CONSTRUCTIONAL DETAILS OF

THE SUPERBE SUPERHETERODYNE

THE STAR OF BROADCAST RECEIVERS FOR THE CONSTRUCTOR OF 1934

This article deals with the necessary detailed information for the assembly and wiring of the chassis.

By DON B. KNOCK
Technical Editor

The issue of AUSTRALIAN RADIO NEWS for last week, October 27, 1933, contained the introduction to something entirely different in the run of superheterodyne broadcast receivers as intended for the reader who may be classed as a "home constructor." Usually, the scheme of things has been for the technical staff of the journal to make plans for something of intended interest to readers, then collect an array of components, and, finally, after the evolution of the finished subject of the article, pass instructions on to the reader to go and do likewise. In most cases there is no possible objection to this. The reader, if he is sufficiently interested in the subject of the technical article, has some or enough knowledge to enable him, with the aid of the circuit diagram and the list of parts, to make a successful duplication of the original. Yet there are always the remaining cases, and we always feel that one of the most annoying features of collecting all the parts together to make a receiver of comprehensive proportions is the fact that the particular dealer may not have them in stock, and will offer the intending purchaser substitutes of some kind.

Where we are considering a receiver of the superheterodyne class, and that receiver is one in which radical changes are included in the design of the coil kit as compared to previous methods, it becomes obvious that a substitution of a coil kit may result in a very disappointed purchaser, and, incidentally, reader. This is vitally important in the "Superbe" superheterodyne, and we decided to take no chances with people trying to use unsuitable coil kits; an experience we encountered in the case of a receiver of partly similar design published some time previously. In short, the usual autodyne coil kit *cannot* be used with a 2A7 Pentagrid valve. The co-operation of the Metropolitan Electric Company, Ltd., resulted in the production of a special Radiokes chassis-kit for the "Superbe" superhet., and in case there are readers who have commenced to read this issue of RADIO NEWS and not seen the previous week's, we will again refer to the why and wherefore of the chassis-kit.

The chassis-kit does away entirely with the necessity for presenting the dealer with the usual list of parts, and the possibility of substitution of unsuitable parts, often occasioned by delay and the impatience of the purchaser, but sometimes by the desire of the dealer to "push" some other component which may mean a higher profit. Although we have published a complete list of parts for the "Superbe" superhet., and we repeat it again in this issue for reference purposes, all that is necessary is to order from any dealer advertising the chassis-kit in AUSTRALIAN RADIO NEWS, a Radiokes "Superbe" chassis-kit. Everything for the making of the receiver is contained in the box, including supplementary instructions corresponding to those found in this article. It is the surest way to avoid trouble, and our advice is to use the chassis-kit as recommended for the quickest and most certain road to success with the "Superbe."

Let us open up the chassis-kit and see what it contains. Exactly what we have specified in the introductory article, and it comprises the following:—

