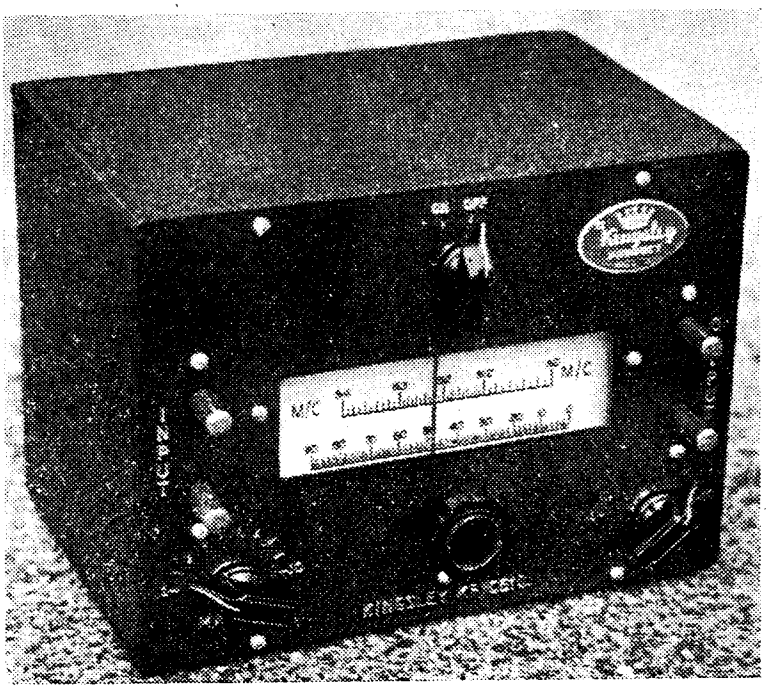
KINGSLEY EQUIPMENT FOR U.H.F.

Opening a New Field for Enthusiasts

AT the moment, considerable interest is being shown in the ultra high frequencies, it being suggested that frequency modulation transmission and television broadcasting will be done on frequencies of between 30 and 100 megacycles, equal to from 3 to 10 metres in terms of wave-length. Completely new technique is necessary to get satisfactory operation of receivers on these high frequencies, and to make the subject clearer it is well to consider the history of radio broadcasting and note how we have progressively employed higher and higher frequencies.



Front view of the Kingsley ultra high frequency converter which is available as a complete unit at a cost of only a few pounds.

The early broadcasting stations used a wave-length of from 1500 to 2,000 metres (150 to 200 kilocycles) but although this band was still used by several European broadcasting stations until 1939, its general use was abandoned about 1924. In Australia the original broadcasting was done on the high wave-length, and excellent long-range daylight reception was a feature of this band, but it was not long before the Authorities decided that the general band for local broadcasting would be from 550 to 1,500 k/Cs. (200 to 540 metres). Even when this change was made there was considerable difficulty with instability at the higher frequency, and trouble was especially prevalent at the high frequency end of the band, sets oscillating much more easily at the lower wave-length. It was often found that it was difficult to get uniform gain at both ends of the band, and many regenerative sets were too lively at 1,500 k/Cs. but would not oscillate at all at 550 k/Cs. Technicians tackled the job and soon had aerial coils with both capacitive and inductive coupling to even up the gain, although full triumph over the problem was not obtained until superheterodynes were manufactured, where the main gain was done at a low frequency, at about 175 k/Cs. for a start. Later improved types of valves and different intermediate transformer design made it possible to get ample gain and stability with an intermediate frequency of 455 k/Cs.

Short Waves

About 1922 the remarkable behaviour of skipping signals in the higher frequencies received considerable attention and soon we had overseas reception on wave-lengths of from 30 to 80 metres, and later on wave-lengths down to 13 metres. At first the short-wave sets were difficult to handle, unstable in operation, suffered from hand capacity effects, microphonic troubles made them howl, and generally speaking the early short-wave sets were a first-class headache and many people despaired that they would ever be any better. But again the technicians settled down to the problems involved and it wasn't long before dual-wave sets were available which could be operated by even the housewife. But as you have probably noticed, few dual-wave sets have attempted to handle anything below 13 metres, and plenty of sets are practically useless at any wave-length below 20 metres.

