A tale of two 1955 Fleetwood 4-valve mantels, model 1003

By Graham Parslow

Fleetwood is a coastal town in Lancashire, England, north of Blackpool and like Blackpool it is also a seaside resort town. Unusually for England Fleetwood is a planned town that was laid out in 1835. The town's largest and most prominent single employer is currently the manufacturer of the menthol lozenge *Fisherman's Friend*. In more prosperous days Mullard, a wholly owned subsidiary of Philips since 1928, operated a factory there that closed in 1979. The Fleetwood logo includes a ship because deep sea fishing and cargo shipping have been the traditional activities of the town of Fleetwood.

Philips in Australia

The Adelaide suburb of Hendon was an airfield until world war two when a large munitions factory was built there. That factory employed my mother as part of producing 3 million .303 bullets a week. Philips opportunely took over the buildings after the war in 1947 and continued production there until 1980. In the late 50s 3,500 people worked for Philips at Hendon. Even more people were employed when transistor fabrication and TV was introduced.

Through the 40s and 50s Philips radios were alternatively badged as Mullard or Fleetwood with some minor cosmetic differences. The circuit diagrams of the Philips model 164 and Fleetwood 1003 both appear in the 1955 Australian Official Radio Service Manual and they are identical. These stable-mates would have been made at the Hendon factory.

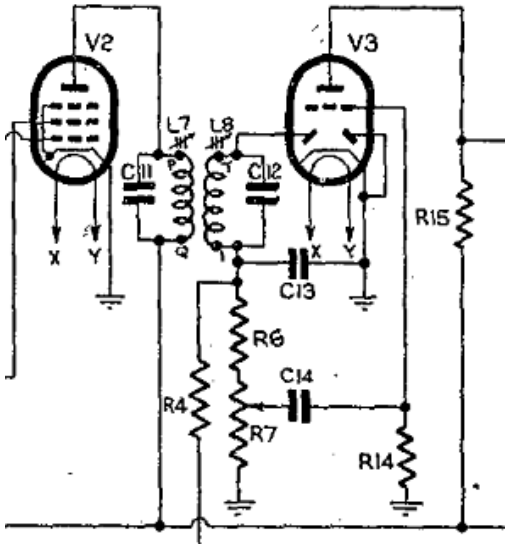
The Fleetwood model 1003 can be distinguished from the electrically identical Philips 164 by having a cloth speaker grille, rather than a metal mesh.

Underneath the Fleetwood and the Philips radios there is more evidence that they are twins. Both have *4 VALVE* stamped into the fibre of the wrap-around backing panel and the same information on the labels (Philips is red, Fleetwood is green). Rather strangely the cases could either come as genuine walnut Bakelite (as for the model 164 shown here) or in thermo-moulded plastics for colours such as the cream Fleetwood. This would have been close to the last use of Bakelite because it was more expensive to produce and the fashion of the 50s was for bright colours to match the kitchens.

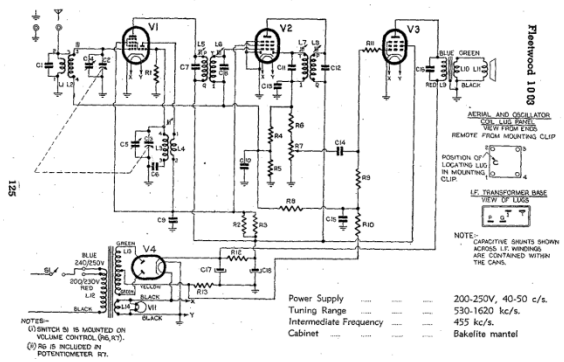
The circuit

In the Fleetwood 1003 we see the advances made in the 50s with modern 9-pin valves that optimised a number of functions. The result is a four valve radio that is a solid performer in reasonable signal strength areas. A Buyer in 1955 could also have paid slightly more to acquire the Philips five valve model 165 in the same moulded case (equivalent to Fleetwood model 1061B).

It is instructive to look first at part of the circuit of the 5-valve model 165. The model 165 uses two valves to achieve IF amplification, detection and AGC. In the circuit diagram V2 is a 6BH5 and V3 is a 6BD7 driving a Philips 6M5 output pentode.



