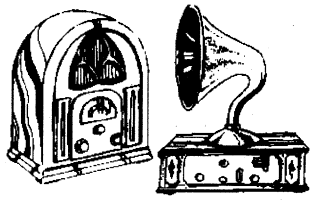
Vintage Radio

by ROGER JOHNSON



Revisiting the Philips 2510 receiver

This novel receiver, generally known as the 'tin trunk' set, was discussed in this column by Peter Lankshear back in October 1991. Six years later, it is time to have another look. The 2510 dates from 1929 and was Philips' first export model, being sold widely in both Australia and New Zealand.

Anyone who has attempted a restoration of this remarkable receiver is most likely to both curse and adulate the wretched thing in the same breath! For those contemplating a repair or restoration, the previous article will probably need to be read in conjunction with this column. The identification of circuit components in this text relate to the component markings published with the circuit in the earlier article, which we're also reproducing here for convenience.

To begin, it might be as well to point out the subtle variants. Speaking personally, I have owned, repaired or inspected about a score of these sets, and I cannot remember any two of them being absolutely identical. However, given the 'hacking about' that some have clearly endured, there is every chance that there may well have been identical sets in their original state.

Listed below are most of the variations:

(a) Earlier and later sets, denoted by the number of stars on the front escutcheon. This was fully discussed in October '91.

It would appear that the earlier six-star models are not as prolific as the later models, and the following observations relate to the later models:

(b) The dial escutcheon. Some are burnished copper to match the escutcheons on the side panels, while others are nickel plated. It is most unlikely that the front escutcheon has been removed at some stage, replated and replaced.

(c) The block capacitors. Some have the square types as shown in the earlier article, and some have more modern-looking can types painted blue with the 'Philips' logo stencilled on them.

(d) The RF coupling capacitors C16 and C9. Some are enclosed in red empire cloth or cambric cloth tubing as described in the earlier article, while others are of the moulded bakelite type with solder lugs, are firmly soldered to the grid pin of the appropriate valve and are mounted vertically.

(e) In some receivers the anode decoupling resistors R4 and R8 are divided into two parts, which are now designated R4A and R4B etc., in the underchassis diagram.

(f) The coil cans. In some sets they occupy almost the entire width of the partition, while in others they occupy about half the width, clearly revealing the vanes of the quite impressive tuning capacitor.

