	Buenos Aires, Argentine.—Irregular 11 a.m.
TI4NRH	9,690	30.94	Heredia, C. Rica.—Sun., 10-11 p.m., noon-1 p.m.; Wed., Fri., noon-1 p.m.
TGWA	9,685	30.96	Guatemala City, Guat.—Daily 1-2.30 p.m.; Mon., 9 a.m.-2.30 p.m.
FZF6	9,680	30.97	Fort de France, Martinique.—Daily, 2.30-3.30 a.m., 9.15-10.50 a.m.

Five-Band 10 To 160-Metre 'Phone And C.W. Transmitter . . .

Modern American Design Will Appeal To VK And ZL Amateurs.



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Left: Neat and compact, the completed transmitter looks like a commercially-built job. Below: A rear view, showing the three racks—r.f. unit on top, modulator next, and power supplies below.

★

THIS transmitter was designed to be as small and compact as possible. The panels on the power supply and modulator are 8¾" x 19" relay rack panels. The power supply chassis is set down 2" below the lower edge of the panel and the modulator chassis is set down 1 inch below the lower edge of the panel, to take advantage of all the space available in the smaller rack. The r.f. panel measures 12¼" x 19". The small 1¾" x 19" panels at top and bottom fill in the additional space in the larger rack.

The meters are the new Triplett Series mounting in a 2¼" hole, but having the same scale length as a 3-inch meter. From left to right, the meters are oscillator plate, buffer plate, buffer or final grid, final plate, and r.f. feeder current. The toggle switch in the lower right hand corner of the r.f. panel is the D.P.D.T. switch shown in the r.f. diagram for reading grid current on either the buffer or final with only one meter. The meter in the audio panel is in the Class "B" plate circuit.

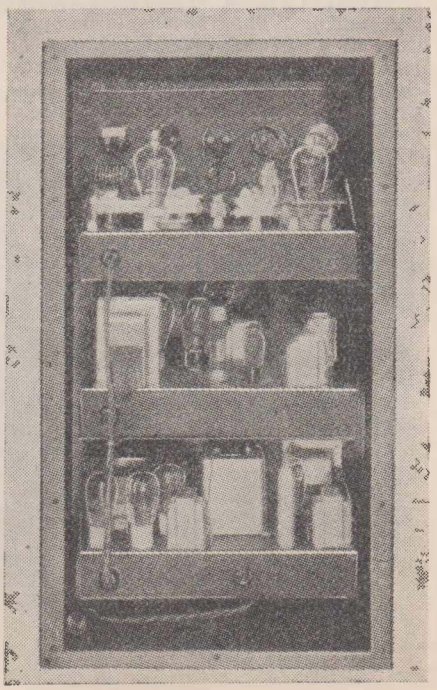
The crystal microphone shown has a high output level, greatly simplifying the problems of hum and r.f. feedback so often encountered in amateur transmitters.

Three-Stage Transmitter Unit For 1.75 to 30 M.C. Output.

By far the greatest problem in the design of an all-band amateur transmitter is that of maintaining suitable L/C ratios in the final stage. Insufficient capacity results in high harmonic content and poor linearity if modulated. Too much capacity results in poor efficiency.

Because most transmitting condensers have a capacity ratio of about 4-1, a maximum of 3 adjacent bands may be covered with proper ratios. Operation on any other bands will leave a great deal to be desired. The transmitter to be described approaches the ideal condition over the full range from 1.75 to 30 m.c. Actually, the L/C ratio on 30 m.c. is slightly lower than the optimum value, but the performance should be entirely satisfactory. On 1.75 m.c. the L/C ratio is slightly higher than is desirable for 'phone operation, but is adequate for reasonable harmonic suppression.

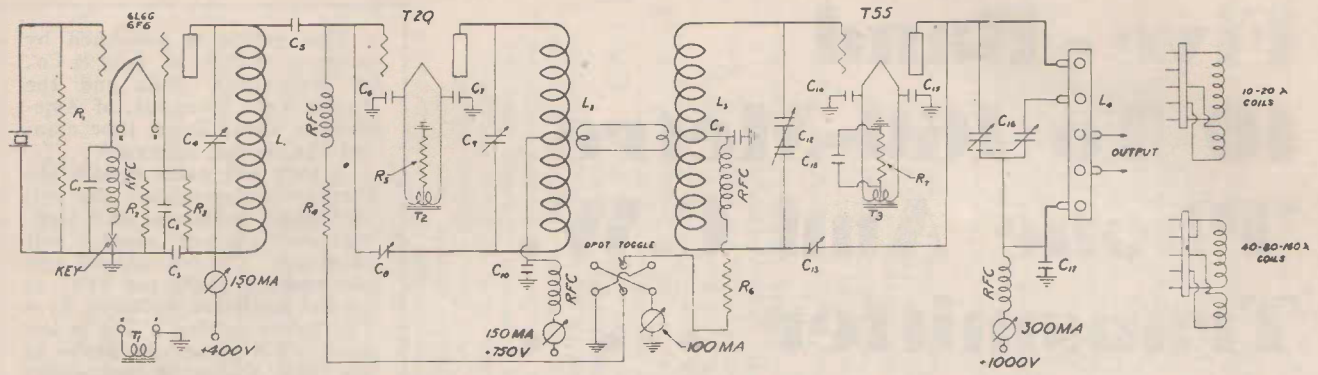
Only 3 stages are used, a 6L6G or 6F6, a T20 and a T55. Using a 20 or 40-metre crystal, more than enough excitation to the final may be obtained on 30 m.c., and on the lower fre-



This article is published by courtesy of F. J. W. Fear & Co., of Wellington, N.Z., and the Taylor Tube Company, of America, in whose latest tube manual the design appeared.

A rack and panel design, the three racks comprise the r.f. unit (top), modulator unit (centre), and power supply unit (bottom). The transmitter unit comprises a 6L6G (or 6F6) as crystal oscillator, followed by a T20 buffer driving a T55 in the final. (For those who desire to use them, Radiotron equivalents of the last two valves are types 809 and 808).

The modulator unit employs a 6C6 resistance-capacity coupled to a 76, transformer-coupled to a pair of 76's in push-pull. These in turn drive a pair of push-pull 6A3's in a class "B" driver stage that easily loads the push-pull TZ20's in the output. (Radiotron type 809's can be used here, with the addition of a 1.5-volt cell for negative bias, inserted between the centre-tap of the driver transformer secondary and earth.



TRANSMITTER CIRCUIT

R1—100,000 ohm 1 watt (Centralab).
R2—35,000 ohm 2-watt (Ohmite).
R3, R4—10,000 ohm 10 watt (Ohmite).
R5—400 ohm 10 watt (Ohmite).
R6—5000 ohm 10 watt (Ohmite).
R7—400 ohm 10 watt (Ohmite).
C1—.00015 mica 600v. C.D.
C2, C3—.01 paper 600v. C.D.
C4—.0001.
C5—.0001 mica 2500v. (Sangamo).
C6, C7—.006 mica 600v. C.D.
C8—8 mmfd. max.
C9—100 mmfd. (Hammond).
C10—.002 mica 2500 (Sangamo).
C11—.002 mica 600v. C.D.
C12—Double section 100 mmfd.
C13—8 mmfd. max. (Hammond).
C14, C15—.006 mica 600v.
C16—Double section 100 mmfd. (Hammond).
C17.—.002 mica 5000v. (Sangamo).
C18—8 mfd. 450v. electrolytic. C.D.
RFC—2.5 mr. R.F. chokes (Micro).
T1—6.3v. (Micro).
T2—7.5v. (Micro).
T3—7.5v. (Micro).

quencies the T20 loafs along delivering only about a quarter of full output when exciting the T55.

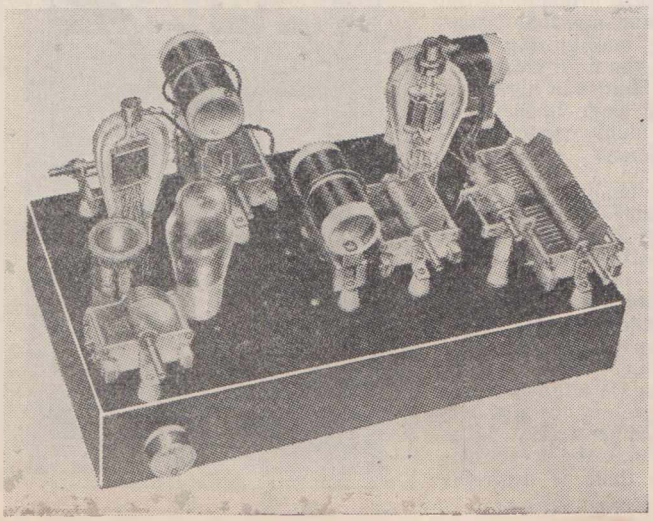
In order to obtain the necessary high capacity ratio, grid neutralisation, permitting an unbalanced output circuit, is used in the final stage. The plate tuning condenser is a Cardwell MT-100-GD, selected because of its high maximum to minimum capacity ratio (100 mmfd. maximum, 13 mmfd. minimum per section). By using only one section or both sections in parallel, the ratio is 15.4 to 1. The final stage voltage and current were then selected to fit the L/C ratios available and the condenser spacing. The T55 should be operated at a 1000 volts and 150 m.a. or less. Operation over so wide a range cannot be achieved without some compromises. One section of the condenser is used on 28 and 14 m.c., and both in parallel on 7, 3.5 and 1.75 megacycles.

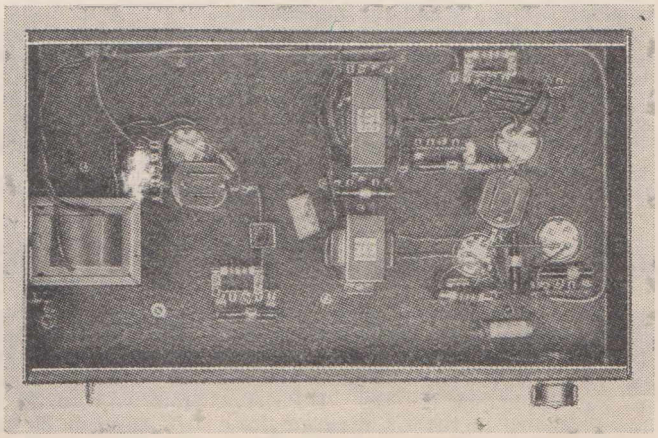
In one respect, grid neutralisation is rather a bad actor at the higher frequencies. The grid of the tube puts a resistive load across half of the input coil, which results in the opposite end of the coil being other than 180° out of phase, the condition necessary for neutralisation, if the coupling is less than unity. Unity coupling is never realised in actual practice, but satisfactory results are obtained if the coil is made as short as possible with the minimum spacing between turns. The best cure, that of putting a resistor across the neutralising half of the coil equal to the grid of the tube, wastes too much driver power on 10 metres, but could be used on the lower frequencies if desired.

The 10 and 20 metre grid coils should be wound as shown, with the turns as close together as possible. If this is done, no difficulty will be experienced. The neutralisation will hold from 20 to 160 metres and only a slight re-adjustment need be made for 10 metres. The neutralisation seems to be better with the centre of the coil grounded as shown, than with the condenser rotor grounded.

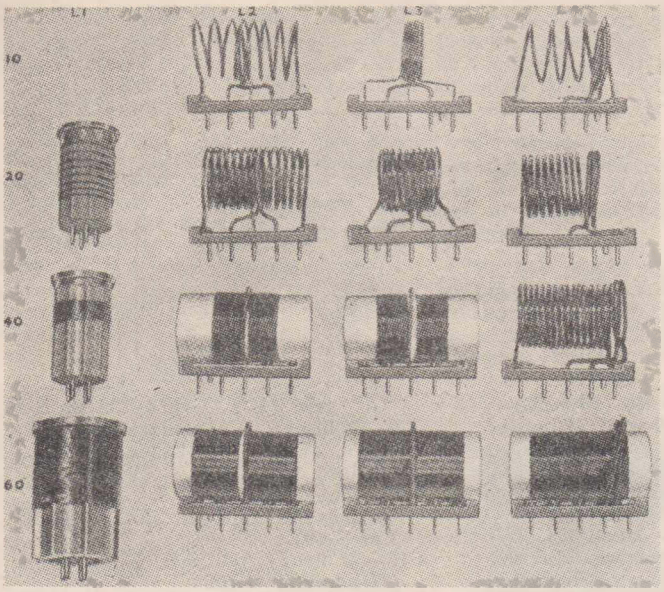
The T55 stage operates normally with grid currents of 20 m.a. or more. In no event should the rectified grid current exceed the maximum rated value of 40 m.a. No improvement in performance is noted if the grid current exceeds 25 m.a., and it is recommended that the stage be operated with 25 m.a. of grid current under load.