In the Fleetwood a single 6N8 performs IF amplification, detection and AGC. .



Fleetwood 1003

VALVE EQUIPMENT AND VOLTAGE ANALYSIS

Valve Function	Valve No.	Valve Type	Plate Volts	Screen Volts	Osc. P. Volts
Frequency Converter	V1	6AN7	210	55	55
I.F. Amplifier, Demodulator and A.V.C.	V2	6N8	210	55	—
Power Amplifier	V3	6M5	208	210	—
Rectifier	V4	6V4	V4 cathode — L13 C.T., 232V.		
Dial Lamp	V11	6.3V, 0.32A tubular screw			
Voltage across R13, –6.7V					

Personally I find the listening experience indistinguishable between the 4 and 5 valve models.

The 9-pin 6M5 power pentode (V3 for the Fleetwood) has a gain of 22 in typical use and the gain is adequate to avoid extra preamplification after the IF stage. More than that R6 is a 400KΩ series resistor built into the 100KΩ volume pot (R7) to reduce the signal passed from the 6N8 to the 6M5. . The 6M5 valve can easily put out 3W of audio, more than enough to drive the five inch Rola model C in the Fleetwood into overload.

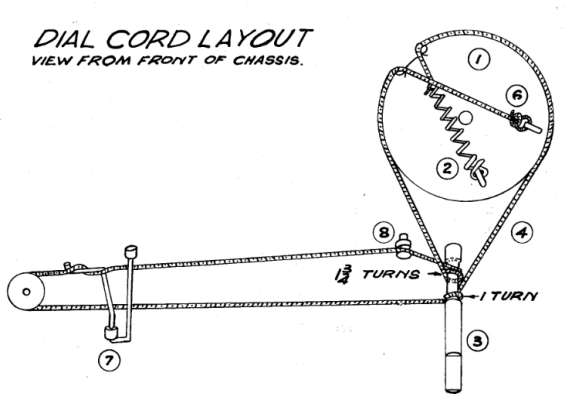
The information above has also been published by Graham Parslow in Silicon Chip August 2015.

Restoration number 1.

Green corrosion spots were apparent in the gold finish of the case. This suggests that the gold finish was formulated in part with copper. Before restoration the speaker cloth on the Fleetwood was badly stained at the left hand side with a green-black goo that also dribbled onto the gold trim and dial. The goo appeared to be acidic and created a copper salt where it affected the finish. The solution to this cosmetic problem was to thoroughly clean both case and grille with degreaser. The black dial

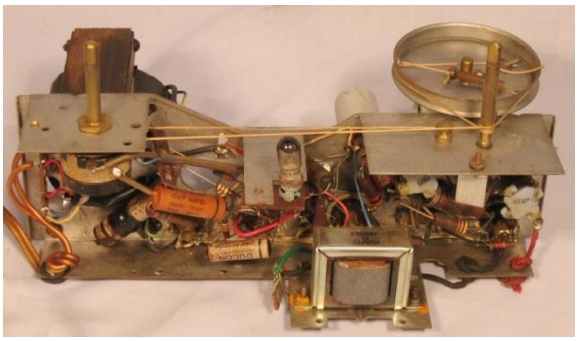
background and the cream case were covered with masking tape and paper in preparation for painting. The exposed face and grille fabric were then sprayed with gold paint. Although it is not an intuitive thing to do, speaker grille fabric takes paint well and the result was excellent. The cream feature- strip at the front of the case was restored by sanding off the new gold coating with a fine-grit abrasive.

There is a trap for beginners with all of the Philips clones that use this cabinet. To the uninitiated it seems that all that needs to be done is remove the knobs and slide the chassis out. However Philips did not make it that simple. Philips gets my vote for the manufacturer that most consistently makes disassembly and servicing difficult. The dial indicator wire is awkwardly poked up from under the dial back panel and if you pull out the chassis with a bit of a tug the dial cord goes twang as it breaks. The correct procedure is to remove the dial plastic (two screws at the front) and guide the dial wire under the back plate that is part of the cabinet moulding.



