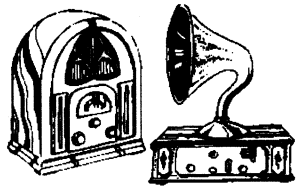
Vintage Radio

by PETER LANKSHEAR



How Astor radios were made

One of the aspects that make vintage radio such an interesting subject are the extreme changes in technology that have taken place in the last half century. Few valve receivers contained more than 10 valves — which, together with their attendant components, were painstakingly hand assembled into massive steel chasses. Today, integrated circuits smaller than most individual valves can contain many thousands of transistors, and entire printed circuit boards are machine assembled in the time that it could take to install a single component in a valve radio.

Recently, we described a receiver made by New Zealand's Radio Corporation, but there were Australian Radio Corporation receivers too, sold as the well known and respected 'Astor' brand. In 1922, before broadcasting in Australia ever started, Melbourne's Louis Coen Wireless was selling radio components to enthusiasts. Then, in 1926, a group of three small manufacturers combined forces to form The Radio Corporation of Australia, making Astor radios to be distributed by the Coen organisation. Before long, Coens joined forces with the Radio Corporation, which went on to become one of Australia's largest radio manufacturers.

We may have their radios today, but what do we know of how they were made, and under what conditions? Fortunately, Douglas Bolton of Mount Waverley in Melbourne has taken time off to write down his experiences in the Astor factory. Here, in his own words is his story:

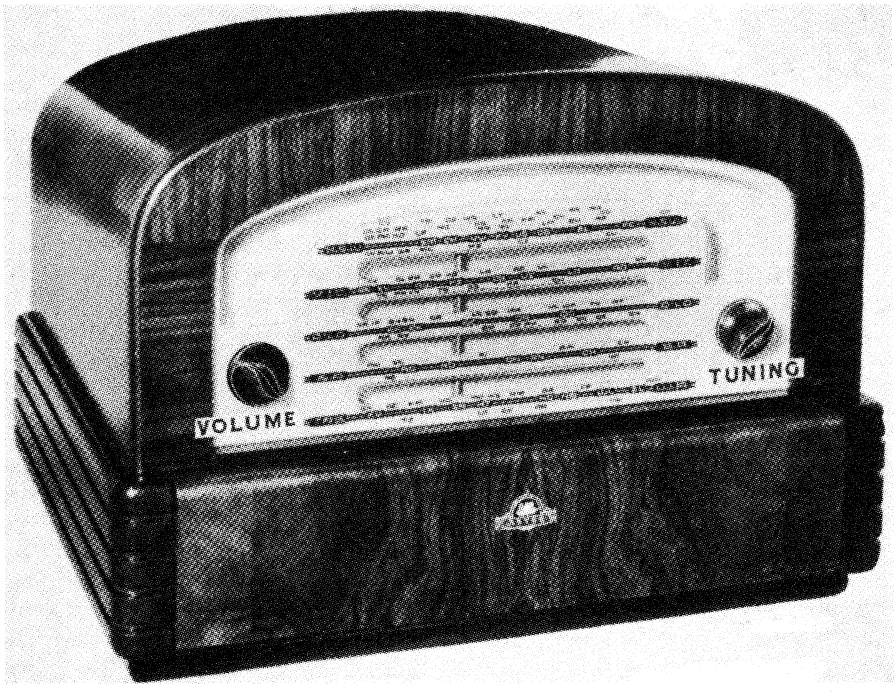
In July 1946, on the day the US detonated the world's first H-Bomb on a Pacific atoll, I started work on the wiring line at Radio Corporation in Grant Street, South Melbourne, assembling Astor radios. At first I sat alongside an older hand, Geoff Austin, at his station to learn the ropes. That meant, basically, learning the 'Astor Way' of laying out wiring, placement of components and making terminations to the company standard.

There were two lines running parallel to each other, usually working on the same model run, although there may have been exceptions to that. Each line was a long bench about 600mm wide and of normal workbench height, topped with sheet iron.

Attached to each side of each line at about one-metre intervals were the wiring stations, with the stations on one side staggered with respect to those on the other side, so that the sets zig-zagged along the line.

