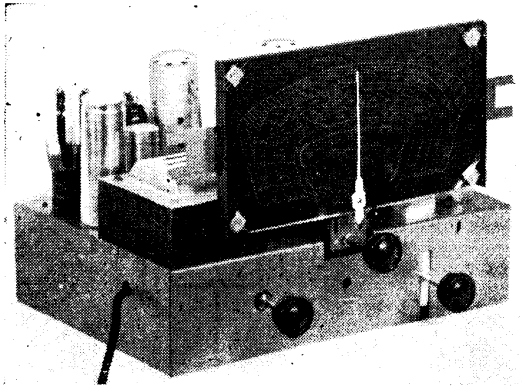
The SKY-HOUND SIX

DUAL-WAVE RECEIVER

By A. G. HULL

Here is the description of a receiver designed to include the best features of modern receiver design. The circuit is standard, the coils are new types wound on Trolitul, and the whole receiver is thoroughly efficient and reliable.



A front view of the Sky-Hound. Any suitable type of tuning dial may be used—specify it to match the coils.

DURING the past three or four years there have been few startling changes in circuit design, but keen attention to detail has resulted in vastly improved performance.

Here is a typical circuit representing all that is considered advisable by present-day technicians. It might be taken as fairly representative of the type of circuit being used for a large number of the better-class receivers for 1939.

I can recommend it as thoroughly reliable and serviceable in every way, and yet so efficient that it is impossible to imagine any way of getting greater range, selectivity or power from any alternative way of using six normal valves.

THE CIRCUIT

At a glance, the circuit appears quite normal, but closer study will reveal several minor points where attention has been paid to detail with good results. This is especially noticeable in the audio end, where a simple form of inverse feedback allows us to obtain "triode" type of quality reproduction, but with the sensitivity and power output of the beam power valve used.

Isolation of the audio end is obtained by using the diodes of the intermediate valve for detection, so that only audio signals are handled by the two valves which comprise the audio amplifier.

COMPONENTS

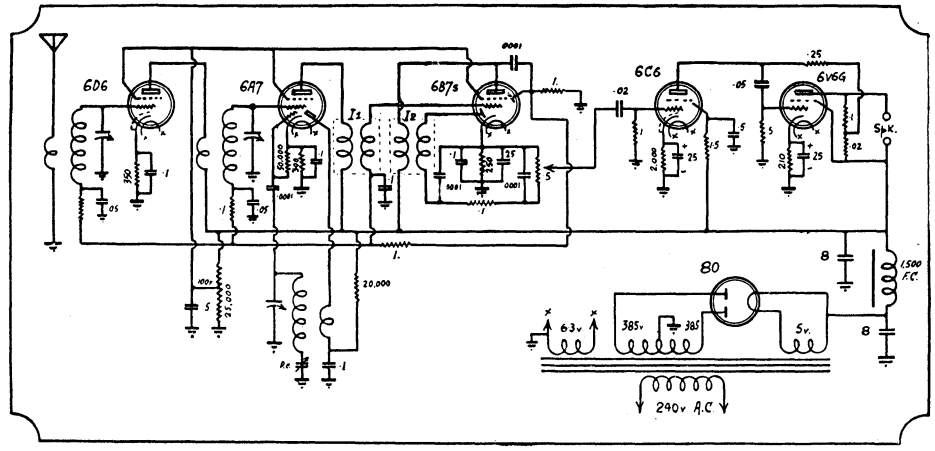
Vastly improved results were obtained with this receiver, compared to those obtained with a similar type of set handled in 1936. This was not entirely due to the circuit, and most of the credit must go to the improved components used, especially the coils and intermediate transformers. In all cases the coils are wound on Trolitul formers, avoiding some of the r.f. losses which occurred with some of the older types of insulation materials.

RESERVE POWER

Of course, at any time, an efficient superhet with an r.f. stage, as well as an intermediate stage, can be depended to have as much sensitivity as can be handled under normal operating conditions, but the reserve of power is nice to have, especially on the short-waves, where often enough a truly sensitive receiver will play the weak stations without excessive noise from the receiver itself, giving far greater effective sensitivity than is usual with a smaller receiver, which is working "flat-out" all the time.