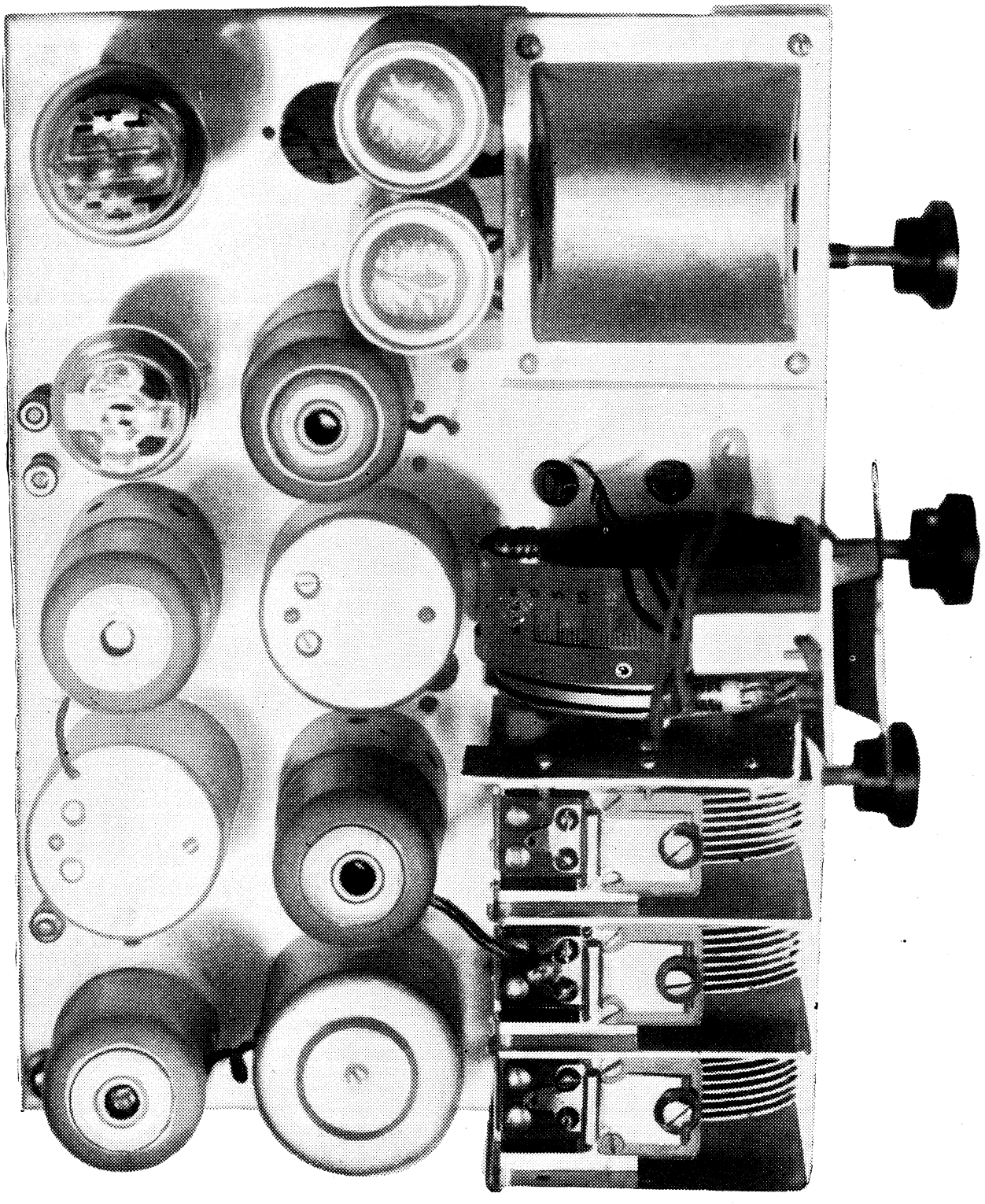
1 only power transformer (5-volt fil. C.T.) (Radiokes)
1 only coil kit (Radiokes) comprising:—
1 aerial coil, 1 R.F. coil, 1 osc. coil
1 175kc. I.F. transformer
1 175kc. I.F. transformer C.T.
1 11-plate Isolantite padder
1 type D3 gang cond. std. spindle anti-clockwise (Stromberg-Carlson)
1 only Visor drum dial with 5/6 mill. tuning meter (Dial Radiokes, Meter EFCO)
1 only H.C. R.F. choke (Radiokes)
1 only 30,000 ohm 7½ma. maxomes resistor (Radiokes)
1 only 20,000 ohm 5ma. maxomes resistor (Radiokes)
1 only 6000 ohm 5ma. maxomes resistor (Radiokes)
1 only 4000 ohm 5ma. maxomes resistor (Radiokes)
1 only 300 ohm. 100ma. pigtail resistor (Radiokes)
1 only 250 ohm 25ma. pigtail resistor (Radiokes)
1 only .25 mfd. Chanex pigtail condenser
7 only .1 mfd. Chanex pigtail condensers
2 only .02 mfd. Chanex pigtail condensers
1 only .01 mfd. Chanex pigtail condenser
1 only .0001 mfd. Chanex pigtail condenser
1 only .00025 mfd. Chanex pigtail condenser
1 only 10 mfd. Chanex semi-dry Dulytic cond. 25-volt working 40v. peak
2 only 8 mfd. Chanex semi-dry Dulytic cond.
3 only 1 meg. I.R.C. grid leaks
1 only .5 meg. I.R.C. grid leak
1 only .05 meg. I.R.C. grid leak
3 only .25 meg. I.R.C. grid leaks
1 only 250,000 ohm Bradleyometer
2 only 3.5v. pilot lamps
4 only 3-piece Acorn valve shields (inside fitting)
1 only T36 resistor panel (Radiokes)
2 only T36 panel pillars (special) (Radiokes)
2 only No. 58 James valve sockets, engraved
1 only 2A7 James valve socket, engraved
1 only 2B7 James valve socket, engraved
1 only 2A5 James valve socket, engraved
1 only 5Z3 James valve socket, engraved
1 only 4-pin blank valve socket, engraved
3 only knobs (Marquis)
1 only .0001 T.C.C. mica condenser
4 only large n.-p. terminals
1 only Tasma 2-way rotary switch
4 only grid clips
1 only 13in. x 9½in. x 3in. chassis (Acorn)
2 only special R.A. coil brackets (Radiokes)
12 only solder lugs, single end
2 only solder lugs, single end, large
1 only solder lug, single end, large hole
14 only ⅜in. x ⅛in. countersunk screws
30 only ⅜in. x ⅛in. round-head screws
36 only ⅛in. hexagon nuts
4 only 5/32in. hexagon nuts
4 only ¼in. x ⅛in. round-head screws
3 only rubber grummets
3 only 7/16in. fibre washers with 5/16in. hole
3 only ⅞in. fibre washers with 5/16in. hole
3½ yards fraywire
12in. 5/32in. x .003 copper braid
2 yards 18-gauge tinned copper wire
2 yards 1 mil. black spaghetti
10 only ⅜in. fibre washers with 5/16in. hole

THE ASSEMBLY.

The first move after opening up the chassis-kit is the mounting of the various major components, and the exact positions may be seen by referring to the illustration of the chassis viewed from above, and the plan diagram in the previous article.

The base is supplied ready drilled, and is of sprayed steel, made by the Acorn Pressed Metal Company. This metal foundation has been supplied with all holes drilled to correspond with the components used in the original, and if any different type of ganged condenser units, etc., should be used, the holes would not fit the component and some alteration would be necessary. The first of the components to mount on the base should be the valve sockets (with valve-screen bases) and speaker-plug socket, because once we have the cumbersome presence of the ganged condenser unit and the power transformer in position, the business of turning the lot over on the bench and manipulating screws, pliers, screwdriver or box spanner

(*Continued on page 26.*)



Looking down on the "Superbe" Superheterodyne chassis. This photograph checks with the plan diagram of the layout illustrated in the previous issue. The visible hole behind the electrolytic condenser on the right is due to an alteration in placement of parts when this chassis was in the embryo stage. The muting switch control is by the left-hand knob, and volume level by the right-hand knob.

