THE AUSTRALASIAN

Radio World

Registered at the G.P.O., Sydney, for transmission by post as a periodical.

1/-

VOL. 12 ..... NO. 3

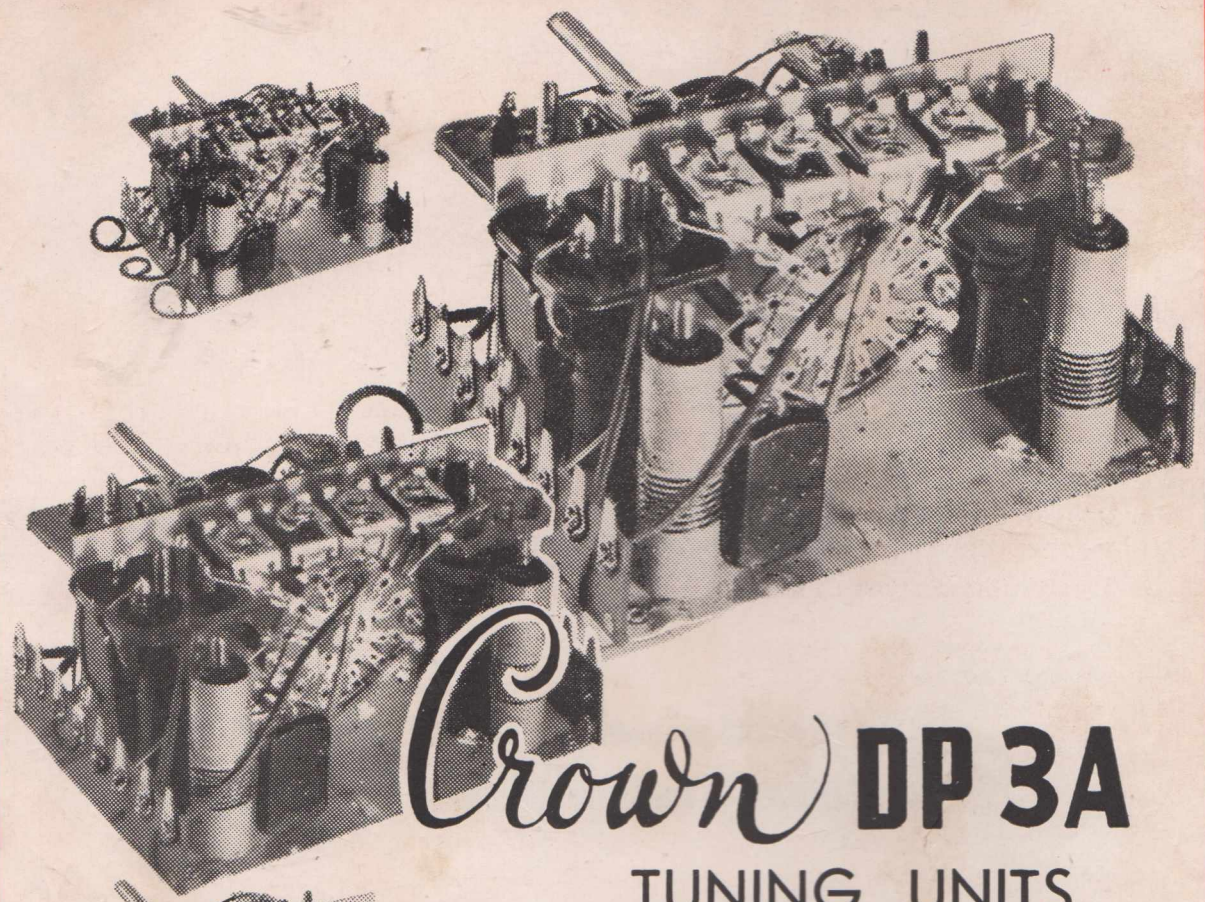
AUGUST 15, 1947

Self-contained "Personal" Set Weighs Under Four Pounds.

High-quality Receiver Uses "Ferrotune" Foundation Kit.

Fidelity Amplifier With Triodes and Inverse Feedback

Latest "Ham" Notes and Short-wave Reception Review



Crown DP 3A

TUNING UNITS

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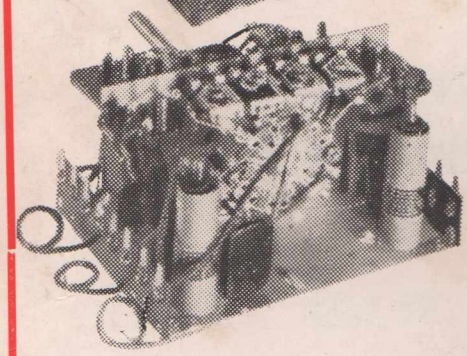

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AUSTRALASIAN RADIO WORLD

Balcombe St.
Mornington
Victoria

Vol 12. **AUGUST, 1947.** **No. 3.**

CONTENTS

EDITORIAL

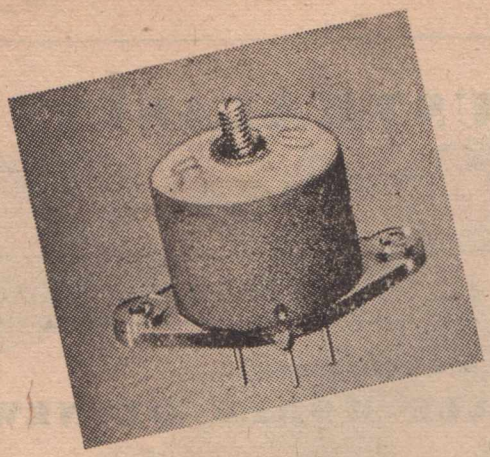
About two hundred letters go through my office every week, and I make a point of reading each and every one of them carefully. From these letters I get impressions. Over the past couple of months my strongest impression is in regard to prices. Quite a number of my correspondents consider that prices of components are too high, and that radio is too expensive as a hobby.

I cannot agree that radio component prices are too high, especially when compared to prices of complete factory-built receivers. It has recently been stated that the average price of an Australian receiver was £27 before the war and is now over £40, an increase of more than 50 per cent. I doubt very much whether component prices have risen to this extent.

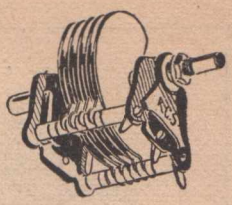
There are plenty of good reasons for increased costs and prices; gone are the days when there were plenty of boys who would work for 15/- per week. Pre-war radio factories were notorious for the way in which they exploited this class of labour.

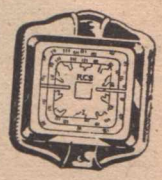
There seems only one satisfactory way of getting cheaper components and that is by a greater degree of specialisation. At present some radio factories still wind their own coils, with their coil winding equipment standing idle for four days every week. If they costed their coils correctly they would find that they could get them made much more efficiently in factories which specialise in this line. So it goes for many other components. And in turn, if the coil winding specialists got all the coil winding business they would be able to make cheaper and better coils.

A. G. HULL.



Midget Coil for Personal Radio (Actual Size)

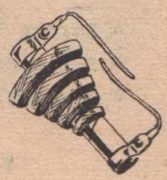


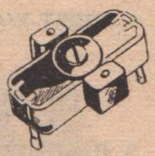


R.C.S. DEVELOPS NEW

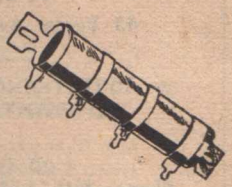
MAGNASONIC *Iron Clad COIL*

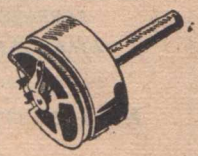
FOR MANTEL AND PERSONAL RADIO





This new advance in coil design offers radio technicians and set assemblers both miniature and midget coils which fulfil *all required standards of performance and stability*, yet meeting with the restricted space available in mantel, portable and personal radios. Both the miniature and midget coils are fitted with standard type base, enabling them to be fitted in lieu of standard coils. This enables manufacturers and assemblers to use these smaller coils without expensive alterations to chassis stamping dies. The secret of the magnasonic performance of this new R.C.S. development is patented Magnasonic Iron Can. See it and other R.C.S. components at your retailer.





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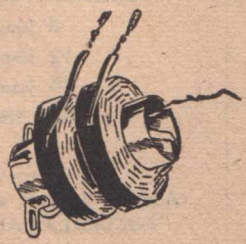
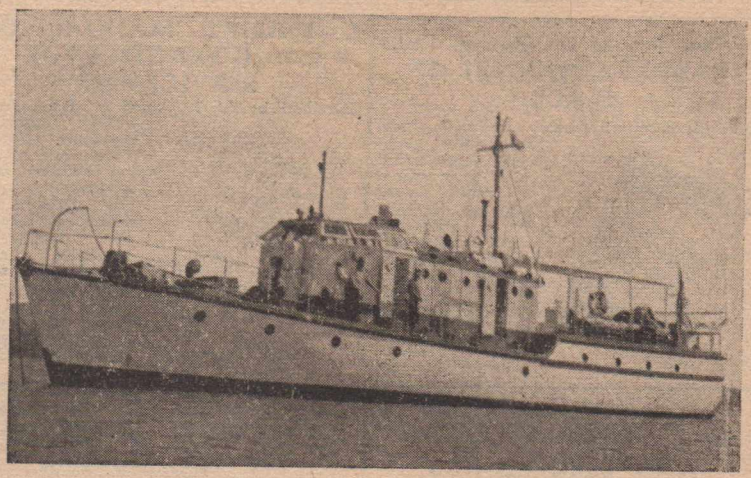


R.C.S. RADIO PTY. LTD., 174 CANTERBURY ROAD, CANTERBURY, SYDNEY.

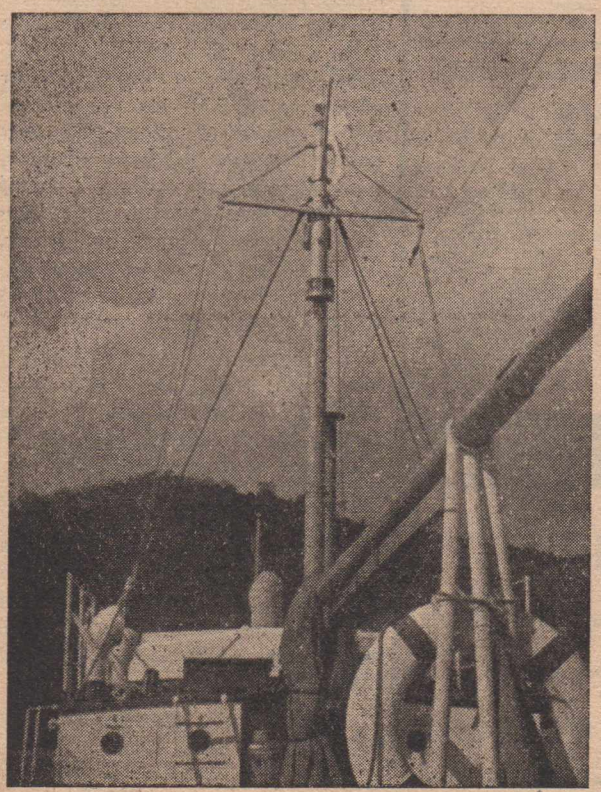
HAM RADIO AT SEA

ONCE you have known the thrill of building and operating experimental transmitters you are unlikely to give up the hobby. Sometimes business or domestic influences cause a hold-up, but a "ham" never forgets.

Commencing on May 12 last a station appeared on the 7 M/cs. band with phone and CW, signing VK2CM. There were those co-operating who knew just who was behind the call sign and those to whom the call was just another station on the band. The latter category was partly correct, but the operator was actually far from being a new hand. As the years passed, Charles D. Maclurcan, Australia's father of amateur radio, has retained his call sign and license, always with the idea that even after a silence of 20 years, something might occur whereby he would wish to get back on the air, even if temporarily. Sure enough the time arrived for this and VK2CM was reborn; a low powered infant but with a lusty signal, arising from an ex-Army type FS6 Transceiver re-calibrated for 7000-7200 K/cs. Antenna employed was the "sure-fire" single-wire feed to a half-wave radiator. During the period of the cruise, not a single schedule was missed with the Australian amateur stations concerned. In a letter to the writer after his return to Sydney, Mr. Maclurcan says:



M.V. "Bilkely," the "home" of VK2CM mobile marine, recently active during a cruise in Northern waters.



Showing the half wave 7 mc., s.w.f. antenna, hung from the yard-arm.

Wentworth Hotel,
Sydney.
13th June, 1947.

My Dear Don,

Enclosed are some photographs of the Motor Vessel "Bilkely", VK2CM, Mobile Marine. My holiday amongst the islands of the Whitsunday Passage was thoroughly enjoyable although, owing to bad weather, we caught no fish. Here is a short description of the ship. She is a twin-screw motor vessel 80 feet long by 16 feet beam; powered by two 300 h.p. 6-cylinder Hercules Diesels, giving her a speed of 14 knots. She is fitted with every convenience and luxury, including Punkaluvre air conditioning, refrigeration and read-

(*Continued on next page*)

VK2CM

(Continued)

ing lights to all bunks, etc. In fact, she is a miniature liner. Highlight of the trip was the little FS6 Trans-Receiver which brought me behind a key again after 22 years off the air. Conditions have changed since my time and I was amazed at the performance of this excellent little outfit. When one considers its small power output and the fact that I was in daily touch with you, VK2NO and Howard Love, VK-3KU, Melbourne, mostly on speech, is a matter for wonder. I also held daily regular schedules with VK4CU, Charles Walker of Clifton, Qld., and all of you contributed to make my trip most enjoyable. I particularly want to thank you personally for the very material help you gave me in preparing the little FS6 for operation and also your kind advice on many matters to bring me up to date with amateur practice. You will remember how frequently I forgot the VK prefix, and swung on to my old callsign, 2CM. Several things struck me very forcibly on coming back into the game after such a long absence. Firstly, the terrific strength of most amateur phone signals and the general excellent quality of modulation. Secondly, the carelessness of many in their methods of calling; I heard one chap call CQ for more than five minutes without a break. Thirdly, the spacing of morse signals, making impossible at times to read even the call signs.

I was also very surprised at the apparently night behaviour of a small group of stations in New South Wales who hold three or four-way conversations lasting for hours. These conversations bring wives and families into the picture, to say nothing of sisters, cousins and possibly aunts. My enthusiasm has awakened again and I am shortly coming back on the air, using a type 109 (for 3.5 M/cs.).

Again expressing appreciation for the help you gave me . . . 73 . . .

Chas D. Maclurcan,
VK2CM."

BIAS FOR BATTERY SETS

Novel Scheme Used In New Portables

IN the design of battery radio receivers one usually has the choice of two methods in order to obtain the necessary grid bias voltages to control the correct operating points of the audio amplifying stages of the receiver.

These two methods are: (A) The use of a separate grid bias battery, and (B) use of the standard back bias arrangement where the control grid voltage is obtained by running the total current drain of the receiver through a resistance of such a value that the voltage drop obtained will be equal to the bias voltage required.

Method (A) is convenient to use with larger battery receivers of the console variety, but the system is found wanting when applied to a portable receiver where size and weight are a primary consideration. When the choice of radio is of the now popular "personal-portable" type use of the bias battery is out of the question.

Method (B) is a well tried and reliable way of obtaining bias voltage and one which has been accepted in almost all battery receiver design in this country.

BY

T. E. SEYMOUR, A.M.I.R.E.

of R. W. Steane & Co. Pty. Ltd.

Makers of "Q-Plus" Coils

Its one disadvantage lies in the fact that the bias voltage obtained is subtracted from the B plus supply voltage, thus leaving the available B plus supply lower by the value of the grid bias voltage.

This is of no great disadvantage in most types of battery receivers but if the set is of the "personal-portable" type where the available B plus battery supply is from 45 volts to 67½ volts, it is an obvious disadvantage to lose 6 or 7 volts of this supply to create bias voltage for the audio amplifying valves.

One method of obtaining negative grid voltages which has gained little consideration and certainly no prominence in this country is to utilise the D.C. grid current flow of the high frequency oscillator in the mixer stage of the receiver.

In this arrangement the voltage drop developed across portion of the oscillator grid leak resistance is filtered and applied as bias in series with the grid return of the output valve.

The fundamental principle is defined by Fig. 1. Here R1 is of such a size that the voltage drop across it due to the D.C. grid current flowing as indicated by the dotted lines is equal to the desired grid bias voltage required for the 3S4 output valve. Condenser C is incorporated to filter the developed bias voltage.

We now come to a point which has been the subject of much debate. I don't intend to enter the controversy existing over the merits or demerits of the grid leak bias arrangements for audio voltage amplifiers, but I do say that the biasing arrangement outlined in the previous paragraph lends itself admirably for supplying a fixed bias for the voltage amplifier as well as the output valve.

To do this one has only to tap R1 at the appropriate position and attach the grid return of the voltage amplifier to this point. Fig. 2 illustrates.

Here voltage between A and C is the bias voltage applied to the output stage and that between B

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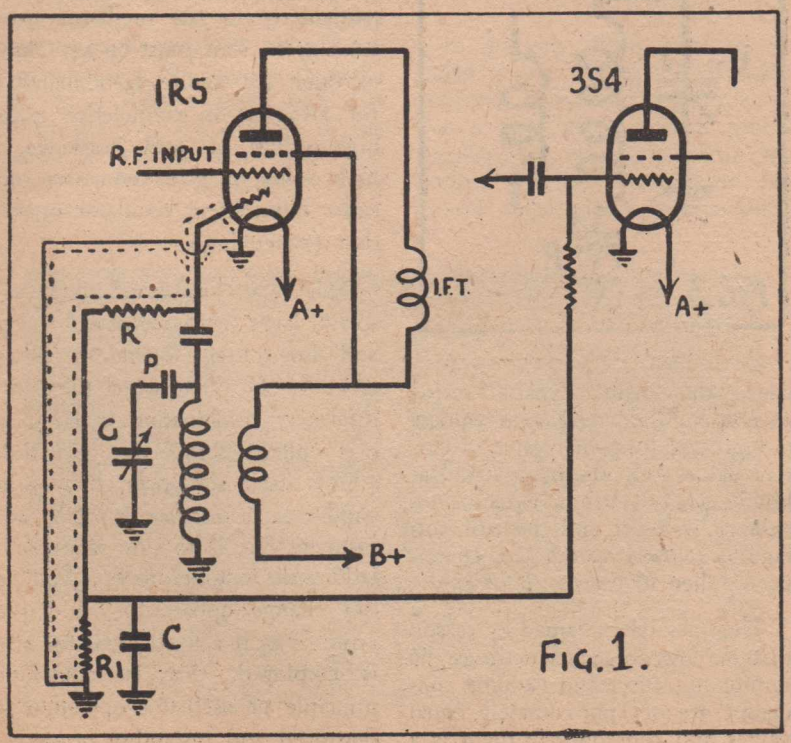


Fig. 1.

BIAS

(*Continued*)

and C bias for the voltage amplifier. In using this method of obtaining grid bias it is essential that the oscillator grid current be kept uniform over the tuning range.

This condition is attained by using a carefully-designed oscillator coil with optimum values and using the oscillator padding arrangement shown in the Figures 1 and 2.

To elaborate on this point: with the usual padding condenser circuit arrangements as shown in Fig. 3 the oscillator grid current will be found to vary from a certain value on the low frequency end of the band to approximately twice this value towards the high frequency end of the tuning range.