Condenser C14 may be used as the excitation control. If tuned to exact resonance, particularly on the lower frequencies, the grid current may be





These above, and under-chassis views of the transmitter illustrate the layout adopted. This should be followed as closely as possible to ensure duplicating the excellent results given by the original.



COIL DATA

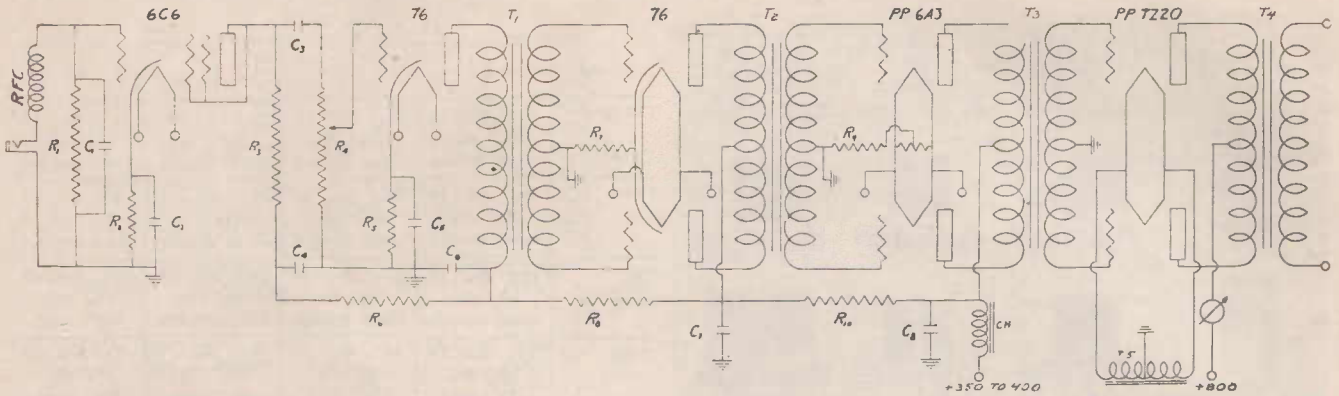
Band	L_1	L_2	L_3	L_4
1.75 Mc	45 t. No 18 2¼" dia. close wound	72 t. No. 20 1¾" dia close wound	78 t. No 20 1¾" dia. close wound	46 t. No 16 1¾" dia. close wound
3.5 Mc	26 t. No. 18 1½" dia. close wound	36 t. No. 14 1¾" dia. close wound	44 t. No. 16 1¾" dia. close wound	19 t. No. 14 1¾" dia. close wound
7 Mc	12 t. No. 18 1½" dia. close wound	22 t. No 14 1¾" dia. close wound	24 t. No. 14 1¾" dia. close wound	16 t. No. 10 1¾" dia. 2½" long
14 Mc	8 t. No. 18 1½" dia. 1¾" long	14 t. No. 10 1¾" dia. 2¾" long	10 t. No. 10 1¾" dia. short as possible	10 t. No. 10 1¾" dia. 1⅞" long
28 Mc		8 t. No 10 1¾" dia. Approx. 3" long	6 t. No. 14 1¾" dia. short as possible	5 t. No. 10 3¾" dia. 2¾" long

This view shows the four sets of coils required to cover the 10, 20, 40 and 80-metre amateur bands. The table on the right gives complete coil specifications.

as high as 80 m.a. C14 should be tuned on the low frequency or high capacity side of resonance until the 25 m.a. optimum value of excitation is obtained. Operation on the high capacity side of resonance is advantageous because it helps to make the driving voltage more sinusoidal.

The unit is very flexible, and may be used in four different combinations on 20, 40, 80 and 160 metres, and in two combinations on 10 metres.

1. The unit may be operated straight through on the crystal frequency. A 6F6G should be used in place of the 6L6G on 20 and 40.
2. The crystal may be one half the output frequency, doubling in the



MODULATOR.

R1—5 meg. 1 watt (Centralab).
R2—2500 ohm 1 watt (Centralab).
R3—250,000 ohm 1 watt (Centralab).
R4—250,000 ohm variable (Centralab).
R5—2500 ohm 1 watt (Centralab).
R6—50,000 ohm 1 watt (Centralab).
R7—1500 ohm 1 watt (Centralab).
R8—20,000 ohm 1 watt (Centralab).
R9—800 ohm 10 watt (Ohmite).
R10—10,000 ohm 10-watt (Ohmite).
C1—.0001 mica.
C2—10 mfd. 25v. electrolytic.
C3—.01 600v. paper.
C4—2 mfd. 450v. electrolytic.
C5—10 mfd. 25v. electrolytic.
C6—2 mfd. 450v. electrolytic.
C7, C8—8 mfd. 450v. electrolytic.
T1—Single plate to push-pull class "A" grid (U.T.C.—PA-132 or S-2)
T2—Push-pull 76's to class "A" prime 6A3's. (U.T.C. PA-233 or S-8).
T3—Class "B" input. (U.T.C.—PA-53AX or S-8).
T4—Class "B" output. (U.T.C.—VM-3 or S-19).
CH—30 henry 100 m.a. filter choke (Henderson C-100).
R.F.C.—2.5 mh. R.F. choke (Micro).

crystal oscillator and working straight through in the buffer and final. This is recommended for 20 and 40.

3. The crystal may be one fourth the output frequency, doubling in the crystal stage and again in the T20 stage.

4. The crystal may be one half the output frequency, working straight through in the crystal stage and doubling in the T20 stage. The 6F6G should be used in place of 6L6G when using 20 and 40-metre crystals.

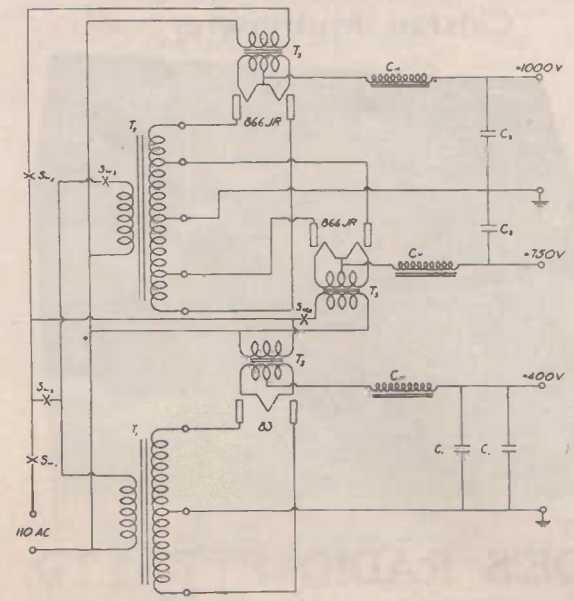
Combination 3 or 4 is necessary for ten-metre operation, 3 with a 40 metre crystal and 4 with a 20-metre crystal. It was not found feasible to use a 20-metre crystal and double to 10 in the crystal stage with this oscillator circuit, because the 20-metre crystal appeared to be a 60-metre fundamental type which operated on its third harmonic. With this circuit, the 10-metre output apparently was the sixth harmonic of 60, and was too low to be usable.

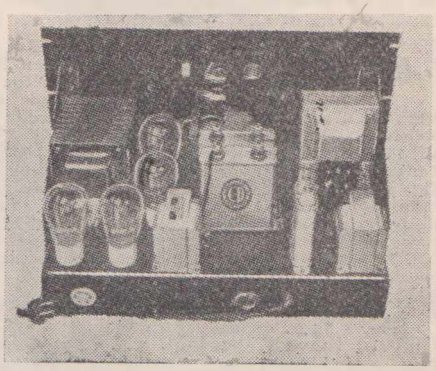
For c.w. operation the transmitter may be keyed in the cathode of the crystal stage, or in any other conventional manner. If keyed in the crystal stage, the key should be in series with the r.f. choke and the following stages should be biased to cut-off with some source of fixed bias.

The 10-metre T20 and T55 plate coils should be wound as shown. The inductance of each should then be varied by compressing or expanding the coils (reducing or increasing the spacing between turns) until resonance is achieved with the minimum amount of capacity in the circuit which will permit proper tuning. In other words, the highest L/C ratios possible are necessary for best efficiency. The coils for all other bands will be correct if duplicated mechanically.

All of the grounds for each stage should connect together and to the chassis at a common point near the mechanical centre for that stage to make all leads as short as possible. The chassis measures 10 x 17 x 3 inches, and the layout should follow that illustrated as closely as possible.

The number of turns in the output coil coupled to L4 will depend upon





Right: A view of the power supply rack (circuit on left), which is built on a steel chassis measuring 10 x 17 inches.

POWER SUPPLY.

T1—400v. D.C. after filter, 150 m.a. or more; T2—1000v. and 750v. D.C. after filter, 250 m.a. or more; T3—5v. 3a.; CH—swinging input choke 150 m.a. or more; C1—4 mfd. 600v.; C2—2 mfd. 1500v.; X1, X2, X3, X4, X5, toggle switches.

the impedance of the feeders and the coupling method used. Coupling should always be to the cold end of the coil. All link coils coupled to L2 and L3 are one turn each.

The first two stages, the 6L6 and T20, make a satisfactory lower-power transmitter with an output of 40 to 45 watts from 20 to 160 metres and 15 to 20 watts output on 10. With suitable power supplies this would make an excellent portable transmitter. For 'phone work, the excitation to the T20 is sufficient for plate modulation.

AUDIO.

The speech amplifier shown was designed to have sufficient gain for any of the crystal microphones commonly used by amateurs, and to have enough power to drive any Taylor class "B" tube. In addition, the cost was kept as low as possible consistent with good performance, and all fancy circuit arrangements were avoided to assure best results with a minimum of complications.

6A3's were selected for use in the class "B" driver stage because low impedance triodes make the best class "B" drivers. Incidentally, pentodes and tubes with pentode characteristics such as 6L6's make the poorest class "B" drivers. The ideal class "B" driver tube would be a constant voltage tube. The 2A3 or 6A3 is the closest approach to a constant voltage tube available to the amateur today.

On the other hand, tubes with pentode characteristics are substantially constant current tubes, and are just exactly the opposite of what is necessary for best results. Where tubes of this type are used as drivers, it is common practice to load the driver tubes with resistance to improve the regulation. Such resistance, if used to improve voltage regulation, should be across the primary of the input transformer and not across the secondary. It is recommended that tubes be used with the correct characteristics for the job, rather than tubes be employed with inferior characteristics, and an attempt made to compensate for these deficiencies with degeneration or other methods.

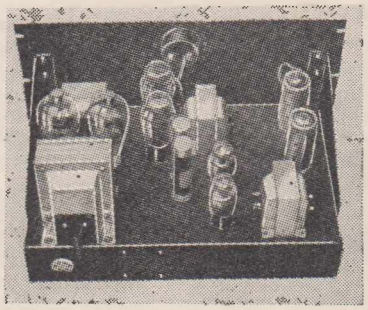
Cathode bias is used, since the output is adequate with the tubes operating class "A," and therefore fixed bias is not necessary.

It was decided to use a push-pull 76 stage and a low ratio transformer ahead of the 6A3's, so that if under unusual conditions the grids of the driver stage were driven positive, the resulting distortion would be limited to that caused by bias shift only, instead of the far more serious distortion which would result if a high impedance class "A" input circuit were used.

The 6C6 and 76 furnish the desired amount of voltage gain. The filter choke, decoupling resistors, and bypass condenser filter the plate supply so that even a fairly-high percentage of ripple in the power supply will not introduce hum in the amplifier.

The power supply voltage must be equal to the desired plate voltage, plus the bias voltage. A supply voltage of approximately 350 should be adequate.

The R.F. choke and C_1 are a filter to prevent R.F. from reaching the first grid. It invariably does so to an entirely satisfactory degree. Although a crystal microphone has high internal impedance, the .0001 mfd. condenser does not have any appreciable effect on frequency response because of the characteristics of the microphone. If R.F. is still present another .0001 mfd. condenser from grid to ground of the second stage may help.