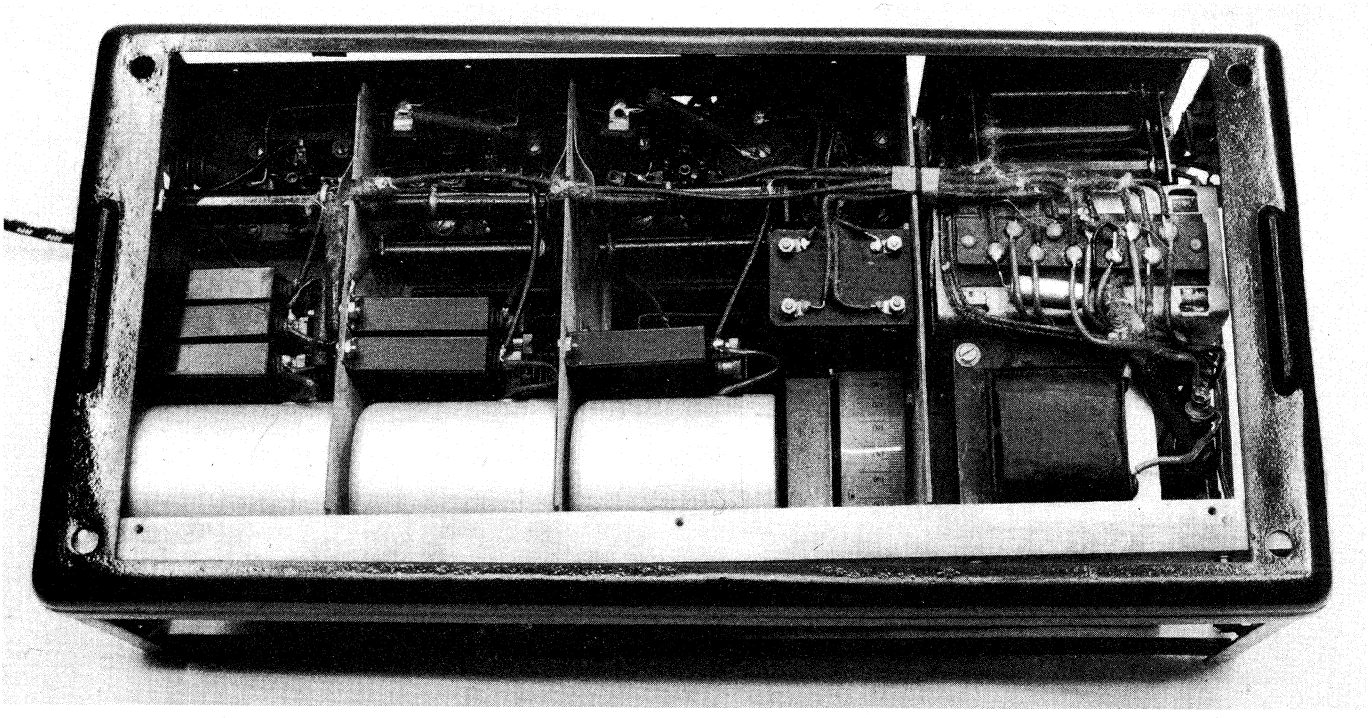


Fig.1: Underneath a 2510, probably of the later variety. Note the capacitors, and R8A and R4A as indicated in Fig.4.