War-time developments have shown that there are uses for much higher frequencies and various radar and other instruments used wave-lengths measured in centimetres. History repeats itself and

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the normal equipment used on 13 metres is practically useless at 6 metres.

But so as history repeats itself, the technicians are on the job again.

For about ten years past the experimental transmitters have used wave-lengths of five and six metres, so that many "hams" know the many little tricks which are so necessary for ultra high frequency reception. But to the general public the ultras are a closed book.

Now the Kingsley Radio People are setting forth on a campaign to popularise the ultra high frequencies by providing the specialised equipment necessary to ensure satisfactory results. The first item of this line is the KS9'er, which we dealt with briefly in last month's issue. The KS9'er is not a conventional type of pre-amplifier or short-wave converter, but is an aerial coupling unit, which is fitted ahead of a ten-metre or six-metre receiver or converter in order to get proper transfer of signal from the aerial to the grid of the first valve in the receiver. Aerial matching is not so important on the ordinary short-waves, but is vital on the ultras. Likewise the aerial itself is most important. Even the best of receivers and converters will be unsatisfactory unless the right design of aerial is employed.

A photograph of the improved Kingsley KS-9'er, which matches the converter in size and shape.

AERIAL FOR "TEN"

To make a reasonably satisfactory aerial for the ten-metre band the very least is a dipole. To make one of these aerials you take a piece of aerial wire of the correct length, sixteen feet six inches for about the middle of the ten-metre band. Find the middle of this piece of wire and cut it, and insert an egg insulator, so that the two ends of the aerial wire are kept an inch or two apart.

Coupling the aerial to the KS9'er, converter calls for a suitable length of co-axial cable, or pair of twisted wires. The co-axial cable with an impedance rating of 72 ohms is fairly readily available from those shops which deal in disposals equipment, but should any trouble be encountered, a suitable substitute can be made up from two lengths of V.I.R. wire, either 16 or 18 gauge, twisted together with five twists to the foot. This V.I.R. wire is the stuff normally used for running inside the conduit of house wiring circuits for the electric light supply. It can be purchased readily at almost any electricians.

The ends of the two pieces of aerial wire are connected (soldered joints, please) to the two ends of the twisted pair or to the two sides of the co-axial cable (inside and outside), after due precautions have been taken to ensure a satisfactory mechanical job, so that the joints will not be under stress as the aerial swings in the breeze. Probably every reader will have his own ideas of how to arrange this, but the neatest job we have noticed was one where two egg insulators were used with a piece of cord to take the load, whilst the ends were taken loosely to the ends of the aerial wires. The aerial is mounted horizontally, as high as reasonably possible and clear of roofs and obstacles.

FOR SIX-METRES

An exactly similar design of aerial is suitable for the six-metre band, but the length of wire used for the aerial should be about eight

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NEXT MONTH

Another feature on a new Kingsley release.

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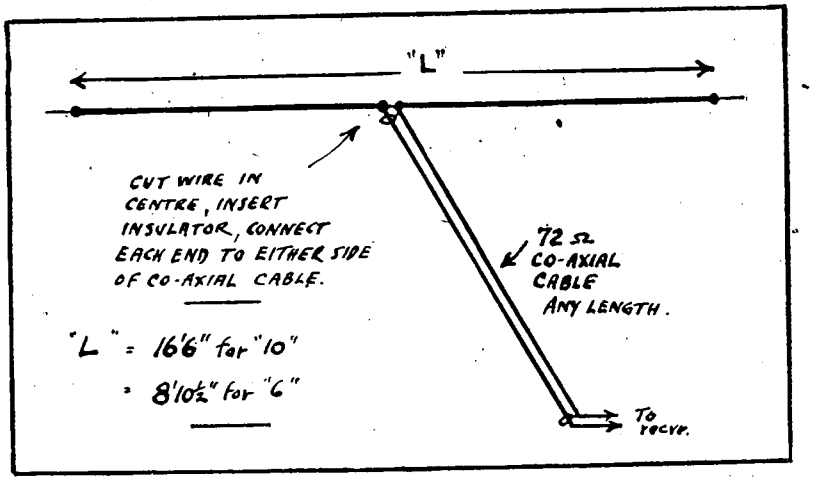
feet ten and a half inches long to suit the middle of the ham band.

