Vintage Radio

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Two More Philips Twins: the Australian 123 & Dutch 283A valve receivers

The Australian model 123 and Dutch 283A 5-valve receivers look almost identical from the outside but that's where the similarity ends. Inside the cabinets are two completely different chassis with different valve types and different circuit configurations.

BACK IN 2012, I wrote several articles on a number of John de Haas's twin Philips receivers. In each case, one was from Holland and the other was made in Australia.

Basically, these were sets that looked identical on the outside but their chassis layouts and circuits were completely different. And so it is with the two sets described in this article, the Dutch 283A and its look-alike, the Australian 123. We'll also take a brief look at the 123's country cousin, the model 131, which used the same cabinet as well.

283A and 123 similarities

The 283A and the 123 receivers are housed in virtually identical cabinets measuring 394 x 189 x 251mm (L x D x H). Both sets weigh about 6.7kg and both are designed to operate off an AC mains supply – between 220V and 260V AC in the case of the model 123. By contrast, the 283A can operate from 110-145V AC or from 200-245V AC.

The only things about these sets that appear different when viewed from the front are the knobs and the dial scales. Even then, the general styling is very similar (see above photo).

Another Australian Philips set, the model 131, also looks much the same as these two. However, it's quite different internally to both the 283A and the 123, as it's a dual-wave 5-valve battery-operated receiver with an RF stage. It will not only run off a 745 1.5V battery and two 482 45V batteries in series (or heavy duty versions of these batteries) but can also run off a 6V vibrator pack or even a 32V home lighting plant. Now that's versatile!

Close inspection of the 283A's cabinet shows that the expected Philips badge has been replaced with a badge that says it is a "Siera Aristona". The reason for this is that Philips in Holland made sets that were badged for other organisations, just as happened in Australia. For example, sets manufactured by Philips in Australia could be labelled as "Fleetwood" or "Mullard".

Similarly, Astor sets could be labelled "Airchief", "Peter Pan", "National", "Monarch" or "Pye". And there were