Each station was a small bench about 600 x 900mm, and attached to its back was a frame carrying a placard setting out the details of that operator's task(s) for that particular model run. There would be a sketch of the chassis and the parts and/or wiring to be fitted, as well as written instructions.

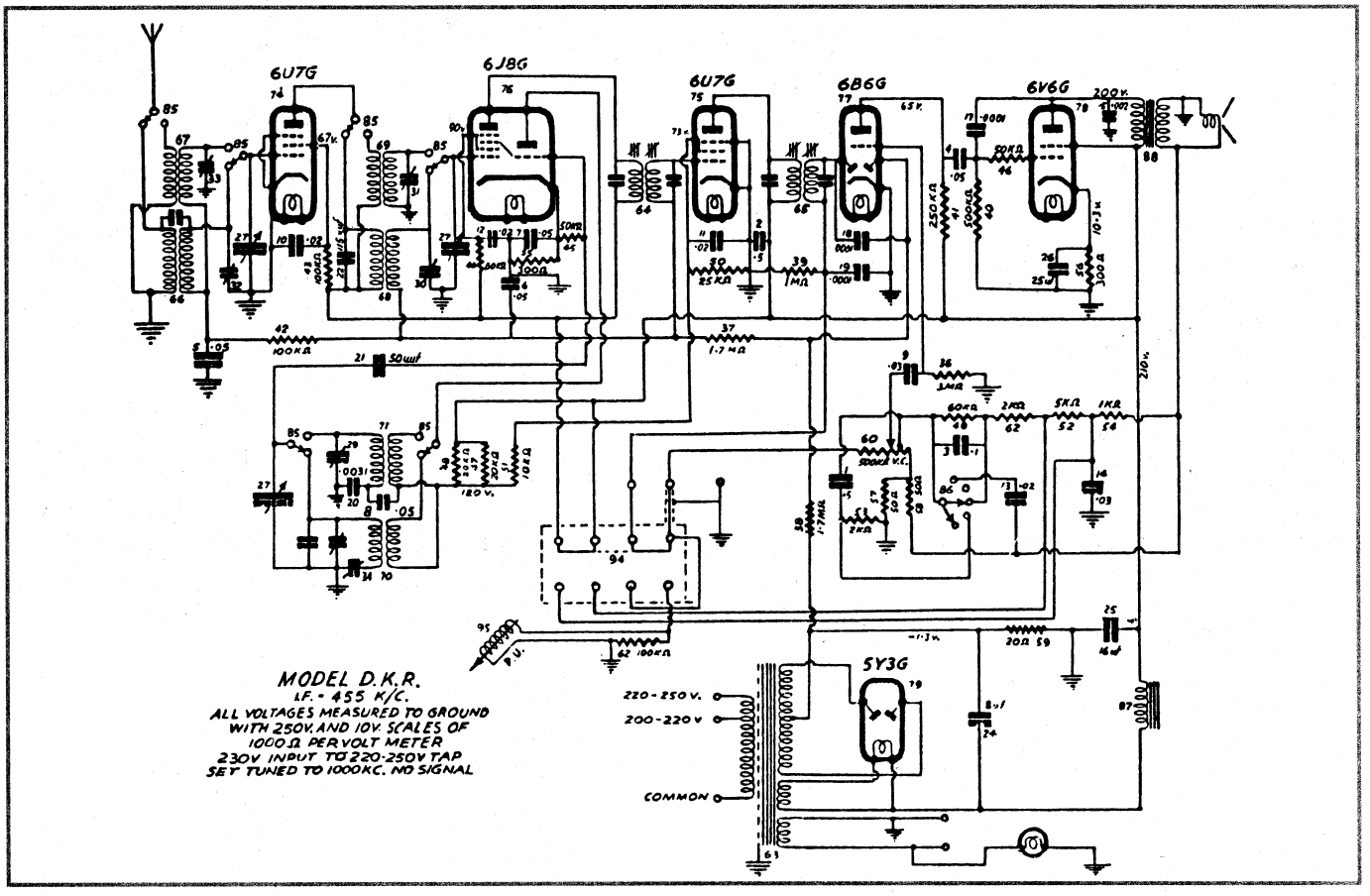
You did not have to be able to read a circuit; some of the wirers were complete laymen in radio terms. To them it was a job, nothing more. Nevertheless the wages incorporated a skill margin above the basic wage as it then was.