The Kingsley Converters

Two models of Kingsley converters are to be released in the near future, one for ten metres and the other for six.

Those who remember days of short-wave reception will recall that one of the most satisfactory methods of obtaining good results on short-waves was by means of a converter. The incoming signal is fed to the grid of a suitable converter valve, with its oscillator section tuned to a frequency differing from the frequency of the incoming signal by the right amount to make the output of the converter suitable for amplification by a broadcast or dual-wave set. Sometimes the high frequency end of the broadcast band is used, such as 1,550 or 1,600 k/C. Thus a broadcast band set can be used to form what would be the intermediate frequency amplifier of a conventional superhet. Sometimes the output of the converter is arranged at a frequency chosen by Kingsley for their 6-metre converter.



Design for aerial recommended for use on ultra high frequencies.

It is simply a matter of putting the Kingsley six-metre converter in front of any short-wave or dual-wave set which has reasonable sensitivity at 10.7 megacycles (just below the 31 metre overseas short-wave broadcast band) and you have what amounts to a double i.f. superhet of the highest efficiency.

The Circuit

As will be seen from the circuit diagram, the Kingsley converter for six-metres consists of a carefully designed aerial matching circuit similar to that used in the KS9'er described in last months issue. The signal is then fed to the grid of an r.f. amplifier using one of the spec-

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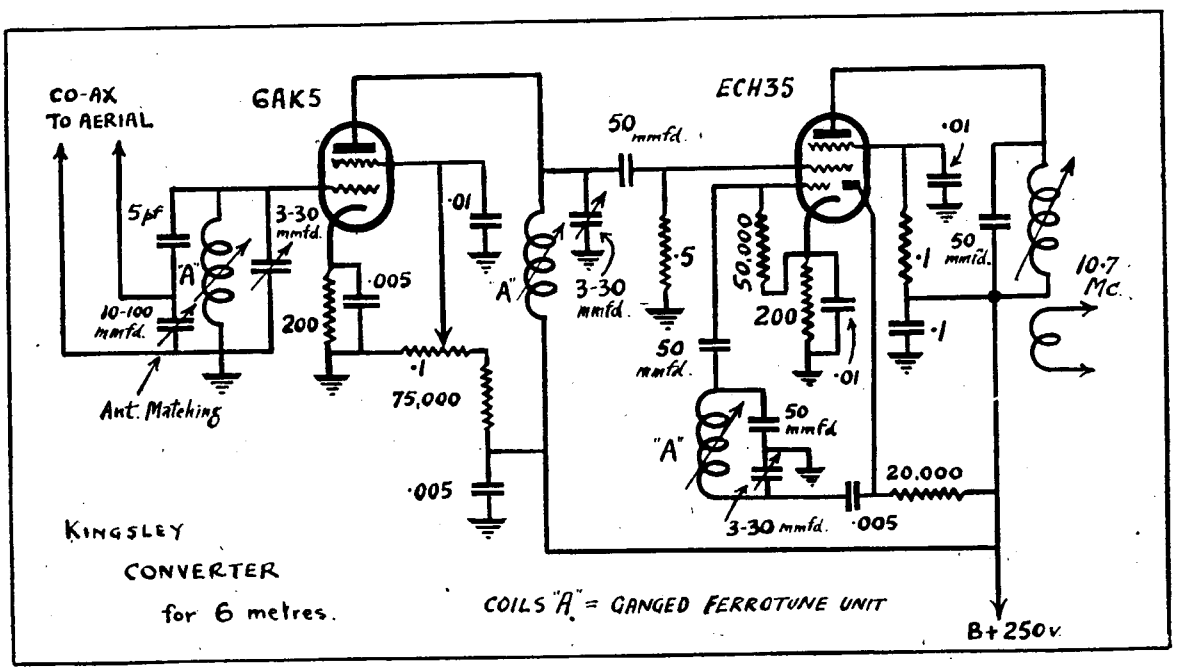
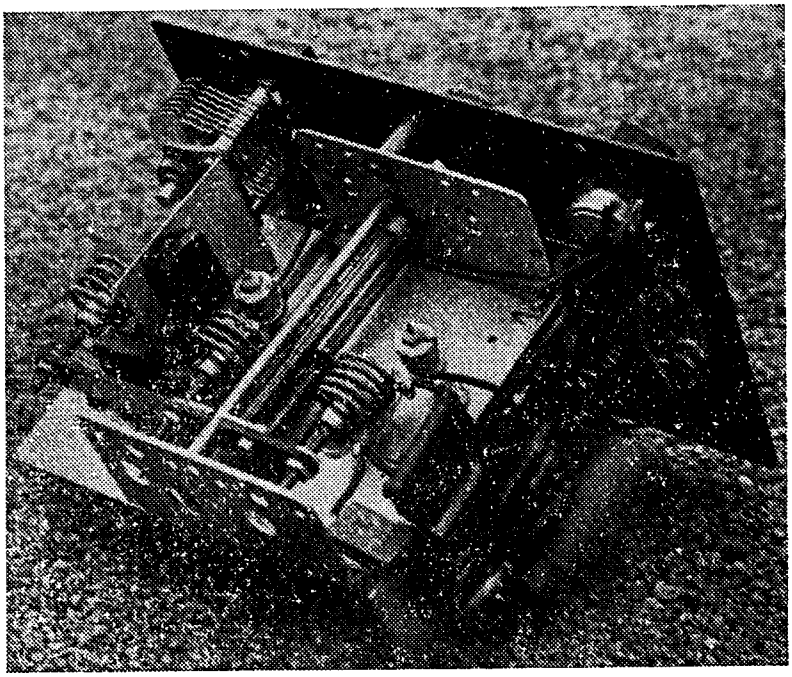