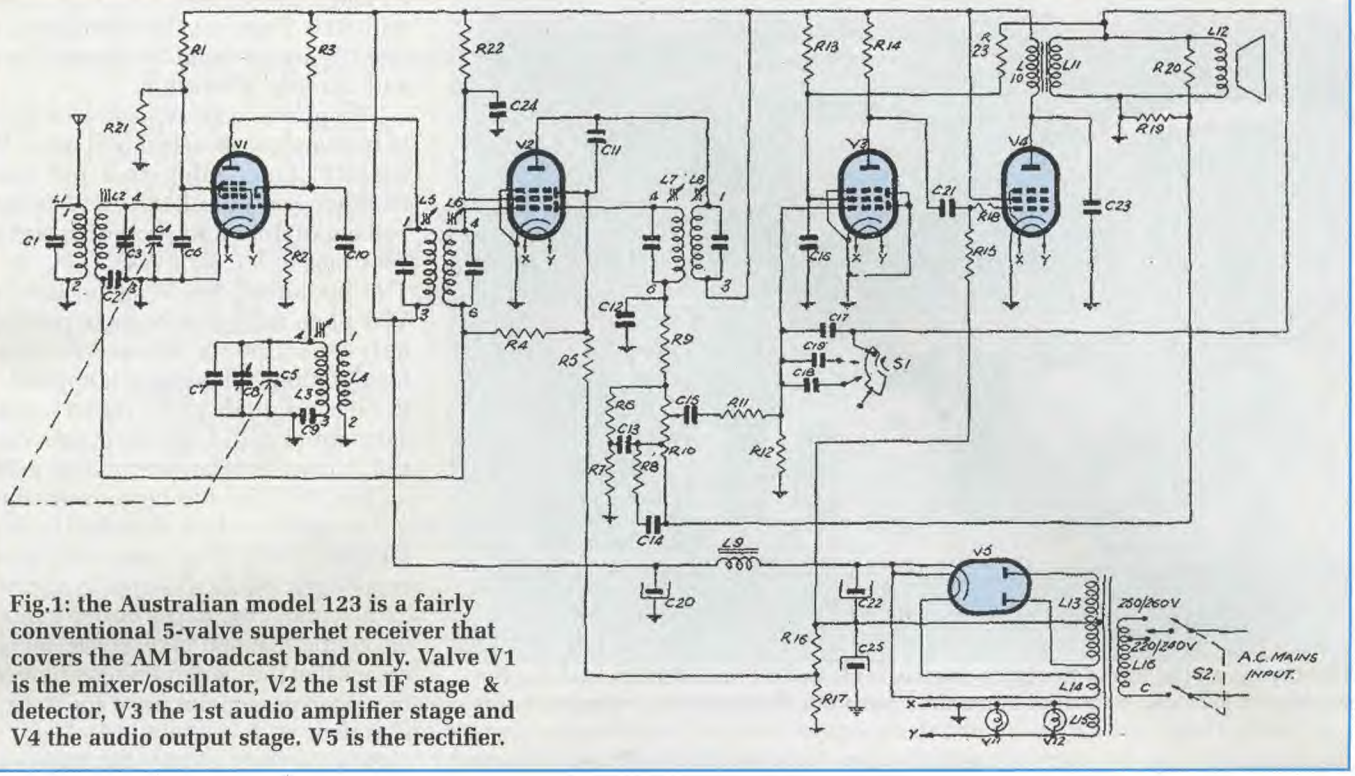


Fig.1: the Australian model 123 is a fairly conventional 5-valve superhet receiver that covers the AM broadcast band only. Valve V1 is the mixer/oscillator, V2 the 1st IF stage & detector, V3 the 1st audio amplifier stage and V4 the audio output stage. V5 is the rectifier.

other manufacturers that did the same thing for small organisations.

Basic specifications

The Dutch 283A is a conventional 5-valve receiver and is similar in some ways to the Australian multi-band table/mantel receivers of the late 1940s and early 1950s. Both the 283A and the 123 have a converter stage, one IF (intermediate frequency) stage, a diode detector, two stages of audio amplification and a dual-diode rectifier.

That's where the circuit similarities end. For starters, the Australian 123 only tunes the broadcast band from 530-1620kHz while the 283A has three AM bands covering 150-433kHz (long wave), 513-1667kHz (broadcast) and 5.77-18.75MHz (shortwave), with bandspread tuning available over part of the shortwave band from 9.23-12.35MHz. This band-spreading was designed to make it easy to tune the 25-metre and 30-metre international shortwave broadcasting bands.

Model 123 circuit details

The 123 has a few circuit refinements that make is just that little bit better than most 5-valve receivers of the era. Fig.1 shows the circuit details.

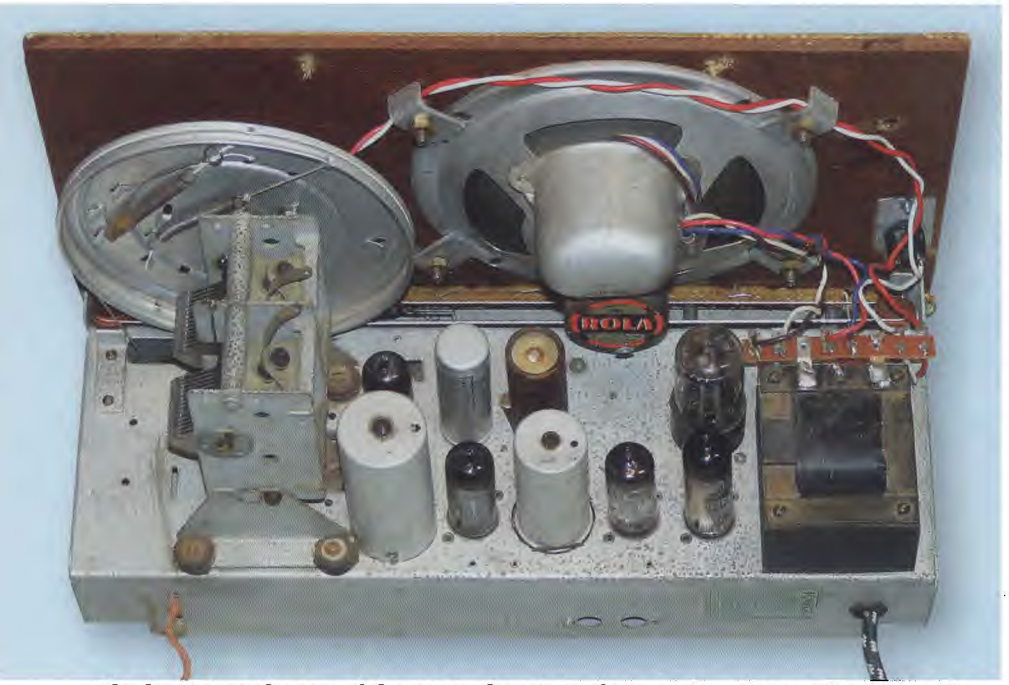
Starting at the left, the primary winding of the antenna coil is tuned to resonate just below the broadcast band.