Astor were noted for their innovative cabinet design. The tuning and volume labels shown on this attractive 'KK' model are, of course, only on the photograph.

Hot irons

Running under each line was a pair of heavy gauge conductors carrying about 30 volts, wired to a pair of terminals on the front of each station to power the soldering irons. The irons were specially made for the voltage, obviously to discourage the temporary or permanent 'borrowing' of irons for use at home! Those irons were HOT. It was possible to light a cigarette off the side of the bits, which were large by today's standards — 3/16" or 1/4" in diameter,



It is clear from this 1940's radiogram circuit that Astor produced well engineered, conservative designs. An advanced feature, as mentioned by Douglas Bolton in his comments about enhanced reproduction, is the elaborate negative feedback network, connected to the tapped volume control, and providing a degree of bass and treble accentuation. Resistor 52 (5k) is shorted out in the gramophone position to produce still more bass boost for pickup equalisation.

if I remember rightly. After all we are talking about octal valve sockets here, and a one watt resistor in those days resembled a small cigarette.

The iron line was fed from what must have been a monstrous transformer, in its own enclosure off to the side of the line. The bits were unplated copper, so the rate of wear and corrosion was high. At one end of the line was a power grinding wheel, where you could 'freshen up' a worn bit. Skilled engineering types are horrified at the very idea of fouling up a grinding wheel with lumps of solder, but the wheel was there just for that purpose, so who am I to complain?

Roughly every fourth or fifth station was manned by a wiring inspector, whose job was to check the accuracy and quality of all work up to that point. Soldered joints were tested by trying to break them loose, with a screwdriver used as a crowbar under the leads to the joint. The inspectors generally were a fair minded crew, who could pick the difference between a botched operation and a production engineering miscalculation.

My impression was that quality control was very good. I would think that very few sets, if any, would have reached the end of the line containing wiring faults. All terminations had to be 'mechanical joints'; that is, the pigtail or wire was passed through the hole in the valve socket or tagstrip lug, bent over and fed through again, and then squeezed firm with long-nose pliers. This was because the operator making the joint was not necessarily the one who soldered it, and the joint had to remain sound until the final soldering. I heard that servicemen hated having to replace any parts so fitted, and I can understand why!

Placement and orientation of parts and wiring was strictly laid down on the layout placards. If the diagram showed a wire passing to the left of a tagstrip, for example, one didn't dare run it to the right! Resistors and capacitors were laid as close as practicable to the chassis and always parallel to one of the axes of the chassis. Non-signal wires, likewise, ran in neat straight lines parallel to the axes, with right angle bends where necessary.

Anode and grid leads, of course, ran as directly as possible at whatever angle was necessary. RF and IF signal leads were in stranded hookup wire, mains in standard power flex, AF in old style shielded hookup, with everything else in rubber covered single strand tinned copper of about 22SWG.

One feature which puzzled me then, and still does, was that the heater wiring in mains sets was not twisted as 'good practice' dictates. At the power transformer, one 6.3 volt lead was grounded, as was one heater lug at each valve socket. The hot filament lead snaked around the chassis to the remaining heater lugs. How come those sets were never known as 'hummers'?

The chassis arrived at the start of the line ready-to-wire, as it were. Valve sockets, and any speaker sockets and battery connectors, were pre fitted. The first operation was to fit a pair of purpose-made metal cheeks to the chassis ends. These served both as handles and as protection for high profile components like tuning capacitors and power transformers, as the chasses made their not-always-cushioned

progress down the line. Those high profile parts were usually the first components, as such, to be fitted.