A view of the modulator unit, which uses a pair of 6A3's in the class B driver stage, driving a pair of TZ20's.

In the speech amplifier-driver, the 6A3's are capable of far more output than is necessary to drive a pair of TZ20's, but a large ratio of available power to required power is desirable for best results.

Many amateurs are under the impression that a low impedance line is necessary between the class "B" driver and the modulator if they are some distance apart. Actually, class "B" grids are of low impedance, and the grid leads may be extended the necessary distance in shielded wire. A properly designed class "B" input transformer will be built so that the coupling between windings will be as tight as possible, to keep leakage reactance at the absolute minimum. This is extremely important.

If two transformers are used with a low impedance line connecting them, the leakage reactance must necessarily be higher than if only one transformer of equal quality is used. Consequently the use of a low impedance line may result in inferior results. If the use of a low impedance line is essential, best design would be to put at least the driver stage with the modulator and use the line where the design requirements are not as stringent.

Power Supply.

For the r.f. and modulator units three different voltages are necessary, 400 volts, 750 volts, and 1000 volts. The audio amplifier and crystal oscillator operate from the same 400-volt supply. Both the T20 buffer and TZ20 Class "B" stage operate at 750 volts, and the final stage at 1000 volts. In the smaller rack in which the transmitter was mounted originally, space was at a premium, and the largest chassis which could be accommodated was 10 x 17 inches. In addition, the height of the unit had to be kept to the absolute minimum. The 400-volt transformer is tapped for 400 or 500 volts at 175 m.a. The total drain for both speech amplifier and crystal stage is a maximum of about 150 m.a.

For the modulator, buffer, and final stage, one power transformer designed to deliver 750 and 1000 volts from the filter with choke input at a total of 250 m.a. is used to obtain both voltages. The final operates at 150 m.a., and the buffer at about 50 m.a. The no-signal plate current to the modulators is about 25 m.a. and swings to 60 or 70 m.a. for 100 per cent. modulation, so the average drain is about the maximum rating of the transformer.

The buffer could be operated from the 750-volt supply with the modulator, or from the 1000-volt supply through a dropping resistor. It was not operated from the 750-volt supply because of the inevitable fluctuation of voltage with change in modulator plate current. In the average amateur transmitter, the meters form the only method of checking performance, so the change in meter readings under modulation is extremely undesirable. As a result, the T20 buffer is operated from the 1000-volt final stage supply through a 5000 ohm 20-watt resistor. As a result all of the meters except those in the modulator plate and feeder stand still as they should under modulation.

Wherever possible, the Class "B" modulator power supply should not furnish power to any R.F. stage. If the same transformer is used for modulator and r.f., it is advisable to use separate filters for each. The same mercury vapor rectifier tubes may be used for both.

At the time this unit was built, no transformers to deliver 2.5 volts at 5 amps. for a pair of 866 Jr. were available. Because 5v. 3a. transformers for 83's are more reasonable than 2½v. 10a. transformers for 866's, they were used. The 866 Jr. filaments are connected in series. This is entirely permissible if the centre tap of the winding is connected to the common connection between the two tubes.

What's New In Radio

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

Mr. R. K. Stokes Now Managing Director Radio Suppliers Pty.

Mr. Keith Stokes, well known for many years as Managing Director of Radiokes Pty. Ltd., advises that he will trade in future as Radio Suppliers Pty. Ltd. His Sydney address is Third Floor, Wingello House, Angel Place. Telephone B 4557.

The new company will continue to control the manufacture and distribution of all Radiokes products, and as well will also be handling the selling rights of certain raw materials in which many of the trade will be interested.

According to Mr. Stokes, this new arrangement will mean that very early in the New Year large stocks of all Radiokes lines will be available in all main centres throughout the Commonwealth. With the new company specialising entirely in sales, excellent service with immediate deliveries can be expected.

★

Three New Permags. By Rola

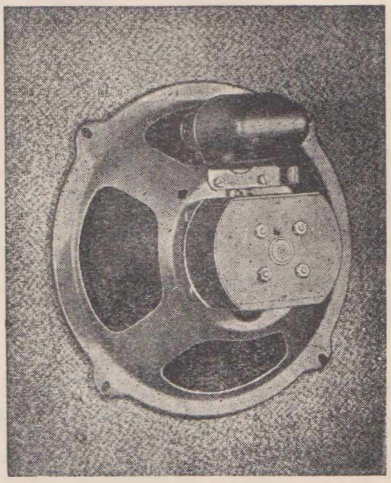
Rola (Aust.) Pty. Ltd. recently announced a new range of three Rola permanent magnet speakers. These are known as the models 8-42, 10-42, and 12-42, and have overall dimensions of 8, 10 and 12 inches respectively.

These speakers embody the latest developments in permanent magnet assemblies, which include 42 ounce alnico magnets, providing a higher flux density in the air-gap than has ever before been attained in commercially produced loud-speakers in Australia.

This high flux density in conjunction with 1in. voice-coils and special moisture resisting diaphragms has resulted in speakers of high sensitivity that will give the utmost sound output from economical battery operated tubes, and weak distant programs.

The high flux density also makes possible an improved transient response so necessary for the clear intelligible reproduction of words and syllables, this is considered of the utmost importance to the country listener who relies on his radio for news, market reports, etc.

Long and trouble-free service is assured due to the use of the well-known "Rola" patented methods of dust-proofing the vital working parts of the units. This is far more effective than the older method of enclosing the speakers in bags and has the added advantage that it does not impair the performance of the units.



The new Rola 10/42 permanent magnet model.

The speakers are also fitted with "Rola" Isocore transformers which embody a combination of electrical and mechanical principles that are new to loud-speaker transformers and are designed to eliminate electrolysis. This valuable feature makes Isocore transformers especially suitable for humid climates when efficient trouble-free performance depends so much upon protection of such vital parts from moist atmospheric conditions.

In addition to their application to battery receivers these speakers will no doubt be found very desirable for public address installations where a high quality unit is desired, because

apart from the fact that the field coil leads, which would be necessary in the case of electro-dynamic units, are dispensed with, a higher flux density is available in these units than is possible with similar electro-dynamic models.

The retail prices of these units are:

Model 8/42 .. .. 61/-
Model 10/42 .. .. .. 65/-
Model 12/42 .. .. .. 72/-

A point worthy of mention here is that these new speakers are ideal for use with receivers employing the new 1.4-volt valves. The larger of the output pentodes in this series has an output of 250 milliwatts. Though this is a fairly low figure, the extremely high efficiency of these new speakers enables more than sufficient volume to be obtained for all ordinary domestic purposes.

★

Raymart Variable Selectivity I.F.'s. Now Available

Up to the present it has been impossible to design a receiver which gives high fidelity reproduction, coupled with a high degree of selectivity when required, without incorporating expensive variable selectivity transformers with coils moved mechanically. The new Raymart i.f. transformer kit overcomes this by using the latest American development in this field.

It now becomes possible to obtain two band-widths at the flick of a switch, one giving full 9 k.c. acceptance and the other 2 k.c. acceptance only for reduction of interference. The iron core provides an extremely high i.f. gain, while the price is less expensive than that of many straight i.f. transformers.

A new line of Raymart air-trimmed i.f. transformers is also now available. These high "Q" transformers have latest pie windings of litz, treated to prevent moisture absorption. Their absolute stability makes them ideal for communications receivers.

Full details of these and other Raymart lines are obtainable free on request from Messrs. John Martin Pty. Ltd., 116-118 Clarence Street, Sydney. Incidentally, this firm has just announced their appointment as distributors for the well-known American United transmitting valves. The following types are available from stock:—303A, 305D, 310, 311, 311T, 342B, 914, 911CH, 930, 930B, 938, 941, 942, 945, 949, 952, 966, 966A and 972A.

★

In "Radiotronics" No. 92.

The release of Radiotron 813—a beam power tetrode for transmitting purposes—is announced in the latest issue of "Radiotronics" (Technical Bulletin No. 92), published by A. W. Valve Co. Pty. Ltd.

Having a maximum plate dissipation of 100 watts, the 813 is in class "C" telegraphy capable of an output of 260 watts, while as a plate-modulated amplifier it may be used to give a carrier output of 175 watts.

A further article (re-printed elsewhere in this issue) gives details of the new 6K8G converter, and discusses its use in a typical six-valve circuit.

Other articles include "Calculation of Grid Bias for Resistance-Coupled Amplifiers," and "Low Voltage Operation of Radiotron 913—a Trouble and Its Cure."

It is also announced that limited stocks of the new 1.4 volt series valves are expected early in December. Incidentally, a receiver using these valves will be described shortly in "Radio World."

A new metal-envelope series of valves has also been announced, in which the grid connection normally taken to the top cap is taken to one of the base pins. This series comprises the 6SF5 high-mu triode, 6SJ7 r.f. pentode, 6SK7 super control r.f. pentode, and 6SQ7 duo-diode high-mu triode. These valves have applications similar to those of types 6F5, 6J7, 6K7, and 6Q7, the addition of the "S" being to indicate the single-ended construction.

★

Vidor "Show Boat" Portable

Illustrated below is the new Vidor "Show Boat" portable radio briefly reviewed in last month's "Radio World." A four-valve broadcast superhet, it is extremely compact, measuring only 11½ x 10⅞ x 7 inches

overall, and weighing only 20lbs. complete with batteries.

This portable is handled in New Zealand by Messrs. F. J. W. Fear & Co., of 31 Willis Street, Wellington, from whom further details are available free on request.

★

Eight-Page IRC Resistor Catalogue

Perhaps the widest range of fixed and adjustable resistors carried in any one make in Australia is the LRC range, handled by W. J. McLellan & Co., of Bradbury House, 55 York Street, Sydney. Type "BT"

insulated metallised resistors are available in ½-, 1- and 2-watt ratings, with minimum resistances, respectively, of 250, 500 and 750 ohms, and a maximum resistance in all cases of 20 megohms. For ranges lower than the minimums quoted, types BW½, BW1 and F2 can be supplied.

Other IRC resistors available for special applications are the type "WW" multipliers and shunts, type "M" motor noise suppressors, and the power wirewound resistors in ratings ranging from 5 to 200 watts, and designed to fulfil all radio, industrial and electrical requirements.

Types of IRC resistors available, with complete characteristics, are listed and illustrated in an 8-page catalogue that is available, free and post free, to "Radio World" readers from the address given above.

★

New Ever Ready Calendar

The reputation that the Ever Ready Co. (Aust.) Pty. Ltd. has built up over recent years for artistic calendar productions is fully maintained for 1939 by the particularly striking design reproduced in miniature below.

Printed by the offset process in natural colours, and depicting a typically Australian girl against a background of sunshine and surf, there is no doubt that it will be received by the trade as enthusiastically as its predecessors.

Over 7000 of these calendars will be mailed to radio and electrical retailers in Australia during December.

★

New N.Z. Technical Radio Mag.

The first issue of a new technical radio magazine—"Fear's Radio Review"—is now off the press, and is being distributed free to set-builders and amateur transmitters throughout New Zealand.

The first issue contains complete constructional details, with photographs, of a five-band 'phone and c.w. transmitter, covering from 10 to 160 metres. Details are also given, with prices, of latest American lines.

Messrs. F. J. W. Fear & Co. advise that this issue is presented to readers with the assurance that it is merely an introductory number. It is hoped to make succeeding issues more attractive—of double and treble the number of pages, and with a much wider variety of constructional articles.

Readers wishing to obtain this and future issues free of charge are invited to forward their names and ad-

dresses to Messrs. F. J. W. Fear & Co., 31 Willis Street, Wellington, N.Z. ★

Philips "Chair-side" Radioplayer Has Many Striking Features

Lately there have been quite a few departures from the conventional in radio receiver design, but few of these have proved such a qualified success as the Philips Radioplayer "Chair-side" model 1362, submitted recently to "Radio World" for test.

Philips Model 1362 "Chair-side" Radioplayer.

The design, construction, and finish throughout both receiver and cabinet are excellent, the general appearance as shown in the illustration above being most attractive.

While primarily designed for placing alongside a lounge chair, the 1362 can equally well be located against the wall, as with the more conventional console. The four controls—tone, tuning, volume and wavechange—are located along one edge of the cabinet, of which the centre portion is recessed to accommodate a sheet of plate glass.

The tuning dial is the well-known Philips "Twilight," carrying zoned broadcast calibrations and shortwave calibrations over the band from 13.5 to 43 metres. The dial, which is of the edgelit type, has a scale measuring approximately 8in. x 6in., the pointer moving through 270 degrees.