This is the view inside the model 123. The valves are all readily accessible and the chassis can be easily removed from the cabinet for servicing.

This technique boosts the performance, particularly at the low-frequency end of the tuning range, and was necessary to get the best performance out of antennas that were less than 10 metres long. By the early 1950s, customers had become lazy when it came to putting up good outside antennas, preferring shorter indoor antennas instead, so the manufacturers employed this technique to get around the problem.

The secondary winding of the antenna coil is tuned across the broadcast band by one section of the tuning capacitor (C4) and the resulting signal applied to the signal grid of V1, a 6AN7 converter valve. The local oscillator includes V1, coils L3 & L4, the other section of the tuning gang (C5) and their associated components.

Unlike some sets, no high-tension (HT) voltage is applied to feedback winding L4 of the oscillator coil. There is no particular advantage one way or



The layout on the top of the 123's chassis is clean and uncluttered, making the set easy to service. A sheet of Masonite® hard board is used as a speaker baffle.

the other, although the method used in the 123 means that there is no voltage stress across the windings or to earth.

The oscillator tunes from around 985-2075kHz. The resulting 455kHz IF (intermediate frequency) from the converter stage is fed through the first IF transformer and amplified by V2, a 6N8. Its output is in turn fed to the second IF transformer and the resulting signal then fed to V2's detector diode (the lower one in the diagram).

From there, the detected audio is fed to the grid of V3, another 6N8, via an RC network that also includes the volume control (R10). V3 acts as the first audio amplifier stage and its output in turn is fed to V4, a 6M5 audio output valve. V4 then drives the loudspeaker via a speaker transformer.

Note that there is quite an extensive tone control cum negative feedback circuit in this set. First, resistor R23 provides feedback from the secondary of the speaker transformer to the screen of V3. In addition, R19 & R20 provide feedback to the bottom of the volume control

C17, C18 & C19 are switched into circuit by S1 and, together with R12, form the tone control circuit. This circuit feeds signal back to the grid of V3, depending on the capacitor selected. And finally, R6, R7, R8, C13 & C14 form a loudness control in concert with R10. Together, these parts ensure that the set has good "tonal qualities" and minimal distortion.