This can briefly be explained by virtue of the fact that at low capacity settings of the tuning con-

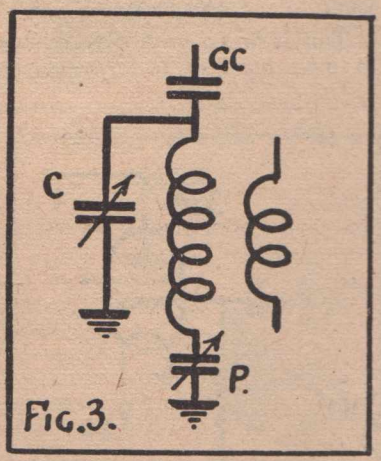


Fig.3.

denser the circuit's dynamic resistance is high, so developed voltage is high, resulting in high grid current values. On the other hand, at high capacity settings, dynamic resistance is lower and the full voltage developed across the coil is not applied to the oscillator grid.

This may be explained by reason that on low frequency settings the tuning condenser and padding condenser are of approximately equal values and consequently there is a

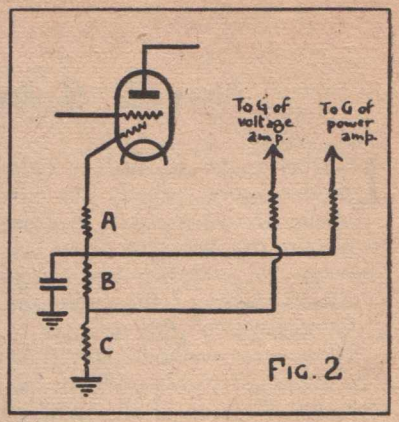


Fig. 2

reduction factor in the voltage applied to oscillator grid by the radio of the tuning condenser reactance to the reactance of the tuning and padding condenser in series, therefore grid current flow will be greatly reduced.

In conclusion, a word of warning.

It is important that the recommended circuit constants specified be closely adhered to. This applies particularly to the oscillator grid condenser. This must be kept low in value (50 mmfd recommended for 1R5) as in conjunction with high values of grid resistance a high value of grid condenser can cause intermittent oscillator operation (squegging).

This is the result of an excessively large time constant RgCg and intermittent operation arises from the fact that when the leak-condenser combination is large, a bias voltage across the grid leak adjusts itself slowly to changes in amplitude of oscillation. This adjustment rate is so slow that oscillations die out before bias voltage can change appreciably, and the action is as if a fixed oscillator bias is employed; that is, automatic principle of oscillator operation is destroyed and instability results.

"HIGH - QUALITY SIX"

Latest Circuit From The Kingsley Laboratory

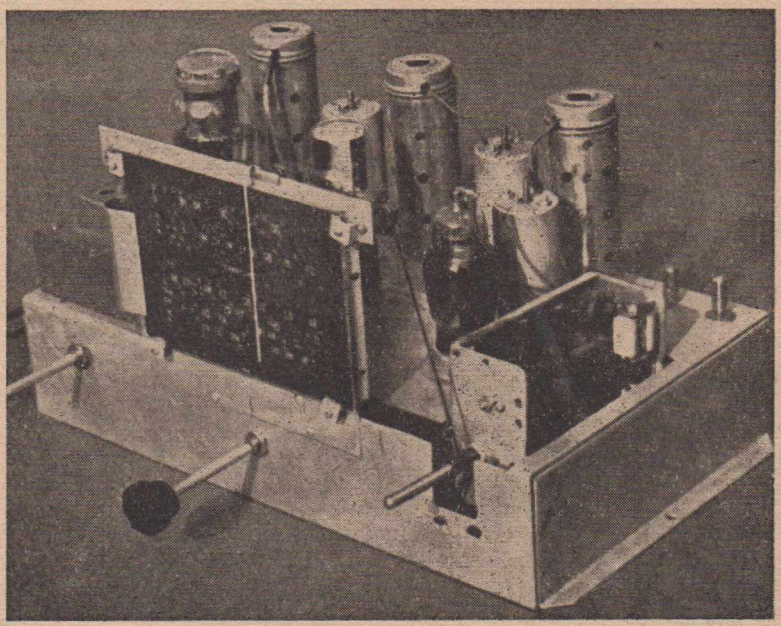
WHILE visiting the Kingsley factory recently we happened to be going through the laboratory when our attention was attracted by the sound of familiar broadcasting voices being reproduced in a most unfamiliar way. A few words of enquiry brought forth the explanation; some of the Kinglsey lab. men were working on an experimental

BY

A. G. HULL

set-up embodying two features which are keynotes in high-quality reproduction; direct coupled audio and wide-band i.f. stage.

Over the past eighteen years a lot has been heard of direct-coupled audio systems and their ability to give a type of reproduction which is hard to define. Even when measured with laboratory instruments you may have a resistance-coupled amplifier which appears to have the same characteristics as a direct-coupled one, but when you put the old ear to the speaker, well, there isn't any doubt about the difference being very real.



Front view of the experimental chassis, showing Ferrotune unit with cover removed.

In the July, 1946, issue we detailed a set using the Kingsley coupled audio system. This set was a fine little job and proved popular, but its performance was limited by the intermediate frequency stage, where normal selectivity was used. This does not allow full reproduction of the audio range. The new version has a special wide-band intermediate stage, made up by using two stages of amplification at the comparatively high i.f. frequency of 1900 Kc. By this means it is possible to get enough selectivity to separate the local broadcasting stations, but with a flat top characteristic which permits a degree of fidelity of reproduction which is impossible with normal intermediate channels.

There being two stages of intermediate amplification, precautions have been taken to ensure adequate stability by decoupling the plate power supply to each intermediate transformer by means of 5,000 ohm resistors and .1 mfd. condensers.

The tuning unit is a special Kingsley "Ferrotune" job which has been developed to suit an in-

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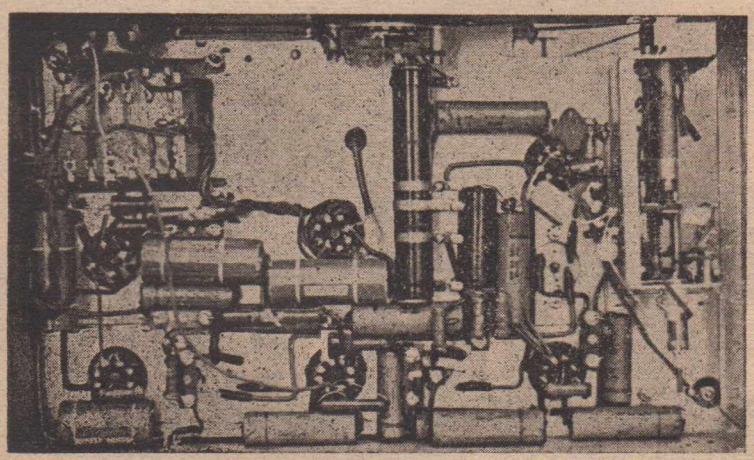


Underside view, showing the wiring and layout of components.

"HIGH-QUALITY 6"

(Continued)

termediate frequency of 1,900 Kc. As is now so well-known, the "Ferrotune" units tune over the band by varying the inductance of the tuning coils by the movement of an iron core in and out of the coil. The scheme has many advantages over conventional tuning systems, especially for home set builders who do not have facilities for aligning the circuits.

The converter valve is a 6J8G, followed by a 6U7G first intermediate amplifier. For the second intermediate amplifier a 6G8G is used, the diodes also supplying a convenient a.v.c voltage and detection as well. This leaves the audio amplifier as a unit, handling only audio signals.

The Audio Amplifier

As mentioned before, the audio end uses direct-coupling. A 6J7G with plate screen and suppressor tied together to form a triode is the first audio valve. The plate ist tied directly to the grid of the output valve, which is also triode, type 2A3 or 6A3. Actual voltage on the plate and grid which are tied together is about 100 volts, although you won't measure it with an ordinary meter. In order to arrange correct bias for the output valve with the grid 100 volts positive in regard to earth is arranged by keeping the filament circuit about 130 to 140 volts above earth by means of the voltage drop across a 4,000 ohm resistor in the filament circuit. The bias voltage is considered as a relationship between grid and filament, and with the above voltages in respect to earth, the grid is 30 to 40 volts negative in respect to filament, which is just what is required for proper operation of the output valve.

In the original set, which we tested, the 6A3, was operating slightly below maximum ratings, with about 350 volts from plate to earth, but only 220 from plate to filament, which is the true plate voltage of a valve. Power output is still ample for ordinary domestic use.

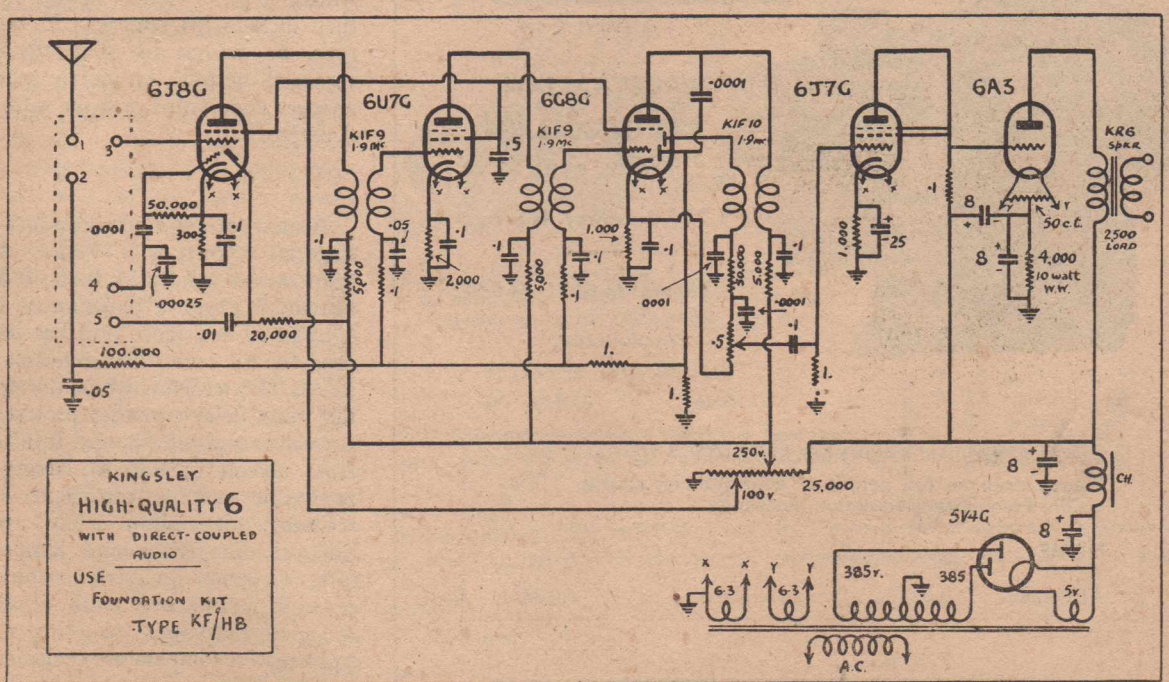
Since the filament circuit of the valve is kept about 130 volts above earth, it is highly desirable to use a power transformer with three separate heater windings, one for the rectifier, one for the r.f. and audio stages and the third for the output valve.

Whilst on the subject of power transformers: it is not a bad idea to get a power transformer with a 125 or 150 milliamp current rating for the secondary. At the lower drain of this set it can then be expected that the actual h.t. voltage will be about 400, allowing the full 250 on the plate of the 6A3, together with 150 from filament to earth.

Alternative Audio

Of course, it is not essential to use direct-coupling in the audio end of the set, and if you have any special preference for any particular kind of audio amplifier you will find that the wide-band intermediate channel has its value with any type of equipment intended for high-fidelity purposes.

For example, only slight modification is necessary to make up a radio tuner for the F.F.R. amplifier from the Kingsley foundation kit which has been introduced primarily to be used with the direct-coupled version.



Circuit for the "High-Quality 6". Note that the .00025 mfd. condenser shown on this circuit as running from terminal 4 of the Ferrotune unit is now incorporated inside the unit.

ROBOT TELEPHONIST

A sound recording device of considerable novelty has recently been invented and is being mass-produced in Switzerland. Known as the Ipsophone, this instrument, which employs a magnetic steel wire, is designed for use as an automatic message recorder on telephone circuits. On a number being called, in the subscriber's absence, this device answers the telephone in the following manner: "Here is Mr. Brown's Ipsophone. Your message is being automatically recorded. Go ahead."

This application is, of course, not new but the ingenious feature of the equipment is the safety code number. The subscriber, before leaving his home, sets one of 1,023 possible combinations of numbers. If when absent he rings his own number to hear any messages recorded, the machine counts from zero to nine three times, and the subscriber has to repeat with it the figures forming his code number. This actuates a circuit and starts the play-back mechanism.

If he desires to record his answer to the message for the advice of his secretary he has to say two words, e.g., "Hello, hello," and then dictates his remarks. If, however, he wishes to eliminate the recorded message, he merely speaks another code word and the wire is demagnetised.

* * *

A new ceramic semi-conducting material known as "Varite" has been introduced by Mullard. It has a marked negative temperature coefficient of resistance and has been used for the series heater resistance in AC/DC receivers where the thermal time delay provides protection for valves and pilot lamps. It differs from silicon carbide in having a negligible voltage coefficient, the resistance depending solely upon phyiscal dimensions and temperature. Ceramic dielectric materials of high permittivity with a wide range of properties including zero and negative temperature coefficients are also being produced by Mullard under the name of "Kaymax."

ENGLISH QUALITY AMPLIFIER

Many Interesting Features In Design

FROM time to time the English technical journal, "Wireless World," has featured designs for quality amplifiers for the reproduction of gramophone recordings and for use with radio reception.

About 1935 the "Wireless World" described a quality amplifier designed by W. T. Cocking, and the writer made a point of calling on this designer when visiting England in 1936 and heard this amplifier in operation with a Hartley-Turner speaker. Several versions and modifications of this amplifier have been published from time to time, but now the "Wireless World" has released an entirely new design for a quality amplifier. The design is the work of D. T. N. Williamson, late of the Marconi-Osram valve factory, and embodies several features which we feel sure will be of interest to our readers.

In the introduction to his article, Mr. Williamson lays down the six principal requirements of a good amplifier as:

"(1) Negligible non-linear distortion up to the maximum rated output. (The term 'non-linear distortion' includes the production of undesired harmonic frequencies and the intermodulation of component frequencies of the sound wave.) This requires that the dynamic output/input characteristic be linear within close limits up to maximum output at all frequencies within the audible range.

"(2) (*a*) Linear frequency response within the audible frequency spectrum of 10-20,000 c/s.

"(*b*) Constant power handling capacity for negligible non-linear distortion at any frequency within the audible frequency spectrum.

"This requirement is less stringent at the high-frequency end of the spectrum, but should the maximum power output/frequency response at either end of the spectrum (but especially, at the low-frequency end) be substantially less than that at medium frequencies, filters must be arranged to reduce the level of these frequencies *before* they reach the amplifier as otherwise severe intermodulation will occur. This is especially noticeable during the reproduction of an organ on incorrectly designed equipment where pedal notes of the order of 16-20 c/s cause bad distortion, even though they may be inaudible in the sound output.

"(3) Negligible phase - shift within the audible range. Although the phase relationship between the component frequencies of a complex steady-state sound does not appear to affect the audible quality of the sound, the same is not true of sounds of a transient nature, the quality of which may be profoundly altered by disturbance of the phase relationship between component frequencies.

"(4) Good transient response. In addition to low phase and frequency distortion, other factors which are essential for the accurate reproduction of transient waveforms are the elimination of changes in effective gain due to current and voltage cut-off in any stages, the utmost care in the design of iron-cored components, and the reduction of the number of such components to a minimum.

"Changes in effective gain during 'low-frequency' transients occur in amplifiers with output stages of the self-biased Class AB type, causing serious distortion which is not revealed by steady-state measurements. The transient causes the current in the output stage to rise, and this is followed at a rate determined by the time constant of the biasing network, by a rise in

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QUALITY

(Continued)

bias voltage which alters the effective gain of the amplifier.

"(5) Low output resistance. This requirement is concerned with the attainment of good frequency and transient response from the loud-speaker system by ensuring that it has adequate electrical damping. The cone movement of a moving-coil loud-speaker is restricted by air loading, suspension stiffness and resistance, and electromagnetic damping. In the case of a baffle-loaded loud-speaker, the efficiency is rarely higher than 5-10 per cent., and the air loading, which determines the radiation, is not high. In order to avoid a high bass-resonance frequency, the suspension stiffness in a high-grade loudspeaker is kept low, and obviously the power loss in such a suspension cannot be large. Electro-magnetic damping is therefore important in controlling the motion of the cone. This effect is proportional to the current which can be generated in the coil circuit, and is therefore proportional to the total resistance of the circuit. Maximum damping will be achieved when the coil is effectively short-circuited, hence the output resistance of the amplifier should be much lower than the coil impedance.

"(6) Adequate power reserve. The realistic reproduction of orchestral music in an average room requires peak power capabilities of the order of 15-20 watts when the electro-acoustic transducer is a baffle-loaded moving-coil loud-speaker system of normal efficiency. The use of horn-loaded loud-speakers may reduce the power requirement to the region of 10 watts."

Dealing with the output stage, Mr. Williamson favours triodes with inverse feedback, explaining this choice as follows:

"Push-pull triode valves without the refinement of negative feedback form the mainstay of present-day high fidelity equipment. A stage of this type has a number of disadvantages. With reasonable efficiency in the power stage such an arrangement cannot be made to introduce non-linearity to an extent less than that represented by about 2-3 per cent harmonic distortion. The output/input characteristic of such a stage is a gradual curve. With this type of characteristic distortion will be introduced at all signal levels and intermodulation of the component signal frequencies will occur at all levels. The intermodulation with such a characteristic is very considerable and is responsible for the harshness and "mushiness" which characterises amplifiers of this type. In addition, further non-linearity and considerable intermodulation will be introduced by the output transformer core.

"If the load impedance is chosen to give maximum output the load impedance/output resistance ratio of the amplifier will be about 2, which is insufficient for good loud-speaker damping.

"It is difficult to produce an adequate frequency response characteristic in a multi-stage amplifier of this type as the effect of multiple valve capacitances and the output transformer primary and leakage inductances becomes serious at the ends of the A.F. spectrum.

"The application of negative feedback to push-pull triodes results in the more or less complete solution of the disadvantages outlined above. Feedback should be applied over the whole amplifier, from the output transformer secondary to the initial stage as this method corrects distortion introduced by the output transformer and makes no additional demands upon the output capabilities of any stage of the amplifier.

"The functions of negative feedback are:

"(*a*) To improve the linearity of the amplifier, and output transformer.

"(*b*) To improve the frequency response of the amplifier and output transformer.

"(*c*) To reduce the phase shift in the amplifier and output transformer within the audible frequency range.

"(*d*) To improve the low-frequency characteristics of the output transformer, particularly defects due to the non-linear relation between flux and magnetising force.

"(*e*) To reduce the output resistance of the amplifier.

"(*f*) To reduce the effect of random changes of the parameters of the amplifier and supply voltage changes, and of any spurious defects."

Glancing at the circuit, the first feature noticed will be the direct-coupled phase-changer of a type detailed in "Radio World" in our issues of May, 1940.

This phase-changer then drives a push-pull audio stage, driving the output valves with resistance-capacity coupling throughout.

