

THE "FERROTUNE" SUPERHETERODYNE

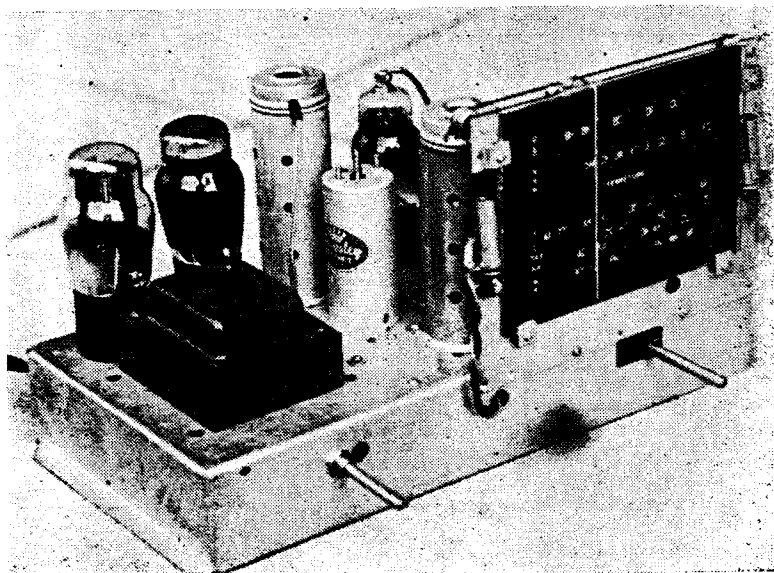
FIRST RELEASE OF CONSTRUCTIONAL DETAILS OF A SET FEATURING PERMEABILITY TUNING

VERY little is heard these days of the old tuned radio frequency receiver. While the T.R.F. type is still a good receiver for certain applications, it is limited in that it lacks sensitivity and selectivity which are readily obtained with the superheterodyne. It has been well established for

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Front view of the "Ferrotune" superhet which does not have a conventional gang.

many years that the maximum gain can be achieved in radio frequency circuits peaked to the optimum values of capacity and inductance. Any attempt to cover a wide band of frequencies by varying the capacity, results in peak performance of the fixed amplifier being disturbed, i.e., peak amplification is obtained at one point representing the best values of Inductance (L) and Capacity (C).

In the superheterodyne circuit, advantage is taken of this fact and the peaked, fixed amplifier is called the intermediate amplifier, and the coils used in conjunction

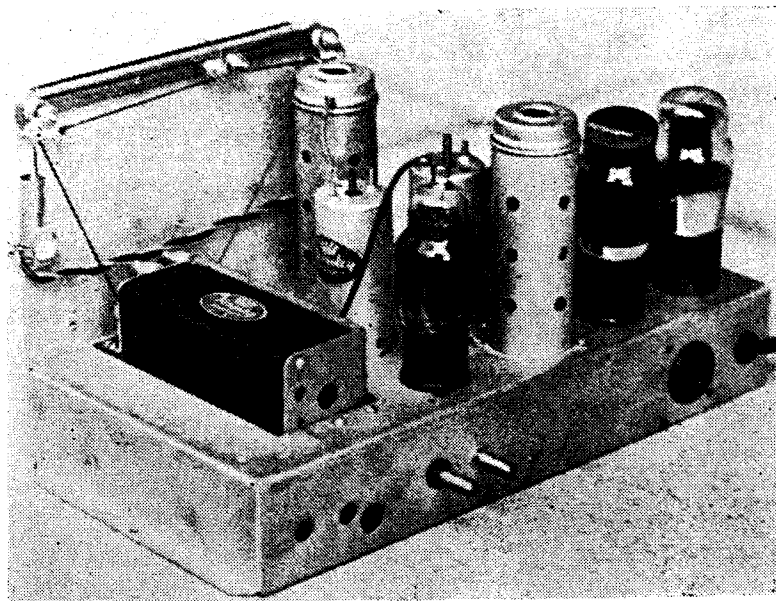
with the valves in this amplifier are called the intermediate frequency.

Transformers

Every endeavour has been made in the past few years to improve the efficiency, gain and selectivity of the intermediate amplifier; the valve design has produced better valves with lower noise level, higher gain and stability.

To match these valves the coil designer has designed I.F. transformers with better gain, selectivity and stability.

One of the major contributions to the improved coils and transformers has been the introduction of the iron dust core. It has been known for years that iron, which is finely divided in the form of dust, with each speck of dust insulated from it's neighbour can, when introduced into a winding designed to carry radio frequency current, improve the goodness of "Q" of the coil. The introduction of compact iron-dust shapes or cores is not



Rear view showing the "Ferrotune" unit fitting through the chassis.

(Continued on next page)

FERROTUNE (Continued)

by any means haphazard, but must be done in accordance with well established laws.

The use of iron has a further advantage for the trimming of the tuning of the coil by the adjustment of an iron-dust slug core, this type of trimming is more satisfactory than trimming by small capacities which change with variations of climatic conditions.

During the war years, while manufacturers were concentrating on the production of radio communication equipment for the armed forces, necessity brought along a number of improvements in design and practice, not the least of these was a very extensive use of iron-dust cores and pots for enclosing and adjusting coils and circuits.

One of the major functions of iron used as an enclosing medium, or for trimming, is the increase of permeability, with consequent reduction of the amount of wire used. This reduces the resistance of the coil for a given inductance.