Valves used in the chassis comprise one 6D6 r.f. amplifier, one EK2 octode frequency converter, one 6D6 i.f. amplifier, one 75 second detector, a.v.c. rectifier and audio amplifier, one EL3 high gain output pentode with inverse feedback, and one 80 rectifier.

Separate Power Pack Unit.

Considerable amount of attention has been paid to ensuring permanence of alignment of the coil assembly. Another noteworthy feature is the chassis assembly and mounting that has been evolved to suit the cabinet employed. The main receiver chassis is vertical, and when the cabinet back is removed the under-chassis wiring is exposed, a detail that should greatly facilitate any service adjustments. The power pack is mounted on a separate chassis located at some distance from the receiver proper, and is joined to the latter by a four-wire cable.

As might be expected from the valve line-up, and from the obvious care that has been taken in the engineering of this receiver, its performance is exceptional. Sensitivity is high and noise level low, resulting in an unusually good effective sensitivity. As well, both selectivity and stability are of a high standard, while the quality of reproduction obtained (the output pentode employs the well-known Philips "audioscopic" system of inverse feedback), is comparable with that obtainable from a receiver using power triode output.

Bright Xmas Souvenir Issue Of "Vesta Vamp"

The "Vesta Vamp," published monthly by Vesta Battery Pty. Ltd., is well known throughout the radio trade as one of the brightest and most informative of house organs in Australia. The Christmas number just published is a special souvenir issue planned to commemorate the tenth birthday of the organisation.

The Vesta company commenced operations ten years ago as a two-man business in a shed in Sydney, and its phenomenal growth is illustrated in the centre two-page spread of this latest issue of the "Vamp." Here the ramifications of the company are shown on a map of Australia and New Zealand, the portraits of branch managers and key executives being included in the localities where they operate.

Wrapped around this central feature is an enlarged "Vesta Vamp," built up with special features appropriate to a Christmas souvenir issue designed for permanent reference. Jokes, cartoons, and a fine Christmas story strike the seasonal note, while as well there are articles on the growth of the company, and dealing with Vesta products and policy.

Altogether, the admirable combination of workmanlike advertising and publicity features, with lively entertainment items and artistic production, in this special issue of the "Vamp" make it a rare and highly successful one. It should be certain to achieve the results aimed at by the progressive organisation which has proposed it.

★

New Ever-Ready Managing Director

Mr. Albert Jewell has been appointed managing director of the Ever Ready Co. (Aust.) Pty. Ltd. as from November 17, in lieu of Mr. R. P. Walter, who resigned on that date.

★

Acorn Shift To New Premises

Acorn Pressed Metal Pty. Ltd. announce that during the Christmas holidays their business will be transferred from the present address to larger and more convenient premises situated in Marshall Street, Surrey Hills ('phone FL 5191).

★

"Schick" Shaver Has Exclusive Patented Head.

Amid the increasing number of electric dry shavers appearing on the Australian market, there are only one or two shavers with sufficient organisation and experience behind them to really ensure the buyer of a guaranteed time-tested product.

Colonel Schick, the inventor of the Schick dry shaver, spent more than

twenty years in study and experiment with skin, hair and shaving, and developed literally dozens of shearing heads (the most important part of the electric shaver) before he evolved the shearing head now embodied in Schick shavers.

After putting in hand the patents on the shearing head, machines and methods were found to produce Schick shavers in large quantities, and now after seven years of successful marketing there are 2,000,000 Schick shavers in use all over the world.

★

Maynard Homerecorder Unit.

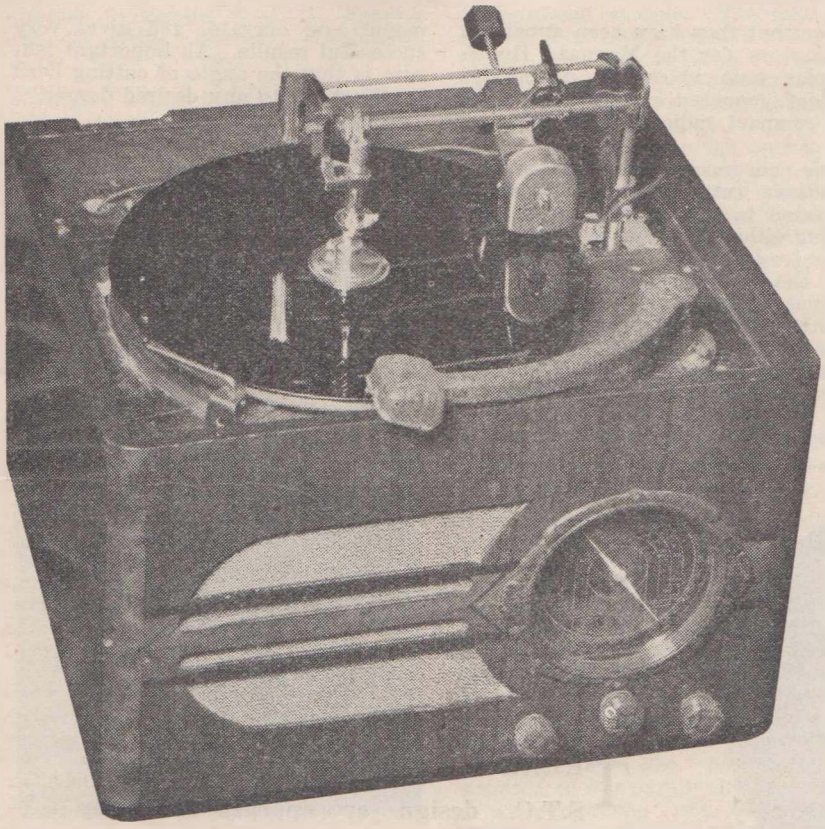
Messrs. John Martin Pty. Ltd., of 116-118 Clarence Street, Sydney, announce that they have been appointed distributors for the Maynard Homerecorder unit which is illustrated overleaf, mounted on the motorboard of a compact radiogram combination.

This new recording unit has a high impedance cutting head, and can be connected to any radio receiver employing either single or push-pull output valves. In the first case, one lead from the cutting head is connected to the plate through a 1 mfd. condenser, and the other is connected to earth, while in the case of push-pull output, a lead is connected to each of the two plates through a .5 mfd. condenser.

The unit is particularly simple to mount and operate, and gives very successful results. An important feature is that the angle of cutting head is adjustable to any desired degree.

Larger models for cutting up to 12in. and 17¼in. records are also available, with a range of recording blanks in diameters extending from 6in. to 17¼in. Other accessories carried include a variety of cutting heads, and steel, sapphire, and diamond cutting needles.

Full details of the complete range of Maynard recording equipment are available free on request from Messrs. John Martin Pty. Ltd. at the address given above.



The Maynard home recording unit (reviewed on the previous page) is shown here mounted on the motor-board of a compact table model radiogram.

VK2ME, 3ME And 6ME — Schedules For December

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

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

	Sydney Time.	G.M.T.
Sundays:	4-6 p.m.	0600-0800
	8 p.m.-midnight.	1000-1400
Mondays:	Midnight-2 a.m.	1400-1600

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

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

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

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

Home Recording

(Continued from page 22.)

of the stylus may be considerably impeded by the mass of thread.

Except for the rare pre-grooved type, all discs require some form of mechanical control over the cutting head so that the stylus may be moved sideways over the surface of the blank, the spiral groove thus formed beginning at the outside of the disc and finishing at a point about 2½" from the centre.

It may well be noted, however, that is reversed, and is done from the inside of the blank towards the edge. It is claimed that in these machines the thread collects itself around the centre, and also that the play-back pick-up will stay in the final groove and will not run over the record as it may in the edge-started type.

The head is generally moved sideways by a threaded rod, which may be driven in various ways—directly by the motor, from the edge of the disc, or from the centre of the spindle. Whatever system is used, no slip is permissible, as any speed variation will cause an off-frequency effect which is particularly noticeable in recordings consisting mainly of single instruments or voices.

Most direct recorders are arranged to cut about 80 to 90 grooves to the inch at the standard turntable speed of 78 r.p.m., although many will also cut the larger discs (16") at 33⅓ r.p.m.

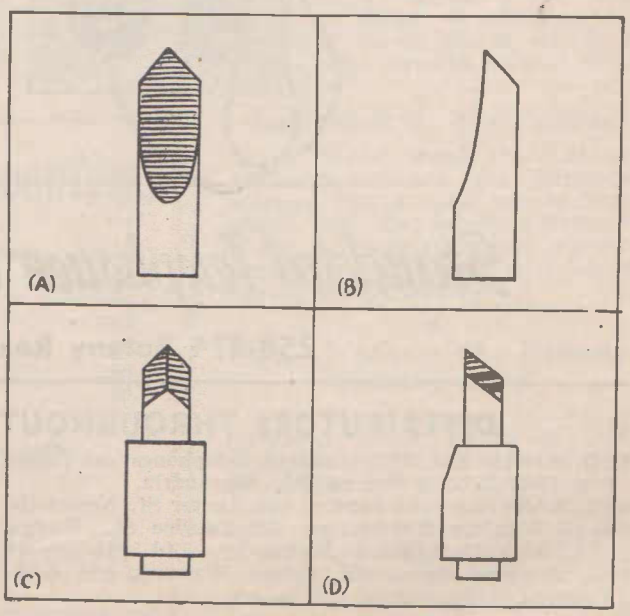
★

Enlarged sketches of a steel cutting stylus are shown in "A" and "B," while "C" and "D" show corresponding views of a typical sapphire stylus.

★

At the slower speed a much longer playing time is available, although many troubles may be encountered, and the enthusiast would be well advised to master the 78 r.p.m. speed first.

(To be continued next month)



The All-Wave All-World DX News

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

★ ★

QSL Exchange Bureau.

The following readers would like to exchange QSL cards with members of the DX Club:—

Leonard D. Hubbard, 17 Patten Road, London, S.W.18, England.

Oscar Westman, 24 Lawrence Road, Maitland, Cope Town, South Africa.

Ben Follrath, 1419 Pearl Street, Alameda, California, U.S.A.

Emily Griswold, 326 No. Main, West Hartford, Connecticut, U.S.A.

Malcolm N. Wicks, "Elmsdale," Balhannah, South Australia.

O. G. Washfold (AW257DX), 59 Radnor Street, Camberwell, E.6, Melbourne, Victoria; O. D. Marks (AW-428DX), 30 Scott Street, South Fremantle, Western Australia.

Mrs. M. M. Anselme (AW307DX), B. Christofferson (AW361DX), Poole Messrs. G. M. Anselme (AW250DX), 16 Hartley Street, Rozelle, Sydney; 16 Hartley Street, Rozelle, Sydney; Street, Bowen, Nth. Queensland.

Syd. E. Molen (AW213DX), Box 8, Kingaroy, Queensland.

Mr. F. J. Rooke (AW429DX), c/- G.P.O., Box 219, Fremantle, W.A.

Mr. R. E. Lee Hunt, 1105 N., Harmen Avenue, Danville, Illinois, U.S.A.

Mr. F. Bluett (AW167DX), P.O. Box 8, Midhirst, Taranaki, New Zealand, writes that owing to illness some SWL's did not receive his card. He now has a new card and QRA's would be appreciated.

Mr. B. Christofferson (AW361DX) advises that his new QRA is C/- Garbutt's Flats, Stoke Street, Townsville, Queensland.

DX Notes And News

304 New Loggings In Two Months.

During October and November I logged 304 s.w. stations: 201 VK's, 35 W's, 30 K6's, KA1AP, KA1AT, KA1JM, VR6AY, GSO, PCJ, FIQA, TPA2, LV4BC, PK2AY, PK2WL, PKDJJ, K7FFT, VEQFI, G2AI, JZK, VU3AR, ZL4BK and others.

I have just received a veri. in the form of a letter from Radio Tananarive, Madagascar. Their frequency is shown as 6063 k.c., and it appears as if their call sign is not FIQA but TSF. The letter was written on October 7, and bears the Chief Engineer's signature.

My receiver is a two-tube a.c. using a 6C6 impedance coupled to a 6F6 in the final. The antenna is a ½-wave 20-metre. — D. Newton, Castlemaine, Victoria.

Amateur Verie. From Indo-China.