ial types of valves designed for the ultra high frequencies, type 6AK5, a miniature valve with characteristics similar to the conventional 6.3 volt heater-type a.c. operated valves, but with specially designed elements to ensure low inter-electrode capacity and allow good gain at ultra high frequencies. Both grid and plate of this r.f. amplifier are tuned to allow maximum gain, with instability controlled by means of a potentiometre in the screen circuit. By adjusting this screen voltage until the valve is just on the verge of "spilling over" it is possible to get terrific gain with low noise level. From this r.f. amplifier the signal is fed to the grid of one of the latest Philips converter valves, the ECH 35. Plate circuit of the ECH35 is tuned to 10.7 megacycles, with a coupling coil to match the aerial primary of the receiver to which the converter is attached.



A photograph of the inside of the Kingsley converter showing the coils and their tuning slugs.

Ferrotuning

A most interesting feature of the converter is that the tuning is accomplished by iron slugs moving in and out of the coils. Referring again to the circuit diagram it will be noticed that we have indicated these three coils with the letter "A". They are all tuned by slugs, ganged together and operated from the main tuning control. They can be seen clearly in the photograph of the inside of the converter. This form of tuning gives a splendid "band-spread" effect, so that the whole sweep of the tuning dial is needed to cover from 50 to 54 megacycles, the full width of this ham band. As a result, the tuning is no more difficult than that of an ordinary broadcast receiver.

Power supply for the converter is taken from the receiver to which it is attached, three wires being provided, one the high tension lead, the other for the 6 volts a.c. and the third is a common return lead for high tension, heater current and earthing. Only a few milliamps of high tension current is drawn by the converter and this can be taken from almost any set without upsetting its performance in any way.

Modest Price

At the moment the Kingsley converter is available at a modest price as a completely built up and tested unit in a neat crackle-finish box. It means that all and sundry can now tune the six-metre ham band with ease if they have a receiver which will tune to 10.7 mcs. Later it is possible that the Kingsley converter will be made available in kit form.

Another Kingsley unit which will be hitting the market about the same time as this story appears in print is a somewhat similar converter, but to cover the ten-metre ham band and the many overseas stations which romp in under favorable conditions on that band. On the six-metre band, in case we haven't mentioned it, the normal range is only 20 or 30 miles, with DX reception coming in on rare occasions. As you will surely know if you have read Don Knock's pages over the past year or two, the incidence of DX reception on six-metres is most interesting, elusive, in fact exciting. With larger numbers of efficient six-metre converters in the hands of enthusiastic listeners there is every possibility that signals from the American mainland will be heard in Australia. If and when this happens the lucky listener will enjoy considerable fame. To all enthusiastic listeners who enjoy the thrill of the chase after elusive DX we can recommend the Kingsley converter as an item which should be alongside the prided receiver.