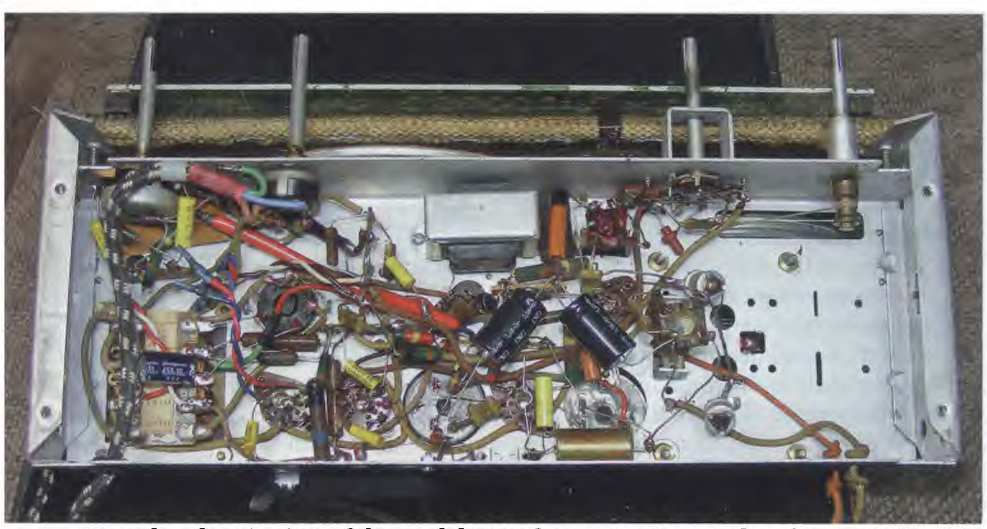
The power supply uses a conventional mains transformer, with V5 (6X5GT) functioning as a full-wave rectifier. Resistors R16 & R17 form a voltage divider and provide negative back bias to V1, V2 & V4.

In operation, the IF signal level at V2's plate can be quite high, particularly when the set is tuned to strong local stations. This signal is applied to the second diode in V2 via C11 and a substantial AGC (automatic gain control) voltage is obtained once the delay on the AGC line has been overcome.

The AGC system is designed to cater for both very strong signals and quite weak ones. No AGC signal is applied to the controlled stages until a moderate strength signal is received, which means that the maximum sensitivity of the receiver is maintained for weaker signals.

Because there is only one audio amplifier stage in 4-valve receivers, they naturally need to have a higher audio level out of the detector than 5-valve sets. This is usually achieved by manipulating the AGC system circuitry. However, this set has a relatively low audio output level from the detector and so a pentode first audio stage is used in lieu of a triode to achieve greater gain.

The end result is a very satisfying performance that's much better than from 4-valve sets. Note that the voltage divider formed by R1 and R21 maintains the screen voltage on the 6AN7 close to a predetermined level, set to achieve optimum performance with the AGC voltage applied to the signal grid.



An under-chassis view of the model 123 after restoration. Only a few parts (mainly electrolytic capacitors) required replacement to get the receiver working again.

Dutch 283A circuit details

Fig.2 shows the circuit details for the Dutch 283A receiver. Once again, it's a 5-valve superhet design but being a multi-band receiver, it's more complicated than the Australian model 123.

As can be seen, the input circuitry is quite different to the 123's. As previously stated, it has four switched bands which tune long-wave, medium-wave (broadcast) and shortwave, with a switchable sub-band so that only a portion of the shortwave band is tuned (ie, for band-spread tuning).