PARTS LIST

1 Base, size 8 x 14 x 3.
1 Dual-wave coil box.
1-3 Gang condenser to suit.
1 Dial to suit gang.
2 Intermediate transformers.
1 Power transformer, 100 ma., 6.3v. type.
2 20,000 ohm 1 watt resistors.
1 50,000 ditto.
4 100,000 ditto.
1 250,000 ditto.
1 500,000 ditto.
3 1 megohm ditto.
1 1½ megohm ditto.
1 200 ohm wire-wound resistor, 100 ma.
1 250 ditto, 30 ma.
2 300 ditto.
1 2000 ditto.
1 Voltage divider, 25,000 ohms.
1 500,000 ohm volume control.
4 .0001 mfd. mica condensers.
1 .02 mfd. tubular condenser.
4 .05 ditto.
4 .1 ditto.
1 .25 ditto.
1 .5 ditto.
2 8 mfd. 500v. electrolytics.
3 25 mfd. electrolytics. 40v.
Valves—1 6U7G (6D6).
1 6K8G (6A7).
1 6G8G (6B7S).
1 6J7G (6C6).
1 6V6G.
1 5Y3 (80).
Sockets to suit—4 valve shields.
Speaker—1500 ohms field, 5000 ohms load.
Sundry hardware, screws, wire, etc.



In this circuit, nothing has been omitted which will achieve the finest efficiency.

THE COST

I haven't worked out exactly what this set would cost to build, but from a glance at the invoices for the parts which I bought it is very obvious that many smaller parts have come down in price a lot since the good old days of 1929. In that ten-year period it seems that resistors and condensers have dropped about 75 per cent.

Compared to ruling prices for the better class of dual-wave superhets with an r.f. stage, the cost of a kit of parts is also most encouraging. Some people seem to have an idea that it's just as cheap to buy a set as build one, but it certainly doesn't apply in the case of a receiver of this type.

I didn't start out to draw comparisons between home-made and factory-made sets, but while on the subject I might mention that the actual components specified by me for this set are exactly the same as those used by prominent set manufacturers, and there is no reason why your home-built set should not give exactly the same performance as its factory-built twin. As a matter of fact, the extra handiwork which you put into your set should mean even better results.

CONSTRUCTION

The actual job of building up a set of this kind is not difficult, but at the same time I wouldn't advise a novice to start out with something quite so ambitious.

Not having built a set for months, I found the task a little slower than I expected, but even so, the time taken on the job was only about four hours. Anybody who has had a bit of set-building experience could expect to do the complete job over a wet week-end.

THE PARTS

Work on the job is helped by the ready-cut bases, which are readily available. With all the holes cut and ready to take the components the whole of the assembly job is simply a matter of meccano-style assembly. Personally I like to fit the power transformer and sockets first and wire up the heaters of the valves. In the original, I ran the lot of the valves, except the rectifier, from a single 6.3 volt filament winding. It was just a matter of running the twisted pair along from socket to socket.

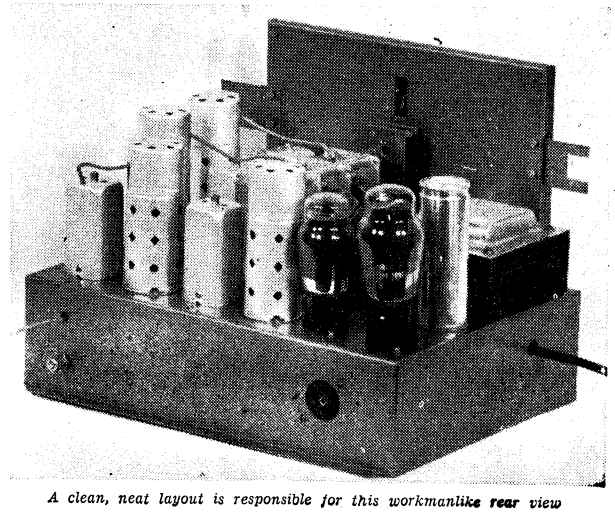
Then I wired the rectifier socket with its filament supply and the a.c. input, and on from the filament side to the first electrolytic and the speaker socket.

After all the sockets have been wired the coils and intermediates are mounted and wired, and leads brought out ready for the component strips as shown in the picture diagram.