The valves used by Mr. Williamson are English types not well known in Australia, but the characteristics of the type used in the first four sockets is quite close to that of a 6J7G with triode connections. For the output Mr. Williamson uses type KT66 pentodes with screen and plate tied. According to our valve charts the KT66 is similar to the 6L6 and 6V6, but we hesitate to say that either of these will give satisfactory service with 450 volts on both screen and or thereabouts. We would, however, expect the 807 to be reasonably suitable under such conditions, or at least with about 385 volts. So to those who want to build this amplifier to hear for themselves how it performs, we suggest that a 385-volt 150 milliamp transformer be used, with 6J7G triodes and 807's, also connected as triodes. Possibly the biggest problem for the local constructor will be to obtain a suitable output transformer. As Mr. William-

son points out strongly in his article, this component is of vital importance, so important in fact that Mr. Williamson gives a full specification for a transformer to meet requirements. We print this data, but doubt if it is of great value here, as it is unlikely that the specified core material will be readily available.

Output Transformer

Specification.

Primary load impedance = 10,00 0ohms C.T.

Secondary load impedance = 1.7 ohms per section.

Turns ratio = 76 : 1.

Primary inductance = 100 H (min.)

Leakage inductance = 30 mH (max.)

Winding Data.

Core: 1¾in. stack of Pattern No. 28A "Super Silcor" laminations. (Magnetic and Electrical Alloys.)

The winding consists of two identical interleaved coils, each 1½ in. wide, wound on 1¼in. × 1¾in. paxolin formers. On each former is wound: 5 primary sections each consisting of 5 layers (88 turns per layer) of 30 S.W.G. enam. copper wire interleaved with 2 mil. paper, alternating with 4 secondary sections, each consisting of 2 layers (29 turns per layer) of 19 S.W.G. enam. copper wire, interleaved with 2 mil. paper.

Each section is insulated from its neighbours by 3 layers of 5 mil Empire tape. All connections are brought out on one side of the winding, but the primary sections may be connected in series when winding, only two primary connections per coil being brought out.

Measured Performance.

Primary inductance = 100 H. (measured at 50 c/s with 5V R.M.S. on primary, equivalent to 2.5mW).

Leakage inductance = 22 mH. (measured at 1,000 c/s).

Primary resistance = 250 ohms.

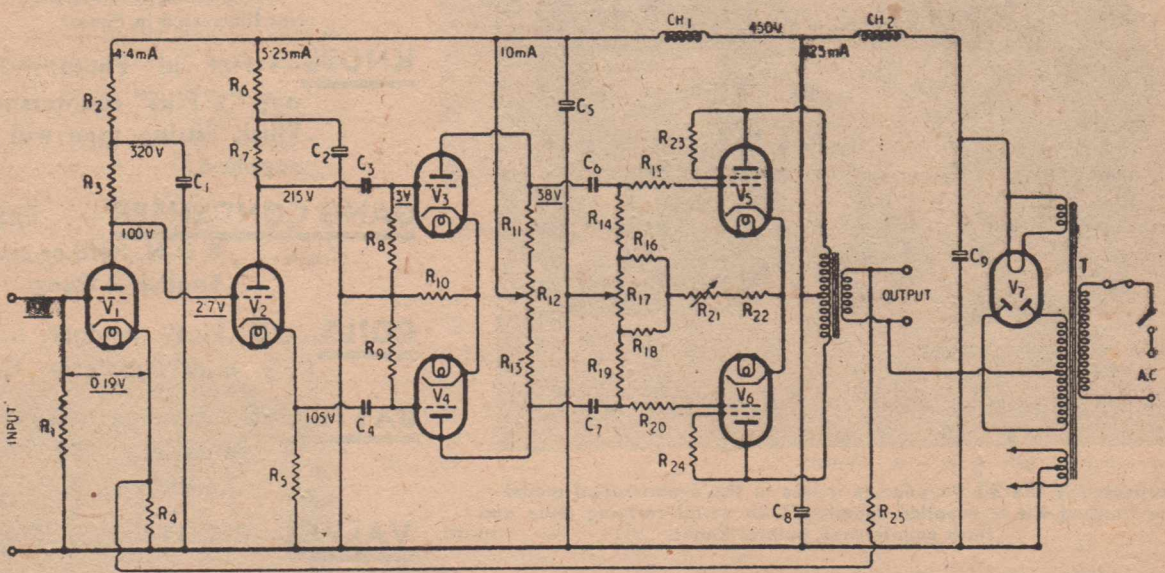


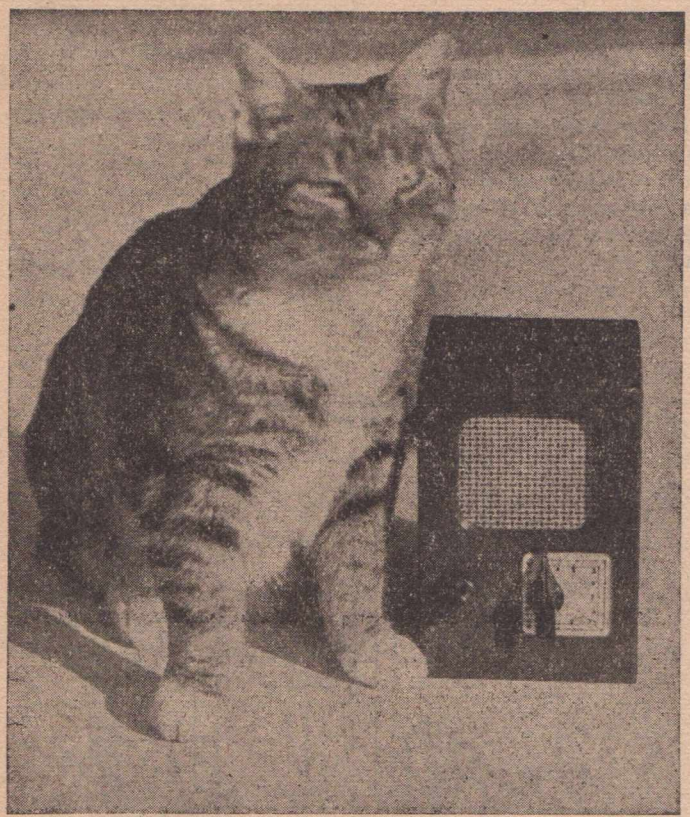
Fig. 5. Circuit diagram of complete amplifier. Voltages underlined are peak signal voltages at 15 watts output.

CIRCUIT VALUES.

R_1	1 MΩ ½ watt ± 20 per cent	R_{15}, R_{20}	1,000 Ω ½ watt ± 20 per cent	C_8	8 μF 550 V, Wkg.
R_2	33,000Ω 1 watt ± 20 ,,	R_{16}, R_{18}	100Ω 1 watt ± 20 ,,	C_9	8 μF 600 V, Wkg.
R_3	47,000 Ω 1 watt ± 20 ,,	R_{17}, R_{21}	100Ω 2 watt wire-wound variable.	CH_1	30 H at 20 mA (Min.)
R_4	470 Ω ½ watt ± 10 ,,	R_{22}	150Ω 3 watt ± 20 ,,	CH_2	10 H at 150 mA (Min.)
R_5, R_6, R_7	22,000 Ω 1 watt ± 10 ,,	R_{23}, R_{24}	100 Ω ½ watt ± 20 ,,	T	Power transformer. Secondary 425-0-425 V, 150 mA (Min.) 5 V. 3A, 6.3 V. 4A, C.T.
R_8, R_9	0.47 MΩ ½ watt ± 20 ,,	R_{25}	1,200 √speech coil impedance, ½ watt.	V_1 to V_4	L63
R_{10}	390 Ω ½ watt ± 10 ,,	C_1, C_2, C_5	8 μF 450 V, Wkg.	V_5, V_6	KT66.
R_{11}, R_{13}	39,000 Ω 2 watt ± 10 ,,	C_3, C_4	0.05 μF 350 V, Wkg.	V_7	U52.
R_{12}	25,000 Ω 1 watt wire-wound variable.	C_6, C_7	0.25 μF 350 V, Wkg.		
R_{14}, R_{19}	0.1 MΩ ½ watt ± 20 ,,				

WE WILL LET YOU JUDGE

BUT STUDY THESE "Q PLUS" FEATURES



Illustrated is the 3¾ Pounder as it was in the experimental model—the finished Kit is supplied complete with aerial carrying strap and flush countersunk pointer knobs.

SIZE—6¼" x 4⅜" x 4⅝"
(136 Cubic Inches.)

WEIGHT—Including Batteries—3¾ lbs.

CABINET—Lightweight Ply Finished in Buff Leatherette.

CARRYING—By means of Plastic Strap which acts as External Aerial.
(Not Illustrated in Photo)

KNOBS—(Not in Photo)—The new "Q Plus" countersunk, Flush Fitting type will be supplied.

GANG CONDENSER—Either F & N, Reid or small English 2 Gang.

COILS—"Q Plus" Midget Loop I.F's and Oscillator Coil.

BATTERIES—Minimax 67½ volt + 1 No. 950 Torch Refill.

VALVES—1R5, 1T4, 1S5, 3S4.

AVAILABLE FROM ALL GOOD RADIO STORES

THE "Q PLUS" 3¾ POUNDER

£3-17-6

INCLUDES CABINET, CHASSIS, COILS, I.F's HARDWARE, Etc.

R. W. STEANE & CO. PTY. LTD.
KEW. VICTORIA

COMPLETE PRICE

£13-3-6

Includes Cabinet, Chassis, Coils, I.F's, Valves, Batteries, Gang and all necessary parts to finish set.

AVAILABLE EITHER AS A FOUNDATION OR COMPLETE KIT

"Q-PLUS"

3¾ POUNDER

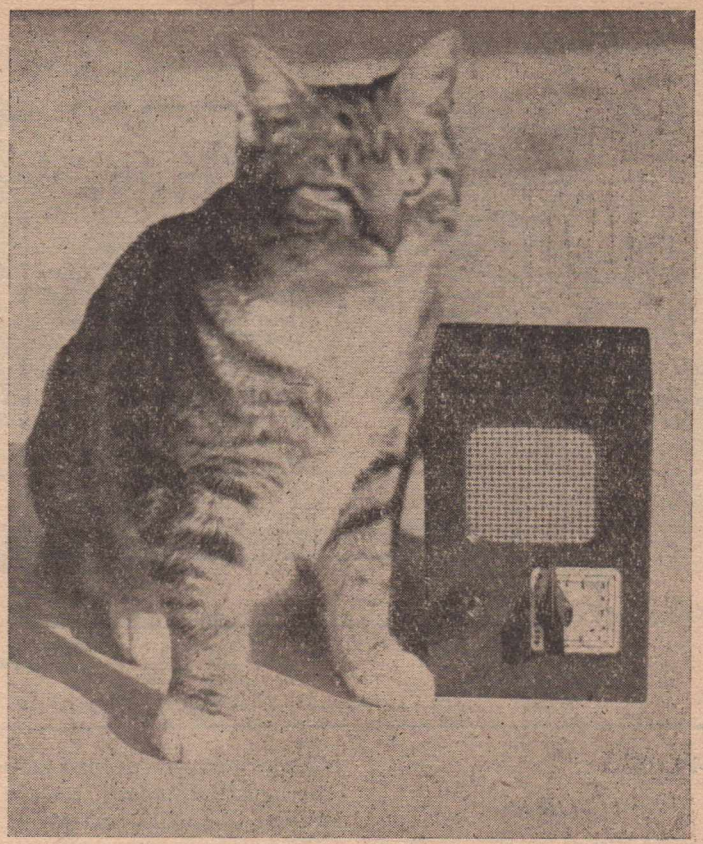
SELF-CONTAINED "BABY" MODEL IN THE MODERN STYLE

THIS little personal set is laid out just as its larger brothers with the exception that every thing is very much smaller. Just the same, we have outlined the layout full-size.

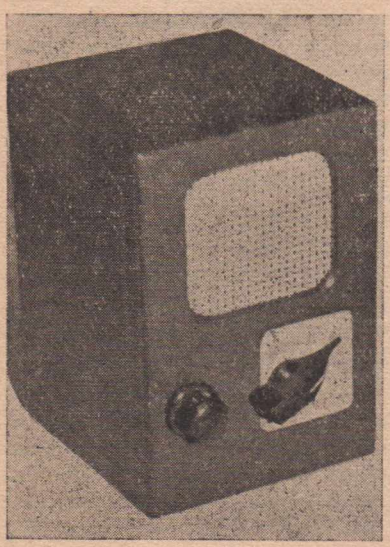
Physical features of this baby superhetrodyne are its unique dimensions, its height being 6¼ inches, width 4-3/8 inches, while its depth is 4-5/8 inches. The cubic content of the completed set is only 136 cubic inches. The total weight of the completed radio, including batteries, is 3¾ pounds.

In regard to the current drain on the batteries, total A battery drain is 194 milliamps, while 12 milliamps is drawn from the B battery supply. Oscillator grid current will range from 95 to 105 micro amps. over the tuning range.

The kit is designed so that any of 3 types of gangs now available may be used. In the photograph the "Reid" 2-gang is shown—should the user desire to incorporate other makes, sufficient space is allowed. The F.N. "Midcap" is one very small gang ideally suited to this set.



Spike Jones, the office cat, purrs as he listens to his well-known namesake.



Special countersunk knobs were not available when our photographs were taken, but will be supplied with kits.

ASSEMBLY

1. Mount all valve sockets, taking care that the filament pins are facing in the direction shown in the diagram. Filament pins are Numbers 1 and 7. In mounting the sockets use the special small nuts and bolts provided.

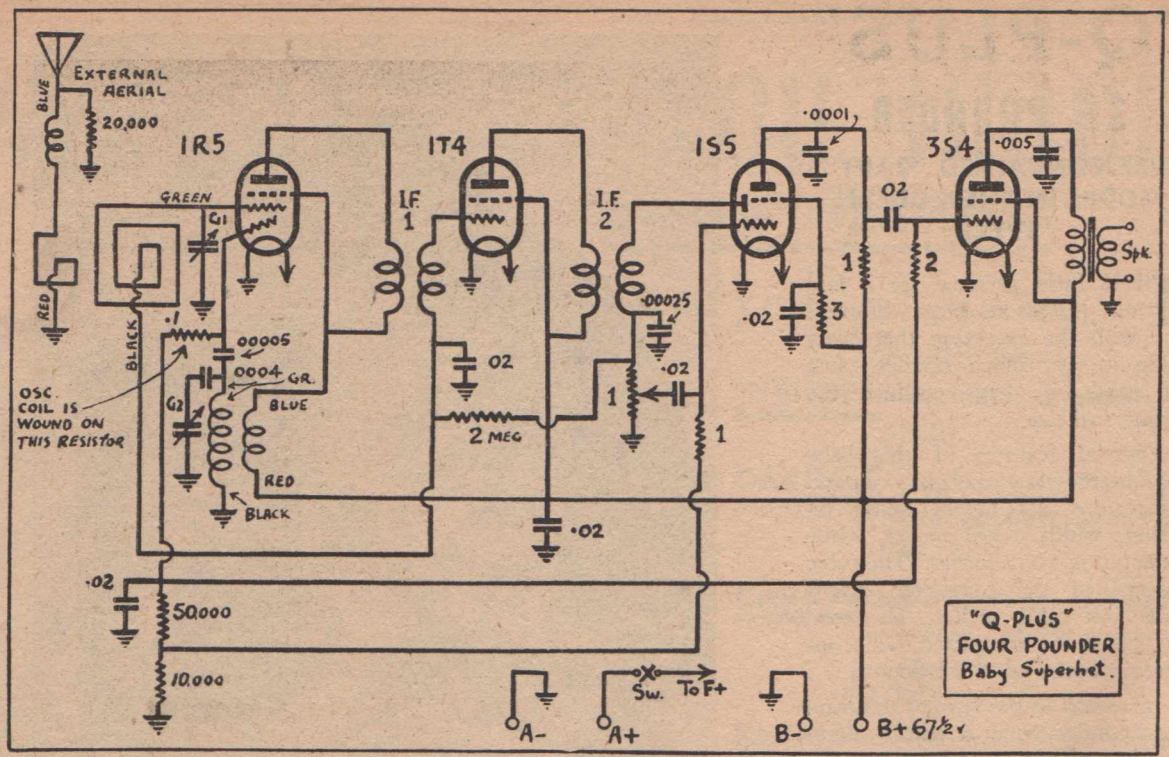
2. Mount the I.F. transformers, also taking care that their position is as shown in the wiring chassis. All positions are viewed from bottom of the chassis.

3. Mount gang condenser, using the holes provided if the "Reid" 2-gang is used, otherwise it will be necessary to drill the holes according to the condenser used. Two Phillips trimmer condensers are mounted directly onto the gang condenser between the gang and the speaker. Solder the solid wire of the condensers on to the earthed eyelets, rivetting the gangs, and then wire the tag on trimmers to their respective grid sections. Trimmers are bent at such an angle that they will not foul gang plates during their 180 degrees rotation. Care should be taken not to break the ceramic insulation of the condensers.

4. Mount speaker, volume control and speaker transformer. It is suggested that the speaker be mounted last in order to prevent accidental damage to the cone.

5. Finally mount small terminal strip and solder busbar wire to the centre shielding pins on the valve

(*Continued on page* 18)



"Q-PLUS"

(Continued)

sockets, and then continue with the wiring as shown in the photographs and diagrams.

6. The loop aerial mounts inside the cabinet, flush against the right-hand wall, looking at the cabinet from the front view. Use two screws and the holes provided, taking care to mount the loop with the small coupling coil at the speaker end of the cabinet.

Wiring

1. Wire pin No. 1 to earth bus-bar for the earth return of filaments for all valves, except the 3S4, which require pins No. 1 and 7 to be connected together for 1.4 volt operation and pin No. 5 to be connected to earth.

2. The positive filament supply may now be wired to each valve (pin No. 7) in all cases.

3. A lead is brought from F+, No. 7 pin on the 1R5 socket, through a hole in the back of the chassis near the 1st I.F. transformer, and runs to one side of the battery switch. A wire from the other contact on the switch runs back through the same hole right round the chassis, coming out on to the top of the chassis through the speaker cutaway. It then runs to positive of the 1½-volt battery.

4. Resistors and condensers should then be wired in as per wiring diagram and photos. One little point which may not be seen is that the earth return of the volume control is earthed to the busbar.

5. A lead from the blue terminal on the loop is brought to one of the screws holding the loop in place. This screw should be arranged as a terminal for connecting the external aerial. From green loop terminal, solder a lead and attach other end directly to the aerial section of the tuning gang. From black terminal on loop, bring a lead

PARTS LIST

FOUNDATION KIT

1—Cabinet.
1—Chassis.
1—"Q Plus" No. 1 midget I.F. transformer.
1—"Q Plus" No. 2 midget I.F. transformer.
1—"Q Plus" Midget 1R5A oscillator coil.
1—"Q Plus" Midget loop aerial.
1—Instruction sheet.
1—Basic wiring kit.
1—Accessory kit consisting of hardware, etc.