KIT-SETS
SAVE *money, time and trouble*

What a saving of money and trouble! No more time wasted in selecting parts from dealer after dealer, no more trouble in planning and drilling the chassis, no more time and money wasted by the failure of second-rate components. Buy complete kit sets of Radiokes parts, tested, matched and guaranteed, complete with circuit and wiring diagrams, ready for immediate assembly.

- **Circuit accurately planned**
- **Every unit a standard advertised product**
- **Parts carefully selected and matched**
- **Chassis drilled ready for mounting**
- **Full instructions and working plan**

Complete kit of parts for the

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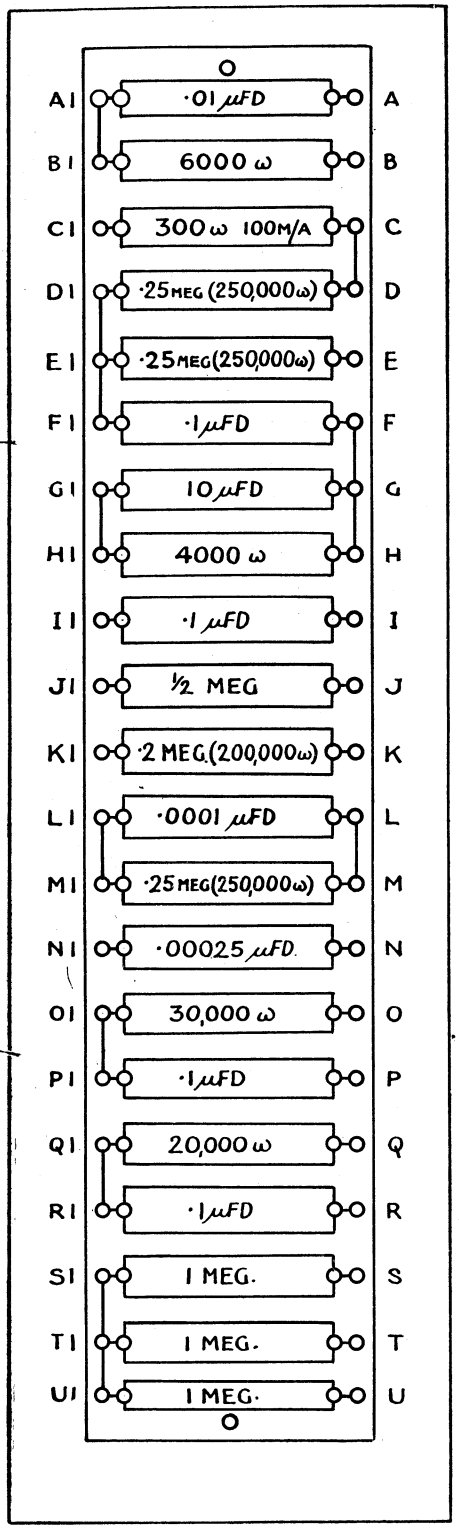

This is the T-36 panel with the positions and link connections of resistors and condensers shown. It was illustrated in the previous issue, and is reprinted as being indispensable for checking the wiring in conjunction with the wiring diagram.

is not quite so easy. The reader can suit himself, but that is our method of starting construction of any receiver. Another thing to remember is that rotor plates of variable condensers can be bent out of place by careless handling of a chassis when upside down. Mount the power transformer first, and mount it in the position indicated in the underneath diagram illustrated in this article.

THE POWER TRANSFORMER

The power transformer has been made specially by Radiokes for this receiver, and any nondescript kind of transformer, such as some of the dubious makes we have seen in the past few months in some dealer's windows, is out of the question. Not only have we to consider the heavier filament load of the 5Z3 rectifier, but there is also the consideration of the 2A5 power audio valve. This is a valve of the indirectly-heated type, and, incidentally, a vast improvement on the 59.

With indirect heating, we must allow for the time taken for the valve to warm up and come into action. If the regulation of the transformer should be poor, the rectifier will be overloaded during this period of warming up, although the 5Z3 is well able normally to cope with this. Such continual overload would shorten the life of even a 5Z3. The secondary voltage to the rectifier is 385 volts, and the secondary is rated to supply 125 milliamperes, being wound with heavier gauge wire than earlier types. A transformer with a secondary voltage of 385 and poor regulation would probably supply the rectifier and electrolytic condensers with well over 500 volts under a no-load condition. The transformer is bolted to the base by the four screws projecting through the laminations in the usual manner.

THE GANGED CONDENSER.

This is one of the new Stromberg type D3, and is mounted on the base in the position shown. We consider the Australian designed and manufactured variable condenser gang of to-day second to none, and this Stromberg-Carlson example is typical of the excellent workmanship of our leading factories.

As radio progressed, and we learnt more about real power amplification, it was realised that one of the most prolific sources of audio instability lay with the vibrating plates of variable condensers. This is particularly so with thin, springy brass plates, and the thicker aluminium plates of the new Stromberg type of condenser reduce such trouble to a minimum. As a further safeguard, the whole gang is mounted on rubber grummets or distance pieces, through which the holding down bolts are passed, and these distance pieces are included in the kit. The trimmer adjustments are of a very solid design, and as they are arranged on the top of each ganged section, there is no question of fishing around in an almost inaccessible position at one side of the condenser structure to carry out this important operation.

INTERMEDIATES AND COILS.

These come next in the assembly, and it is advisable to leave the mounting of the dial and the Efco visual tuner until the very last, because we know just how easy it is to damage a dial in the process of turning a chassis over and over whilst working with tools and soldering iron. The intermediate transformers could actually be mounted at the same time as the valve sockets (and valve-screen bases), but I.F. transformers are also a component we like to treat with due respect; similarly coils; so it is as well to give them attention after most of the bulky business is attended to. The electrolytic condensers can be bolted in position at the same time, and we consider the Dulytics used about the most convenient of all electrolytics for mounting and subsequent wiring. We always fit Dulytic electrolytics for any purpose with confidence. We have enjoyed the privilege of inspecting the manufacturing process and we know what these condensers will stand up to. Also, for

(Continued on page 28.)