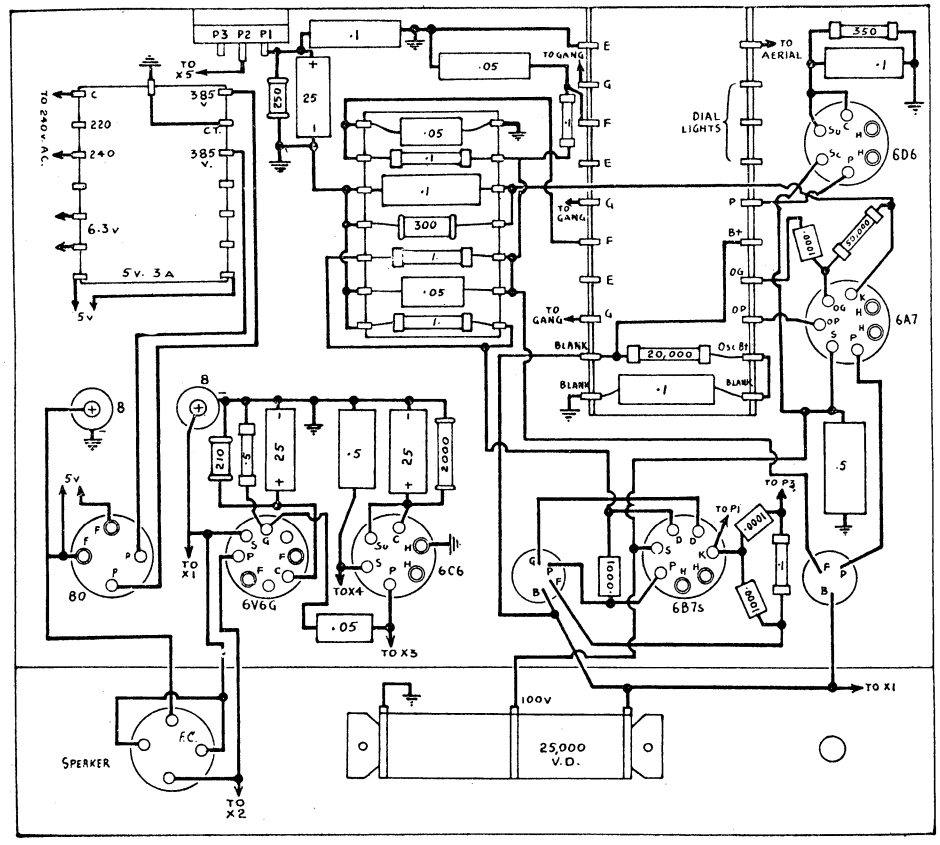
Before mounting, the strips are fitted out with the components as shown in the diagrams, and only a certain amount of care is necessary to make this method of mounting a vast improvement over the old idea of letting the bits hang on to their terminals.

WARNING

There is a point to be watched carefully in connection with the use of Trolitul, and that is in connection with



A clean, neat layout is responsible for this workmanlike rear view



Keep this wiring diagram before you when making the set. Don't forget the little panel shown below.

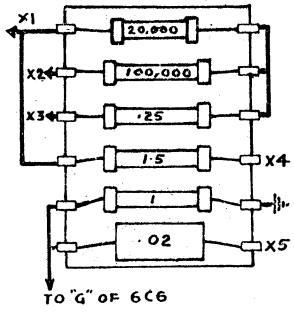
its melting point, which is fairly low. For example, the terminals of the intermediate transformers come through the Trolitol base, and if you heat up the terminals too much the base will soften. If you then push at the terminal, you may move it about. No harm will be done by actually melting the insulating compound, and it will set back in its normal state as soon as cool. But is possible to conceive that careless use of both heat and pressure might result in a broken connection on the inside of the terminal. It is only a remote possibility, but it is mentioned for safety's sake.

POINTS TO WATCH

Make sure that the negative (black) side of the electrolytic by-pass condensers go to earth in every case.

Make sure that the cans of the electrolytic filter condensers are effectively earthed to the base.

Connect up all earth terminals with a run of bare wire. Even if it doesn't look nice, it's a great help to efficiency, especially on short-waves.



Connections for the little sub-panel.