A series-tuned trap consisting of

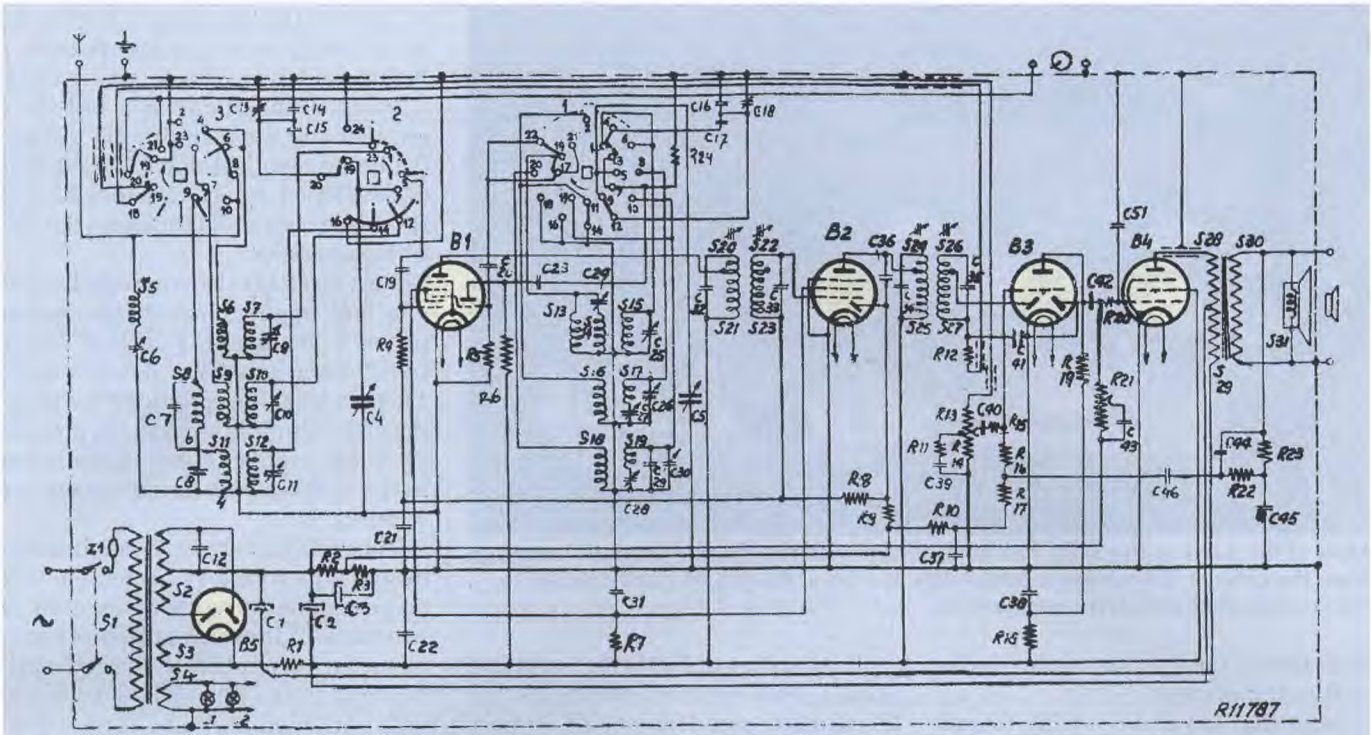


Fig.2: the Dutch 283A receiver is also a 5-valve superhet but is more complicated than the model 123 since it also covers the long-wave and shortwave bands, with a switchable sub-band on shortwave.

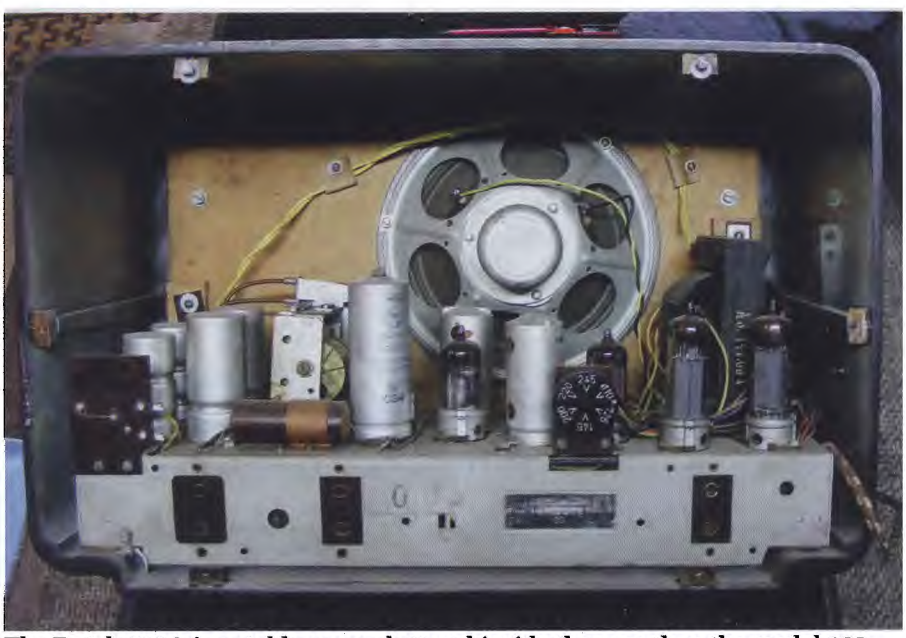
S5 and C6 on the 452kHz IF is connected between the antenna and earth on all bands. This minimises signal breakthrough by stations at the high-frequency end of the long-wave band and is necessary because these stations operate at frequencies close to the IF (down to a minimum of just 19kHz away).