BALANCE OF COMPONENTS

4—Peanut tube type socket.
1—Midget 2 gang condenser.
1—Ro'a 3C speaker and transformer.
1—1 meg. midget type volume control.
3—.02 ufd. 200v. paper condensers.
2—.02 ufd. mica condensers.
1—.005 ufd. mica condenser.
1—.0004 ufd. mica condenser.
1—.00025ufd. mica condenser.
1—100ufd. ceramicon condenser.
1—50 uufd. ceramicon condenser.
1—3 meg. ½w. I.R.C. resistor.
2—2 meg. ½w. I.R.C. resistors.
2—1 meg. ½w. I.R.C. resistors.
1—50,000 ohm, ½w. I.R.C. resistor.
1—20,000 ohm, ½w. I.R.C. resistor.
1—10,000 ohm, ½w. I.R.C. resistor.
1—Energo rotary switch.
2—"Q-Plus" Special Knobs.
2—Philips' Trimmers.
1—67½v. minimax battery.
1—No. 950 1½v. dry cell.
Valves: 1 each— 1R5, 1T4, 1S5, 3S4.

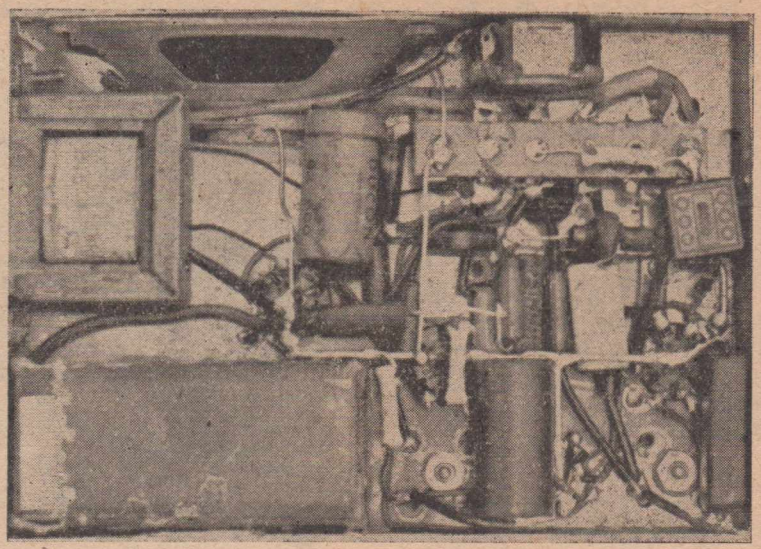
sufficiently long to go through the hole in chassis at the rear of 1st **I.F. transformer and solder it to** the F— (A.V.C. Line) of that component. Red terminal on the loop can be earthed at the most convenient earthing point.

Description of Components

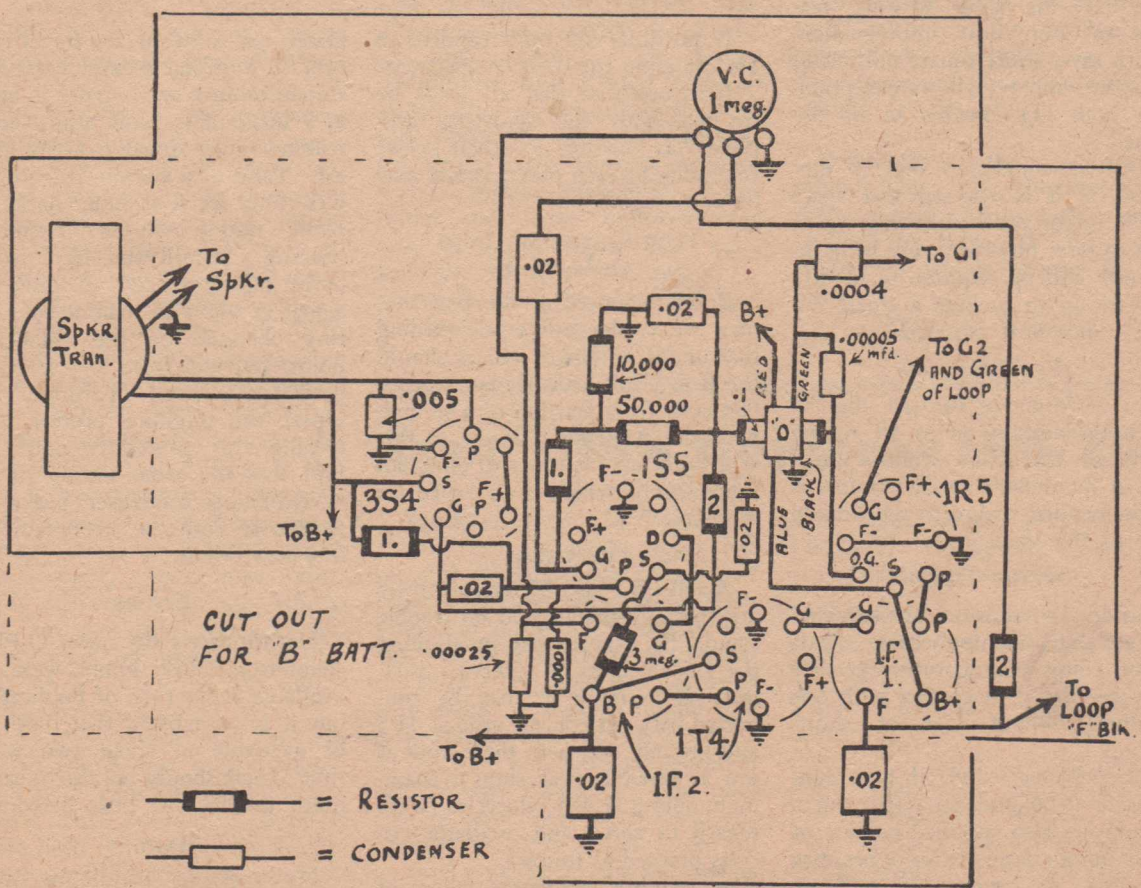
The "Q Plus" oscillator coil and I.F. transformers should need no introduction. The oscillator coil is actually wound on the grid resistor, while the I.F. transformers are of the "Ferropreg" type for maximum performance.

The new layer type 67½ volt Eveready Minimax battery is incorporated and merely sits in place, being held by the chassis and cabinet. "A" supply is obtained from an ordinary torch unit cell which

(*Continued on next page*)



By comparing this photograph with the diagram below, it is easy to follow the wiring and lay-out.



ALL F+ CONNECT, AND THEN RUN TO + OF "A" BATTERY THRO' SWITCH.
ALL B+ CONNECT AND THEN RUN TO 67½V. ON "B" BATTERY.

(*Continued*)

has been found to give about 5 hours' continuous life, or up to 10 with intermittent operation. It must be remembered that these cells cost about 9d., whereas their big brother, the portable A, is about ten times the price and weight. Another favourable point is that they are obtainable everywhere.

The "A" supply is switched by the small rotary switch situated in the back panel, fitting in above the 1st I.F. transformer, or through the switch on the volume control should this component be available.

Special Features

Needless to say, the latest "peanut" tubes are used which, whilst having similar performance to their GT equivalents, are almost one-quarter of their size. The I.F. transformers are unique in that they have the latest "Q Plus" feature of iron dust impregnation, which saves every square millimeter of space, and yet allows exceptionally high "Q" factors to be obtained.

Only a numbered dial is supplied, as it is realised that space is the important feature in a set of this calibre; however, very little ingenuity will be required to modify the set up to include a small station indicator if required.

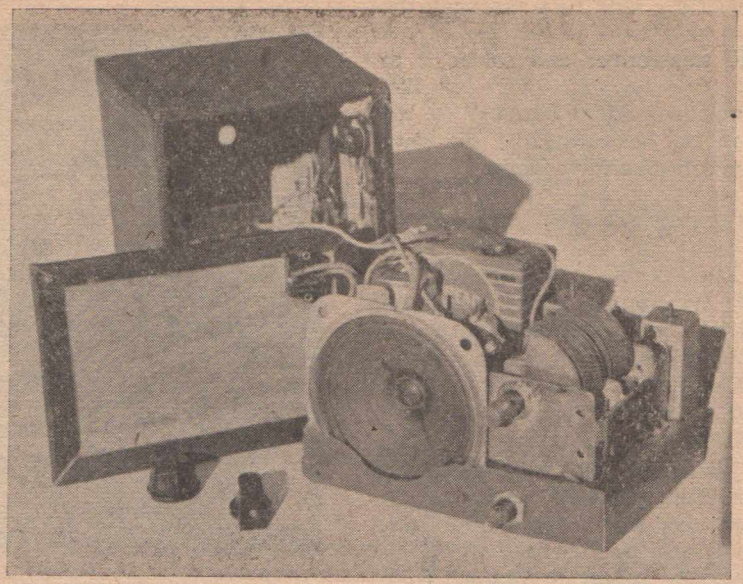
Performance

In performance for size the "Q Plus 3⅜-Pounder" wins all round, although when, in country areas, use of the outside aerial terminal is recommended owing to the limited size of the loop.

Circuit Details

I.R.C. ½w. resistors are specified throughout, mainly because, apart from being sound resistors, they may be placed in contact with one another without fear of short-circuits.

"Ceramicon" silvered type condensers (100 and 50 micro micro farad) are also specified because of their unique size. Other types may be used, of course, but will require a different layout if they are to be fitted in satisfactorily.



In this photo a miniature air-dielectric gang is shown. Equally suitable and much lighter in weight is the F.N. "Midcap", a very small tuning gang using a high-efficiency plastic dielectric.

If possible, .02 mica condensers are desirable for their compactness.

It is essential that all leads be covered with the spaghetti supplied, as owing to their close proximity to each other, shorts may be encouraged.

Putting the Set Into Operation

Before connecting the batteries, may we tender a special warning that under no circumstances should the B 67½-volt leads come into contact even for a fraction of a second, with the A filament leads, as this will cause all filaments to burn out immediately, which is an expensive mistake.

Alignment

As all "Q Plus" I.F. transformers are specially pre-aligned no trouble should be experienced in aligning the I.F. circuits. If a service oscillator is available it may be connected between control grid of 1R5 and ground, and with the output as low as possible, peak slugs to maximum output at 455 kilocycles. With regard to aerial and oscillator circuits proceed as follows.

The padding condenser being of fixed value. there is no adjustment here. Screw oscillator trimmer in about one-third of its travel, and tune in a station around 1400 Kcs. Rotate cabinet until signal is heard at a maximum. Now adjust aerial trimmer until signal is at its loudest. Tune in a station around 950 Kcs, turn aerial trimmer back and forth, noting whether circuit is peaking. Should you have to require more capacity to peak the signal at 950 Kcs than at your setting obtained on the 1400 Kcs point, you will have to screw your oscillator trimmer in further and repeat the aligning process, continuing this procedure until you find that the same setting of the A trimming condenser peaks the signals at both the 1400 Kcs and 950 Kcs points.

Knobs

Unfortunately the new "Q-Plus" countersunk flush knobs were not available at the time of publication, but it is anticipated that they will be available in about two weeks time. These should put the finishing touch to this fine little performer.

Handle

No carrying handle is made available, as it is felt that the indi-

(*Continued on page* 30)

RADIO ON H.M.S. "VANGUARD"

Vital Equipment For Battleship

THE radio organisation of a fleet includes many separate communications channels: external ones for transmitting and receiving messages by morse to and from the Admiralty, shore authorities and other fleets; internal, using both morse and telephony, for manoeuvring signals, for radar reporting, for gunnery control, for administrative messages, for the direction of aircraft and for many other purposes. A large warship, such as a battleship, must be provided with radio equipment for each of these many channels. And H.M.S. *Vanguard,* as Britain's newest battleship, is not only so equipped but is fitted with all the newest types of apparatus developed as a result of lessons learned during the Second World War.

The majority of the equipment is arranged in five compartments. In the forward superstructure conveniently adjacent to the Command is the Bridge Receiving Room. This contains nearly a dozen receivers covering the low-, medium-, high- and very-high-frequency bands, i.e., from the 16 Kc/s. used by the Rugby world-wide broadcast morse transmissions up to the 100-150 Mc/s. band used for the radio-telephone communication with aircraft. There is also the medium-frequency direction-finding set used for navigational purposes and a 50-watt output high-frequency transmitter principally for emergency use, which, with an associated receiver, can be operated off batteries in the event of a failure of the ship's normal power supplies.

A small compartment at the back of the Bridge itself contains the V.H.F. radio-telephone transmitters. This position is dictated by the need for keeping the length of the aerial feeders to a minimum. The dipole aerials are necessarily mounted high up on the foremast in order to obtain the maximum practicable quasi-optical range for communication with ships and aircraft.

The remainder of the *Vanguard's* transmitters, covering the medium- and high-frequency bands, are divided, on the principle of not putting all one's eggs in one basket, between two transmitter rooms sited below the mainmast.

The Lower Transmitting Room, sited below decks for protection against bomb hits and shell fire, contains a 400-watt output medium-wave wireless-telegraphy transmitter, a high-frequency set of similar power for either wireless-telegraphy or radio-telephony and two 50-watt dual purpose sets. There is also a crystal wavemeter of high accuracy. The Upper Transmitter Room, sited high up in the after superstructure to avoid the effects of underwater damage, contains a 5 kW. output medium-wave wireless-telegraphy transmitter and four high-frequency sets, of 2 kilowatts, 400 watts and two of 50 watts output respectively, for both morse and telephony working.

Lower Receiving Room

The fifth compartment, intended as a standby in the event of damage to the Bridge Receiving Room, is the Lower Receiving Room, which is sited aft adajacent to the Lower Transmitter Room. In addition to receivers, this contains the perforators, undulators and relays needed for high-speed morse transmission.

An extensive remote control system is provided to allow the sets in the three transmitter rooms to be controlled from any receiving position in either the Bridge or Lower Receiving Rooms, and from various other places in the ship, such as the Bridge for manoeuvring purposes and from the Operations Room for the direction of aircraft.

Power for all the equipment is provided by a 50-cycle three-phase A.C. system giving 400 volts, supplied by three 40 kW. motor alternators widely spaced in the ship.

—"Practical Wireless," Eng.

Type 1H6G Replaces 1B5/25S

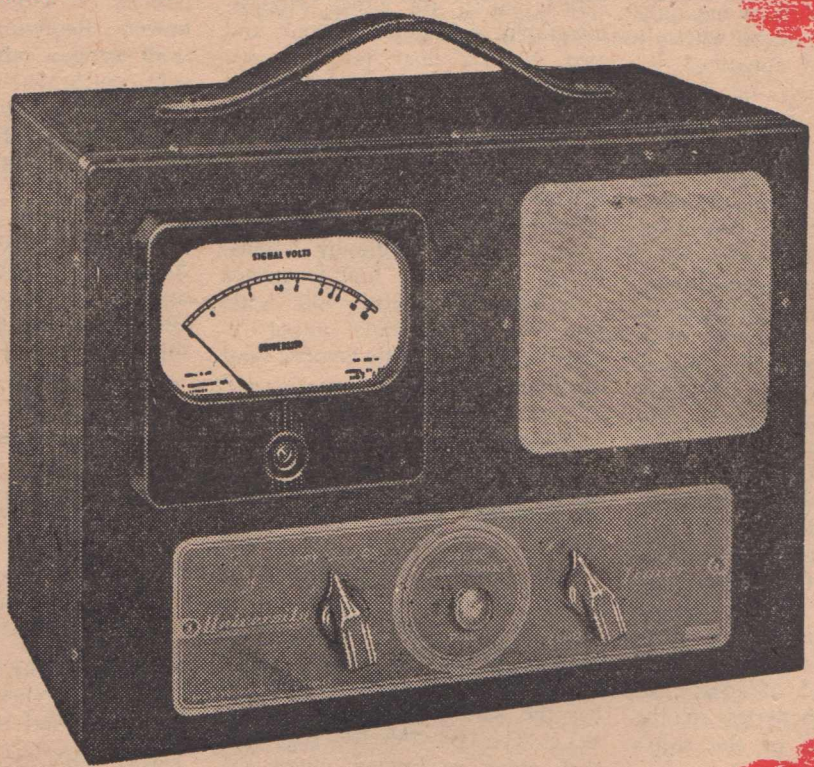
Radiotron type 1B5/25S is at present in very short supply and there is no immediate prospect of relief. On the other hand, type 1H6-G is in abundant supply and has the same electrical characteristics as type 1B5/25S. It is suggested that radio servicemen might use type 1H6-G to replace type 1B5/-25S so long as the present condition of shortage continues. The only change which need be made is the change of socket from a 6in to an octal type. In making the change over, pin 1 of the octal socket is left without any connection but all the other pins are connected in the same order as the pins of type 1B5/25S, leaving the last pin (number 8) unconnected.

Details of the socket connections of the two types are given below for ease of reference:

Type	1B5/25S	1H6-8
Socket	6-pin	octal
Pin 1	Filament+	No connection
Pin 2	Plate	Filament+
Pin 3	Diode No.2	Plate
Pin 4	Diode No.1	Diode No. 2
Pin 5	Grid	Diode No. 1
Pin 6	Filament —	Grid
Pin 7	—	Filament —
Pin 8	—	No connection

NEW.. FAST..

The University



VERSATILE!

SIGNAL TRACER

Just Released!

WHAT IT IS:

It's a Signal Tracer—the most versatile and fool-proof instrument that has ever been designed for speedy and economical radio service work and general fault finding. It is something that has been talked about for many years but has never before appeared on the Australian market. Portable—light—sturdily constructed—it has a host of advantages all of which appeal to the service man, the amateur set builder and the experimenter. It is built into an attractive brocaded steel case with a leather carrying handle and all the necessary test leads and instructions are supplied. It embodies one of the famous "University" four-inch square meters, together with a new 3½" permagnetic speaker. Standard type, easily replacable batteries are built internally and a book of instructions explains the uses and shows how signal tracing is the latest up-to-date method of service work. Signal tracing is carried out both by ear and by eye. You hear the signal in the speaker—and you see the signal on the meter. This is the post-war service instrument—one that is simple to use, fool-proof, speedy, portable, economical and right up to the minute. You've waited a long time for it and here it is.

WHAT IT DOES:

Spearhead of this most efficient instrument is the probe. This is a bakelite moulding into which is built one of the new bantam type valves. There is practically no pre-setting and adjusting to be done on the instrument itself. You merely take the probe and trace through the receiver under test and watch the indications on the meter or listen to the indications on the speaker and presto! —the fault is found that way. It actually traces the path of the signal RIGHT THROUGH the radio receiver from start to finish. It can be used just as effectively on amplifiers or intercommunication systems and will give the same effectiveness and speedy service. It makes fault finding in radio receivers, etc., easy and quick. When the probe strikes the faulty section, indications are given by the meter and speaker both. It will indicate clearly and easily faults in coils, condensers, intermediate frequency transformers, components, as the signal is traced. It makes service work sure and certain. This is the instrument you must have—a necessity in every place where radio work is being done. Quantities are limited, so place your order early. Ask for model S.T.B. "University" Signal Tracer.

WHERE TO SEE IT:

N.S.W.
John Martin Pty. Ltd.
George Brown & Co. Pty. Ltd.
Fox & MacGillycuddy Ltd.
Bloch & Gerber Ltd.
Dominion Factors Pty. Ltd.
Electronic Parts Pty. Ltd.

QUEENSLAND
Chandlers Pty. Ltd.
Irvine Radio & Electrical Co.
Trackson Bros. Pty. Ltd.
A. E. Harrold

WESTERN AUSTRALIA
Atkins (W.A.) Ltd.