Make sure that the 240-volt power supply wires are effectively soldered to the terminals of the power transformer. Live 240-volt leads are dangerous if they come adrift. Put a knot in the cord so that any pull won't be taken by the terminals and put a rubber bush in the hole through the chassis so the power cord won't get frayed.

Use 1-watt resistors for all grid-leaks even if they don't have to handle this amount of power. They are quite cheap.

ALIGNMENT

Dual-wave receivers appear to be easier to build and easier to get into operation than old-style broadcast sets. Apparently the coil people take greater care with the assembly and testing of the dual-wave coil units. The last three sets built with dual-wave coil boxes have all gone straight into operation as soon as they were finished, and without any adjustment of trimmers or pad-

der they have played quite successfully. In one case, no further adjustment was required, even for peak performance, while with the other two adjustments amounted to only a fraction of a turn on a couple of trimmers. It will be most surprising if the set fails to play all the local broadcasting stations quite readily as soon as it is properly wired up. Then a touch of the screwdriver on the trimmers will soon tell you whether you can improve things by realignment.

ALIGNMENT STEP-BY-STEP

Actually the initial testing and alignment of the set, once you have made sure that it is wired right and operating, is to fit the dial so that the gang condenser is fully meshed when the dial pointer is right over at the far end of the dial beyond the 500k.c. mark.

Using an aerial consisting of two or three feet of wire, and with the volume control fully advanced, you then swing the dial to some station down around 2UW, and it should come up on the spot indicated by the dial, if the dial is calibrated to suit the coils and tuning condenser used.

At any rate, swing the dial to and fro over this station, at the same time trying an eighth of a turn one way and then the other on the oscillator trimmer (broadcast). If a fraction of a turn in one direction gives better results, try another fraction; but don't on any account start turning this trimmer with turns at a time or the whole alignment may be lost.

Once having found a peak position on the oscillator trimmer from which any variation of adjustment means a loss of volume, you can next adjust the r.f. stage trimmer for best results and then the aerial trimmer in the same way. When adjusting the aerial and r.f. trimmers, keep the dial tuned to the station exactly as it was set when the oscillator trimmer was adjusted.

THE PADDER

Next swing the dial to the top end of the dial, somewhere about 2FC, and get a station there, and rock the dial to and fro over the station while adjusting the padder for maximum results. This adjustment will not be anywhere near as critical as the adjustment of the oscillator trimmer, but don't rush the job. Try half or a quarter of a turn at a time, then rock the dial and be quite sure whether volume is up or down. If down, go back half a turn and try again in the other direction.

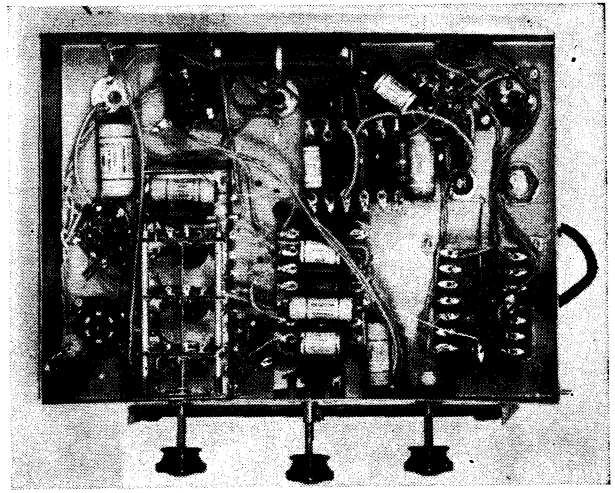
THE INTERMEDIATES

When convinced that the r.f. end of the set is properly adjusted, a fraction of a turn might be tried on each of the intermediate trimmers, working on each trimmer individually until a peak position has been found. Trimmers on the first intermediate are far more critical than those on the second, and if this is noticed it is not to be worried about.

SAFETY FIRST

Don't take risks with electricity.

If you are not quite sure—don't do it. Get advice first.



UNDER THE CHASSIS

The sub-panel method of assembly is clearly illustrated in this picture. Owing to the design of the coil unit, connections to it are very short and convenient to make.

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ABOVE THE CHASSIS

From this picture you will get an idea of the layout. Note the grid leads running across the coils to the gang. Performance does not appear to suffer because of these leads being a little longer than usual.