A multi-position switch selects the relevant antenna coil and has an additional position that connects the audio amplifier section to the record player input socket. This socket is shown at the top right of the circuit.

The mixer/oscillator circuit is conventional but because the 283A is a multi-band receiver, the antenna and converter circuits are considerably more complex than in the 123. Valve B1 is an ECH42 and this functions as the converter. Its characteristics are similar to a 6AN7's but it uses the European 8-pin miniature Rimlock base.

In fact, all valves in this set use the Rimlock base which is quite different to the Noval 9-pin base commonly used in Australia.

The 452kHz IF from the converter stage (B1) is applied to the first IF transformer, designated on the circuit as S20, S21, S22 & S23. Its output is in turn fed to B2, an EAF42 valve. This valve has a slightly lower gain than the 6N8 used in the Australian 123 and has only one diode in the envelope.



The Dutch 283A is notably more cluttered inside the case than the model 123, although the valves are still all readily accessible.

B2 amplifies the IF signal and then applies it to the second IF transformer (S24-S27).

The output from the second IF transformer is in turn fed to the diode detector in B3, an EBC41 duo-diode triode. This valve is equivalent to a 6BD7/6BD7A.

From there, the detected audio signal is routed back to the wave-change switch (top left of Fig.2) which selects between it and the record player input. It is then fed back to volume control R13/R14 and then to the grid of B3 via C40 & R15.

B3 amplifies the audio signal and in turn drives audio output valve B4, an EL41 which is equivalent to a 6M5. B4

Most of the parts in the 283A can be accessed with the chassis partially removed from the cabinet. Removing it completely is a lot of work and risks damage to the complicated dial-drive mechanism.

then drives the speaker via an audio output transformer.

Note that the audio wiring to and from the wave-change switch is shielded. This is good practice as it minimises hum in the audio signal.

The lead from B4's plate to the speaker transformer is also shielded, a precaution that's normally considered unnecessary. In this case though, a shielded lead has probably been used to prevent any IF signal that may still present in the output of this valve from being radiated. In addition, this shielded lead also acts as a capacitor (probably 10-15pF) which partially shunts any IF signal to earth.

Note the network connected to B4's grid, consisting of R20 (47kΩ) and C51 (47pF). This network attenuates the IF signal by more than 10dB. In fact, I commonly use this same network configuration on many of the sets that come across my bench if they exhibit excessive IF signal levels in the audio output stage.

The audio negative feedback circuit is less complex than that used on the 123. It consists of an RC network connected the output of the speaker transformer and the grid circuit of B3.

The power supply is again conventional and uses a transformer with a tapped primary so that a wide range of AC mains voltages can be catered for. There is also a fuse in the input to protect the set should something go seriously wrong in the receiver, a feature lacking in the Australian 123.

Valve B5 functions as a full-wave rectifier and the resulting HT voltage is filtered using C1 and C2. Back bias is developed across resistors R2 and R3, while resistor R1 separates the two filter capacitors.

Note that R1 is also connected across one half of the speaker transformer primary, so that this section of the transformer acts as a power choke. This is a great idea provided the phasing of the winding is correct to provide optimum ripple (hum) cancellation in the speaker transformer secondary winding.

The rectifier valve (B5) is a directly-heated type with a 4V heater. There is no equivalent type that was used in Australia. If it ever required replacement, then an indirectly-heated rectifier such as a 6V4 could be substituted with a few modifications. These would involve swapping the socket to a 9-pin miniature type, connecting the 6V4's heater wiring to the 6.3V winding and leaving the 4V winding with no load.