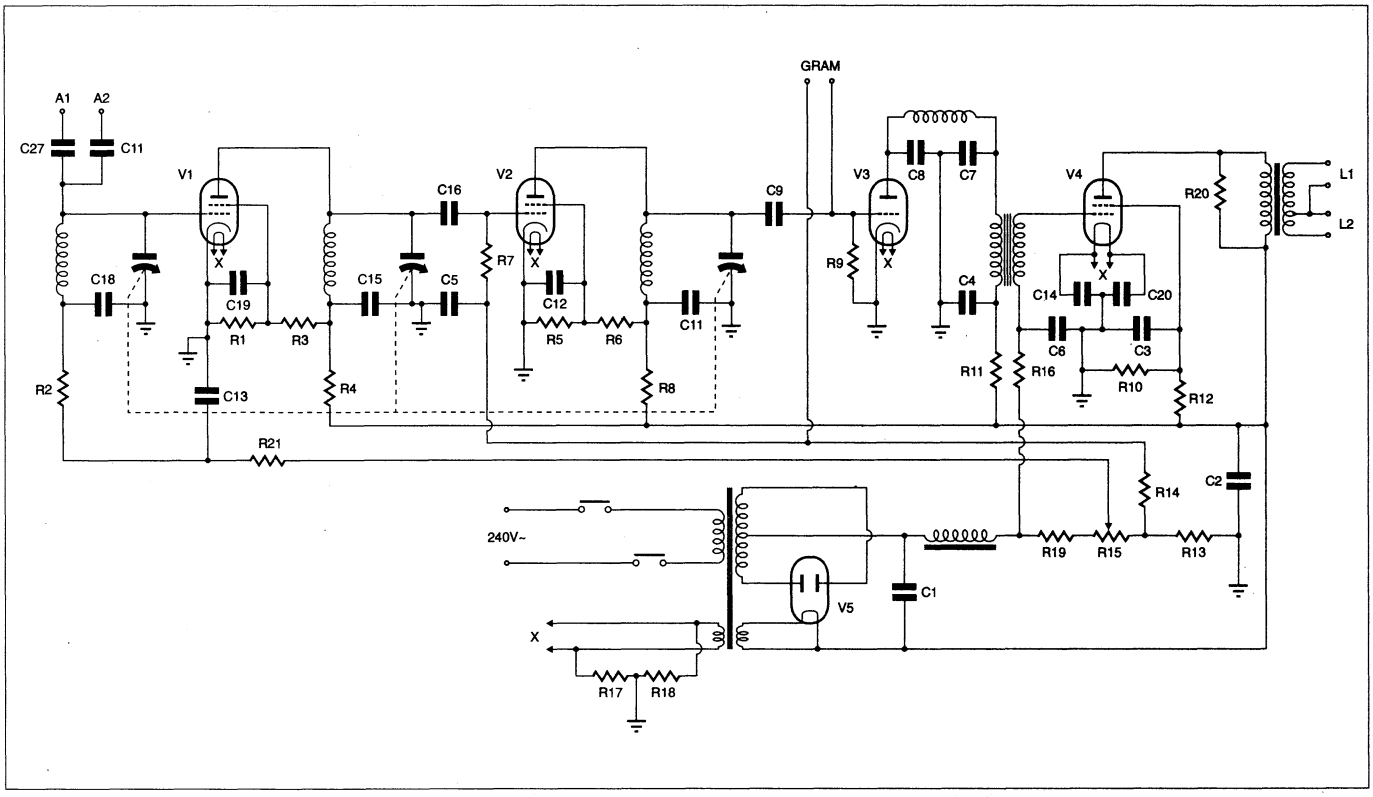


Fig.3: To refresh your memory, and for convenience, here's the schematic for the 2510.

(g) Not all sets had 'A1' and 'A2' antenna connections.
(h) The lid lock. Some had the lock and key, others did not. It is fairly easy to see if there would have been a lock, because the hasp is most likely to be still retained in the lid, even if the mechanism has since disappeared. Of the ones fitted with a lock, some had a key escutcheon, others did not.
(i) Supply voltage. This needs careful attention. On the rear panel is a maker's plate which states the model number (stencilled) and stamped on the plate is the supply voltage and the serial number. Quite a few of these sets are for 210V AC only, and SHOULD NOT be run at 240/250 volts. If the plate is missing, which is unfortunate, the only way to tell is to connect 4V AC to one of the filament windings and then measure the voltage on the transformer primary.
(j) Finally, some sets had a small tinplate rectangular window with a fine wire soldered across the rear opening, to form the reference line for the dial reading. This little window was fixed to the back of the inside of the lid, directly behind the dial escutcheon and fixed with the same rivets. In other sets, the dial reference line was a small piece of fine wire affixed to a small fibre upstand which was bolted to the chassis.

So there we have two classes of 2510, and within the second class there are nine different sub-classes each with two possibilities.

Construction

Although Philips produced sound designs which performed well, their manufacturing engineering was, depending upon one's point of view, either 'simply unorthodox' or 'a rotten flamin' mongrel'. Those who are more kindly disposed are Philips enthusiasts, others are not!

It is difficult to see an American manufacturer engaging in the rebated lid, and the very tricky pieces of sheet metalwork of the power supply cover, the valve box and the large fully enclosed tuning gang. Then again, it would be a dull world indeed if everything was the same, and the pleasing lines and proportions of the 2510 contribute to its beauty and appeal.

Layout

The sketch of Fig.4 shows the location of the major components. Figs.5 and 6 show the connections to the terminal strip and the capacitor box. These have been traced over many hours by the author, and are not taken from official service literature. Figs.7 and 8 show the connections to the volume