Build the "Radio News" new "SUPERBE" 5-6 Superhet from guaranteed parts supplied by FOX & MACGILLYCUDDY LTD.

LIST OF COMPONENTS.

1 Radiokes special coil kit £4/15/-
1 Drilled chassis 8/6
1 Power transformer, Radiokes, ... 26/-
1 Full-vision dial, Efco 10/6
1 Tuning meter, Efco 13/6
1 H.C. R.F. choke, Radiokes 2/-
1 30,000 ohm maxome, Radiokes 1/6
1 20,000 ohm maxome, Radiokes 1/6
1 6000 ohm maxome, Radiokes 1/6
1 4000 ohm maxome, Radiokes 1/6
1 300 ohm 100ma. resistor, Radiokes 1/6, Pollock 1/6
1 250 ohm 25ma. resistor, Radiokes 1/6, Pollock 1/6
7 .1 mfd. condenser, Wetless 1/6, Chanex 1/4, Sprague 2/6
2 .02 mfd. condensers, Wetless 1/2, Chanex 1/2, Solar 1/3, Sprague 1/6
1 .01 mfd. condenser, Wetless 1/-, Chanex 1/-, Sprague 2/-
1 .0001 mfd. condenser, Wetless 1/-, Chanex 1/-, Sprague 2/-
1 .00025 mfd. condenser, Wetless 1/-, Chanex 1/-, T.C.C. 1/6
1 10 mfd. electro. cond., Dulytic 1/6
2 8 mfd. electro. cond.— Dulytic 5/9, T.C.C. 6/6, Solar 6/6, Sprague 1/6
3 1 meg. resistors, I.R.C. 2/-, Bradley 3/-, Beldas 1/9
1 .5 resistor, I.R.C. 2/-, Bradley 3/-, Beldas 3/-
1 50,000 ohm resistor, I.R.C. 2/-, Bradley 3/-, Beldas 6/6
3 250,000 resistors, I.R.C. 2/-, Bradley 7/6, Emmco 1/3
1 250,000 Potentiometer, Bradley 1/3
2 3.5v. pilot lamps 1/3
4 3-piece valve shields 7/-
1 Radiokes resistor panel. 2 T36 pillars. ..... 6d.
3 6-pin sockets, Marquis 1/3, Airzone 1/-, Renrade 1/6
2 sm. 7-pin sockets, Marquis 1/6, Airzone 1/3, Renrade ..... 6d.
2 UX sockets, Marquis 1/3, Airzone 1/-, Renrade ..... 9d.
1 .0001 fixed condenser, T.C.C. 1/6, Wetless 1/-, Renrade ..... 6d.
4 Large N.P. terminals, each 1/-
1 2-way rotary switch, 2/6. 4 Screen-grid clips, each ..... 3d.
Bolts, nuts, solder lugs, hook-up wire, etc. ..... 3d.

VALVES:
Radiotron, Ken-Rad, National Union.

2 58 type .. 17/-
1 2A7 type .. 21/-
1 Dynamic speaker, 2500 ohm field to match 2A5—Amplion £2/8/-
Jensen £3/5/- (D9), Jubilee £2/10/-, Magnum £3/5/-
1 2B7 type .. 20/-
1 2A5 type .. 17/6
1 5Z3 type .. 18/6

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months we have been using a bank of Dulytics in an experimental transmitting station and have repeatedly tested them under a load of 1800 volts at 200ma. This, of course, is in a series-parallel bank, but *without* equalising resistors. There is never any sign of leakage or "spluttering" under this drastic load.

The positions of the intermediates may be seen on reference to the plan diagram in last week's issue and the illustration with this article. Looking down on the chassis: the first I.F.T. is mounted between the two 58 valves (with the 2A7 in front, immediately behind the condenser gang), and the second I.F.T. is immediately behind the drum dial. Holes are cut in the base for the projection through of the connecting leads which are color-coded, as the other diagrams indicate. These intermediate frequency transformers, as used in the "Superbe" superhet., have special features which contribute to the desired performance, namely, high amplification, good selectivity and the absence of whistles. Mr. Mansfield, of the Metropolitan Electric Company, carefully explored the design of suitable intermediates for this receiver and found that a somewhat different method of winding the honeycomb primary and secondary made all the difference in getting the "joeys" out of the receiver. We are not at liberty to divulge a trade secret, but emphasise that this is a very important feature, and one more reason why the chassis-kit specified must be used.

The intermediate frequency used is 175kc., this, as is now well known among superhet. devotees, being the best all-round choice for selectivity. The elimination of image interference is taken care of in the "Superbe" by the inclusion of the T.R.F. stage, which, of course, contributes considerably to the overall sensitivity and low noise-level. Behind the first section of the condenser gang is mounted the aerial coil, this being the only coil unit at the signal frequency above the base. At this stage it is necessary to refer to the illustration on page 32 of the previous issue. This shows the underneath view of the chassis, and corresponds to the point-to-point wiring diagram with coded indication of connections. This diagram is reproduced in this issue on page 30.