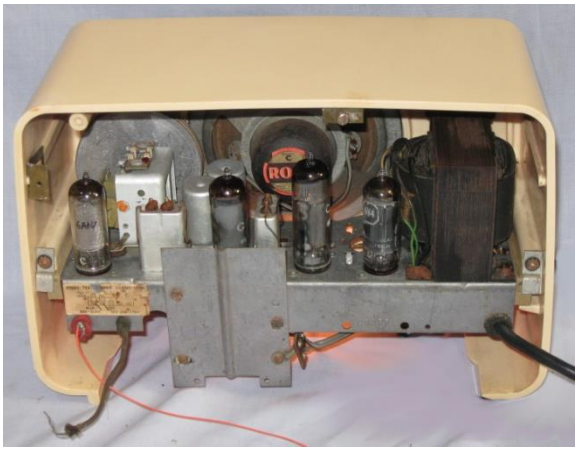
For this radio the dial was already restrung, not with dial cord but with domestic string. This suggests that someone else had fallen into that trap for beginners. The crude string worked well enough so it was not restrung.

Another aspect of this radio is that the Rola 5C speaker is tightly clamped into a circular groove in the back of the case moulding. This is good for making a baffle for the speaker, but means that the speaker wires must be unsoldered to remove the chassis.



This radio was received working and everything under the chassis looked fine so there was little to do but look at the rather messy lay out. The speaker transformer at the bottom was still lustrously metallic and clearly stamped Plessey- 21- 5,000/3.5 (input and output impedance in ohms). Plessey would subsequently take over Rola, based at Richmond in Melbourne, in the mid-1960s. One essential chore was to replace the rather stylish gold figure-8 two core flex with a three core mains power cord.

The top of the chassis showed classic Philips IF transformers that were relatively miniature for the era. This radio also has the characteristic Philips compact tuning condenser with brass plates that carried over to early Philips transistor radios.



Although the back of the radio was protected by a punched fibre board a large amount of dust covered the valves and top-side radio components. The dust and grime was removed by brushing with mineral turpentine and blowing dry. Before this cleanup a small fragment of the ARTS&P label was evident on the chassis to the left of the power cord grommet. Sometimes I replace the ARTS&P labels with a reproduction, but in this case it could not easily be seen with the back plate installed so it was omitted.

One blemish was not removed during restoration and that was pitting of the dial plastic where the corrosive goo had etched it. Even a deep polish with trusty old Brasso did not go deep enough to remove the pitting. Old Brasso is formulated with kaolin and quartz instead of silica for abrasives and the suspension compounds do not harm most plastics. Those fine abrasives bring back most plastic surfaces to spectacular clarity. The Brasso formula changed in 2008 to comply with U.S. volatile organic compounds law and the new formulation can be disastrous on some plastics. Sadly I am down to my last few millilitres of old-formula Brasso.

Restoration number 2.

This radio was among several that I obtained as a lot. The grille fabric was frayed, the knobs were of two styles (neither original) and it was grubby with splotches of goo. My first reaction was to move it on untested at a HRSA mini-auction. I should perhaps have kept to that plan. However, I plugged it in and it did not work. This is when the “rise to the challenge” urge set in and I removed the back. This was a bad choice in retrospect when I think how the hours might otherwise have been used.

Initial power consumption was 42W and decreased to 22W after the electrolytic capacitors had reformed. The final working power consumption was 32W and in hind sight the low 22W figure was explained by having no HT on anodes of the 6AN7 and 6N8 valves.

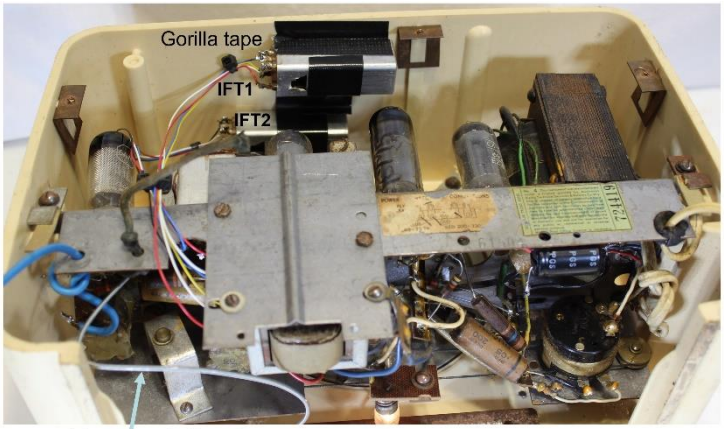
However, this is getting ahead of the tortuous route to this restoration.