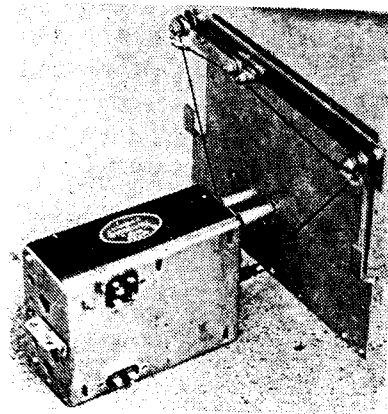
The foregoing is the basis of de-

sign of the Kingsley "Permaclad" coils and intermediate transformers. The advantages of these coils and I.F.'s when built into a superhetrodyne receiver, achieve gain and selectivity, which it was difficult for the kit builder to obtain without a considerable amount of test gear.

The use of "Permaclad" coils and I.F.'s ensures that you get the performance built in at the Kingsley factory and tested by the most modern methods available. Every coil and I.F. is individually tested before it is packed, and provided no damage occurs to it in transit, you use a tested component.

Gangless Superhetrodyne

Until late 1945 there were no available means in Australia to build a superhetrodyne receiver or, for that matter, a T.R.F. without the use of variable capacity shunted across the coil. It will be obvious that, with a given number of turns (i.e. inductance "L") the L.C. ratio can only be at peak at approximately one point of the combination of the two. This is evident in some receivers, particu-



The "Ferrotune" unit is supplied complete with calibrated dial.

larly of the T.R.F. type, by the fact that the increase of the capacity of the variable condenser shows flatness of tuning when approaching the top or low frequency end of the band. This is roughly caused by the fact that the inductance is swamped by capacity.

A system of varying the inductance with the capacity fixed, would be a better method of tuning. If the inductance is increased by more turns being added, resistance (R) will at once rise, and too much (R) will also flatten the tuning due to reduction of "Q".

Iron core tuning can do the job nicely — a given number of turns is employed on the coil, together with just the right amount of shunt capacity to give good "Q" and consequent gain; then by arranging for a slug to be pushed into the coil. Its inductance rises rapidly as the core goes in — "C" remains constant and, what is more important, "R" remains constant.

This roughly is what "Ferrotune" does, but it does more — it eliminates the necessity for padding condensers, and as the two cores, which tune the aerial and oscillator coils are mechanically driven, the unit is mechanically tracked during manufacture.

Building a superhetrodyne with this unit is just too easy.

Lining Up Procedure

The gangless "Ferrotune" unit is built into a self-contained case, complete with dust cover. It contains the necessary fixed and trimming capacity coils, cores and a mechanical arrangement to provide for the movement of the cores when the control is rotated. By this ar-

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angement, the variable factors usually encountered when assembling a condenser coil, arrangement due to variable length of leads, placement of parts etc., are all under control.

Alignment

To align the receiver, the use of a calibrated signal generator is helpful, but in the case of not having access to one, the factory setting of the I.F. transformers can be relied to give approximately the correct intermediate frequency and the iron cores purely trimmed for maximum output. For those with a generator, the I.F. transformers should be aligned to 455 kc's.

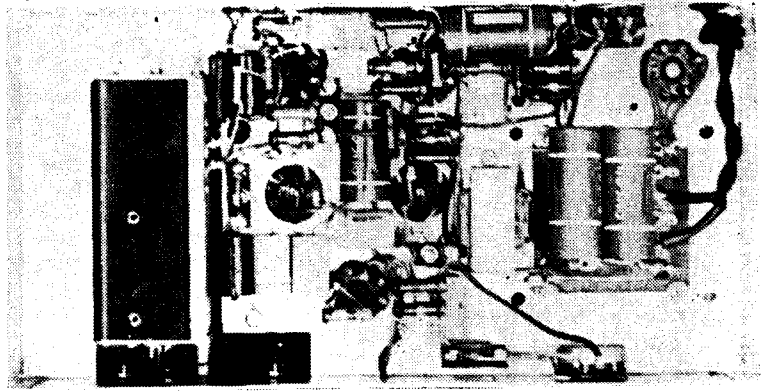
To check the "Ferrotune" unit, first check the position of the pointer in relation to the stop lines on the ends of the dial scale when

AVAILABILITY

Owing to the keen demand for "Ferrotune" units and the limited production at present, due to scarcity of essential raw materials, there may be delays in deliveries, but every effort is being made to meet all orders.

the tuning spindle is against the appropriate stop. Second, tune in an identifiable station on the high frequency end, or use the generator, and adjust the oscillator trimmer marked "A" to bring it to its correct position on the dial. Last, adjust the aerial trimmer marked "B" for maximum output. These trimmers are located on the back of the "Ferrotune" unit.

The underlying idea in provid-



Photograph of underside of chassis, showing wiring and layout of components.

ing the home builder with a chassis which places the "Ferrotune" unit and the I.F.'s in the intended position, is to ensure that only the simple adjustments outlined above are necessary in order to make it function correctly.

Warning

The following notes of caution are set out for the aid of the home builder:—

(1) I.F.'s must be on 455 kc, as the unit is lined in the factory into I.F.'s tuned to this frequency. All "Permaclad" Kingsley I.F.'s are brought to this frequency during manufacture. The merest touch of the iron-core trimmer should be sufficient to compensate for capacity due to leads, etc.

(2) Breaking of the seal and interfering with the electrical or mechanical adjustment of the tuning unit will upset the lining, and it

will be unlikely that the home builder will have means to restore the unit to its original condition. In such case, it should be returned to the factory for service, which will be charged for.

Circuit

We publish herein a suggested circuit arrangement for a receiver embodying the "Ferrotune" unit. While the R.F. circuit should be, in the main, adhered to, the audio amplifier can be of any type to suit the taste and requirements of the intending builder.

The "Ferrotune" unit should be used only in conjunction with the special dials designed for it, just as one would not attempt to use an "F" gang dial on "H" gang condenser set-up, so the correct dial should be applied to the "Ferrotune."