The aerial coil unit is shown in the circuit diagram (blueprint) as L1, the second R.F. coil unit, in the grid circuit of the 2A7 (and plate of first valve) as L2, and the third R.F. unit, which is the oscillator portion, as L3. L2 and L3 are mounted underneath the base in the positions shown, horizontally, and brackets are supplied with the chassis-kit for this. All the coil connections are numbered as shown, so that there is no chance of going wrong easily in this direction. Also, different colored flex leads project through the base of the intermediate transformers, the colored connections being marked in the circuit and the wiring diagrams.

MUTING SWITCH.

Having got so far, the aerial, earth and pick-up terminals should be fitted, and the aerial terminal, also one of the pick-up terminals, must be insulated from the metal base by means of the insulated washers provided. The two-point Tasma switch used for the muting or silencing control is also supplied with insulating washers, and care must be taken to see that the threaded bush is properly centred, otherwise a short to earth here means complete and effective silence continuously. The switch in action does this by earthing the grid circuit of the 2A5. With the potentiometer (R8), which is a .25 meg. Bradleyometer, there is no necessity for insulation of the screwed bush. The shaft of the Bradleyometer is electrically insulated from the moving contact and resistance inside the casing, thus making mounting of this important component more convenient.

THE RESISTOR AND CONDENSER STRIP.

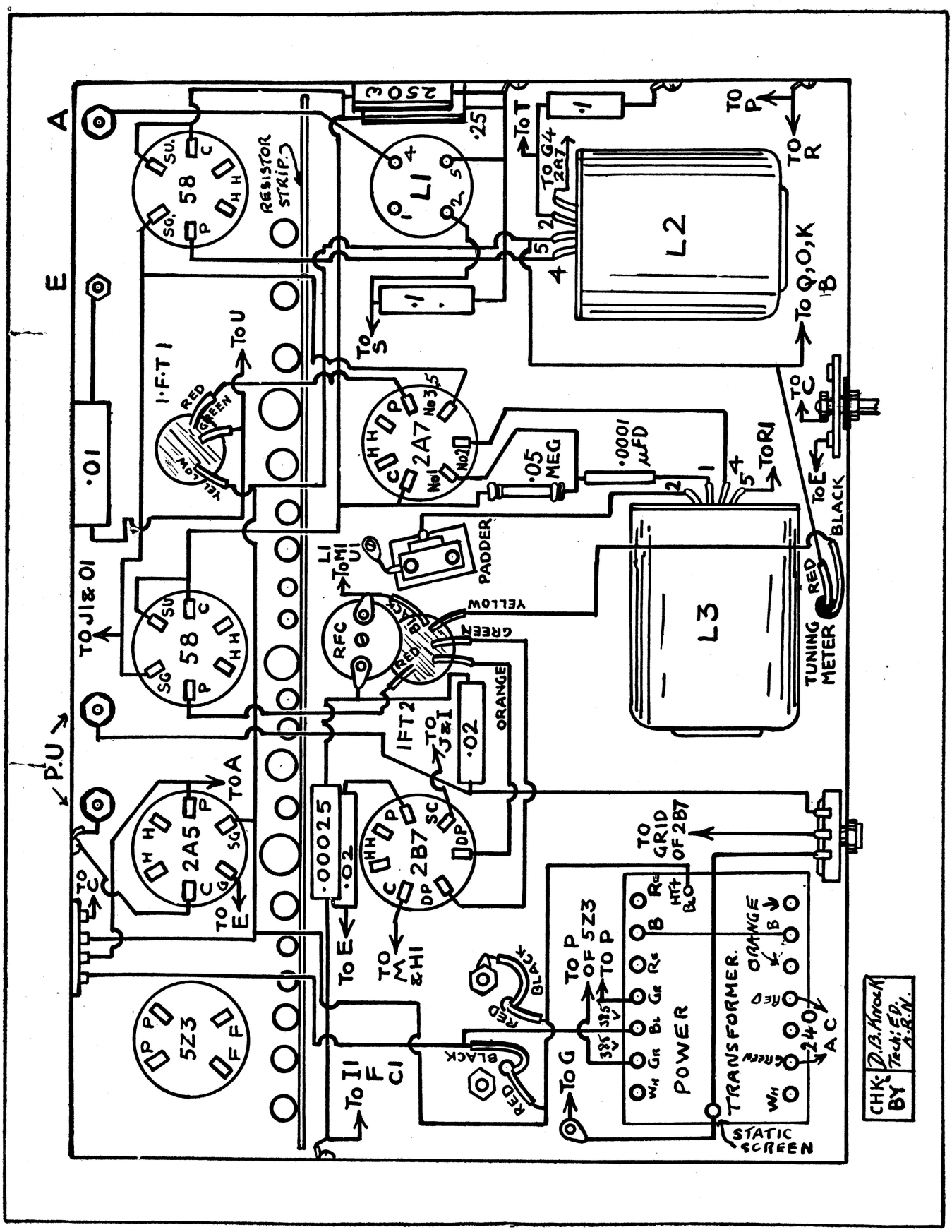
The next thing to deal with is the assembly of the special resistor strip designed to facilitate the wiring of the receiver. This strip is marked in the Radiokes chassis-kit as the "T.36 panel." It may be seen in position in the illustration on page 32 of the previous issue, arranged vertically in front of valve sockets at the rear of the base. We published a coded diagram of this strip on page 30 last week, and in order that any reader who may not have seen the previous issue can understand the wiring instructions given this week, the diagram is republished.

It will be seen that alphabetical order, with the addition of the figure 1 on one side, has been used to indicate the various resistors and condensers. Arrange all these on the strip exactly in the manner shown, the mounting being done by soldering the pigtailed connections of each resistor or condenser to the eyelets provided on the strip. Where you see two joined together on one side, such as A1 and B1, solder a wire across the eyelets. All these bridge connections should be made before the strip is mounted in position under the chassis so that there will be no confusion when actual wiring up is commenced. The strip is of the correct length to fit across under the chassis, and is supplied with two panel pillars which bolt through the rear side of the base and hold the strip in position.