VICTORIA
Vealls Electrical & Radio Pty. Ltd.
Replacement Parts Pty. Ltd.
Hartleys Ltd.
John Martin Radio & Electrical
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RADIO REFLECTIONS FROM SHOOTING STARS

Discoveries by Indian Engineers

SHOOTING stars, or, to give them their more scientific name, meteors, have held a fascination for mankind from the earliest times and although they are no longer regarded with superstition, they still form a subject of absorbing interest. They even have their uses, for it is now known that while the ionization in the upper atmosphere which makes long-distance radio communication possible, is maintained during the daytime by ultra-violet light from the sun, it is the continuous arrival of countless millions of microscopic meteors, travelling at enormous velocities, which maintains the level of ionization throughout the hours of darkness. Meteors are thus far more than a subject of scientific curiosity.

BY

G. R. M. GARRATT

M.A., A.M.I.E.E.

For several years radar methods have been used for the observation of meteors, and their transient echoes will be familiar to many radar operators. With the recent discovery, however, by two engineers of All India Radio, Messrs. Chamanlal and Venkataraman, that under suitable conditions, meteors can also be "heard" on an ordinary communication receiver, a new line of research has been opened up.

Variable Pitch Whistles

The transmitters of All India Radio at Delhi are situated about 10 miles from the Receiving Centre, and while monitoring the high-power short-wave transmitters it was noticed that feeble heterodyne whistles of an unusual nature could often be heard but they could not be explained by any of the known causes. The whistles were invariably of short duration, never lasting for longer than 1½-2 seconds; they commenced as a high-pitched note of about 2-3,000 cycles, fell rapidly in pitch and usually died away before reaching zero frequency. Only in rare cases did the whistle pass through zero and reappear as an ascending note before dying away. The whistles were most frequent between 2.0 and 6.0 a.m. and were only rarely heard during the hours of daylight.

Searching to explain these unusual characteristics, Chamanlal and Venkataraman concluded that they could only be explained as a Doppler effect arising from the interference of the direct ground waves from the nearby transmitter with the waves reflected from some rapidly moving reflecting surface. Calculations showed that if this was the true explanation, the reflecting surface would have to have the initial velocity of the order of 50-80 kilometres per second. Such velocities could only be associated with meteors entering the earth's upper atmosphere, and visual observation soon confirmed this theory by establishing a direct correlation between the arrival of a visible meteor and the occurrence of the audible whistle.

Although a visible meteor invariably produces a whistle of considerable intensity, a far greater number can be heard but not seen. In fact, at certain times of the year, the number arriving is so great as to make it impossible to maintain an accurate count.

Meteors can be broadly divided into two classes—the first being those which enter the earth's atmosphere from random directions, and the second those which are travelling in definite orbits comparable with those of a comet. From the point of view of radio communication those arriving from random directions are by far the most important since it is these which are now known to maintain the ionization in the upper atmosphere during the night. The number of such meteors is literally astronomic and it has been computed that at least a thousand million encounter the atmosphere every 24 hours.

Do you know that the shooting stars you see are only the size of a pin's head?

The vast majority of these meteors are of only microscopic size, but their very high velocities and their great number result in steady ionization of the atmosphere at high altitudes and give rise to the familiar reflecting layer. It is, of course, only the larger meteors which produce sufficient ionization to give an individual echo, and it must be a very large one to become visible to the naked eye as a "shooting star." "Large" and "small" are comparative terms, however, so it may be as well to remark that although estimates vary, a "small" meteor can be regarded as being about the size of a grain of sand, while a "large" one, visible as a bright shooting star, is no larger than the top of a black-headed pin and has a mass which seldom exceeds 10-15 milligrams!

Although less important from the point of view of radio communication, those meteors which travel in regular orbits are by far the most spectacular since they give

rise at times to brilliant "showers" during which very large numbers may be seen. Such meteors are probably the remains of disintegrated comets which continue to travel in the original orbit. The fragments tend to be spread out more or less along the whole length of the orbit, and if the earth should happen to pass when the main bulk is passing, a most brilliant display of shooting stars may be seen by the naked eye. There are nine principal meteoric showers during the year, but really brilliant displays are of rare occurrence.

Conditions For Whistles

In order to detect the arrival of a meteor on a normal radio receiver there are a number of special conditions which must be fulfilled if success is to be achieved. First, it is necessary to have a powerful transmitter—at least 10kW and preferably about 50kW, radiating an unmodulated signal on a frequency of the order of 5-15 megacycles. The receiver requires to be situated about 8-15 miles from the transmitter so that it is within the skip distance but so that only a very weak ground wave is received. It is essential that the ground wave received should be a weak one since the reflected echoes may have a strength as low as only 1 millivolt or even less, and if a strong ground wave is received, the normal A.V.C. action of the receiver will so reduce the amplification as to make the feeble echoes entirely inaudible.

It will be appreciated that a highly sensitive receiver is required for these observations. A communication receiver with two R.F. stages before the mixer is most suitable, although under good conditions a few of the stronger echoes can be picked up on a high-quality broadcast receiver.

Night-time Phenomenon

A somewhat inconvenient habit of these meteors is that, like the skylark, their peak period of whistling is during the hours just before dawn. A few can be heard from midnight onwards, but a far greater number will be audible about 4 a.m. and it is rare to hear one during the hours of daylight or during the evening. The reason for this state of affairs is easily understood if we recall some of our schoolboy astronomy and remember that besides rotating on its axis once every twenty-four hours, the earth makes a journey round the sun once every year. The earth travels round its elliptical path with an average velocity of 29 kilometres per second and it is obvious that as the earth rotates on its axis there is only one part which is "facing forwards" and where the highest relative velocities will be encountered between the earth and any meteors which it happens to meet. The area facing forwards will actually lie at some point within the tropics and at any moment will be on the longitude where the solar time is 6 hours before noon, i.e., 6 a.m. local time. Various other factors combine to place the peak period rather earlier than this and in practice the highest number of meteors are encountered around 4 or 4.30 a.m.

Doppler Effect

As was mentioned earlier, the "whistle" is due to a Doppler effect produced by the beating between the ground waves and those reflected from the local area of ionization caused by the passage of the meteor through the atmosphere. The apparent frequency shift of the reflected waves is due to the component of the velocity of the reflecting surfaces towards the observer and it will be clear that if this velocity was constant, a whistle of constant frequency would be heard. In practice, this velocity is not constant for two reasons—first, the meteor is retarded very rapidly in the earth's atmosphere, and, secondly, the component of velocity towards the observer clearly varies with the instantaneous position of the meteor in its track in relation to the observer. For example, suppose that a meteor was travelling at a constant velocity on a horizontal course which passed directly over the head of the observer. Such a meteor would have a component of velocity which would first be directed towards the observer but which would fall to zero as it passed overhead and then increase in the opposite direction as it receded. Such a meteor would cause a whistle which would first fall in pitch, pass through zero frequency and then increase again before dying away at 1-2,000 cycles.

A very small proportion of such whistles can in fact be heard but they are invariably very feeble since the meteors causing them are at extreme altitudes where the retardation of the earth's atmosphere has not entirely arrested their progress before they reach the point where the velocity towards the observer is zero.

Since the beat note is dependent on the direction of the meteor as well as its velocity, it is not possible to calculate the true velocity without simultaneous observations of its position and track. It is easy, however, to calculate the component velocity towards the observer. For example, assume that a beat note of 3 kc/s is heard using a transmission frequency of 6 Mc/s. Then the

(*Continued on page* 37)

PLASTICS TO REVOLUTIONISE TELEVISION

Cloud Pictures of Great Fidelity

(From our London Correspondent)

DETAILS of new plastic optical systems, which will revolutionise the design and performance of domestic television receivers, was described at a meeting of the Television Society in London recently.

The new systems, which have been evolved in the Optical Development Department of I.C.I. Plastics Division at Welwyn, may render obsolete the present-day small curved screen, round which viewers are obliged to huddle in order to get an undistorted picture. In its place will be a large flat screen—approximately 16 in. by 13 in., providing a well-lit picture of great clarity to a much larger audience.

The heart of the television receiver is, of course, the cathode ray tube. It is in television what the loudspeaker is in a sound system—the instrument by which the electrical impulses collected on the aerial are converted into something tangible.

With the design of television receiver at present in use, the viewing screen is, in fact, the curved end of the cathode ray tube. There are, however, definite limits to the size of picture obtainable by this system. The type normally used is of 9 in. diameter, giving an image 7½ in. by 6 in. on its end, but the provision of a large picture by this system would demand a cathode ray tube so big that its incorporation in a domestic set would be physically impossible. For example, a picture large enough for comfortable viewing would demand a cathode ray tube two feet in diameter and very much longer.

The obvious solution has been to develop an optical system with large light-gathering power, so as to make the utmost use of the already weak picture on the cathode ray tube. Such a system has been available for some time. Consisting of a concave mirror plus a corrector plate of complex shape with a non-spherical surface to ensure absolute accuracy, it had been used for some years in astronomical work. In the I.C.I. laboratories this has now been adapted to television projection, and the factor which has hitherto prohibited its widespread use—the enormous cost of the lenses and mirrors when made in glass—has been completely overcome by the perfection of a rapid and cheap method of casting accurate lenses in transparent plastics, known as "Transpex" I and II. The extreme accuracy demanded of a lens of this nature has been obtained by building up on their surfaces a skin of the same material until they constitute a perfect reproduction of the mould. This unique process, known as Surface Finishing, had paved the way to the widespread utilisation of such systems, and their mass production at a very moderate price for installing in domestic television receivers. Eventually, the bigger screen will not necessitate any increase in the price of receivers—if anything, the reverse. Moreover, the optical system is so compact that it will enable combined television and sound receivers to be produced in cabinets of quite moderate size.

The new plastic system reproduces pictures without any foreshortening or reflection of highlights in a room—which are ineradicable faults of the curved screen. Coloured pictures are reproduced with great fidelity.

Another interesting development is called a directional screen. This concentrates all light in the normal viewing area of the projected picture, enabling a large number of people in the normal living room to see it equally brightly, whatever their position with respect to the receiver. These screens, which are still in the experimental stage, are covered with tiny plastic lenses so minute that 40,000 are contained in the square inch.

Mass production of plastic optical systems by the Surface Finishing process will begin before the end of the year, and be in full swing by the middle of 1948. The necessary factory will be established in the London area.

ANNOUNCEMENT FROM KINGSLEY

Mr. Lay. W. Cranch, general manager of Kingsley Radio Pty. Ltd., Melbourne, announces the appointment of Mr. George W. Doyle as sales and advertising manager of the company.

He entered upon his new duties on July 1st.

Mr. Doyle, who has been connected with the radio and electrical industry for over 20 years, will be remembered as the founder and managing director of Industrial Newspapers Pty. Ltd., Sydney, publishers of "The Electrical and Radio Merchandiser." He has been the managing editor of that journal since its inception in 1938.

Kingsley Radio Pty. Ltd. will shortly announce the release of a number of new products and Mr. Doyle will implement the sales policy of Kingsley's well-known lines from the head office of the company in Melbourne.

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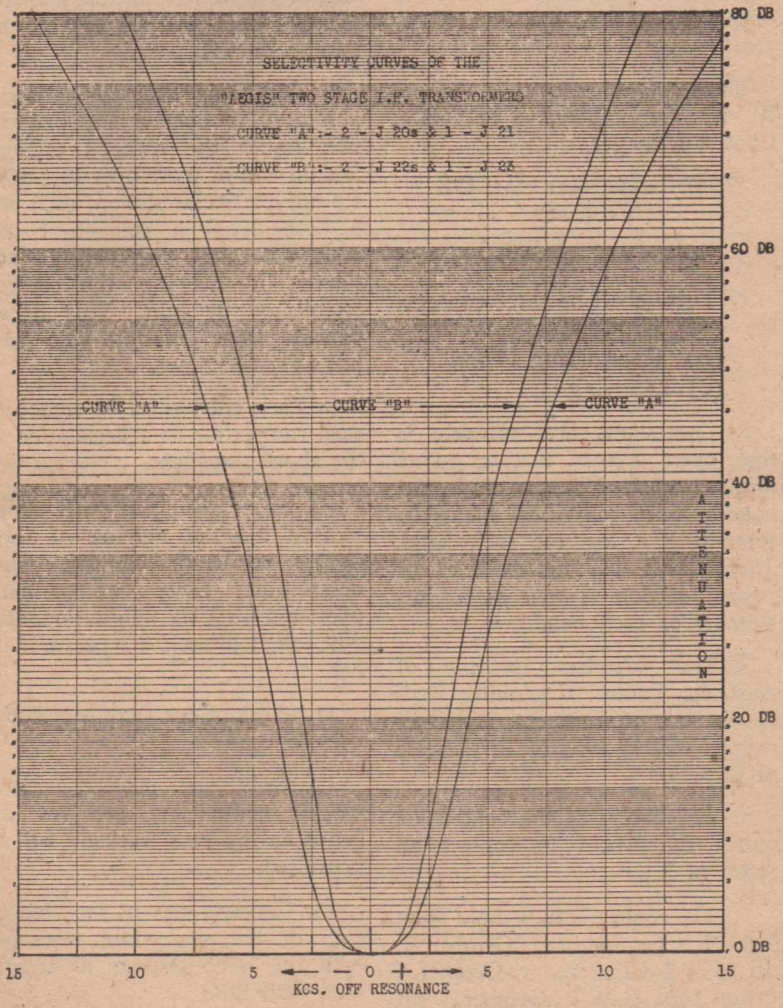

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INTERNATIONAL DX CONTEST

Promoted By Wireless Institute

THE 1947 Federal Convention of the W.I.A. directed the Federal Executive to organise and conduct a 1947 International DX contest to be held over the four week-ends in October.

The co-operation of amateurs throughout the world is sought through their respective radio societies to ensure that the contest is successful not only from the standpoint of VK stations but as a means of providing an interesting series of week-ends for overseas stations.

This contest is similar in nature to those previously held and which were very familiar to the pre-war gang with the exception that allowance has been made this year for single-band operation in addition to the "open" all-band trials.

Both the open and single-band sections are subject to awards and participants are only asked to endorse their logs with the particular section they are contesting.

It hardly seems necessary to have to explain the formulation of serial numbers, but, without this knowledge, some few Hams might miss the enjoyment of the contest, so here is a brief resume of the method. Each participating station allots himself three figures, anything between 111 and 999. These figures form half the six-figure serial number that he hands over to the station he contacts. The other half, at the first QSO, consists of three noughts, 000. Therefore, for example, 453,000 may be a station's number that he passes on to his first contact. In exchange he will receive a similar number, say, 687, 989, which shows that that station has worked another station before, because the three 0's have been substituted by 989. The second half of the six-figure serial number is taken from the first three figures of the number received at the previous QSO, and is added on to a station's own three figures. Then this combination is given to the next contact, and so on throughout the test. Always retaining the first three figures, adding the second and transmitting them in that order.

The executive of the W.I.A. invites amateurs all over the world to participate in this contest and can guarantee you some thrills—especially as the U.H.F.'s should be opening-up around this time of the year!

Further details are available from R. H. Cunningham (VK3ML), Contest Manager.

1947 International DX Contest

Rules and Conditions

1. There shall be three contests:
   (a) Transmitting C.W.
   (b) Transmitting Phone.
   (c) Receiving.

2. Contestants may compete in the "open" events, that is, on all licensed amateur bands, or, in any one or more individual bands by submitting a log for each band. There shall be awards for the "open" section as well as for the winners of each band.

3. The Wireless Institute of Australia Contest Committee shall be the sole adjudicators, and their rulings will be binding in the case of dispute.

4. The nature of the contest requires the world to contact all States of VK.

5. The contest is to be held from 0001 E.S.T., Saturday, October 4, till 2359 E.S.T., Sunday, October 5 (from 1401 G.M.T., October 3, till 1359 G.M.T., October 5) and will continue over the following three week-ends in October at the same times.

6. The first two week-ends are to be devoted to PHONE operation, whilst the latter two for C.W. The receiving contest is open at all times and incorporates both phone and C.W reception.

7. The contest is open to all licensed transmitting amateurs and receiving stations in any part of the world. Unlicensed ship and expedition stations are not permitted to enter the contest. Financial members of the W.I.A. and its affiliated societies only will be eligible for awards in VK.

8. Only one licensed station is permitted to operate any one station under the owner's callsign. Should two or more operators operate any particular station, each will be considered a competitor and must enter his own callsign and submit, in his log, the contacts established by him. This debars persons from entering who have not a HAM licence.

9. Each entry must be signed by each competitor as a declaration of the above statement.

10. Each participant will assign himself a serial number of three figures, as detailed in the contest description. When two or more operators work the one station, each will assign himself a separate number.

11. All amateur frequency bands will be used.

12. Only one contact with a specific station on each of the bands during each weekend will be permitted.

13. Contacts may be repeated on each of the succeeding weekends with the same stations in accordance with Rule 12.

14. Each contact must be accompanied with an exchange of serial numbers and signal strength reports, including readability, strength and tone.

Kingsley to Foster Experimenting

Plans For New Lines

AT a social dance, held at the Dorchester, Melbourne, on July 29, the directors of Kingsley Radio Pty. Ltd., entertained several hundred prominent radio trade personalities, dealers, distributors and members of the factory staff.

A feature of the evening was the presentation of samples of the new Kingsley products which are to be made available in the immediate future.

An inspection of the many new lines being introduced was most encouraging to one with the interests at heart of the home set-builder and amateur experimenter. It is obvious that Kingsley Radio will be doing a lot of good work to foster amateur radio and amateur set building.

Pride of the display was a multi-band communications receiver with tuning turret. The "Ferrotune" principle is employed throughout and the utmost in band-spreading has been achieved. At a glance it appears that the tuning range and the band-spreading are superior to anything we've even read about in American technical journals. And that is saying something. We feel sure that when this receiver is released in the immediate future it will create a furore. We hope to have further particulars for next month's issue.

Among the many other items we noticed an aerial matching unit, consisting of a plug-in coil, with a 6AK5G miniature valve.

The unit is not an r.f. pre-amplifier stage, as it appears at first glance, but an aerial matching unit to attain great efficiency in the aerial coupling, a point which seems to have been considerably neglected in the past.

A lot of interest was also displayed in the new Kingsley range of loud-speakers, and the many new versions of Kingsley foundation kits employing "Ferrotune" units.

The evening was a grand success and seems to mark the true opening of the bright post-war boom which we have all been looking forward to for so long.

CONTEST

(*Continued*)

15. The judges reserve the right to disqualify any station whose tone report is consistently less than T8.

16. Scoring: Three points will be allotted for every contact completed with an exchange of serial numbers and signal reports.

17. VK stations will multiply their total score by the number of countries worked on each band and stations outside Australia by the number of districts worked on each band in Australia: there being eight in all: VK2, 3, 4, 5, 6, 7, 8, 9. The onus of establishing the identity of new countries will rest with the participants.

18. No prior entry need be made for the contest, but each contestant is to submit a log at the conclusion of the test showing: date, time (in G.M.T.), band, a station worked, in and out serial numbers, in and out signal strength reports, and points claimed for each QSO. Finally a summary of points and multipliers claimed must be shown at the conclusion of the log.

19. Entries from VK stations must reach the W.I A., 191 Queen Street, Melbourne, C.1., not later than 14 days after the conclusion of the contest and overseas logs should reach that address by December 31, 1947.

20. Awards: Attractive certificates will be awarded to the station returning the highest total in each State of each participating country. Special prizes, donated by our advertisers, will be awarded, in addition to certificates. to section winners in Australia. There will be no world winner.

21. Overseas stations should call CQ VK, and VK stations CQ DX TEST. It is especially requested CW stations refrain from operating during the phone contest and likewise, the phone stations QRT during the CW trials.