Verifications lately received are from Hawaii Isles, U.S.A., Peru and Indo-China, the latter being from Rene Lebon, Box 13, Hanoi. He is the operator of FI8AC. There are only a few amateurs in Indo-China, so details of his station should be of interest. Receiver H.R.O., transmitter being four-stage crystal-controlled 50 watts input to final, and the antenna half-wave Zepp. With this rig FI8AC has worked 93 countries, 36 zones and W.A.C.

Reports were sent this month to Argentine, Chile, Fed. States of Malay, British New Guinea, Hawaii, U.S.A., Dutch Indies and Japan, but South Africa is still the "dark continent" as far as my locality is concerned. Loggings this month include K6's LKN, ILW, MTP, DTT, OGN, GQF, K5AF, KGU, W6LYY, W6MYD, W2FAM, KA1JN, J2MI, PK6XX, VK9WL and dozens of VK's. No November 20, RNE, Moscow, came in at the most perfect reception I have yet heard—QSA 5, R max., modulation perfect, and for a wonder no QRM, QRN or QSB.—Gordon Young (AW-245DX), Brisbane, Queensland.

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.]

Ultra-High-Frequency Conditions Good ★ 11 Metre Stations At Good Strength ★ All The Latest Information Regarding New Stations And Schedules ★ Reports From Observers In All States ★ Tuning Guide.

Interesting Month On U.H.F. Bands. —8.4m. Station Logged.

A feature of reception during the past month has been the splendid reception conditions on the U.H.F.. bands. This has been more especially the case with the 11-metre band, on which good signals have been audible on most mornings. The two latest stations to be logged are **W9XA** and **W2XJI. W9XA**, located in Kansas City (c/- Commercial Radio Equipment Co.), operates on 11.33 m., and has been putting in a very strong signal at times. **W2XJI** (Bamberger Broadcasting Service, 1440 Broadway, New York) has only been heard once, on December 3, and on this occasion signals were not very strong, and were a trifle difficult to follow. Other 11 m. loggings include the following:—**W9XJL**, 11.49 m.; **W9XUP**, 11.56 m.; and **W9XAZ**, 11.36 m.

The 9.49 m. channel has not been so interesting, signals failing to come up to expectations. Only **W9XPD**, St. Louis, has been worth logging.

However, in the last week of November, a really interesting catch was logged on **35,000 k.c., or 8.4 m.**—the highest frequency broadcaster reported in this country to our knowledge. This was station **W9XUY**, Omaha, Nebraska. This station was heard from 10 a.m. till noon at R4-5.

It is reported that there are three new transmitters on the 11 m. band. These are **W8XNU**, Cincinatti, 25,950 k.c., 11.56 m. (same freq. as **W6XKG** and **W9XUP**); **W2XKI**, Newark, 26,300 k.c., 11.4 m.; and **W3XEX**, Norfolk, 26,005 k.c., 11.53 m. As yet we have been unable to check the authenticity of this report.

The police bands have been very poor. This is probably on account of the reorganisation of the police transmitters which was hinted at in these columns previously. It is now believed that police transmissions will be conducted on a cross-band system with headquarters stations on 175 or 125 metres, and the mobile transmitters on 8 metres. Just at present a few isolated signals are to be heard on the old 9 metre bands, amongst them being Newark, now using the call **WQIE.**

★

Latest Overseas Station Information.

Austria.

OER-2, 49.4 m., and **OER-3**, 25.4 m., are still on the air relaying programmes from Reichsender Wein. It is also reported that two new transmitters are planned—**OER-4**, 31.35 m., and **OER-5**, 19.75 m. All these stations will be using a power of 50 k.w.

Call.	Location.	Old Freq.	& W/L.	New Freq.	& W/L
HJ7ABD	Bucaramanga	9630	31.14	4815	62.29
HJ1ABP	Cartagena	9616	31.20	4805	62.41
HJ6ABH	Armenia	9520	31.51	4875	61.48
HJ6ABB	Manizales	6105	49.16	4855	61.8
HJ3ABX	Bogota	6013	49.8	4795	62.5
HJ5ABD	Cali	6085	49.3	4825	62.2
HJ3ABH	Bogota	4900	61.19	4895	61.25
HJ4ABP	Medellin	4880	61.44	4885	61.38
HJ3ABD	Bogota	4841	61.95	4845	61.92
HJ7ABE	Bucaramanga	4820	62.24	4775	62.82
HJ1ABE	Cartagena	4800	62.46	4835	62.03
HJ1ABB	Barranquilla	4780	62.72	4785	62.66
HJ2ABJ	Santa Marta	4660	64.3	4865	61.6

Bechuanaland.

ZNB, 50.84 m., has adopted a new schedule—4-5.30 a.m. QRA is P.O. Box 106, Mafeking.

Burma.

Radio Burma, Rangoon, now transmits simultaneously on 49.9 and 80.6 m. Latest schedules are: Daily exc. Monday, 10.15-1 a.m. and 1-2.30 p.m.; Mondays, 1-2.30 p.m. Power 1-2k.w. At the present moment no call sign has been allotted, although an application has been made to the Bern Bureau for the use of XYZ and XZZ.

Chile.

CB1180, Santiago, operated by the Sociedad Nacional de Agricultura, has been testing in preparation for a change of frequency. At present it is being reported on 25.47 and 25.0 m. All reports verified—there is no need to include an IRC. QRA is Casilla 40-D.

CB946, 31.71 m., will soon go on the air at Santiago. Will be known as "Radio Basquedano." Operated by Markoff Bros. Ltd.

CB1174, Santiago, 25.55 m., is another Chilean station recently reported on the air. Operated by Orlandini and Taggio Ltd., it uses a power of 1k.w.

CB1190, Valdivia, has shifted from, 11900 k.c. to 11,910 k.c., to eliminate QRM from XEW1.

Colombia.

The gradual process of transferring the Colombian transmitters to the 60 m. band is nearing its completion. The latest list available lists the following frequency shifts:—

The following stations are not included in the above list, and it is not known if they are to be changed to 60 m. frequencies, if they are to leave the air, or remain as shown.

Call. Location.	Freq.	& W/L.
HJU—Buenaventura ..	9510	31.55
HKV—Bogota	8795	34.1
HJ4ABU—Medellin ..	8650	34.7
HJ4ABE—Medellin ..	6145	48.79
HJ3ABF—Bogota ..	6070	49.42
HJ6ABR—Pereira ..	6054	49.52
HJ1ABG—Barranquilla	6042	49.65
HJ1ABC—Quibdo	6000	50.0
HJ2ABC—Cucuta	4790	62.59
HJ6ABC—Ibaque	4740	63.25

HJ7EAB, Bucaramanga, is a new transmitter on 63.3 m. It relays **HJ7EAK**, signing at 1.10 p.m.

HJ7ABB, Bucaramanga, is another newcomer, relaying **HJ7ABA**. This station, "Radio Santander," operates on 62.8 m. QRA is Apartado 37.

Costa Rica.

TIEMC, the new station referred to last month, is reported to be operating on 48.87 m., and not 29.8 m. as previously stated.

TI2RS, "Radioemisora Athena," 40.2 m., is the latest Costa Rican. It is on the air daily except Monday from 12.30-2 p.m.

Cuba.

COCM, Habana, has been wandering all over the dial—quite a common characteristic of Cuban stations. Listed on 30.41 m. (9865 k.c.), it has been reported recently on 8780, 9820 and 9855 k.c., or 34.1, 30.5 and 30.44 m.

Dominican Republic.

HIG, Ciudad Trujillo, states that it now operates on 32.29 and 47.67 m. Power 150 watts. Schedule extended one hour, station now closing at 12.40 p.m.

S.W. stations relaying **HIX**, Ciudad Trujillo, are **H13X**, 17.2 m., **HI1X**, 47.32 m., **HI2X**, 25.08 m., and **HI3X**, 19.63 m. **HI3X** is not on a regular schedule, being used only for special broadcasts.

Note the following seldom-listed Dominican stations: **HI5E**, 31.41 m., Cuidad Trujillo; **HI5P**, 45.7 m., Puerto Plata; **HI6H**, 45.3 m., Ciudad Trujillo; and **HI5G**, 45.1 m., La Vega.

Denmark.

Denmark is being heard on a new frequency near 17,930 k.c., 16.7 m. Copenhagen has been heard over **OZH**, **OZG** and **OZF**.

Ecuador.

HCJB now has a wide range of frequencies. Usually it operates on 33.5 and 72.99 m. It also transmits religious programmes on 48.13 m., 41.4 m., 24.1 m., and 20.8 m. These latter broadcasts are made at irregular intervals.

HC2CW, Guayaquil, has changed frequency from 9280 to 9300 k.c. Address is P.O. Box 1166.

Ethiopia.

The latest frequency on which Addis Ababa is operating is 9520 k.c., 31.51 m. Heard from 4-6 a.m.

Fiji Islands.

VPD, Suva, has added a number of new wavelengths. In addition, its power is up to 10 k.w. Watch for it on 19.79, 25.22 and 48.94 m.

Guatemala.

TGWB, Guatemala City, 46.2 m., is a new relay station for **TGWA**.

TG2X, Guatemala City, 50.47 m., is reported off the air.

TG-2, Guatemala City, has shifted to 48.48 m.

TGS has completed a long period of testing, and is now carrying out a regular schedule on 51.81 and 25.9 m.

Haiti.

HH2S, Port-au-Prince, has shifted to 50.4 m. Schedule is from 10 a.m.-1 p.m. daily except Monday. From 11.30 a.m.-12.45 p.m. the programme is entirely in English.

Hungary.

HAS-6, Budapest, 13.8 m., is a new station in this country.

Switzerland.

Switzerland now has a short-wave broadcasting station and therefore will not need to transmit its overseas programmes over the League of Nations' stations. The new station is in charge of the Director-General of Posts and Telegraphs, Radio Division, at Bern. At present experimental broadcasts are being carried out on 31.46 m. from 4-5 a.m. (except Mondays and Tuesdays). In addition it is thought that 19.53 and 25.27 m. channels are being tested. No identification signals are employed, and as yet no call letters have been assigned. Power is about 300 watts.

Lithuania.

Information from the Chief of Radio Section, Director-General of Posts and Telegraphs, Kaunas, Lithuania, indicates that irregular tests are being conducted over **LYR** on 32.2 m.

It is believed that four new stations are being planned—**LYZ**, 48.98 m.; **LYZ-2**, 31.5 m.; **LYZ-3**, 25.21 m.; and **LYZ-4**, 19.61 m.

Mexico.

XEGW is the new call of the station previously known as **XEPW**, 49.1 m.

XEW1 has increased its power on 25.2 m. Also uses 49.84 m. allocation on occasions.

New Zealand.

ZL2ZB testing on 43.1 m. is being heard well. Address is Hope Gibbons Building, Dixon Street, Wellington C1.

New transmitters to be installed at Wellington with the calls **ZLT** 1 to 6 inclusive will operate on 49.3 m., 31.45 m., 25.47 m., 19.63 m., 16.88 m., and 11.6 m., respectively.

Paraguay.

ZP-14, Villarrica, is now transmitting on 49.8 m. Is on the air from 5-8 a.m. Tuesdays and Thursdays,

and 2-8 a.m. Sundays and Mondays. Known as "Radio Cultura."

Spain.

Radio Nacional, Salamanca, key station of the Nationalist network is relayed by **EHZ**, Tenerife, on 28.93. (N.B.—Call is definitely EHZ, not EAJ43 as sometimes thought, as the Tenerife station is not a broadcasting station, but a radio telephone transmitter used for relay purposes.) The Salamanca programme is relayed by a large number of 40 m. transmitters located chiefly at Valladolid.

Turkey.

Radio Ankara on 31 m. now uses the call **TAO**, as also does the 19 m. transmitter.

United States.

A new 11-metre station is **W9XH**, South Bend, Ind., relaying WSBT/WFAM on 11.3 m.

Los Angeles will soon have another 9.49 transmitter. ..The CBS station **W1OXE** at Boston will be transferred to the West Coast.

W3XAL will use new allocations on 31.02 and 13.9 m. at once.

Venezuela.

Following is the very latest list of Venezuelan stations available.