One unusual component in the power supply is capacitor C12 (22nF). This has been included to reduce any interference being fed into the receiver via the mains and then radiated into the antenna circuit. It also acts to suppress interference generated by the rectifier diodes.

A rear view of the Dutch 283A with the back cover in place. The unit has inputs for a turntable and also features external loudspeaker terminals.

Dial drive systems

Dial drives have often caused restorers more headaches than all other problems within a set. Generally, I don't have much trouble with restringing dial drives but even I will not press my luck with some European sets – they can be a nightmare to fix if something goes wrong.

The 283A falls into the latter category. It has a dial-drive that isn't that easy to work on and is not one that I would really want to tackle. It's certainly much more complicated that the dial-drive mechanism on the Philips 123.

In practice, the 283A can be satisfactorily serviced with the chassis only partly removed from the cabinet. Removing it completely is simply too much work and risks damage. Fortunately, the dial-drive system in this particular set was intact and didn't require any work during the restoration.

By contrast, the model 123's chas-

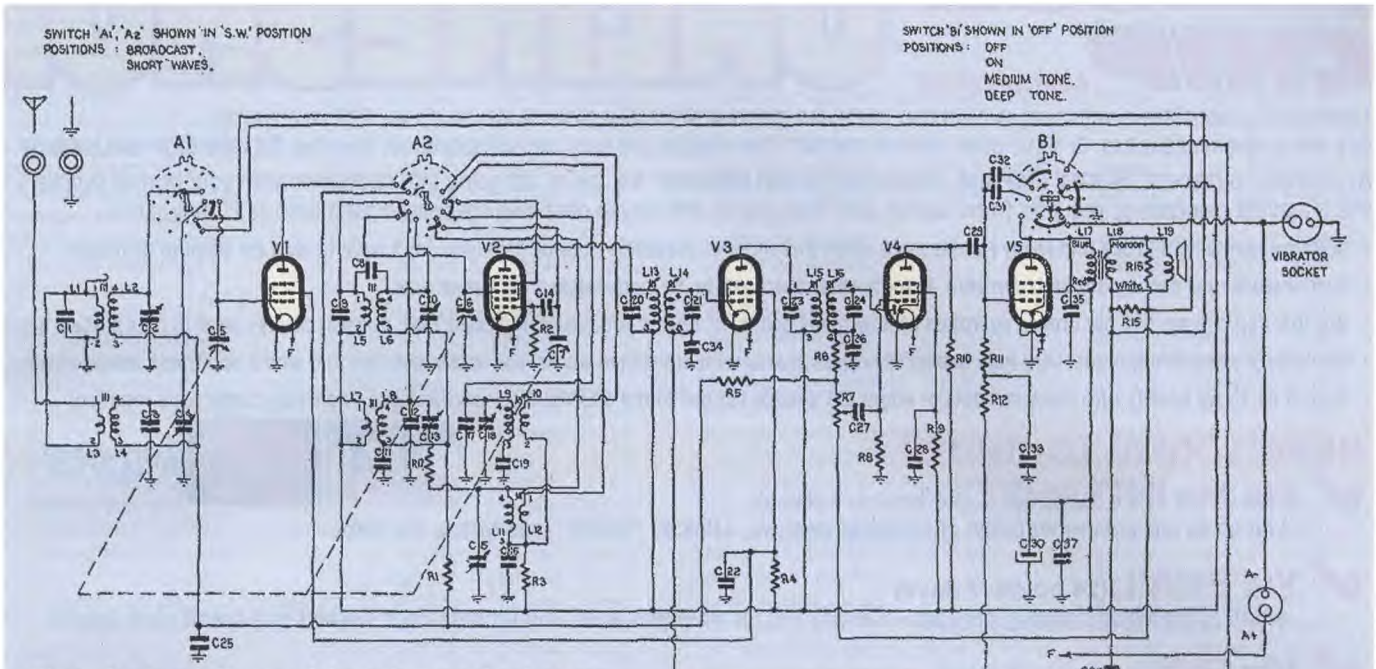


Fig.3: the Australian model 131 is a 5-valve battery-operated superhet that can also be powered from a 6V vibrator or a 32V DC lighting plant. It's housed in the same cabinet as the 123 and 283A receivers.

sis was completely removed from its cabinet during the restoration of that set. It's a fairly simply procedure and the dial-drive was easy to repair.