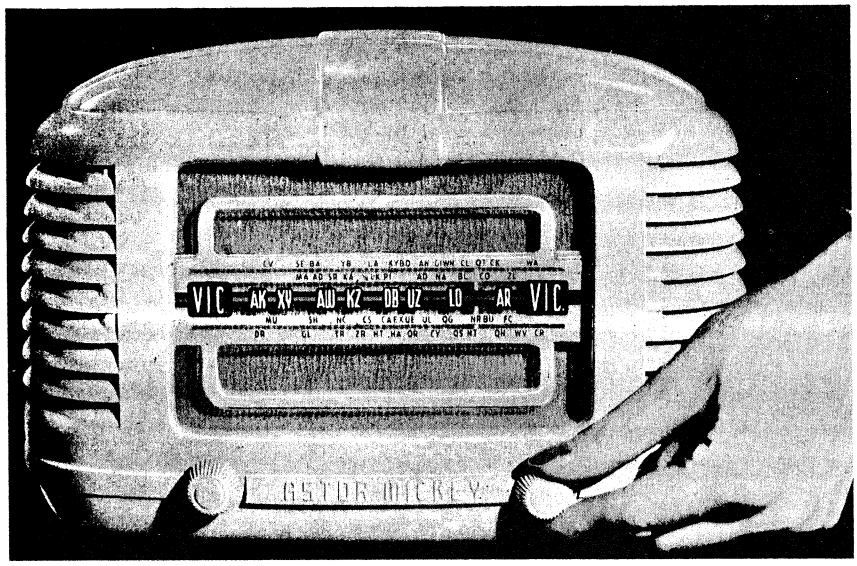
Few nuts and bolts

Nuts and bolts were kept to a minimum. Much use was made of self-tapping screws, usually hexagon headed, and driven home by Spintites. (Ed: otherwise known as 'nut drivers'.) *Valve sockets and the like were eyeletted to the chassis before reaching the line, and earthing points were preformed 'lugs', made by pressing tongues of the chassis metal down into the underside of the chassis during the actual chassis fabrication.*

Tagstrips ('distrips' in Astor-talk) were soldered to the chassis by their mounting feet. The chasses themselves were steel, plated with zinc, lead or cadmium — I am not sure which, after all this time. (Probably cadmium — P.M.L.) *Certainly the latter two would be rather naughty today. Whatever it was, it made soldering to the chassis very easy.*

Radio Corporation was fairly self-sufficient as to components. They bought in Philips or Radiotron valves (always American type numbers in my time), Rola speakers (without transformers), Ducon fixed capacitors, IRC fixed resistors, nuts, bolts and screws, dial lamps and cord, wire, Ersin solder, dry batteries and record player decks. They made their own chassis, cabinets (both timber and plastic) knobs, dials and associated hardware, tuning capacitors, potentiometers, all inductive components, valve sockets, dry battery connectors, tagstrips, rotary mains switches, wafer switches and Ferrocart car radio vibrators.

Although, as I said, the company made its own inductive components, there was a temporary exception in the case of IF transformers. One day the lines came to a dead stop for lack of IF's. It turned out that the IF making facility had broken down, and there was much rushing about by foremen and higher ranks until production eventually resumed, using a supply of IF's which had been hastily arranged from the nearby Kingsley factory.



Promotional material from Astor, advertising one of their well known Mickey (Mouse) series of radios in compact plastic cabinets. This particular 'KM' model was clearly intended for use in the home state of Victoria.

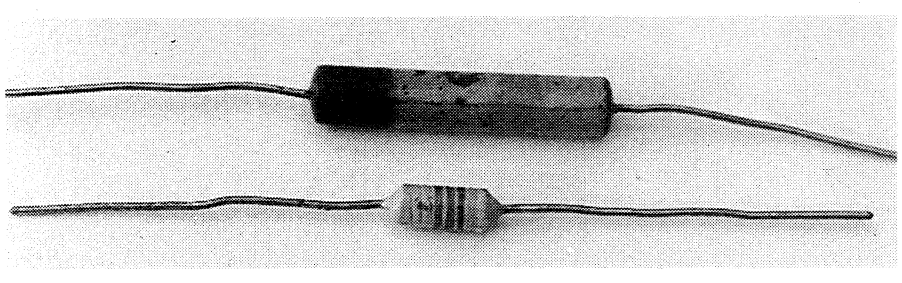
Somewhere out there could there be a restorer scratching his head over an Astor containing 'foreign' IF's. Fear not, it could be authentic!

The atmosphere on the line among the wirers was friendly and cheerful, on the whole. They were not a bad bunch of people and included a sprinkling of female wirers, who wielded soldering irons and pliers on an equal footing with the males — but not on an equal wage footing, in those unenlightened times.