Call.	Location.	Wavelength. (metres)
YVQ	Caracas	44.95
YV4RB	Valencia	45.98
YV1RN	Maracaibo	46.13
YV6RC	Ciudad Bolivar	46.73
YV5RH	Caracas	46.88
YV5RF	Caracas	46.99
YV1RH	Maracaibo	47.19
YV4RD	Maracay	47.62
YV5RP	Caracas	47.79
YV5RJ	Caracas	47.88
YV1RG	Valera	48.13
YV1RI	Coro	48.28
YV5RC	Caracas	50.27
YV1RL	Maracaibo	50.52
YV4RE	Valencia	50.71
YV3RA	Barquisimeto	51.0
YV1RB	Maracaibo	51.3
YV5RR	Caracas	51.4
YV1RE	Maracaibo	51.46
YV5RM	Caracas	59.9
YV6RU	Ciudad Bolivar	61.44
YV2RN	San Cristobal	61.55
YV3RN	Barquisimeto	62.24

Slogan.
"Radiodifusora del Gobierno Nacional"
"La Voz de Carabobo"
"Radio Maracaibo"
"Radio Bolivar"
"Ondas Populares"
"La Voz de Venezuela"
"Ondas del Lago"
"La Voz de Aragua"
"La Voz de la Philco"
"La Voz dela Esfera"
"Radio Valera"
"Radio Coro"
"Radio Caracas"
"Radio Popular"
"Radio Valencia"
"La Voz de Lara"
"Ecos del Zulia"
"Estudios Universo"
"Radiodifusora Maracaibo"
"Radiodifusora Venezuela"
"Ecos del Orinoco"
"La Voz del Tachira"
"Radio Barquisimeto"

Reports From Observers

Mr. A. R. Payten (Coff's Harbour, N.S.W.).

Although there is nothing really startling to report this month, conditions are certainly better than they have been, despite the fact that QRN is nearly always troublesome in this locality. Generally speaking, there has been a definite improvement on the 16 and 19 m. bands, and an equally definite falling off on 49-50 m.

Interesting loggings of the month include the following. On 31.3 m. a description from Philadelphia of a football match between Army and Navy was logged at good strength (QSA5, R9). This was heard on November 27 between 5 and 6.50 a.m. The match was played in the snow, before a crowd estimated at 102,000. After 6.55 a.m. signals faded rapidly and no station announcements were heard, but the station would almost certainly be **W3XAU.**

Also Radio Ankara, **TAO**, on 31.7 m.; **DZC**, 29.16 m., and **DZB**, 29.87 m.; and Vatican City, **HVJ**, on 49.75 and 19.83 m.

Following are the regular broadcast stations heard:—

16 m.: **W3XAL** (improving daily), **GSG** and **DJE.**

19 m.: **JVF, W2XE, YDB, GSI, GSO, DJQ, HVJ, GSF** and **RKI.**

25 m.: **VLR-3, OLR4A, JZJ, GSD, DJD.**

27 m.: **PLP, CSW-2.**

28-29 m.: **JVN, PMN, DZC, DZB.**

30 m.: **EAQ, COCM, COCQ.**

31 m.: **2RO, PCJ, 2ME, VLR, W3XAU, JZI, HS8PJ.**

44 m.: **PMH.**

49 m.: Vatican City, **HVJ.**

Amateur loggings between 4 and 5 a.m., and during the early evenings include the following on 20 m.: **F8XT, ZS6EB, VQ4KTB, PK6XX** (Portable), **OA4AI, FB8AD, J2MI, KA1JP, KA1ME, K6OQE, K6DTT, ZS6EO,** and **TI2FC.**

Mr. J. Ferrier (Coleraine, Victoria).

UHF DX has been only fair this month except for one or two days when 10 m. was really good. 11 m. has been fairly good, much better than 9 m.

The amateur band, as mentioned above, was quite good on one or two days. Following are the best loggings:—

Canada: **VE- 5VO, 4BF, 4LO, 5AEZ** and **5GQ.**

Southern Rhodesia: **ZE- 1JZ.**

Burma: **XZ- 2EZ.**

Europe: **HB9CZ** (Switzerland), **ON4ZA** (Belgium), **G- 8MA, 8JV, 6KL, 2IS, 6LL, 6WX** (England).

Egypt: **SU- 1MW, 1RO.**

D.E.I.: **PK- 2WL, 1VY.**

Philippine Is.: **FA1ER** (15 watts).

Hong Kong: **VS6AO.**

(Splendid DX, OM, 10 countries listed on 10 m. phone.—S.W. Ed.)

Mr. W. H. Pepin (Maylands, West Australia).

For a few weeks DX reception has improved on all bands, although QRN has been more troublesome than is usual, extending down as far as 13 m.; whilst above 50 m. reception of even the very strongest signals is all but impossible.

13 m.: **GSJ** and **GSH** are the best stations, the former being much the better of the two.

14-15 m.: In this area several good phone stations have been logged:

KAX, 14.01 m., phoning Tokyo; **JVA**, 15.7 m., phoning Bandoeng; and **PLE**, 15.9 m., phoning Tokyo.

16 m.: **DJE** and **GSG.** Also on 16.87 an American which I believe to be **W3XL** and not **W3XAL.** Heard from 7 a.m.-mid-day (Perth time), with frequent announcements in several languages.

19 m.: The usual regulars; also an unknown Hawaiian station on this band around 10 a.m. one Sunday.

25 m.: **DJD, GSD, TPA-4, W8XK** and **JZJ.**

27-29 m.: **PLP** and **PMN** put in really remarkable signals—remarkable for both strength and clarity.

31 m.: Band has been marred by exceptionally high noise-level at night. In the mornings **GSC, GSB,** and **COCX** are best.

The amateur bands are just fair. 10 m. phone loggings include **W6MKF, W6GCX, W6LSO, W6ITH, XZ2EZ, PK2WL, VK2GU** and **VK2HF.**

On 20 m.: **PK4HS, KA7HB, CO7CX** and **PK1TT.**

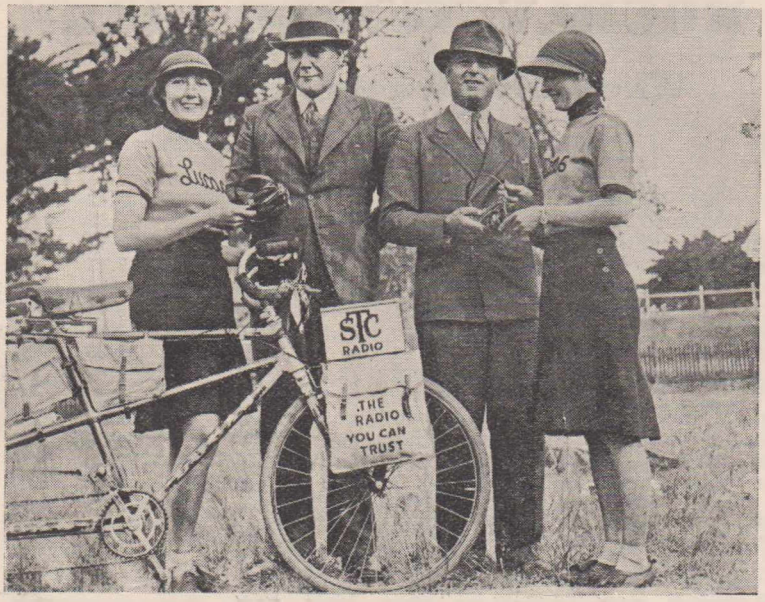
Mr. J. K. Sorensen (Gympie, Qld.).

Back in Gympie again, and able to settle down to some DX work. Have found conditions very different. Just at present there are many stations audible during the afternoons, but conditions are poor in the early evenings, only the Australians, **JVN** and Daventry.

QRN is very heavy and practically prevents any listening on the lower frequencies.

ZLT-1 has been heard a number of times in the early afternoon phoning Sydney and London.

On 25 m. of a daytime **VLR-3** is very strong, putting in much stronger signals than are heard from the 31 m. transmitter at night.



In happy mood, the Tandem Girls, who have averaged over 100 miles a day on their record-breaking return ride from Sydney to Perth, are here seen with Mr. Tom Court, S.T.C.'s designs engineer (left), Mr. Reg. Mills, S.T.C.'s radio manager in Victoria—and a pair of the new S.T.C. headphones.

The amateur bands are poor; on 20 m. only a few W's and K6's.

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

Since writing you last regarding my new antenna (2½ waves in phase, 16ft. 1½ins. aside, feeders 8ft. long and spaced 6ins.) I have found that it gives very satisfactory results when only a ½-wave high—i.e., 36ft. As a matter of fact it is practically as good at that height as it is at 68ft. high, the only difference being that the noise-level is slightly less at the latter height. I have just started work on yet another antenna—a rotary beam using a W8JK beam—this will take some time to complete and will probably not be in use till next year.

DX conditions have not been very good this last month, especially above 40 m., where the noise-level has been exceptionally high. Running through the various bands, I have found the 25 and 31 m. bands very good in the mornings until 8 a.m., when they fade out very rapidly; 10 and 11 m. have been very poor; 13 m. good from 9.30 p.m. till midnight, with GSJ strong; 16 m. only fair; 20 m. very erratic until midnight when a fair number of Europeans and Indians can be logged; 25 m. good from 10 p.m., with CR7BH very good from midnight till 1.15 a.m.; on 31 m. the noise-level has been very high in the early part of the evenings, although later KZRM and VUD are good.

Best amateur loggings are listed below:—

5 metres: VK5JT, VK5LX and VK5HM.

10 metres: ZL1HY, ZL1AJ, J3FJ, KA1ER, W6NWK (portable on board the M.S. "City of Dalhart," 800 miles N.E. of N.Z.), K6LCV, W1HJO, W9FAA, W9DRG, CO2WM.

20 metres: CN1AF, CR7AU, VS2AG, YV4AO, YV5ABQ, VP6TR, VP6R, SU1RD, SU1JM, SU1MW, FI8AC, PK6XX, PK4KS, VK9XX, VU2FU, ..VU2HQ, ..KA7EF, ..F8XT, F3JP, G6JL, PAOMZ, OA4AI, HC1FG, VE5AGI.

Mr. C. Anderson (Dumbleyung, West Australia).

Conditions have varied a good deal during the last month. During the last week or so bad QRM has greatly interfered with reception during the afternoons and evenings.

A recent verification from "Radjo Martinique" was a very FB card. No call letters were given. QRA is Box 136, Fort-de-France.

An Italian phone station, IQA, on 20.27 m., was a new logging; as also was W3XAL, using one of their new frequencies on 31.1 m.

An interesting amateur heard this month on 20 m. was PK1RL, using only 4 watts, and putting in a steady R7 signal.

Loggings:—

13 metres: GSJ, GSH and W8XK.

16 metres: GSG, W3XL (not W3XAL), PHI-2, DJE.

17 metres: FZE-8.

19 metres: HAS-3, W2XAD, TPA-2, OLR5A, PCJ-2, W8XK, TGWA, TPB-6, HVJ.

20 metres: IQA, HBJ, DZH.

25 metres: RNE, Saigon (25.2), VLR-3, W8XK, OLR4A, W2XE, 2RO, W1XAL, OLR4B, COCX, TPA-4, Saigon (25.6).

26-30 metres: HBO, CSW (27.27), PLP, PMN, JVN.

31 metres: COBC, JDY, COCM, EAQ, IRF, CSW, COCQ, 2RO, W3XAL, ZHP, ZRK, VUD-3, KZRM, W3XAU, W1XK, W2XAF, HS8PJ, ZBW-3, COCH, HAT-4, KZIB.

39-44 metres: JVP, HBQ, PMH.

49 metres: ZRK, VQ7LO, W8XAL, 9MI, Rangoon, ZRH.

58 metres: PMY.

62 metres: VUD-2, VUM-2, VUC-2, VUB-2.

20-metre amateurs logged are:—

Philippines: KA- 1AF, 1AP, 1ER, 1CS, 1CW, 1ME, 1JM, 2OV, 7EF.

D.E.I.: PK- 1MJ, 1RL, 1VY, 2WL, 3WI,, 4KS, 6XX, 6CI, 2AY.

China: XU- 8ET, 8RB, 9W.

Japan: J- 2NF, 2MI.

Indo-China: FI- 8AC.

Hong Kong: VS- 6AG.

India: VU- 2CA, 2CQ, 2BG, 2HQ, 2FU.

Federated Malay States: VS- 2AP, 2AG, 2AJ.

Ceylon: VS- 7GJ.

Burma: XZ- 2DY, 2JB.

Hawaii: K6- MVA, GAS, LKN, OJI, ILW, BNR, DLL, NFY, KGA, OFW, NYD.

Cuba: CO- 2RH, 2JJ, 6OM, 7CX, 2RR, 2WM.

Costa Rica: TI- 2RC, 3AV.