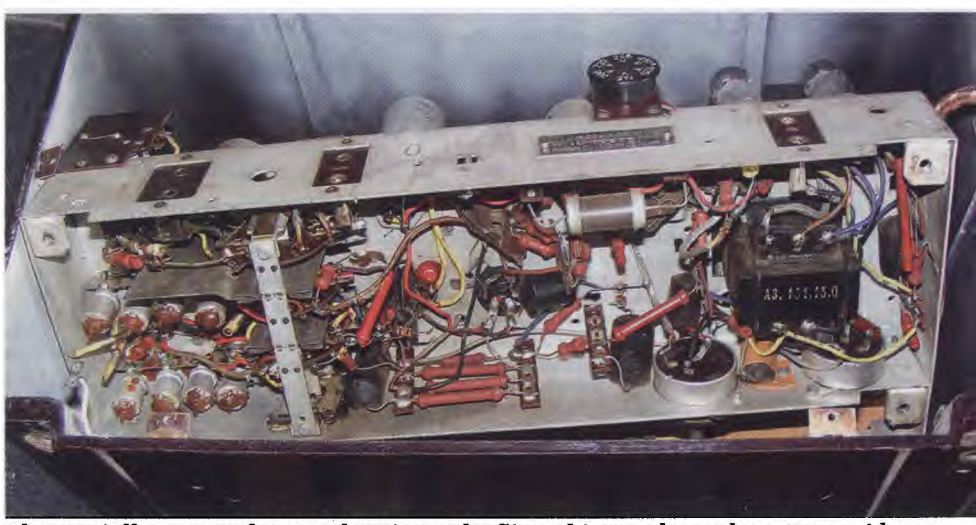
The model 131

Externally, the Australian model 131 looks the same as the other two but it's really quite different. As mentioned earlier, it can be operated from batteries, a 6V vibrator or 32V DC lighting plant.

Fig.3 shows the circuit of the model 131. It uses miniature 7-pin 1.5V battery valves, the line up being 1T4, 1R5, 1T4, 1S5 & 3V4. It's a dual-wave receiver, covering both the broadcast band and the 6018MHz shortwave band.

The model 131 is also a 5-valve receiver but unlike the other two sets, there's no rectifier and it features an RF stage. This gives it greater sensitivity, making it suitable for use in remote rural environments. The performance of the small battery valves is not as good as those used in mains-powered sets, although a 5-valve battery set still performs slightly better than a 5-valve mains operated receiver. That's because a 5-valve battery set has five amplifying stages compared to just four for a mains-operated set, since the fifth valve in the latter is the rectifier.

One advantage of 1.5V battery-operated valves is that they use a lot less power than conventional valves; around 1.8W total for the 131 compared to 45W for the 283A.



The partially removed 283A chassis can be flipped up as shown here to provide access to the under-chassis parts. It has a lot more parts than the model 123.

Summary

Despite being visually similar, the Australian 123 and Dutch 283A receivers are very different to each other when it comes to their chassis design. Both would compare well with each other as far as performance is concerned but the Dutch Philips has the advantage that it can also cover the long-wave and shortwave bands (as well as the traditional broadcast band).

On the other hand, when it comes to servicing or restoration, the Australian set is by far the easier to work on. Many European radio manufacturers, not just Philips, seemed to delight in making their sets difficult and complex to service, although the model 283A isn't too bad in this regard except for the dial-drive mechanism.

In fact, dial-drive systems are one area where European manufacturers have excelled in making something that could be simple into a mechanical nightmare. SC