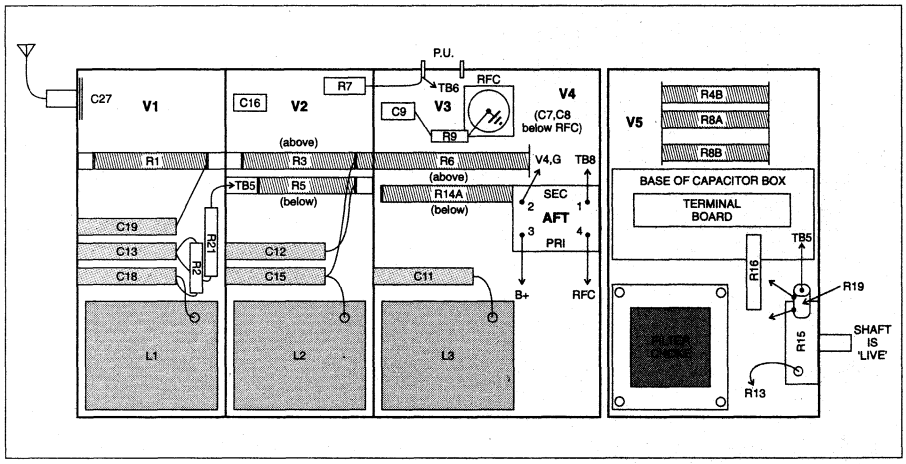


Fig.4: This diagram shows the location of the major components visible in Fig.1.

control and the power transformer.

When repairing one of these sets, be sure to use the circuit diagram and the layout. For those unfamiliar with the valve connections, be sure to refer to the B5 base diagram given in the valve data books and not the UY base diagram. Each of the valves was available in both the European and American bases!

'Bush carpentry' repairs

Finding valves for these receivers is a problem and it appears to have been a problem for a considerable time. Indeed, Neville Williams wrote in *Radio and Hobbies* in December 1941 to March 1942, about the problem of valve replacement for the then 'older' sets, with particular mention of the earlier European types. Consequently, many repairs in days gone by have centred around finding a suitable equivalent valve or valves for those that have expired.

Amongst these repairs have been substituting a standard type 80 rectifier for the 506, running it on the same 4V heater winding and 'hoping for the best'. Other attempts were to replace the valve sockets with the 'P' type and substituting types AF3 for the RF amplifiers, a 'whatever' for the detector, and an AL3 for the output valve.

I found that another would-be repairer had mounted a small auto-transformer under the chassis to step up the heater voltage to 6.3V, and inserted three type 6SH7's and a 6V6-GT for the original lineup. Yet another attempt was the substitution of the taller E452's. These valves were metal sprayed to provide RF shielding. The valve box was discarded as it was not tall enough, and no longer necessary for shielding purposes.

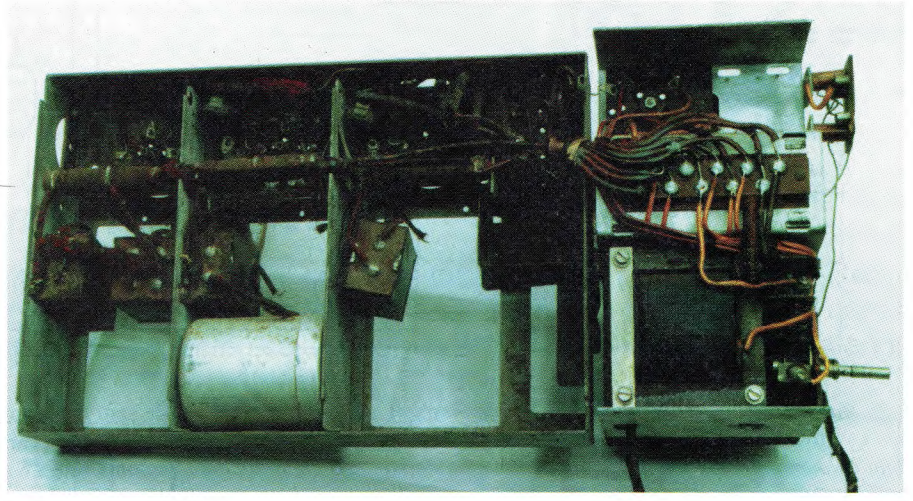


Fig.2: This rather bedraggled specimen is actually complete, and restorable, although a valve box will have to be made. Note the differences from Fig.1.

Getting them going

The following comments and suggestions are to effect temporary, reversible repairs to a 2510 until the correct component can be obtained.