Canal Zone: K5- OF.

Argentine: LU- 4BC.

Great Britain: G- 2TR, 2XN, 2DS, 5DT, 5GO, 5ZG, 6DT, 6WX, 8NJ.

France: F- 8DC, 8XN, 8XL.

Holland: PA- OMZ.

South Africa: ZS- 2X, 4H, 5AB, 5BK, 6CZ, 6DW, 6DY, 6EJ.

Northern Rhodesia: VQ2HC.

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SWL Card Exchangers' Section

This month we are again including in these columns a list of overseas listeners who are interested in the exchange of SWL cards. All the persons mentioned in these lists guarantee 100 per cent. QSL.

Lewis Sakurada, Box 14, Lanakai, Hawaii; Harold La Pierre, 124 Maithland Street, Halifax, Canada; Sydney Lashley, Box 252, Bridgetown, Barbados, B.W.I.; John Greenbank, 28 Chelmer Street, Oamaru, N.Z.; Peter Koelmans, Zijde, 144, Boskoop, Holland; Dick Merlehan, 5 Valentia Pde., Dublin, Ireland; B. W. T. Cockcroft, "Wanganui," 8 Whetebridge Road, Onchan, Isle of Man; Doug. C. Johnson, 169 Covurg Road, Halifax, Canada; Meredith Stroth, 172 Queen St., Kitchener, Canada; Maurice L. Hunt, 16 Princess Street, Knutsford, Cheshire, England; George Ludkin, Group D Co., Beachley Camp, Chepstow, England; B. Pearsall, Mount Carmel Cottage, Carmel, near Holywell, North Wales; Ronald Burt, 101 Railway Cottages, Salt River, Capetown, South Africa; Wm. Buchanan, 189 Park Street, Sydney, Canada; George Poulain, 67 Mt. Pleasant Street, Syd-

ney, Canada; John W. Sledge, Jnr., 201 West 4th Street, Cisco, Texas, U.S.A.; Hubert L. Martz, Holabird Q.M. Depot, Baltimore, Maryland, U.S.A.; Bill McMullin, 1421 Highland Avenue, Bluefield, W. Va., U.S.A.; Joe Scott, 1718 Berkshire Place, Toledo, Ohio, U.S.A.; H. Bowers, 19 Hubbard Street, Concord, Mass., U.S.A.

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On The Ham Bands

More regarding that old question: the "ham" v. SWL controversy. In a current American publication appeared the following extract from a letter of verification received from W9——: "I wish you boys would not send along SWL cards, for I receive so many that I cannot possibly answer them all. Not that I am hard-boiled or anything of that sort, but I simply do not have the time to make them out, and also the expense is quite heavy."

We feel that the above sums up very succinctly the attitude of a good number of amateurs. Possibly SWL's would do well to carry out the following suggestions:—(1) Send only reports which you feel will be of some real interest to the "ham" concerned; (2) always include return postage—strange as it seems there are still SWL's who feel injured if they receive no QSL following a failure to include a reply coupon or unused stamps with their report.

Just at present the ham bands are just fair. 20 m. is not too good at all, and with summer conditions with us we can expect a further falling off. On the other hand, 10 m. should continue to provide something of interest. A glance at Observer Ferrier's report will indicate that there are thrills for even the most blase DX-er on this band. VE, ZE1, XZ, HB, ON, G, SU, PK, KA and VS6 on 10 m. phone is surely a good month's work. And remember, too, that it is much easier to obtain a QSL for a report on 10 m. signals. From personal experience we can say that 80-90 per cent. of your reports will be acknowledged.

6K8-G Converter

(Continued from page 20.)

Consequently, in connection with this receiver, which may be regarded as a typical one, the total frequency drift due to A.V.C. and other effects is plotted against aerial input voltage for the receiver as a whole. On the diagram are shown two curves giving the upper and lower limits of individual 6K8-G valves and any Radiotron 6K8-G should be within these limits. It will be seen that the upper limit is +2.5 k.c. and the lower limit —1.8 k.c. For the purposes of comparison the curve for an average 6A8-G is shown and the improvement due to the use of the 6K8-G is evident. These curves were taken at a frequency of 18.6 megacycles.

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-1 a.m.

13.93	GSJ
13.97	GSH
13.99	DJS
16.86	GSG
16.89	DJE
19.63	DJQ
19.68	TPA-2
19.7	OLR5A (exc. M, S)
19.74	DJB
19.76	GSO
19.8	YDC
19.82	GSF
25.29	GSE
25.34	OLR4A (exc. M, S)
25.4	2RO-4
25.42	JZJ
25.53	GSD
27.27	PLP
28.48	JIB
29.24	PMN
30.78	COCQ
30.96	ZHP
31.28	VK2ME (M)
31.3	VUD
31.38	DJA
31.49	ZBW-3
31.55	HS8PJ (F)
31.58	XEWW
31.8	COCH
32.9	COCB
33.2	COBZ
39.95	JVP
48.7	VPB
49.9	COCO
49.98	Rangoon
58.3	PMY
60.0	VUD
60.6	VUM
61.4	VUC
70.2	RV15
98.6	YDA

1-2 a.m.

13.93	GSJ
13.97	GSH
13.99	DJS
16.23	HBH (M)
16.86	GSG
16.89	DJE
19.63	DJQ
19.68	TPA-2
19.7	OLR5A (exc. S, M)
19.74	DJB
19.76	GSO
19.8	YDC
19.82	GSF
19.84	HVJ
19.85	DJL
25.0	RNE
25.24	TPA-3
25.29	GSE
25.4	2RO-4
25.34	OLR4A (exc. S, M)
25.49	DJD
25.53	GSD
27.27	PLP
28.48	JIB
29.24	PMN
31.3	VUD
31.35	TPB-11
48.7	VPB
49.83	DJB
49.9	COCO
58.3	PMY
60.0	VUD
60.6	VUM
61.4	VUC
70.2	RV15

2-3 a.m.

13.93	GSJ
13.97	GSH
16.23	HBH (M)
19.71	PCJ (Th)
19.74	DJB (M)
19.76	GSO
19.82	GSF
19.85	DJL
25.24	TPA-2
25.29	GSE
25.4	2RO-4
25.49	DJD
25.53	GSD
31.3	VUD
31.35	TPB-11
48.7	VPB
49.31	VQ7LO
49.83	DJC
60.0	VUD
60.6	VUM
61.4	VUC

3-4 a.m.

16.86	GSG
19.71	PCJ (Th)
19.85	DJL
25.24	TPA-3
25.49	DJD
25.53	GSD
31.13	2RO-3
31.35	TPB-11
31.55	GSB
49.1	GSL
49.31	VQ7LO
49.59	GSA
49.83	DJC
60.0	VUD
60.6	VUM
61.4	VUC

4-5 a.m.

19.62	GSP
19.65	W2XE
16.86	GSG
19.71	PCJ (Th)
19.85	DJL
20.64	HBJ (M)
24.52	TFJ
25.24	TPA-3
25.49	DJD
25.53	GSD
29.04	ORK
31.13	2RO-3
31.3	VUD
31.35	TPB-11
31.55	GSB
44.94	HBQ (M)
49.1	GSL
49.31	VQ7LO
49.59	GSA
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
20.64	HBJ (M)
22.0	SPW (T, Th, Sat)
24.52	TFJ
25.24	TPA-3
25.34	OLR4A
25.42	JZJ
25.48	DJD
25.53	GSD
27.17	CSW
28.93	EAJ43
29.04	ORK
31.13	2RO-3
31.28	PCJ (M, T, W)
31.35	TPB-11
31.46	JZI
31.55	GSB
39.95	JVP
49.1	GSL
44.94	HBQ (M)
49.59	GSA
49.83	DJC

6-7 a.m.

16.86	GSG
16.87	W3XAL
19.56	W2XAD
19.62	GSP
19.65	W2XE
19.67	W1XAL
19.72	W8XK
19.85	DJL
22.0	SPW (T, Th, Sat.)
25.0	RNE
25.24	TPA-3
25.34	OLR4A
25.49	DJD
25.53	GSD
27.17	CSW
30.4	EAQ
31.13	2RO-3
31.28	PCJ (W)
31.28	W3XAU
31.35	W1XK
31.35	TPB-11
31.55	GSB
40.83	DJC
43.1	2ZB
49.1	GSL
49.59	GSA

7-8 a.m.

19.56	W2XAD
19.65	W2XE
19.72	W8XK
19.7	OLR5A (W)
19.76	GSO
19.82	GSF
19.85	DJL
25.0	RNE
25.24	TPA-3
25.34	OLR4A
25.42	JZJ
25.45	W1XAL
25.49	DJD
25.53	GSD
27.17	CSW
30.4	EAQ
31.09	CS2WA
31.13	2RO-3
31.28	W3XAU
31.32	GSC
31.35	TPB

31.35 KZRM
31.35 W1XK
31.41 OLR3A (T)
31.46 JZI
31.48 W2XAF
31.55 GSB
43.1 2GB
49.83 DJC
49.92 OLR2A (Th, F)
58.31 OK1MPT

8-9 a.m.

19.56 DJR
19.63 DJQ
19.65 W2XE
19.7 OLR5A (M, S)
19.72 W8XK
19.74 DJB
19.76 GSO
19.82 GSF
25.0 RNE
25.24 TPA-3
25.34 OLR4A (M, S)
25.42 JZJ
25.45 W1XAL
25.49 DJD
25.53 GSD
25.60 TPA4
28.9 EAJ43
30.04 COBC
30.31 CSW
30.4 COCM
30.43 EAQ
30.7 COCQ
31.06 LRX
31.09 CS2WA
31.13 2RO3
31.27 HBL (S)
31.28 W3XAU
31.32 GSC
31.35 KZRM
31.35 W1XK
31.45 DJN
31.46 JZI
31.48 W2XAF
31.49 LKJ1
31.55 GSB
31.58 XEWW
31.8 COCH
38.48 HBP (S)

9-10 a.m.

19.56 DJR
19.56 W2XAD
19.63 DJQ
19.7 OLR5A
19.72 W8XK
19.74 DJB
19.76 GSO
19.8 YDC
22.0 SPW
25.34 OLR4A
25.42 JZJ
25.45 W1XAL
25.49 DJD
25.51 OLR4B
25.53 GSD
25.61 TPA4
30.31 CSW
31.06 LRX
31.09 CS2WA
31.13 2RO3
31.27 HBL (S)
31.32 GSC
31.35 W1XK
31.38 DJA
31.45 DJN
31.48 LKJ1
31.48 W2XAF
31.55 GSB
38.48 HBP (S)
49.1 GSL

10-11 a.m.

19.56 DJR
19.63 DJQ
19.7 OLR5A
19.74 DJB
19.76 GSO
19.8 YDC
19.85 DJL
25.26 W8XK
25.34 OLR4A
25.4 DJZ
25.49 DJD
25.53 GSD
25.61 TPA4
26.31 HBO (M)
29.15 DZC
31.13 2RO3
31.25 RAN
31.28 PCJ (M, T, Th)
31.32 GSC
31.38 DJA
31.45 DJN
31.48 W2XAF
31.49 LKJ1
31.55 GSB
49.1 GSL

11 a.m.-noon.

19.56 DJR
19.6 GSP
19.63 DJQ
19.7 OLR5A
19.74 DJB
25.26 W2XK
25.34 OLR4A
25.42 DJZ
25.42 JZJ
25.49 DJD
25.53 GSD
25.61 TPA4
31.13 2RO3
31.25 RAN
31.28 PCJ (M, T, Th, F)
31.32 GSC
31.38 DJA
31.45 DJN
31.48 W2XAF
31.55 GSB

Noon-1 p.m.

19.56 DJR
19.71 PCJ (W)
19.74 DJB
25.26 W8XK
25.42 DJZ
25.49 DJD
25.53 GSD
25.60 TPA4
31.28 PCJ (F)
31.32 GSC
31.38 DJA
31.48 W2XAF
31.55 GSB

1-2 p.m.

19.56 DJR
19.74 DJB
25.42 DJZ
25.49 DJD
25.53 GSD
25.61 TPA4
31.28 PCJ (F)
31.32 GSC
31.38 DJA
31.48 W2XAF
31.55 GSB

2-3 p.m.

25.53 GSD
25.61 TPA4
31.32 GSC
31.48 W2XAF
31.53 GSB

3-4 p.m.