THE WIRING INSTRUCTIONS.

Now comes the important business, which often seems like a nightmare to

(Continued on page 32.)



This point-to-point wiring diagram is arranged to correspond with both the circuit diagram and the alphabetical code adopted for connecting resistors and fixed condensers. The heater wiring of all valves is omitted for the sake of clarity. Lug connections to the base indicate earthing points.

many constructors who are not quite conversant with the usual circuit diagrams. We have simplified the process considerably by adopting the alphabetical method of identification shown. With these instructions, compare the resistor strip diagram with the point-to-point wiring, and we are quite sure there will be very little chance of a mistake.

First of all, it will be noticed that in all diagrams we have deliberately omitted the heater wiring, for we consider it to be only a source of confusion to many when trying to follow a diagram. By looking at the blueprint it will be seen that the various secondaries of the power transformer are also color-coded. These colors are also the means of showing the correct connections on the diagram of the transformer terminal strip in the wiring diagram. The 2.5-volt 2-amp. winding feeding the heater of the 2A5 has two orange leads, with the centre-tap to earth black. The 2.5-volt 8-amp. winding with red leads and black C.T. to earth feeds the two 58's, 2A7 and 2B7. The filament winding for the 5Z3 rectifier, 5 volts at 3 amps, is indicated by white leads, but in this case the centre-tapped black lead is the high-tension positive lead. This must not be confused with the other black leads connecting to earth, and also to the static shield of the transformer.

Note that the 2500-ohm speaker field is not used in the positive lead in the filter system in this receiver, but is connected in the negative. The field does double duty in providing the necessary filter choke and, as portion of the bias resistance in conjunction with R15, the 300-ohm 100ma. resistor (C1 and C on the resistor strip). Where you see connections to earth indicated by a solder lug screwed to the base in the wiring diagram, be careful to scrape away any sprayed paint around the hole, in order to ensure good electrical contact. The paint used for spraying chassis is a form of insulating varnish, and is often particularly good insulation where it is not wanted.

Use a clean soldering iron, resin-cored solder (and a little flux if desired), and use the fraywire supplied with the kit for connections. We will at this stage draw attention to the plate connections of the first 58 and 2A7 valves. These leads are screened by slipping over them a short length (about five inches) of copper braid (which is supplied with the chassis-kit), and the braid is earthed carefully. This screening plays its part in the general stability of the receiver and the elimination of unwanted whistles, by ensuring that no stray R.F. gets into the primary circuit of the first intermediate transformer. Normally the 2A7 valve itself is intended to preclude this possibility, which is so often present with the usual autodyne valve used in this position, but there is nothing like being doubly sure. Now for the actual connections. Refer to the resistor strip.

A connects to the plate of the 2A5 valve.
B to the B positive maximum.
C and D to one side of the muting switch.
E to the other side of the muting switch.
F G H I all connect to earth (chassis).
J connects to the screen of the 2B7.
K to the plate of the 2B7.
L M both connect to one side of the R.F. choke and centre-tap of the second intermediate frequency transformer (secondary).
N connects to the opposite side of the R.F. choke.
O also connects to B positive maximum (black from rect.; fil. C.T.).
P connects to earth (chassis).
Q connects to B positive maximum.
R to earth.
S to green lead on the first intermediate transformer.
T connects to lug No. 2 on R.F. coil (L2).
U connects to lug No. 2 on the aerial coil (L1).

Now, working on the other side of the resistor strip:—

C1 connects to earth.
C1 and H1 connect to the cathode of the 2B7 (red end of 10 mfd. condenser), and also to L1 and M1.
I1 connects to J.
J1 to O1 and P1.
K1 connects to B positive maximum.
O1 and P1 both connect to the screens of the 58's and the 2A7.
Q1 and R1 connect lug No. 5 to the oscillator coil (L3).
S1, T1 and U1 all connect to L M.

A systematic following of this chart and the diagrams, and there is very little room left for any doubt about what should go where. Instead of going into details about the connections to the various valve sockets, and the speaker plug socket, all these connections are shown in detail on the blueprint diagram.