RECEIVING

1. Rules for the receiving contest are the same as for the transmitting contest, but is open to members of any Short-wave Listeners' Society in the world. No transmitting station is allowed to compete in the receiving contest too.

2. Only one operator is permitted to operate only one receiver.

3. The dates, scoring of points, and logging of stations once on each band per week-end are subject to the same rules as for the transmitting contest.

4. To count for points, the call-sign of the station being called, and the strength and tone of the calling station, together with the serial number and signal strength report sent by the calling station, must be entered on the log.

5. The above items must be filled in before points can be claimed, that is, it is not sufficient to log a station calling CQ or TEST. Verification of reception must be made in accordance with the conditions in Rule 3 above.

6. VK receiving stations cannot log any VK stations—only overseas stations. Overseas stations will enter up VK stations heard only.

7. The awards for the receiving contest will be similar for the winners in the transmitting tests.

8. Receiving logs are to be similar to transmitting logs.

Listening Without Phones

Another Reader's Experiments

I WAS most interested to read the article in the April issue on "Listening Without Phones."

The idea was mooted some years ago in America when it was claimed that a man could hear by connecting one side of a voice coil to his wrist and the other to a salt solution in his ear (whilst lying on his side). So about three years ago I carried out a series of experiments along those lines in one of His Majesty's laboratories. First, with one side of an amplifier output transformer secondary to a metal wristwatch band on the left wrist, with a pretty good skin contact due to perspiration, and the other side of the same coil to a cottonwool pad soaked in strong solution of common salt, right inside the right ear. Result—a click, but no music. Then I turned up the volume to maximum when the 8 ohms winding should be turning out about 8 or 10 watts. Result—rolled a smoke and did some more thinking. Then I tried a one hundred ohm pot. shunted across 12 volts of A.C. 50 cycle and selected the the voltage with the pot. for the same electrode arrangements. Result—nil. So I tried biassing both positive and negative starting with 1.5V. and working in steps upward, at the same time keeping the A.C. voltage smaller than the D.C. bias. At 4.5V. there was a distinct audible click on making contact at the battery, and this became progressively stronger up to 22.5V. D.C. when there was a slight pain with each click, but not on continuous D.C. All the way from 1.5V. DC to 22.5V. DC there was no A.C. hum whatever. Then the battery lead fell on to the 45V. terminal! Well, I got up off the floor, dusted my clothes down, walked back to the bench and promptly taped over the 45V. terminal. So, beware of 45V D.C. in the ear drum.

The net result of the whole show was nothing more than this—a click on connecting establishes definitely that electric impulses are audible when applied in this way, but are not audible when repeated rapidly (50 cycles), either when the polarity remains uniform or when it alternates. This would seem to me to indicate that the conclusion drawn by Mr. Stevens about the nerve cells may be along the right lines, but perhaps not quite precise. Possibly there is a chemical discharge or charge as well as the electrical relation between nerve ends and adjacent cells. For further experiment, I suggest that some fruitful fields may open up in research on the following points: Electrolytes, either basic, acid, neutral, organic, etc.

Capacitors in which the whole head or only parts of the head, or narrow strips of skin may form the dielectric.

Inductors in which either opposite or identical phases may influence the left and right aural nerves.

Finally, (as Mr. Stevens has shown) motion has a certain influence, and hence should definitely indicate the direction in which further research may be carried on.

Since most of us "electrons" do not know the finer points of biology, it seems that a bit of co-operation might be sought in the matter of nerves in general and hearing in particular.

"Q-PLUS"

(*Continued from page* 20)

vidual user may desire to fit, perhaps, a leather strap so that the set will swing from the shoulder. Others may prefer an ordinary suitcase type of handle on the top of the case.

One good idea is to fit a shoulder strap and use it as an extra aerial. A satisfactory aerial and shoulder strap can be made up by plaiting together a number of plastic-covered flexible wires, and then soldering their ends together. They can then be connected to the external aerial terminal of the loop and will help to boost up performance.

The Valves

The new miniature valves are most interesting in construction, and have many unusual features besides their small size. From a performance point of view they are much better than might be expected, in every way appearing to outperform the older style of battery types.

One point calls for a word of warning. The only identification of the type numbers is the way it is marked on the glass, the valves not having a moulded base. You have only to wipe your thumb over the letters a couple of times and you will find that the type numbers have been completely wiped off and you will have no way of knowing the difference between the 1R5, the 1S5 or any of the others.

Conclusion

Should you require additional information on the "Q Plus 3¾-Pounder," the manufacturers, R. W. Steane & Co. Pty. Ltd., 143 High Street, Kew, Victoria, will gladly supply same upon request.

CALLING CQ!

By Don Knock, VK2NO

BILL McLAUGHLIN (VK2-ML) ran into a snag when on 14 Mc/s phone. Outside the house a length of down-spouting from the roof persisted in chattering emulation of a loud-speaker the while Bill used his mike. Cure was simple and effective. The pipe was cleaned and connected to earth; previous effect being caused by oxidisation of metal surfaces and resultant rectification. Which reminds me . . . in 1923 or thereabout, workmen in London engaged on a building near the old 2LO transmitter on the roof of Marconi House went on strike because a jib crane persisted in acting weirdly . . . playing tunes and whatnot. There were superstitious souls among the toilers, but the BBC engineers put matters right.

* * *

Notice in "Wireless World" (England) that the old Droitwich station of the BBC, known as 5XX, is no more, having been dismantled. This station had an interesting career, being a "long-wave" affair, around 1600 metres or so. It reached out in fine style into all parts of mid-England and could be heard well and truly with a humble crystal detector outfit. In the severe winter of 1925, accumulated ice brought down the big cage antenna, and in the snow-bound night BBC engineers set to to get the station back on the air. There was and still is a BBC tradition about unbroken transmissions. Only wire to hand was iron fencing wire, and a few hundred feet of this was hurriedly heaved up on the windlasses. After a few minutes' working, somebody happened to go outside and spotted the wire glowing red up there in the darkness. Which was to be expected with the resistance of the iron and the many amperes of RF forced thereinto. But the station kept on the air until the next day when appropriate steps were taken.

* * *

Ever notice those VK's who go off pop about other VK's who have "the temerity to work inside the American phone band on 20"? There's nothing at present to stop any VK from working anywhere between 14 and 14.4 Mc/s apart from which . . . what of the ZL's? They are well and truly in that US phone band and are often R Max in Eastern VK. Under those conditions one fails to see objection to VK's being there. I imagine anyway that the ZL's get sore with VK's who use phone between 14 and 14.1 Mc/s. Where *are* the VK's supposed to use their phone if not there, apart from the high frequency end of the band on the other side of the US allocation? It is all complex and a job for Atlantic City to decide, as will no doubt be the case. As this is written there is word from ARRL that it looks like good-bye to 7200 to 7300 Kc/s . . . a not-very-surprising event, if such be the case. Evidently the pressure from foreign broadcasters has been considerable. Against that bit of news is a gleam of sunshine that says a band 450 Kc/s wide seems assured around 21 Mc/s. It will be an interesting DX allocation, but in the humble opinion of this scribe, frequencies around the 7 Mc/s region are of much more value to amateurs as a *communication* medium.

* * *

It would be interesting to know how many beams are already under construction or have been planned

(*Continued on next page*)

Lame Dogs and Stiles

From Phil Edwards (VK2GS) of Newcastle, comes an idea with which this writer agrees heartily, and which a few of those who sit smugly with QRO and DX-hunting beam arrays would do well to emulate. Says Phil, who, by the way, is first-class key-pounder who is not above slowing down for the Tyro . . . "Was QSO VK's 2ACP and 2AIH, and the proposal was made that the three of us should form a sort of unofficial 'haven of refuge' for sprog hams. Reason behind this is that oft-times one notices the helpless stumblings and fumbling of so many new-chums, who need desperately to get CW training and practice from seasoned operators. Their general 'procedure' and coherence is so poor that we have noticed many CQ's from them being ignored in a rather obvious way, by DX and QRQ types. This is a rotten state of affairs, and we would like it known here and now that here at least are three operators with thousands of key-hours who are always on the look-out for a new call sign, and will give the newcomer a really useful QSO on CW at HIS speed." Fine business, gentlemen, and for the benefit of those new lads making a break on 7 M/cs. CW . . . if you QSO VK2ACP you will be working with one of Australia's oldest radio amateurs. Bill Zech took part in the formation of the original Wireless Institute, and that was somewhere back in 1910.

—D.B.K.

HAM NOTES

(*Continued*)

ahead for 21 Mc/s. American radio manufacturers have obviously been confident in the allocation of a band around 21 Mc/s ever since VJ Day, as witness the commercially-produced ham-band receivers catering for 21 to 21.5 Mc/s.

* * *

The Big News about the "inductively-coupled Dipole" and those who have adopted it as a gift from the Antenna Gods . . . the man responsible for modernisation of an old scheme is W9NLP, of Chicago, who can be heard practising what he preaches with a powerful signal in the US 20-metre phone band. Old scheme . . . yes . . . ever hear about the Pickard method of feeding a half-wave system? It goes back to the early 56 Mc/s days!

* * *

We have radio control of model aircraft . . . as near perfection as one could wish for . . . accelerated in development by war. Today radio control of model aircraft is of vital importance in aeronautics . . . in determining the behaviour of unusual designs in controlled flight without risk of life. If the little fellow behaves well . . . the big prototype follows. It was the late Ross Hull who first tackled the problems of controlling model aircraft in flight by radio, and many of his ideas have since been put to good use. Ross would have been delighted with the "Minijet" . . . a miniature power plant that is what the name implies. Such small jet propulsion units are now in manufacture overseas, and one or two are being investigated by scientific circles in Australia. No use aero-modellers writing for the "gen" on where to get "Minijets" . . . I don't know. And I imagine they are a "toy" one needs to be careful with in some respects.

* * *

There's something very familiar about the following: "G5WC comes up with a tirade against the senseless poppycock you hear on 7 Mc/s, mainly from the 'Circle Clubs' who nightly clutter the band with what seems to be an excuse to keep the TX running and stay up until everybody else has turned in. There are also the cross-town talkers who complain about bad conditions whilst simultaneously blotting out DX." The foregoing is from G6FO's "Short-wave Maga-

Jim Weatherill and Don Knock walk down Pitt St. The photo is not too good, but it gives the right impression, that "hams" sometimes lose their worried looks.

Experimental Radio Society of N.S.W.

The 17th Annual Re-union held recently was a great success and was well attended by members and visitors. Old Hams, representatives of the P.M.G., Kindred Societies, the Radio Press and Industry were well in evidence. Lionel Todd (VK2LS) was the representative R.I. and his response to the Departmental Toast was of considerable interest. The W.I.A. was represented by "Bill" Moore (VK2HZ) who also proposed the toast to the Society. All suburban Clubs and Newcastle District were ably represented and the three Press officers present were Messrs. Les Keast (S.W. Editor, "A.R.W."), John Moyle (VK2JU, Editor "R. and H.") and Bob Meadows (VK2ARM, "Radio and Electrical Weekly").

Catering arrangements were excellent and a feature of the decorations was that the Birthday Cake sported a beam array! The usual fortnightly meeting was held on May 22, when visitors, including Messrs. Throp (ZL4HS), Drake, Higgins, and Bowie, the latter being enrolled as a member.

Well-known for activity in particular on 166 M/cs., VK2AGL lectured and demonstrated VHF gear.

In suggesting a drive for increase of membership, Mr. Harry Burke offered two transmitting filter condensers as an incentive to the member obtaining the highest quota of recruits in a 3 months' period. Two valves were offered by Mr. Jeff Carter, proprietor of The Ham Mart, Enfield, for the runner up.

Considerable discussion was devoted to future technical and Field Day activities and the president, Reg Anthony (VK2TR) urged members to make more use of 50 M/cs.

Criticism was offered also on operating procedure to be heard on the "domestic bands" at the present time, and the need stressed for observance of correct methods. Meeting dates are July 3 and July 17. Location is Melody Hall, George St., Burwood, N.S.W., very handy to the railway station. Enquiries should go to the Secretary, W. Hayes (VK2AJL), 34 Nicholson Street, Chatswood, Telephone JA 7729.

zine," May, 1947, issue. Seems that "Networks" and "Clubs" with their blah about anything but radio are a rash that has appeared on the face of the hobby in places far and wide.

* * *

Noticed a glaring example of the worst form of VFO operation. It was in the late Sydney afternoon, on 14 Mc/s CW. A G6 called CQ DX, and as he neared the end of his call, a powerful local swooped on to the G, dithered about on a "Bug" for a few seconds, sending ink ink's and whatnot. The very second the G6 finished his DX call, this VK2 started calling him on his frequency. What makes the exhibition of Rotten Behaviour all the more glaring . . . the offender was a Very Important Person who should be setting a good example, instead of demonstrating selfishness in the extreme. What do *you* think?

* * *

Strange, how upon testing a hopefully-erected antenna for a special purpose, things don't always work out right. When long periods go by with no replies to DX calls, don't assume that all is lost, and haul down the new antenna. Wait a while! A new 14 Mc/s half-wave system was under test at the writer's station, designed expressly for early morning work with G's and Continentals . . . loading excellently . . . and placed in the correct broadside. Concentration was on CW between 14 and 14.2 Mc/s, but after answering many G DX calls and having no luck, and having batted out lots of CQ's, it was suspected that something was wrong. It was, but not with the antenna . . .

A change was made to phone on 14.2 Mc/s and the first call brought response from a G8 and a report of S8/9. Of late it has been noticed that it *is* easier to raise the DX on phone than on CW, the inter-station QRM between CW stations in the LF end of 14 Mc/s is seemingly heavier than in the phone regions. So, if you are a CW man in particular, don't scrap that new antenna until you have given it a fair go.

Misuse of the V.F.O.

A timely castigation of American hams for their misuse of VFO control is contained in an editorial in "CQ." It points out that VFO is all very nice and fine and all that, but that crystals were mass produced in huge quantities during the war. Tolerances of those crystals are often closer than the best prewar commercial crystals. VFO's became popular mainly in DX contests because ability to move in closer to a DX station was a big advantage over the fixed frequency station. Added to this, the high price of crystal units at that time made crystal *coverage* of a popular ham band an expensive business. VFO as intended is an excellent adjunct to any station, but with extensive application came undesirable features. Operators with no sense of courtesy tuned their rigs on top of the DX and that before the other fellow had completed the QSO. That goes on right now . . . you and I can hear it on "twenty" on a crowded Saturday or Sunday afternoon! As if that isn't enough nuisance, there are the indifferently engineered VFO's . . . those that chirp and bloop all over the band, and radiate T6 variety signals. There is nothing at all amiss with the fundamental idea of the VFO . . . it is excellent . . . but there are sounder arguments in these crowded times for the use of crystals. When schedules are made by a C.C. station, there is no argument about where that station will be on the dial . . . the other fellow knows where he will find him. That, of course, can be said also of VFO. But how many VFO users possess *really accurate* standards of frequency check? The bane of the DX bands today is the badly-used VFO. With everybody trying to run out of the QRM, the situation can become chaotic . . . the QRM is likely to be vastly increased. Those who talk about accurate standards for the setting of VFO's should note this. The specifications of the most de-luxe VFO available to the radio engineer (by General Radio, U.S.A.) are for a piece of apparatus that costs about £A150. It is temperature-controlled with voltage regulation . . . has a special variable condenser with worm drive cut directly into the spindle . . . the coils are super-special . . . and the mechanical work is perfection. Yet the makers claim accuracy of plus or minus .1% of the calibrated chart data which is made up individually for each instrument. If a crystal calibrator is used, then the instrument becomes as accurate as that infallible standard. Answer for the VFO ham seems to be a crystal calibrator. But there will no doubt always be those who just don't care how much QRM they may cause the other fellow.

—D.B.K.

For the benefit of phone men who like suppressor modulation . . . VK2NO has for sale, on behalf of a G friend, a brand new Type 803, unused. Price as at factory cost, well below the list figure.

* * *

As this is written, in early July, there is a report circulating among VK's that an ABC broadcast news item stated that Australian amateurs are to be given increased power rating of 100 watts. In other words, that there will be one class of licence, the "A" class. "A" licensees will not therefore be affected, but the 50-watt men will glow with satisfaction, and a few anodes may glow hotter, too. The buzz also says that FM is to be permitted in certain channels . . . there's nothing new about that, we already HAVE FM . . . quite unintentional, in channels such as 14 and 7 Mc/s! As usual, these buzzes are not yet substantiated, and meanwhile one must rely on "Part 3 Orders" . . . the newspapers.

(*Continued on next page*)

HAM NOTES

(Continued)

For the benefit of those who are now aware that a very old hand is occasionally active on 7 and 3.5 Mc/s phone and CW, in the person of Chas. D. Maclurcan, VK2CM . . . for goodness sake refrain from asking him for his "HANDLE." The wrath of the Gods is like to be as naught. The Chistian NAME is Charles . . . and he says that the HANDLE there is broken . . . with which we agree mightily.

* * *

A visitor around Sydney stations recently has been Jim Wetherill, G5UB—VE7ALG, who is radio officer on the Union Co.'s MV "Wairuna." Since visiting your scribe's shack he has become well and truly affected by the 50 M/cs. virus and is making plans to get into operation as the first 50 M/cs. Mobile-Marine station in and around these waters.

With the DX period at VHF's looming toward the end of the year, there is always the possibility of some unexpected contacts with this Marine station. When Jim has made the necessary arrangements with authorities he will be active afloat on all bands from 3.5 to 50 M/cs. During the war, G5UB served with the RN in an important capacity, fitting fighting vessels with W/T and Radar gear.

* * *

An old friend of the early HF DX days comes to light as GW-3GHB, heard actively on 28 and 14 M/cs. phone and CW. He is Bert Hay, key-pounder on the Union Co's "Aorangi" 20 odd years ago, in the days when GDVB was an interesting contact for Australian amateurs. Yes, in the period quoted, it was not uncommon for ships to work with amateurs ashore, perhaps because there was an atmosphere about radio communication over long distances. I well recall getting in QSO with a station signing a G four letter call in the early '20's, and when I asked for the QRA the answer came, in somewhat condescending tone . . ."here HMS 'Hawkins', on China station, H.R.H. Prince George aboard." There was the occasion, too, when HMAS "Adelaide" asked me to handle TFC with Navy HQ, and there was a bit of a stir over that episode for the reason that the telegraphist on duty had, after futilely trying to raise FUO (then a Sydney naval station) turned to the 20 metre Sydney amateur station he could hear pounding in up there off the Solomons. But such things don't happen in this post-romantic times of radio.

* * *

Was amused to hear a VK2 on "20" eulogising to a W9 the "inductively coupled dipole" he was using, and how "he could strongly recommend it," ad lib, and so on. Which would have been a laudable intention no doubt, but for the fact the W9 was W9NLP, who modestly volunteered the information that he *"knew the system, as he was the author of the article in January, 1947, "Q.S.T." Which all* goes to show how careful you have to be.

* * *

He couldn't have much confidence in his VFO . . . that station I heard on 40 saying "he would rather use crystal when on 80, as there is not so much splatter on the broadcast band!" There's too much tendency to regard crystal control as a panacea for a variety of ills, but to assert that a VFO is not comparable to a crystal-controlled oscillator is to likely draw protests from those who do make correct use of VFO's. One fails to see where the application of either form of oscillator could have much bearing on the "splatter" question, assuming that the VFO is well isolated from the modulated final. Such treatment is essential in any case if the VFO is to meet with the requirements of present-day band usage.