Firstly the power supply. For those sets with a 210 volt primary, the set must either be used in conjunction with a mains stepdown transformer, or a 'Variac' variable transformer. Otherwise, the power transformer will have to be removed, stripped and rewound — which is time consuming and expensive. It may be cheaper to have a 210/240 auto-transformer especially wound, which would at least preserve the original.

In the event of discovering a faulty transformer with a 210 volt primary, common sense suggests that it should be re-wound with a 240V primary. Unfortunately there is practically nothing at all with which the power transformer can be substituted.

The replacement of capacitors has been dealt with in the previous article, and the accompanying diagram should be of benefit in locating the individual connections. The repair of the resistors is similarly covered.

The next and biggest problem is likely to be the valves. The degree of difficulty for each types in ascending order would surely be (1) the 506, (2) the E415, (3) the E442 and hardest of all, the output valve C443.

Incidently, there is a difference between a 'C443', a 'C443N' and a 'C443N series 250'. They each have different characteristics. If you use a type PM24A, the ratio of the output transformer will be upset as this valve requires an optimum load of 8000 ohms, as opposed to 15,000 ohms for the C443. Otherwise, the other characteristics are almost identical.

The PM24B is the direct equivalent of the E443N, and the PM24M is the direct equivalent of an E443H. Of the two, PM24M/E443H is by far the most suitable, and the other should not be considered. An E443H with 200 volts only on the screen will probably draw plate current fairly similar to the C443.

Another reasonable substitute could be the Tungsram type PP4, with Brimar

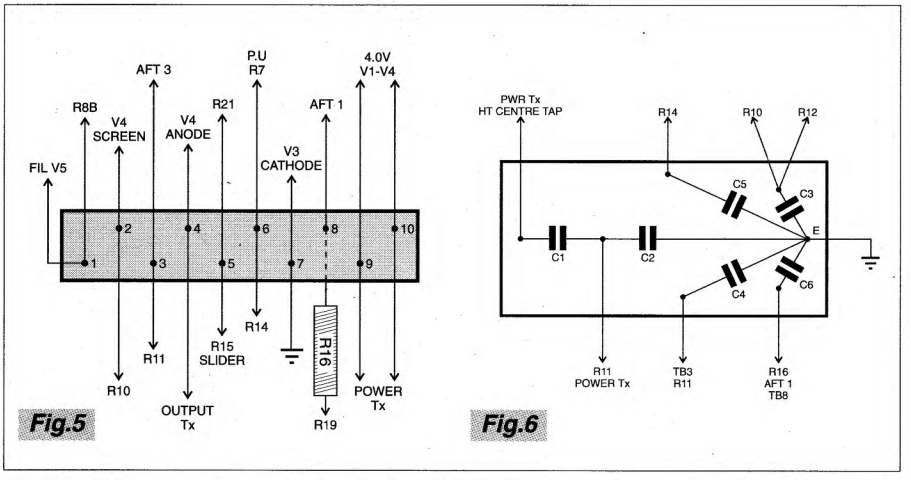


Fig.5: The connections to the terminal strip. This diagram is aligned with the location diagram of Fig.4.
Fig.6: The connection to the capacitor box.