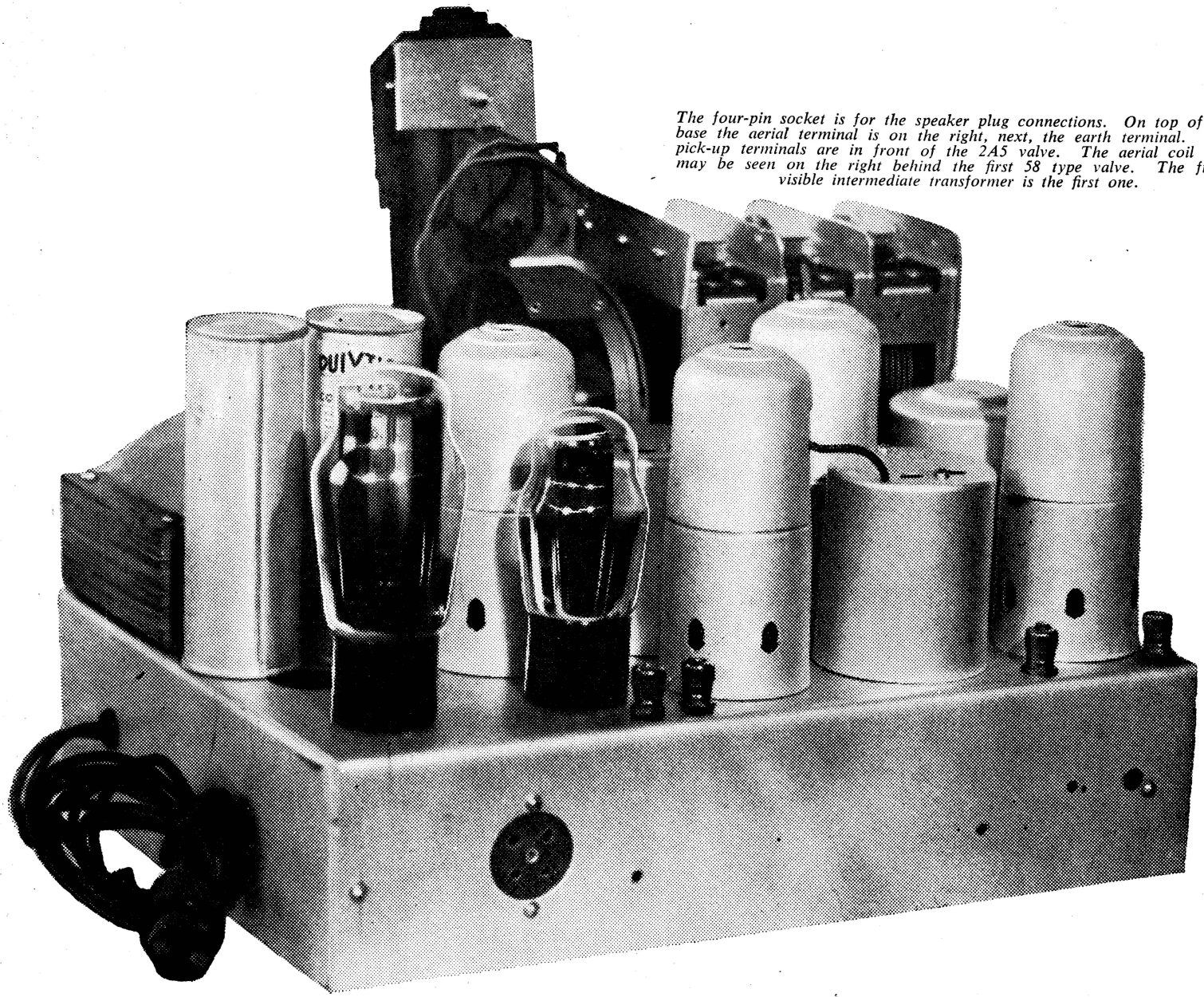
Note that the pick-up terminals are left open, and there must be no bridging of these by any connection other than the pick-up.

The valve sockets we have used in the "Superbe" superhet call for some comment. They are of James manufacture and are a particularly accessible kind of socket, with two holes for mounting and a type of contact for soldering which is easily attended to. The lug for soldering is arranged in an elevated position, literally "in the air."

THE LOUDSPEAKER.

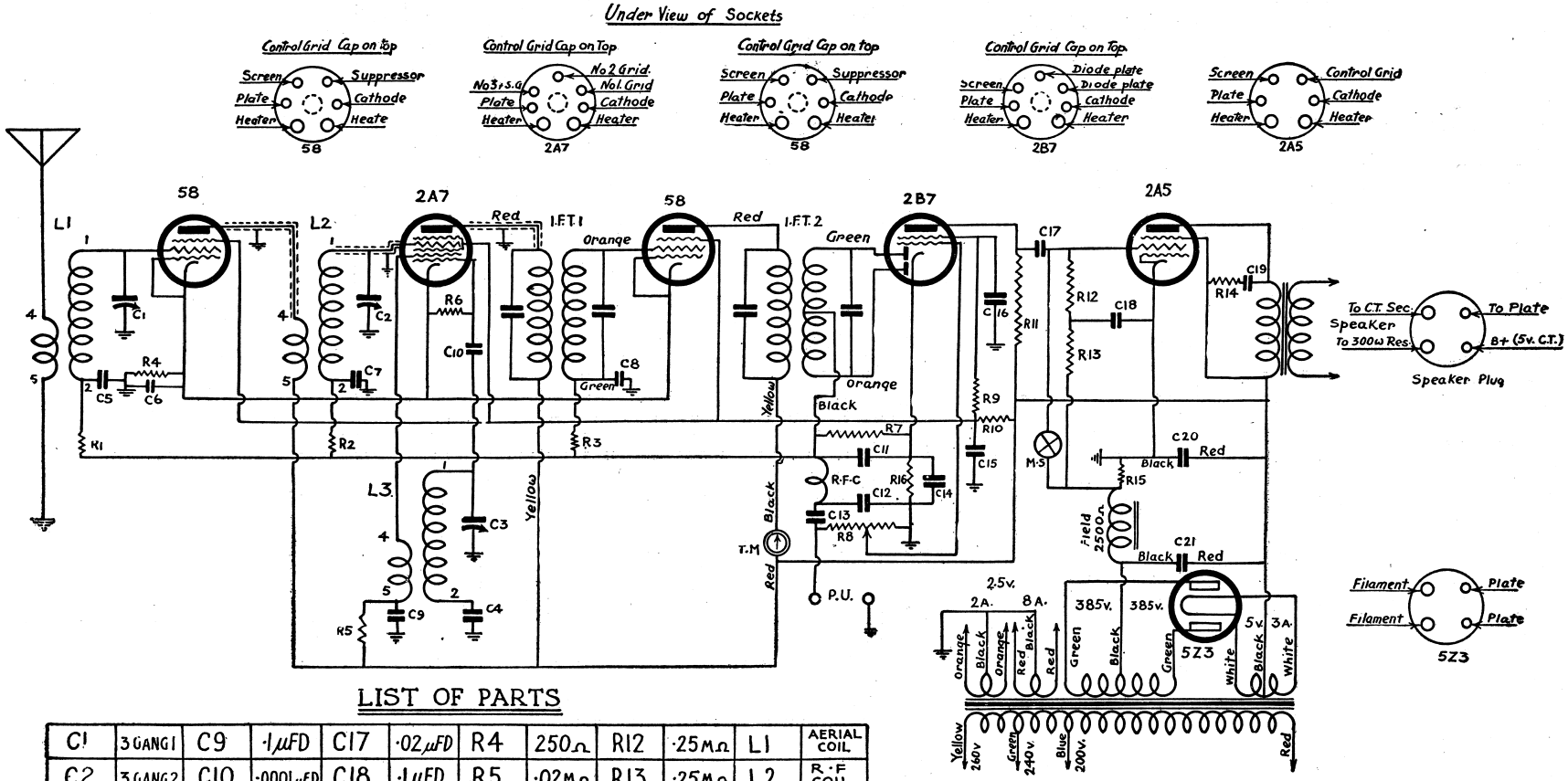
We are very much enamored of the Jubilee 2500 D.C. dynamic speaker we chose for use with the "Superbe" Superheterodyne as being eminently suitable and well able to deal with the load the 2A5 will deliver. A special transformer is fitted with this speaker, and readers should be sure when ordering this item that they are supplied with one having the correct transformer to match the 2A5. The new Jubilee speaker possesses a