* * *

Some VK2's were heard in condemnation of "Gremlin's" par in June "Amateur Radio" about "a VK2 that uses his VFO to slide

Is There A Plumber In The House?

Anybody want to play around with wave-guides and plumbing of that ilk? Ex-Radar men with a liking for point-to-point work at UHF's can now use 2500-2700 Mc/s, 5250-5650 Mc/s, or 10,000-10,500 Mc/s. If these channels come in for as much attention in VK as the one next above 166 M/cs does . . . total of activity will be about nil. Understand that W.I.A. Federal HQ have asked the P.M.G. for 235-240 and 420-430 Mc/s. These ranges, if made available, should be of immediate interest to those with 166 Mc/s experience in the bag.

on to other fellow's frequencies and interject, etc." One assumes that "A.R.'s" scribe could have been referring to anybody, and anybody's guess is as good as the next man's. But continual harping on the subject by people who took the par to heart indicates obviously guilty consciences. If as one protester opined . . . "it doesn't mean anything to me—I just ignore it" . . . then why refer to it at all?

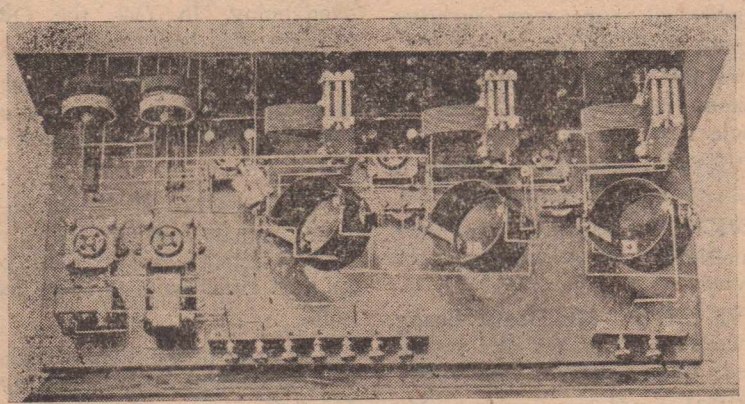
* * *

Was interested in a test between two N.S.W. country stations who changed in mid-afternoon from 40 to 80. Both stations are located more than 300 miles from Sydney. On 80 they were S3 at this writer's location, but at the same time the signal from both was a good S6-7 on 40. Ample indication that a harmonic suppressor in the aerial coupling unit wouldn't be a bad idea. How many of us take it for granted that we "can't be radiating much of a harmonic?" And how many of us take steps initially to guard against such radiation? Presence of harmonic radiation is more likely to be emphasised in a crowded locality where amateur stations are in close proximity. The country station is usually in a more favorable set-up from most points of view affecting general communication.

* * *

Those little gadgets selling in Sydney Disposals dealers, comprising a miniature "transmitter" with telescopic support tube and cylindrical moulded container are interesting. They were designed as distress transmitters for rubber aircraft dinghies and functioned in a simple but effective manner. The "ditched" airmen erected the outfit in the rubber craft, and set it into action. It radiated a squegging signal at 175 M/cs. and the Radar stations on the coast could spot the "blips" and send out search craft. Countless lives were saved by these miniature TX's. In Sydney they are being bought up with an eye to 166 M/cs. usage, but it is to be hoped that those applying them will have the good sense to dispense with the 2 meg resistor across the grid condenser, and connect a 10K resistor from grid to "earth" instead, thus changing from "squeg" to plain oscillator action. The valve is a handy 1.4 volt VHF triode; connections to which are unmistakeable, but if you slap the HT across the wrong pins you will have only yourself to blame. It will be easy enough to get these little oscillators to cover 166-170 M/cs. and for a pocket TX perhaps with "loop" moduation, functioning from a torch cell and a Minimax battery, there is scope for fun.

—D.B.K.



Just in case you've never seen one before, this is how they wired sets in the good old days around 1926. Note the absence of shielding, but the angling of the coils to avoid interaction. Imagine how much trouble the r.f. signals must have had to negotiate the sharp bends in the bus-bar hook-up wire!

V.H.F. NOTES and NEWS

Reference in June "A.R.W." to the departure of VK3NW for G-Land was a little premature, for Ken comes to light with another stack of Notes on 166 and 50 M/cs. activity in VK3. In N.S.W. highlights on 50 M/cs. has been the first test with a vessel out in the open ocean, with interesting results. As mentioned elsewhere, Jim Wetherill, G5UB/P—VE7-ALG has been in these waters for a week or two on the "Wairuna." During his stay in Sydney, the writer got busy on his little HF TX and remodelled it for 50 M/cs. output. For reception, Mr. Cronan of Hurstville, N.S.W., produced a splendidly performing Converter for use ahead of the Hallicrafters SX40 receiver Jim totes around with him. Antenna, because of lack of time, was the simplest of all—a vertical SWF radiator 9 feet 7 inches long, hauled up on a signal halyard. From the start the little TX with 15 watts on an 807 final put out a mighty solid CW signal on 50 M/cs. During initial tests, with the ship in Darling Harbour; the antenna below the wharf shed roof level, and with ships on either side, VE7ALG/P was S7 at the writer's station and reported VK-2NO S9. From the time the ship sailed on Saturday, June 28, at mid-day, consistent communication was had until around 8 p.m., when at that time distance approximated 70 miles from land. Right up to the 60 mile region, the signal from this mobile-marine station was running S7.

Other Sydney stations in contact with VE7ALG/P were VK's 2NP, 2WJ, and 2JU. The latter, by virtue of plenty of power and height of antenna radiates a particularly powerful signal over the Sydney area. This station and VK2NO were the only two Sydney stations audible out at sea after about 4 p.m., and the favourable geographical position of both stations may be assumed to account for this. Although one of the Blue Mountains' stations, VK2LY, was active during the early evening. VE7-ALG/P did not hear him; a point that is rather puzzling because of the 3000 feet elevation of Katoomba. VE7ALG/P looks forward to plenty of W and VE QSO's on "Six" when he nears the Pacific Coast.

VK3NW writes—"After all the good intentions about packing radio gear away and not wasting more time with it until my return from England, I found myself embroiled in the organisation of a Field Day on 166 M/cs. After the manner in which our Field Day stimulated 50 M/cs. interest, we reckoned that a similar outing would ge the 166 M/cs. boys hopping a bit. I fixed up a little 6V6 High-C oscillator to drive the 832 and dug out an old 6C6, 6C6, 6A6 Class B modulator, to use the gear mobile. On Sunday June 22, came the big day, and results were very pleasing. The following stations were active on 166 M/cs. and 50 M/cs. was used also for checking.

VK3LS—Arthurs Seat. Super-regen. PP 6V6's in plate and cathode lines with 8 watts.

VK3XA—Dromana. Converter into Communications RX. 7 stage crystal rig with 832 final. 20 watts. In seaside house 100 feet above sea-level.

VK3ACM—Home location. Camberwell. Super-regen/superhet. 5 watts to PP 6V6's.

VK3MO—Home location. Merlynston. Super-regen. 2.5 watts to single 6V6. MCW.

VK3YS—Macedon. 5-6 watts to 832 tripling. CC. Super-regen. RX.

VK3HZ—Warrigul. Super-regen. Single CV6 in linear oscillator. 6 watts.

VK3ANW—Mt. Donna Buang. 8 watts to 832. ASV RX remodelled. Coax-dipole 16 feet high.

VK3EM—Home location, McKinnon. Super-regen. and Bendix TX.

VK3ARK—Home location, East Brighton. No details of rig.

VK3MB—Cranbourne. Transceiver. CV6 osc. 955-6V6 RX.

VK3HK—Mt. Dandenong. On 50 M/cs. receiving only on 166 M/cs.

VK3QZ—Brighton. No details of rig.

The stations worked from our location on Mt. Donna Buang, together with approximate distances and signal strengths are as follow:

Herewith Station, Miles, Signal Received, Signal Given, Remarks—

VK3ACM—35; 5 9 plus; 5 9 plus; —.

VK3XA—61; 5 9 plus; 5 9; —.

VK3LS—60; 5 9 plus; 5 9 plus; —.

VK3ARK—37; 5 8; 5 7; —.

VK3MO—33; 5 6; 4 5; Newcomer on band.

VK3QZ—37; 5 9; 5 8; —.

VK3YS—64; 5 9 plus; 5 4; TX not giving much output or antenna poor.

VK3EM—36; 5 9 plus; 5 9; —.

VK3HZ—30; 5 8; 5 8/9; —.

VK3MB—40; 5 8; 5 8; —.

Interesting points about the tests were—

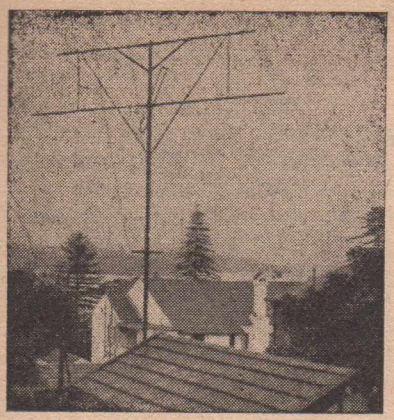
(a) Obvious need for stabilised transmitters and more selective receivers. For the first hour the band was jammed full of stations, all overlapping. In fact, the QRM problem was bad all day.

(b) The fact that low power is quite satisfactory for this work, e.g. VK3MO with 2.5 watts to a dipole.

(c) When line of sight is maintained signals seem to go an unlimited distance. Results much better than from home to home location.

(d) Some of the Ballarat stations were supposed to be on 166 M/cs. from Buninyong, but were not heard by anybody so far as I know. This would have been a 100 mile

(*Continued on page* 37)



Some of he sky-wires at VK2NO. You can't blame the neighbours for feeling nervous.

contact from Donna Buang. They were on 50 M/cs. and worked one or two stations.

Dave Medley, VK3MJ, accompanied me and took his new 50 M/cs. portable which consists of a 6V6 CO-tripler, 807 doubler, cathode-modulated and running 25 watts. It is made from a Type 3 No. 2 and is very neat and compact. RX is simply a Converter into the IF unit of the original Type 3 receiver.

Antenna was a doublet, and Dave had 10 contacts. *During the afternoon who should turn up on* 50 *M/cs. but VK4PG, Bundaberg, Queensland, with signals R9, and as steady as a rock for about an hour. He worked VK's* 3*HT and* 3*CP.* An interesting thing was the *building by VK3HZ of a* 166 *M/cs. transmitter during the afternoon.* He contacted VK3MJ on 50 M/cs. about 1230—said he could hear my 166 M/cs. signals on his super-regen., and asked that we look for him later on 166 M/cs. as he would try to get something going. About 2 hourse later there he was—R8! He had built the oscillator, tuned it with Lecher Lines, got a modulator on to it and strung up a Nylex fed doublet within two hours. He then contacted VK3LS and possibly one or two others. Well, that is the end of the VHF activity for me in Australia for a while. Hope to see you soon on 14 M/cs. from a G station somewhere."

In Sydney just now it is possible to pick up excellent crystals in holders around the 8 M/cs. region for the price of 5/-. Some of the crystals are applicable for 50 M/cs. although I imagine that as these words are penned, the supply will have dwindled. Three Sydney stations appeared one night—all slap on the same frequency—result of a visit to the Pitt Street Store for 5/- crystals. Now it is a question of who will shift where—or who will do a spot of touching up with carborundum flour.

Inter-station QRM on "Six" is something that will surely set in as more stations move into the band. There is room for a hundred or so stations in the one area provided there is co-operation between all who use the band. First matter for emphasis is that super-regens. should be definitely tabu. Reasons for this suggestion are ample without enlarging on them.

Population on 50 M/cs. in and around Sydney has been lighter than usual because of a wave of interest for 166 M/cs. This interest is not prompted by any really experimental urge, rather by the easy acquisition of ex-Service Radar and ASV gear, which is easily retunable for the 166-170 M/cs. band. One doesn't blame the users, but there *is* something about it all that doesn't seem "experimental" when application and result are virtually assured. The old-time idea that we are primarily "experimenters" and amateurs secondly is likely to go by the board in any case, following on the decisions at the Atlantic City Conference. This writer's tip is that once a really "DX" station pushes 50 M/cs. signals over the Pacific waters into the Sydney region, there will be a wholesale exodus from 166 M/cs. Heard a station on one of the "domestic" bands yarning with another VK2 about what he is "going to do on Six." Lots of people have talked and still talk in that strain but the 50 M/cs. band seems difficult to find. The aspirant for Six metre honours mentioned that "he *believed that some of them in Sydney had worked about* 500 *miles on Six . . . that's interesting news"* . . . and the Lord knows it is also STALE news . . . considering that it was December, 1946, when the DX balloon went up on 50 M/cs., and that 500 miles was well and truly eclipsed by the VK3—VK4 contacts of 1000 miles and more.

—VK2NO.

SHOOTING STARS

(*Continued from page* 25)

velocity v of the reflecting surface towards the observer is given by

$$v = \frac{Nc}{2f}$$

where N is the whistle frequency, c is the velocity of electromagnetic waves and f is the transmission frequency. In the example quoted

$$v = \frac{3{,}000 \times 3 \times 10^{10}}{2 \times 6 \times 10^{8}} \text{ cms/sec}$$

$$= 75 \text{ km/sec.}$$

Although this figure is only a component, it gives some idea of the order of the velocity which may be possessed by a meteor and it is estimated that the real velocity may range from 20-180 km/sec. It should not be difficult to develop a technique employing two receiving stations making simultaneous observations of whistle frequency from which the real velocity could readily be ascertained. In fact, it seems likely that further research on meteors will be carried out on these lines.

Acknowledgment is made to Mr. Cecil Goyder, C.B.E., lately Chief Engineer of All India Radio, by whose courtesy the writer was enabled recently to pay several visits to the transmitters and receiving centre in New Delhi and to experience a first-hand demonstration of the phenomenon described above and which, so far as is known, has not been previously reported.

—*"Wireless World," England.*

Shortwave Review

CONDUCTED BY
L. J. KEAST

NOTES FROM MY DIARY—

BBC YEAR BOOK, 1947

I have received from the BBC the Year Book, which covers every aspect of the Corporation's work in its Home and Overseas Services. It is packed with information and authoritative discussion and with forty pages of photographs makes good reading.

* * *

ANGLO-AMERICAN RADIO AND TELEVISION SOCIETY

Further welcome mail from London was my membership card from the above Society. This Society, founded in 1928 by Leslie Orton with the object of promoting International goodwill and aid to radio and television enthusiasts, is unique inasmuch as there is no membership fee for overseas members, and in addition, a very fine little booklet is posted free. Any readers of these pages desirous of joining this Society should write to Mr. Leslie Orton, 15 Hawthorn Drive, Willowbank, Uxbridge, Middx. England.

* * *

BROADCASTING STATIONS

By last English mail I received a fine little booklet from Iliffe and Sons Ltd., London, compiled by Wireless World. It contains a pretty comprehensive list of Broadcasting Stations, including Long and Medium-Wave stations of the European Zone and also of the Short-wave stations of the world. The entries have been checked against frequency measurements made at the BBC's Tatsfield Receiving Station, and stations known to have a power of less than one kilowatt have not been included.

* * *

PLEASE, ARCHIE

Ed "Archie" Gardner is amazed —a Canadian restauranteur has written him for permission to name his new cafe "Duffy's Tavern." It seems that over 50 American restaurants have been named after this great comedy show in the last six years—but this is the first time anyone has asked OK from the originator of the name.—WLW Radio News. (And what a show, I think I have very many times expressed my pleasure when tuning to Archie—L.J.K.)

* * *

JOLSON THE GREAT BACK ON WLW-NBC

Al Jolson, film and stage headliner for more than two decades, will be new star of "Music Hall" when he takes over on Thursday, October 2nd, through WLW-NBC.

Jolson is no newcomer to "Music Hall," having been the star with Paul Whiteman and Deems Taylor of the first such programme on NBC, inaugurated in the summer of 1933.

Jolson, the son of a Jewish cantor, was born in what is now Leningrad, Russia, and came with his parents to the United States when he was a child. Al left home at 13 to go into vaudeville and later joined Dockstader's Minstrels, where he first sang his songs in blackface. Broadway discovered him in 1911, following his success in the new Winter Garden show under Shubert auspices. He has been an international favourite ever since. And even at the risk of taking you away from your radio receiver for a night, I would strongly recommend anyone to see "The Jolson Story" when it plays your local cinema.

SAYS WHO?

Desmond Hickey from Petone, New Zealand sends some details of his recent loggings:

H12T, Ciudad, Trujillo. "La Voz del Yuna." This station is now on 7.275 mc, having moved here from 6.48 mc, and is heard fairly well till sign off at 3 p.m. Relays HI3T

NEW STATIONS

HCICG, Quito, 7.876 mc, 38.10 m: Looks as though "The Voice of the Andes," our old friend, HCJB, has opposition with this new Ecuadorian. HCICG, whose slogan is "Radio Ecuador Amazonico," is being heard at 9.30 p.m. Power is only 200 watts, so careful attention is necessary; but on favourable nights after an opening march, a religious service is sessioned.

HCJAB, Bogota, 11.755 mc, 25.52 m: This is not actually a new station but an old one heard on a new frequency. "Radiodifusora Nacional," with a power of 2,500 watts has been listed for some time, but it has taken the "South American Tiger" (Arthur Cushen) to catch them first over in this hemisphere. Sunday afternoon about 2 o'clock is the best time to log them, but interference from GSD requires concentration when tuning.

CE604, ? Chile, 6.045 mc, 49.62 m: Desmond Hickey of Petone, New Zealand, reports this new Chilean, and says they open at 9.30 p.m., but are badly QRM'd by Kuala Lumpur.

HHCN, Port-au-Prince, Haiti, 5.66 mc, 53 m: An air mail from Radio News says this new West Indies station was due to open on July 15 with a daily schedule of 8—11 a.m. Will use French, Spanish and English and verify all correct reports sent to Avenue Christophe, No. 55, Port-au-Prince, Haiti, W.I. (I am just afraid that the times will not suit us here, certainly not at my listening post—L.J.K.)

1170 kc. Veri. received from this station last year.

A new outlet for Radio Splendid of Buenos Aires is 11.97 mc. Heard until 1 or 2 p.m. in chain with LRS 9.317 mc. I think this is LRS 1 moved from 5.985 mc. Identification is: "Radio Splendid de Buenos Aires."

HCJB, Quito has been moving around 47 metres—at present on 6.23 mc until sign off at 3 p.m.

LRA1, Beunos Aires, "Radio Del Estado." I am hearing this one on 9.69 mc, with classical music until signing off at 1 p.m.—relays LRA 750 kc.

COKG, Santiago, Cuba, "Cadena Oriental de Radio," 8.955 mc, has English announcements when opening at 9.30 p.m.

OAX4M, Miraflores, Peru, "Radio Miraflores La Voz de la Democracia," 6.315 mc, requests reports when making English announcements at 3 p.m.

ZYC-8, Rio de Janiero is now verifying by card with picture of Rio. QRA is Radiodifusora ZYC-8, 'Radio Tamoio," Intiga Radio Educadora, Rio de Janiero, Brazil. This station operates on 9.61 mc, relaying Portuguese programmes of PRG-3, Radio Tupi of 1280 kc.

Relay of H12T 7.275 mc heard on 11.90 mc, till 3 p.m. Only heard here after CE1190 closes at 1.30 p.m. (And a very fine and interesting list, Desmond. Have always envied you New Zealanders with your splendid reception of the South Americans.—L.J.K.)