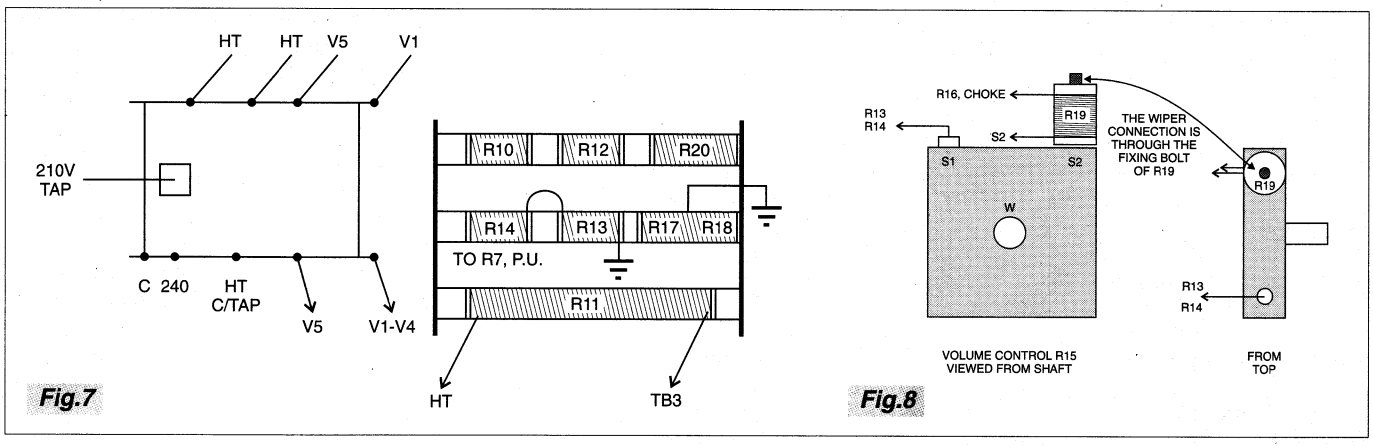


Fig.7: The connections to the power transformer and resistors inside the power box.
Fig.8: The connections to the volume control.

PenA1, Cossor type PT41 or Triotron types P425 and P435 being the only other candidates. All of those types, together with PM24A and PM24M, draw 1.0A heater current which is in excess of the modest 250mA of the C443. If using those types, it may be as well to use the high impedance connection of the output transformer and operate the speaker via a speaker/transformer of the conventional type. Otherwise, the mismatch may be too great if using the voice coil of a modern speaker direct to the low impedance tapping, causing noticeable distortion. This of course assumes that a 'Sevenette' or PCJJ speaker is unavailable.

How does one allow for the increased heater current? Simply by removing the dial lamp! The bulb is of the motorcar tail lamp variety, generally rated at 3W. Operating at 4.0 volts, the rating might fall to 2.5W or so, which means it still draws about 0.75A — which is the difference required to run the substitute valve types.

As for the RF pentodes, there are a reasonable number of types available. Some might not have the bakelite screw type top caps of the older European valves, but rather have a modern style of top cap. This can usually be carefully removed, and the top cap from a dud valve placed in its stead. If the correct valve types can be procured but with UY bases, then with care, those valves can be re-based.

The alternatives for the other valves were covered in the previous article.

Frame & cabinet

Now let's talk briefly about restoring the frame and cabinet panels. If the paint has seriously deteriorated, or the metal has become rusty, it is best to remove the panels by carefully unscrewing the BA fixing screws, using generous doses of penetrating lubricants, and sliding out the panels. Then have the frame grit blasted. The frame will need to be sanded smooth with several grades of 'wet and dry' paper, primed, undercoated and finished off with a quality, semi gloss black spray can paint. The panels can be given a vigorous polish with an extra cut automotive polish.

In operation

The gain of these receivers is quite sufficient for full power to be obtained with using merely three or four feet of antenna, such is the power of modern AM broadcast transmitters. This reduces considerably adjacent station interference, and also simplifies alignment, which consists of peaking the three trimmers at the high frequency end of the band.

Although these sets are unorthodox and somewhat daunting, this and the previous article should help those who may be contemplating restoring these sets, but up until now have been a little deterred by the unconventional layout. ❖

PHILIPS 2510: Component values

Capacitors

C1	5uF
C2	4uF
C3,5,6	1uF
C4	2uF
C7	550pF
C8	1650pF
C9	40pF
C11-15	0.5uF
C16,17	13pF
C18-20	0.5uF
C27	(4pF)

Resistors

R1,5	50k
R2	200k (100k)
R3,6	40k
R4,8	38k (30k)
R7,9	2M
R10	30k
R11,14	100k
R12	20k
R13	35 ohms
R15	200 ohms
R16	100 ohms
R17,18	50 ohms
R19	225 ohms
R20	40k
R21	50k (100k)

Valves

V1	E442
V2	E442
V3	E415 or E424
V4	V443
V5	506

Note: Values in brackets are for 1931 models. Some sets do not have C14 or C20.