(*Continued on page 38.*)



The four-pin socket is for the speaker plug connections. On top of the base the aerial terminal is on the right, next, the earth terminal. The pick-up terminals are in front of the 2A5 valve. The aerial coil unit may be seen on the right behind the first 58 type valve. The fully-visible intermediate transformer is the first one.

Back view of the "Superbe" Superheterodyne chassis.



LIST OF PARTS

C1	3 GANG 1	C9	·1μFD	C17	·02μFD	R4	250Ω	R12	·25MΩ	L1	AERIAL COIL
C2	3 GANG 2	C10	·0001μFD	C18	·1μFD	R5	·02MΩ	R13	·25MΩ	L2	R.F COIL
C3	3 GANG 3	C11	·0001μFD	C19	·01μFD	R6	·05MΩ	R14	6000Ω	L3	OSCIL COIL
C4	PADDER	C12	·00025μFD	C20	8μFD(EL)	R7	·25MΩ	R15	300Ω 100%	I.F.T. 1	INT. FREQ. TRANS.
C5	·1μFD	C13	·02μFD.	C21	8μFD(EL)	R8	·25MΩ(pot)	T.M	TUNING METER	I.F.T. 2	C.T DO DO
C6	·25μFD	C14	10μFD.	R1	1MEGΩ	R9	·5MΩ	M.S	MUTING SWITCH	R16	4000Ω
C7	·1μFD	C15	·1μFD.	R2	1MEGΩ	R10	·03MΩ	P.U	PICK-UP		
C8	·1μFD	C16	·1μFD.	R3	1MEGΩ	R11	·2MΩ	R.F.C	R.F.CHOKE		

AUSTRALIAN RADIO NEWS SUPERBE" SUPERHET

This is the circuit diagram of this superb receiver. We reproduce this diagram in black and white for the convenience of readers who may prefer this to the blueprint. The "Superbe" Superheterodyne is a broadcast receiver of the "Five and Rectifier" type, and is far in advance of any other yet published for the Australian radio public. It has a stage of tuned R.F. amplification preceding a most effective valve combination, using the newest valve types. The design includes visual tuning, automatic volume control of a very desirable nature, and silent tuning between stations with the least complication. The "Superbe" Superheterodyne sets a new and much higher standard in constructional broadcast receivers for the coming year.

feature which overcomes the trouble so often encountered with many speakers—that of misalignment. Once a voice coil assembly is pulled slightly out of centre by a warping cone, "rattle" in reproduction results.

This cannot occur in the new Jubilee model, for the coil is carried on a corrugated concentric disc, which is a permanent part of the speaker frame. The coil can only move in one direction and not sideways. Such design means a farewell to speaker servicing, as once this corrugated disc is assembled by the makers it stays centralised under all normal conditions. Note that the combination of R14 and C19 constitutes a tone filter in the plate of the 2A5, and the resulting average tone level obtained with the Jubilee speaker is all that anyone could wish for. We have *not* included a tone control in the design of the "Superbe" superhet., but there is no reason why the fastidious should not fit one if they so desire. It can be done in various ways, and the simplest is to provide a variable resistor in place of R14, with an overall value of 10,000 ohms. The variation in tone will not thus be very great, but we consider that a wide range of tone variation tends to overdo things, and some receivers we have listened to recently have been anything but pleasant to listen to, the arranging of the tone level being too much on the low side. There is a happy medium to it all, and it is to be found in the tone level of the "Superbe" Superhet. as it stands.

GENERAL DETAILS.

We know that in a few cases we shall receive correspondence asking what about a push-pull system for 2A5's against the single 2A5. Our answer to that is, try the lone 2A5 first and see how you like it. We shall be very surprised if it is considered to be anything but capable of giving all the "fidelities" of reproduction we claim for it in the "Superbe." If the reader considers that at a later stage he would like to make a comparison by the use of a push-pull audio system, then there is nothing difficult in applying it in any of the various resistance coupled methods. With such, however, and the