Poking around with a screw driver is my natural default to investigate a dead radio. A healthy sign for this radio was a slight hum from the speaker indicating that the speaker transformer was good. Poking at the volume control produced a healthy 50Hz buzz so the 6M5 output stage looked good. No buzzes or clicks could be produced from any contact in the RF section. The last component in the chain is the second IF transformer and the miniature types in this radio are notorious for going open circuit and being irreparable. The second IF transformer is buried under the output transformer, but ingenuity in measuring from other points established that the secondary was open circuit and then it was bed time.

After a sleep I was keen to replace IFT2 and hear the radio working. I had a Philips "tinnie" portable in my queue that could be stripped for a matching IF transformer, but that radio was potentially restorable, so I left it intact. An AWA chassis on my salvage shelf had a medium-size set of square-section IF transformers and I scavenged IFT2 from it. I removed the output transformer to get to the IF transformer leads and soldered onto them 4 relatively long fly leads to connect the replacement IF transformer. The original IFT was left in place although one lug to its intact primary was cut so that it did not become a parallel connection to the replacement primary winding. With some confidence and optimism it came time to switch on. However, the radio remained dead and the saga had a bit to run yet. This was the point to change from "I think I have nailed this one" to approaching the job systematically.

Turning on the ever-reliable LSG 11 signal generator showed that modulated 455kHz injected to the secondary of IFT1 produced a 400Hz audio output, but nothing when injected at the IFT1 primary. Conclusion: another open circuit IFT, as was confirmed by a multimeter.

That salvaged AWA chassis donated its other IFT and it was linked into circuit with fly leads, exactly as before for IFT2. The only difference after this was that the signal generator could produce audio output when injected to the IFT1 primary. Power consumption had risen to 32W because the anodes of V1 and V2 were now connected to HT by intact IFT windings (see the circuit diagram).



The magic-fix wire

The IF transformers were Gorilla-taped to the roof of the radio.

This left only the circuitry around the 6AN7 mixer. Was it as simple as a bad valve? A substitute 6AN7 did not change anything. Someone had previously removed the original fly-wire from the aerial coil that makes external connection to an aerial wire. What was installed was some heavy duty 20 Amp multi strand wire that was annoyingly stiff and inconvenient. It must have been what the installer had in-hand at the time. The soldering looked like it was done by a plumber rather than an electrician. A bit of poking revealed that the solder had not adhered to the aerial coil, only to the large loop at the end of that wire. Replacing the aerial wire may have been the fix if the wire was not making contact, but it was not the answer.

Pin voltages for the 6AN7 were right on specification as given in a previous figure. Daunted by the prospect of firing up a CRO and checking the oscillator the trusty screwdriver came out for a bit more poking.

Success. Touching a screwdriver to pin-9 of the 6AN7 produced audible and tuneable radio output. The level was low, but at last there was hope. Pin-9 is the grid of the oscillator section of the 6AN7. The length of conductor connected to pin-9 was critical- too short or too long and the magic disappeared. My first thought was that this fix was acting as an antenna for an RF signal to insert at the oscillator grid even though it made no sense. Indeed it was completely wrong. A 15pF capacitor linking pin-9 to the aerial as a source of RF did not substitute for a 15cm screwdriver. A piece of solid-core hook-up wire soldered to pin-9 and bent back under the case produced a result as good as I could get. The performance was improved significantly by re-aligning the IF transformers. The end result was most satisfactory, particularly after replacing the first filter electrolytic.

My final analysis on reflection was that the oscillator had wandered off frequency so the heterodyne was no longer producing 455kHz and my “magic wire” had re-tuned the oscillator. With hind sight I might have achieved the same end by adjusting the padder capacitor in parallel with the tuning gang for the oscillator. Yet another fault to be prepared for in future.

A working radio motivated me to take up the restoration of the case. The original knobs are hard to come by, but a set of knobs salvaged from a different Philips radio made a reasonable substitution. In the end only the distressed grille fabric detracted from the final appearance.