* * *

Miss D. Sanderson sends a fine list of Chinese loggings: XOPD, 9.55 mc, 31.41 m; news in Chinese at 9 p.m.

ZBW, Hong Kong 9.52 mc, 31.49 m.: relays BBC at 9.15 p.m.

XPRA, 10.26 mc, 29.20 m.: Talk in English on Summer season in China, Garden Shrine, etc., at 9.45 p.m.

XLRA, 11.49 mc, 26.10 m.: News in Chinese at 10 p.m.

XMTA, 12.21 mc, 24.60 m: News in Chinese at 7.45 p.m.

XGOA, 9.72mc, 30.86 m: News in Chinese at 7.30 p.m.

XPTA, 11.65 mc, 25.73 m: News in Chinese at 8.30 p.m.

XGOA, 15.35 mc, 19.53 m: News in English at 7 p.m.

XNCR, 6.02 mc, 49.82 m: News and music around 9 p.m.

XMNG, 7.34 mc, 40.80 m: Good at 8.30 p.m.

XPSA, 7.01 mc, 42.60 m: Heard at 9 p.m.

XORA, 9.83 mc, 30.50 m: Heard announcing as XORA at 10.15 p.m.

XGAS, 11.69 mc, 25.65 m: R8 at 10.30 p.m.

* * *

Rex Gillett of Prospect, S.A., forwards a fine log:

CD6RA, Luanda, Angola, 0.47 mc, has been heard to sign off with good signals at 7 a.m. Signs with Portuguese National Anthem.

Four Radio SEAC outlets are being heard here about 10.30 p.m.—they are:

17.77, 15.12, 9.525 and 6.075 mc. I can't hear the 3 mc outlet.

Radio Addis Ababa on 9.62 mc is at good strength prior to sign off at 2 a.m. Is now verifying reports.

OIX-1 is believed to be the station heard on 6.12 mc until closing at 7 a.m. with an anthem—speech sounded like Finnish.

"This is Accra calling" is announced on 4.915 mc, just prior to closing at 4 a.m. with "God Save the King." Signals are good.

EPB, Teheran, 15.10 mc, announces "This is Teheran calling" at beginning of news in English at 10.15 p.m. Sign off is at 10.30. Signal R5.

Radio Batavia has news in English at 8.30 p.m. on 4.97, 9.557, 10.365, 15.145, and 6.175 mc.

I find VQ7LO's frequency nearer 4.855 mc rather than 4.885 mc as listed by other sources. VLQ7LO signs off at 5 a.m. (Pietermaritzburg was on 4.88 mc but moved to 4.855 so perhaps VQ7LO has hopped in. —L.J.K.)

Lourenco Marques is fair level about 7 a.m. on 3.49 mc. In relay is the 4.925 mc channel with very fair signals.

Radio Noumea indicates in a recent letter that its schedule is 9—10 a.m. and 6.30 to 8 p.m. (Radio Noumea is found on 6.16 mc and sometimes runs till a little after 8 p.m.—L.J.K.)

KXPI is now verifying with cards having large red call letters.

Radio Dakar is fine level till sign off at 8 a.m. on 11.715 mc. Can be identified with "Marseillaise" at closing.

Johannesburg on 3.45 mc is fair strength till sign off at 7.05 a.m. Jo'burg also operates on 9.875 mc, and is heard with BBC news at 2 a.m. Capetown has been heard to sign off at 8 a.m. on 5.88 mc on Saturdays. Signals are good.

* * *

A welcome surprise came this month in the form of a letter from an old friend of these pages, Mr. R. C. Schooth, of Brisbane. He says inter alia, "After a span of six years, or is it more?—I have decided to revert to the old hobby of DX-ing. I have purchased a fairly new model receiver and find it quite a good performer on short-wave, so in the near future I'll endeavour to make a list of stations and send it in to you. I have been getting "A.R.W." for some time and note that most of the prewar contributors like myself, have gone into smoke.

I have been hearing most of the Yank K's and W's mornings, afternoon and evenings and in my opinion A.F.R.S. shows and entertainments are excellent. I keep my eye on the clock when I'm home for 4.15, 6.15 and 7.15 p.m. to mention only a few of the times, and tune to Bob Hope, Fibber Magee and Molly, Charlie McCarthy and dozens of others. I find it too cold for early morning listening, but I'll do my best later in the month of July and send you some notes." (Delighted to hear from you again and look forward to your reports. —L.J.K.)

* * *

HELP WANTED

Seldom a station beats Rex Gillett, but one on 7.09 mc has so far not been definitely identified. It leaves the air following the playing of "God Save the King." Rex says, "I doubt whether Baghdad would close with the British Anthem. I am not sure of the languages."

On about 6.205 mc an unidentified station closes at 6 a.m. following a choral tune. Language seems to be French. (This may be Tangier—L.J.K.)

VERIFICATIONS

Rex Gillett says he has now verified 78 Countries, which is exceptionally good when one realises that during the war a great number of countries could not be reached, and since the war many have not yet verified reports. His latest list includes: CE,1190, HBJ-2, HEI-5, HER-5,HBF, Noumea, XGOE, Leopoldville(9.745 mc), KWID(11.90 mc), KNBI (6.06 mc), Warsaw, VUD-10, VUD-9, KZPI, XDY, VUM-2, (4.92 mc), Johannesburg 4.895 mc, Luxembourg, CSW-6, YV5RM, LKG, LLI, LKJ. The report for LKQ was the first from Australia and that for LLI the second from Australia.

ZPA3, Asuncion, Paraguay. "Radio Teleco" operates on 11.87 mc, and relays ZP3 700 kc. Verification was a card with picture of transmitting stations.

QRA, Azara 56.

COCX, Havana, Cuba. "Mil Diez La Emisora Del Pueblo" operates on 9.27 mc, relaying CMX 1010 kc. Schedule 10 p.m.—3 p.m. Veri. was in Spanish from Administrator Juime Gongalez. QRA Reina 314. Altos, Habana.

Desmond A. Hickey, of Petone, New Zealand says, "These verifications are to hand since May: YV-5RU, Caracas, Venezuela," Ondas Populares on 4.88 mc, with a power of 2000 watts relays YV5RG, 1010 kc,—veri. was in form of a very attractive card. YV2RN, San Cristobel, Venezuela. "La Voz Del Tachira", operating on 4.83 mc, relays YV2RB 980 kc.—verification was a letter in Spanish from station director, Juan C. Chacon, QRA, Apartado 37.

* * *

BRIEF MENTION

KZPI, Manila, lists its correct frequency as 9.692 mc instead of 9.71 mc; Mr. Harry Miller, Production Manager of the station suggests DX-ers keep an eye out for KZOK, a new station of the Philippine Broadcasting Corp. At time of writing he was not sure of the frequency to be used. The station will employ Spanish and the Philippine national language, Tagalog.

From July 1 AFN, Munich, on 6.08 mc has been closing at 8 a.m. instead of 10 a.m. owing to an order from the Commander of the U.S. Forces in Germany, General Clay.

"Radio News" advises VP4RD, Trinidad, now temporarily off the air due to breakdown of modulation transformer is awaiting replacements from U.S. due August 15. Is expected to open officially on August 31, unless further delay. Watch for it on about 9.625 mc to 9.635 mc and 6.085 mc. Reports should be sent to Trinidad Broad-

casting Co. Ltd., Broadcasting House, Port of Spain, Trinidad, B.W.I.

Congratulations to Roy Matthews, Secretary Radio Listening Post, W.A., on receiving advice from Northern Rhodesia that his was the first report from Australia verified by Lusaka, 9.71 mc.

According to "Wireless World" Guide there are 18 frequencies alloted to shortwave stations in Nanking and 8 in Chungking.

Prague has three transmission periods in English. They are daily from 3.45—5 a.m. on 9.553 mc; 5.45—6 a.m. and 7.45—8 a.m. on 6.01 mc. News is the first item in each period, usually followed by other features to complete each quarter hour.—Radio Listening Post.

Note new schedule for WLWR, 15.13mc, 19.83m—9.45 p.m.-7.30 a.m., beamed to Europe and North Africa.

From "Radio News," Chicago, we learn: "New outlet for Spanish-speaking countries is in the making. The transmitter equipment is to be located on Fernando Po Island, off west coast of Africa. It will have 200,000 watts power and the antenna is to be a 4-beam unit, directed to Europe, North America, South America and Far East, in all languages. It will probably be 1948 before station is completed. It is sponsored by Compania de Radiodifusion Intercontinental."

British Honduras: ZIK-2, Belize, 10.598mc, has been heard around 4.30-5 a.m., beginning with news.

British Somaliland: Radio Somali, 7.125mc, call is VQ6MI and sked 5.30-8.30 p.m.

"LAS CORTAS EMISORAS ONDAS DEL PERU"

(The Shortwave Radio Stations of Peru)

Here is a fine list sent to me by Des. Hickey, of Petone, New Zealand.

Freq. Call Sign Location Slogan - Sign off time and Address

5620—OAX2A Trujillo, "Radio Trujillo," 2.30 pm. c/o OAX2B Apartado 338.

5870—OAX4P Huancayo, "Radio Huancayo," 2.30 pm. Apartado 187.

5890—OAX4Z, Lima, "Radio Nacional Del Peru", 2.30 pm. c/o OAX4A, Avenida Petit Thauars 447.

5907—OAX4V, Lima, "Radio America," 2.45 pm. c/o OAX4U, Casilla, 1192.

6010—OAX4Q Lima, "Radio Victoria," 3 pm. c/o OAX4X Edificio Minevia.

6038—OAX6B Arequipa, "Radio Landa," 3 pm.

6158—OAX1A Chiclayo "Radio Delcar" 2.30 pm. Casilla 9.

6197—OAX1B Piura, "Radio Piura," 2.30 pm. Apartado 149.

6315—OAX4M Miraflores, Lima, "Radio Miraflores La Viz De La Democracia" 3 pm (c/o OAX4L Jesus Nazareno, 113 Lima.)

6330—OAX6E Arequipa, "Radio Continental" 3 pm. c/o OAX6C.

6368—OAX4H Lima, "Radio Mundial," 3 pm. c/o OAX4F, Apartado 1098.

6415—OAX4G Lima, "Radio Lima," 2.45 pm. c/o OAX4B Ave. Uruguay 355.

9340—OAX4J Lima, "Radio Colonial," 3 pm. c/o OAX4I Casilla 1166.

9380—OAX4W Lima "Radio America" 2.45 pm. Same as OAX4V 5907.

9520—OAX4E Lima, "Radio Central," 3 pm. Belem 1038.

MISS DOROTHY SANDERSON SENDS SOME FINE NOTES ON EUROPEAN LOGGINGS:

Europe	*Met.*	*M.C.*	*Time*	*Notes*
SDB2	27.83	10.78	6.30 am	Special DX programme, talk and music.
SBP	25.63	11.70	5.15 pm	Music and English lesson.
Munich	41.10	7.29	6.45 am	Music and news.
Azores	61.98	4.84	7.00 am	News in Portuguese and good programme.
ORL2A	49.92	6.01	7.30 am	News in English and music.
HER4	31.48	9.53	7.45 am	Swiss musical programme.
HEI7	19.58	15.32	12.00 pm	News in English and music.
HER5	25.08	11.96	10.00 am	Swiss music.
HER5	25.28	11.86	1.00 pm	News and music.
Munich	48.62	6.17	6.45 am	News and music.
Andorra	50.02	5.98	6.30 am	News in French and music.
Sux	38.15	7.86	6.15 am	Programme of Arabic music.
Radio Lausanne	48.68	6.17	7.30 am	News in French.
Paris	19.53	15.35	7.45 am	News in French and English.
Paris	16.81	17.85	8.00 am	News in English.
Paris	25.22	11.88	3.30 pm	News in French.
Paris	31.37	9.56	3.45 pm	News in French.
Paris	41.21	7.28	7.45 am	News in Spanish and French, music.
Radio Tetuan	49.49	6.06	6.30 am	News in Spanish by man and woman announcers.
PCJ	31.28	9.59	2.00 pm	News in English.
PCJ	25.57	11.73	1.45 pm	News; QRM from WRUL.
PCJ	19.71	15.22	7.00 pm	Listeners' Mail Bag, music.

Speedy Query Service

G.E. (Preston) has a factory-built set which will operate only at low volume and he suspects that the volume control potentiometer is faulty.

A.—You could make a rough test of this item by operating the set upside down on the kitchen table, or what have you, and shorting out the potentiometer terminals with a short piece of wire. Shorting from the centre terminal to the earthed terminal should stop all signal and shorting from centre terminal to the other outside one should give you full volume. If the potentiometer is at fault this will prove it, but if shorting out the terminal does not have any effect you will need to look elsewhere for open-circuited or short-circuited condensers and resistors, faulty valves and so on. When in doubt, try to localise the fault by running along the valve caps, lifting the clips and noting the crackle which occurs in the speaker. Working back from the output end of the set if you find one clip which doesn't respond you can start to look for faults in the associated circuit of that valve.

To settle an old argument between a couple of readers, can anyone tell us definitely whether radio reception is possible inside a submarine when submerged?

N.S. (Albury) wants an index to Volume 11.

A.—We published an index to volume 10 in the issue of August, 1946, but so far we have not yet got around to preparing an index for volume 11. Will see what can be done for next issue.

* * *

M.E. (Corowa) wants a battery-operated receiver to use the new miniature valves, but in a full-size set.

A.—Yes, the new miniature valves give splendid performance and are quite suitable for use with big batteries in a big set. At the moment we have such a set in hand, due for release about the September or October issue. If you can't wait for these issues there is nothing to stop you using the circuit of the "Voyager" (June issue) or the one in this issue, but with an aerial coil instead of the loop. Used with an outdoor aerial a set of this type should give splendid daylight range. Even with the loop, which is inefficient, they have quite good range.

* * *

A.S.C. (Wellington) wants to build the smallest possible "personal" model.

A.—The set detailed in this issue is about as small as you can go with the components at present available, but if you are keen there is nothing to stop you using your own ingenuity. You don't need another circuit, as either the one in this issue or the "Voyager" in the June issue would be quite suitable. Just collect the smallest parts you can obtain, and then see how much space you require. Remember that the smaller the loop the less pick-up it will give, so aim for a large loop and then pack the bits on to it to give a thin case. Keep the metal chassis at least an inch or two from the loop.

COILS FOR 6SA7GT

In answer to a query in last month's issue we mentioned that we had not seen any coils about for the 6SA7GT converter. Mr. Magrath of the Aegis Manufacturing Co., has since pointed out that these coils are available in the Aegis range, either in individual coils, or in dual-wave brackets, both with and without r.f. stage.

Our enquirer was in search of miniature coils for a baby set. Our answer was not entirely incorrect, but it may have given other readers the wrong impression.

BARGAIN CORNER

Advertisements for insertion in this column are accepted free of charge from readers who are direct subscribers or who have a regular order placed with a newsagent. Only one advertisement per issue is allowed to any subscriber. Maximum 16 words. When sending in your advertisement be sure to mention the name of the agent with whom you have your order placed, or your receipt number if you are a direct subscriber

WILL SELL Radio Worlds and Radio Hobbies, back issues, 109 in all. Best offer for lot, or will separate. D. R. Rees, Entrance Avenue, The Entrance, N.S.W.

FOR SALE, new 4-valve superhet, in polished cabinet. £12/10/-, or will trade for mod. oscillator. John Ambers, 82 Princes Highway, Arncliffe, N.S.W.

EARPHONES, 2,000 ohm Brunet earphones, as new. Best offer. Apply "T.H.S.", care Radio World, Mornington, Vic.

WHAT OFFER? Radio Parts or cash for unused I.C.S. Radio Course, value £26. Transferable to any subject. H. R. McRitchie, 7 Mornington Flats, Whyalla, S.A.

WANTED TO SELL.—12-watt Amplifier, P.P. 2A3's, and 12" Alnico permag. speaker, good tone. £16. "Alnico," c/o Radio World, Mornington, Vic.

WANTED.—Someone to build or sell me a small receiver for DX work, battery-operated. Write to D. Ardis c/o H. Baalman, Private Bag, Boolarra, South Gippsland, Vic.

WHAT OFFERS? 3 2mc. I.F.T.'s, B.F.O. to match; 2 relays (4.5v d.c.), CV6 (U.H.F. triode), ARDD5, ARP35, three 807's, all as new. R. L. Crick, Beaufort, Vic.

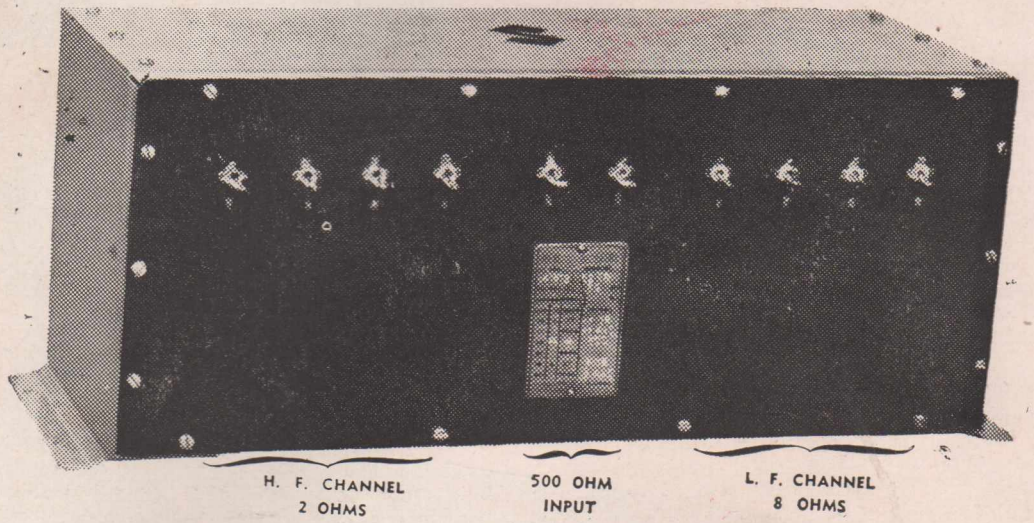
FOR SALE.—"World Cruiser" Communications 8, 3 I.F.T.'s, H. gang, bandspread condensers, special 5-band coil switch and calibrated dial, with broadcast and 16-45 metre coils, trimmers and padders. what offer? W. O. Yates, Box 190, Toowoomba, Queensland.

WANTED.—Information on R.C.A. receiver type BC342M, particularly as regards alignment on the six bands, tracking, etc. Fred H. Hicowe, Box 15, Sorrento, Vic.

RED LINE

EQUIPMENT

FREQUENCY DIVIDING NETWORKS



GENERAL

Type D482 is specifically designed for High Fidelity radio gramophones and small talking picture sound installations. The unit consists of a shunt type cross-over network using high "Q" inductances and is intended for insertion in a 500-ohm line. Loud-speaker input transformers are incorporated in the unit, the voice coil winding being brought out for each channel to 4 terminals for connection either in series, for conventional operation, or in parallel for use with loading resistances for medium and high power circuits with wide range characteristics such as the "Full Frequency Range Amplifier."* This latter method will present what is virtually a constant load to the output tubes with an exremely high damping factor and lead to a marked improvement in transient response.

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Weight: 18 lbs. **Size: 13 x 5½ x 5.**

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Printed by the Bridge Printery Pty. Ltd., 117 Reservoir St., Sydney, N.S.W., for the Proprietor of the "Australasian Radio World," Balcombe St. Mornington Vic.