Not once did I personally see any sexual harassment; not that there was much spare time for any of that. Although there was a good fellowship on the line itself, management was not universally admired, but I suppose that is par for the course in factories. The obvious and immediate targets for this lack of affection were the foremen (one per line) who, to give them their due, had a less than easy ride in those days of full employment and the postwar labour shortage. They looked to me as men under considerable pressure. Although I never liked them as people, and that could be my fault as much as theirs, I have to admit to feeling some sympathy for them.

Radio Corporation had its pilfering problems, just like any factory making consumables I suppose. At the time of which I write, there were shortages of tuning capacitors, electrolytic capacitors and speakers, at least at the retail store level. Presumably, as the radio factories were absorbing all available supplies to meet the postwar demand for new sets, any temptation to 'lift' such things from the factory was heightened. There was a legend that even twelve inch speakers had been smuggled out!

Anyway, the management occasionally conducted random searches of bags and pockets, by the time clocks at knock-off time. I saw it happen once or twice, but I never was one of the 'chosen'; the checkers just picked out individuals at random.



Comment was made about the cigarette-sized one watt, IRC resistors that were used in immediate post ware radios. For comparison, one is shown alongside a modern equivalent. Not only is the modern resistor much smaller, but it is also more reliable.

Good quality sound

As finished sets left the line, they went to the final test to be fitted with valves and then to a screened room for alignment. My impression at the time was that they were rather better than the average domestic radio, in terms of both RF sensitivity and sound quality. As regards the latter, of course they

were not hi-fi, but they had a rich full sound without being mellow or boomy, and this was true of the smallest mantel as well as the table models and consoles. I think that this was due to a form of automatic loudness control in the audio end. They had, for the time, a fairly sophisticated frequency-dependent feedback loop around the output transformer, in conjunction with a tapped volume control.

Four years after I left the company I bought my first car, which came with an Astor radio as standard equipment. The sensitivity of the set was quite remarkable, but the nature of the sound it produced from a Rola 5C speaker was almost unbelievable. The subjective impression was that the speaker had to be an eight inch at least.

To summarise my time at Radio Corporation, I have to say that I did not greatly enjoy it, but it had its moments. It was an interesting and valuable experience which laid the foundation for my subsequent working life in radio and electronics. The following eleven years I spent on the communications side of radio in the Department of Civil Aviation, and I was struck by the number of colleagues who had passed through the nursery of 'The Corp.'

Well, thank you Douglas. I found the story quite fascinating, and I am sure that many readers will have too. Recording of experiences like this are very important. It is easy enough to find old balance sheets and annual reports to provide a financial history of an organisation, but without the participants making the effort to write them down, the real stories about people and conditions become lost.

One can understand a certain lack of enchantment with repetitiously fitting the same section of wiring and components, day after day. Those of us who never experienced the 'joys' of working in a radio factory half a century ago, may now have a better appreciation of what went into making today's 'collectibles'.

In *EA*'s predecessor *Wireless Weekly* for February 15, 1938, there is an article on the Astor factory with a photograph, unfortunately not suitable for reproduction, showing a wiring line just as Douglas describes them. What he does not spell out is that workers had little elbow room, and such luxuries as a view through a window were completely absent. I suspect that these workers would have had some sympathy for battery hens!

Douglas comments about the freedom from hum in receivers which did not have twisted and balanced filament wiring. When mains powered equipment first appeared, considerable attention was paid to wiring the filament circuits with twisted leads, and this practice continued with professional equipment such as Douglas would have encountered in Civil Aviation.

However from around 1932, especially with the introduction of the lower-current 6.3 volt heaters, receiver manufacturers found that filament lines did not radiate much hum and that time could be saved in assembly by running a single lead, with the other side of the filaments grounded.

One situation arose, however, that should be remembered in repair work. Filament currents in the chassis can generate significant differences in potential between two earthing points, and one of the tricks of good design was to select the best points to make audio circuit earth connections. The wrong position can cause a significant increase in hum.

After his explanation as to why 'belt and braces' techniques were used in terminating component leads before soldering, I shall in future try to be a little more tolerant when attempting to unblock holes in solder tags! A countless number of solder tags must have been broken over the years as a result of this practice, although some manufacturers, (AWA was one), kept such joints to a minimum.

Finally, my thanks again to Douglas Bolton for his memoirs, and also to Darryl Kasch for providing the circuit and receiver illustrations. ❖