13.99 DJS
16.89 DJE
19.63 DJQ
19.74 DJB
19.79 JZK
19.85 DJL
30.04 COBC
31.28 VK2ME (S)
31.38 DJA
32.15 OAX4J
32.59 COBX
33.26 COBZ
49.18 W3XAL
49.5 W8XAL

4-5 p.m.

13.99 DJS
16.89 DJE
19.63 DJQ
19.74 DJB
19.79 JZK
19.85 DJL
20.64 HBJ (M)
25.24 TPA3
26.31 HBO (M)
31.28 VK2ME
31.35 TPB-11
31.38 DJA
49.5 W8XAL

5-6 p.m.

13.99 DJS
16.89 DJE
19.63 DJQ
19.74 DJB
25.23 TPA3
28.14 JVN
31.28 VK2ME (S)
31.35 TPB-11
31.38 DJA

6-7 p.m.

13.99 DJS
16.86 GSG
16.89 DJE
19.31 PCJ (Th)
19.63 DJQ
19.66 GSI
19.74 DJB
19.76 GSO
19.82 GSF
25.23 TPA3
25.29 GSE
25.52 GSD
28.14 JVN
31.28 VK2ME (S)
31.38 DJA

7-8 p.m.

13.99 DJS
16.86 GSG
16.89 DJE
19.63 DJQ
19.66 GSI
19.71 PCJ (Th)
19.74 DJB
19.76 GSF
25.29 GSE
25.52 GSD
25.57 Saigon
28.14 JVN
31.38 DJA
31.49 ZBW3
31.55 VK3ME

8-9 p.m.

13.93 GSJ
13.97 GSH
13.99 DJS
16.86 GSG
16.89 DJE
19.63 DJQ
19.68 TPA2
19.71 PCJ2 (Sun)
19.74 DJB
19.8 YDC
19.82 GSF
25.29 GSE
25.4 2RO4
25.57 Saigon
27.27 PLP
28.14 JVN
29.24 PMN
30.96 ZHP
31.28 VK2ME (S)
31.38 DJA
31.45 VPD2
31.49 ZBW3
31.55 VK3ME
34.0 VPD3
43.1 2ZB
44.64 PMH
70.2 RV15

9-10 p.m.

13.93 GSJ
13.97 GSH
13.99 DJS
16.89 DJE
19.58 OLR5B
19.63 DJQ
19.68 TPA2
19.7 OLR5A
19.71 PCJ (W)
19.74 DJB
19.8 YDC
19.82 GSF
19.85 DJL (S)
25.0 RNE (W)
25.4 2RO4
25.29 GSE
25.57 Saigon
27.27 PLP
28.14 JVN
29.24 PMN
30.23 JDY
30.61 XGOX
30.96 ZHP
31.28 VK2ME (S)
31.28 VK6ME
31.38 DJA
31.45 VPD2
31.49 ZBW3
31.55 VK3ME
34.0 VPD3
43.1 2ZB
44.64 PMH
48.7 VPB
49.5 W8XAL
58.3 PMY
70.2 RV15

10-11 p.m.

13.93 GSJ
13.97 GSH
13.99 DJS
16.86 GSG
16.88 PHI
16.89 DJE
19.58 OLR5B
19.63 DJQ
19.68 TPA2
19.74 DJB
19.8 YDC
19.82 GSF
19.85 DJL (S)
25.29 GSE
25.4 2RO4
25.42 JZJ
25.57 Saigon
25.65 HP5A
27.27 PLP
28.14 JVN
29.24 PMN
30.23 JDY
30.61 XGOX
30.78 COCQ
30.96 ZHP
31.28 VK2ME (S)
31.3 VUD
31.35 W1XK
31.38 DJA
31.49 ZBW3
31.55 VK3ME
34.0 VPD3
43.1 2ZB
44.64 PMH
48.7 VPB
49.5 W8XAL
58.3 PMY
60.0 VUD
60.6 VUM
61.4 VUC
70.2 RV15

11 p.m.-midnight.

13.93 GSJ
13.97 GSH
16.86 GSG
16.88 PHI
16.89 DJE
19.56 DJR
19.63 DJQ
19.68 TPA2
19.74 DJB
19.79 JZK
19.8 YDC
19.82 GSF
19.85 DJL
25.29 GSE
25.4 2RO4
25.42 JZJ
27.27 PLP
29.24 PMN
30.61 XGOX
30.78 COCQ
30.9 ZHP
30.96 ZHP
31.28 VK2ME (S)
31.3 VUD
31.35 W1XK
31.38 OAX4T
31.38 DJA
31.49 ZBW3
31.51 HS8PJ (Th)
31.8 COCH
32.09 COBC
32.59 COBX
33.2 COBZ
39.95 JVP
44.64 PMH
48.7 VPB
49.5 W8XAL
49.9 COCO
49.96 HP5K
49.98 Rangoon
58.3 PMY
60.0 VUD
60.6 VUM
61.4 VUC
70.2 RV15

"C" And "R" Checker

(Continued from page 8.)

No provision is made for the balancing of the smaller condensers. It is generally enough to observe whether the sample under test (providing it is not defective) gives a reasonably sharp balance at the "null" point.

In the largest size of condenser, however, most of those now used are electrolytic types, and at low frequencies have a relatively large power factor which is not necessarily a reason for rejection. At the same time it should not be too large. Some show a power factor of less than 5 per cent. and are acceptable; others show 30 per cent. or more and cannot be recommended.

The adjustment to exact balance when the power factor or loss factor

is appreciable is done by the 2500-ohm rheostat.

Operational Hints.

In making a measurement, the component to be measured is connected across the "res. cap." terminals and the range switch set to what is believed to be the nearest value.

In all probability the screen of the 6E5 will be completely fluorescent, but if the potentiometer is turned a point is reached at which the "eye" opens to a clearly defined angle. If by careful adjustment, the edges of this pattern cannot be made dead sharp, the power factor of the component must be different from that of the standard. On the largest capacity range this can be cleared up by the power factor control.

If the balance falls outside the readings ".1 to 10" on the ratio scale, a better result will be obtained on another range. If the balance is obtained only at one extreme limit of the potentiometer adjustment, the component must be open-circuited or short-circuited, or at any rate substantially so in relation to the range in use. A 10 mfd. condenser would appear a dead short if tested on the 100 mmfd. range.

When measuring condensers on the 100 mmfd. range, the same sharpness of balance must not be expected as on the higher ranges. It is not that balance is not dead sharp—assuming that the power factor is not exceptionally bad, balance is quite good—but a larger movement of the ratio control is required in order to show an appreciable change in the indicator pattern. The best way is to swing the knob to and fro between positions each side of balance until the exact point can be judged. With this particular instrument measurements can be made as low as 5 mmfd., while the readings around 100 mmfd. are remarkably accurate.

Provision For Matching.

A useful feature is the position marked "Match." For example, it might be necessary to adjust a number of components to the same value or to check their departures from standard. This is available for inductances of not less than 1 henry. Push-pull transformers can be tested for balance in windings.

The leakage and continuity test utilises a Philips neon—the lowest available voltage lamp should be used. When a condenser is connected, the lamp flashes momentarily due to charging, and in a dim light this should be perceptible down to .05 mfd.

If the condenser is a good one it may be necessary to wait quite a while for the next flash, but a poor condenser causes rapid flashing, while one a continuous light. These tests must that has broken down completely gives not be applied too literally to electrolytic condensers, as they always leak to some extent.

Frequency of flashing depends not on resistance alone, but on a factor derived from both resistance and capacity, providing a truer measure of condenser quality.

With regard to construction, there is scope for individuality, but if the scale is to remain accurate, a close copy of the original wiring and placement of components is essential. Further hints in this direction will be given next month, together with a list of parts.

"1939 SKY-KING DUAL-WAVE FIVE" LIST OF PARTS

1 steel chassis 15" x 9½" x 3", stamped and drilled to specifications (Acorn)
1 power transformer, 80 mill. 5v. 2a., 6.3v. 2a., 385v., C.T. 385v.
1 D.W. coil kit, 2 465 k.c. iron-core I.F's. (Foxradio)
1 2-gang condenser (Stromberg-Carlson)
1 dial (Efco)
4 knobs
3 valve shields
5 octal wafer sockets
1 4-pin speaker socket
4 terminals, 2 red, 2 black (Dalton)
1 power socket and plug
1 power cable and plug
3 midget grid clips
1 .5 megohm potentiometer (Microhm)
1 25,000 ohm voltage divider
1 D.P./D.T. rotary type toggle switch (or 1 6 x 2 single-deck Yaxley switch)

FIXED RESISTORS:

1 220 ohm 1-watt carbon
2 250 " " "
1 2,000 " " "
1 15,000 " " "
1 20,000 " " "
1 50,000 " " "
3 .1 megohm " "
1 .25 " " "
1 .5 " " "
3 1 " " "
1 1.5 " " "

FIXED CONDENSERS:

4 .0001 mfd. mica
1 .02 " tubular
4 .05 " "
2 .1 " "
3 .5 " "
2 8 " wet electrolytics
1 16 " " "
3 25 " " "

SPEAKER:

1 dynamic speaker to match single 6V6G, 2000 ohm field (Rola)

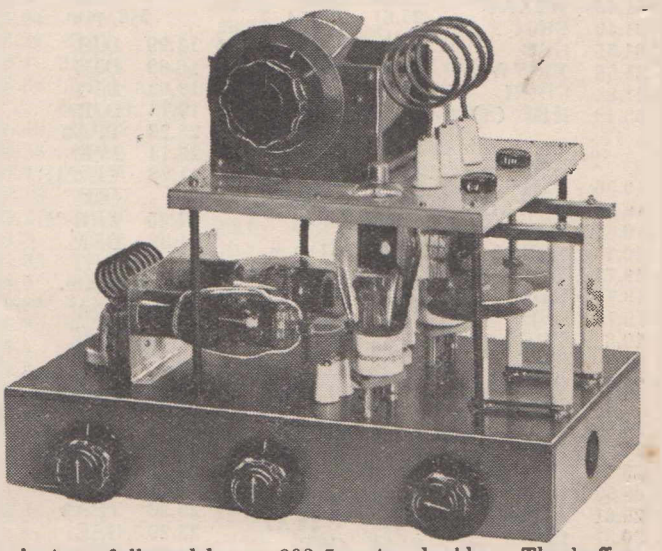
VALVES:

1 6K8G, 1 6G8G, 1 6J7G, 1 6V6G, 1 5Y3G

MISCELLANEOUS:

Push back, 2 doz. 3/16" nuts and bolts, solder tags, dial lights, copper shielding

5- And 10-Metre 'Phone And C.W. Transmitter Next Month



Very little work is being done in Australia at the moment on the ultra high frequency bands, despite the fact that in the future they will be of tremendous importance. Hence, in an effort to stimulate interest in the "ultra - shorts" among amateurs, a 5- and 10-metre 'phone and c.w. transmitter designed and built by Mr. W. McGowan (VK-2MQ) will be described next month.

The exciter uses a 6L6G crystal oscillator followed by an 807 10-metre doubler, in turn followed by an 802 5-metre doubler. The buffer stage comprises a pair of 802's in push-pull driving a pair of 809's in push-pull in the final. Radiotron transmitting tubes have been used throughout. The accompanying photograph of the buffer and final amplifier was taken when the unit was nearing completion in its final form.

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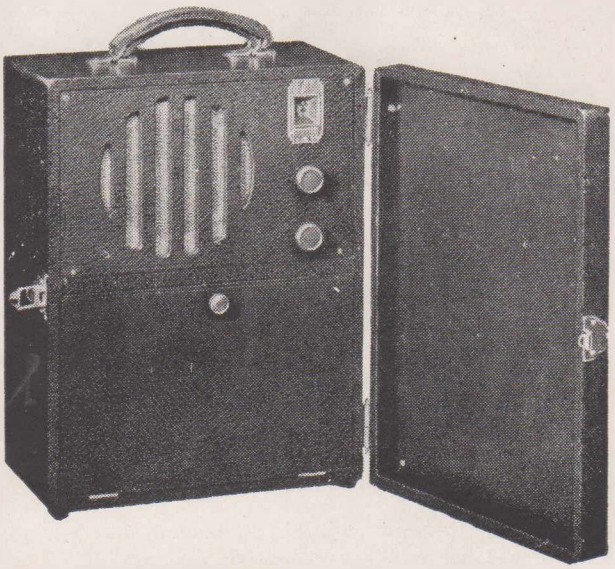

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