STC 1941 model 831: a story with a not entirely happy ending

By Graham Parslow

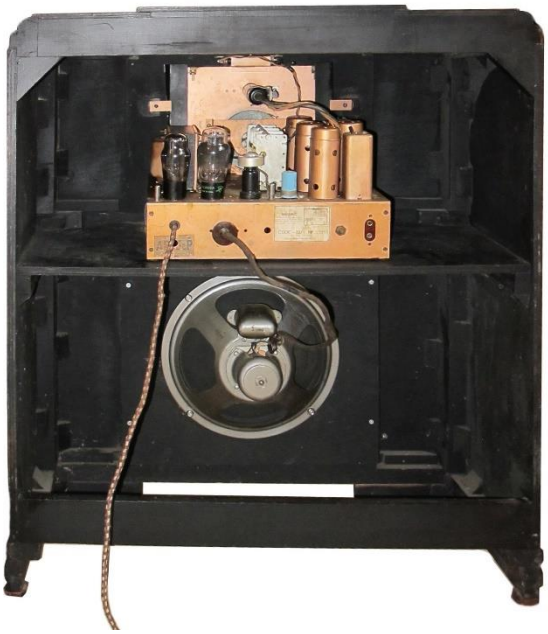
A collection begins with a first item and this STC was the beginning of my vintage radio collection, back in 2004. It was from a collectables shop in Yackandandah. The family that ran the shop were grieving for the death of their grandfather and it was some of the descendants that I bought this radio from. The people in the shop were not the regular proprietors, just helping the family out. They were trying to dispose of as much of grandpa's estate as possible to clear space. At that stage I had no idea how much the radio was worth and neither did the sellers. I offered them $200 and everyone was happy. The radio got me started on finding literature to learn more about my treasure. I purchased Brian Smith's reprinted 1938 STC sales manual and that book did not have my console case in it. A picture in Rod Smith's *Best Years of Australian Radios* p125 dates the case to 1941. The ARTS&P is stamped with a "G". All information suggests that 1940-41 is the correct period for this one.

The ARTS&P designation as No. 7 is also informative because it indirectly indicates the number of valves in the radio. More precisely No.7 refers to the number of electron paths that are subject to royalty payments. Most radios are licensed with No. 5 decals. The STC 831 is a top shelf design with nine separate valve envelopes. Unusually the diodes for AGC and detection are in a stand alone 6H6 miniature octal valve. This small valve is nevertheless enclosed in a full size valve shield.

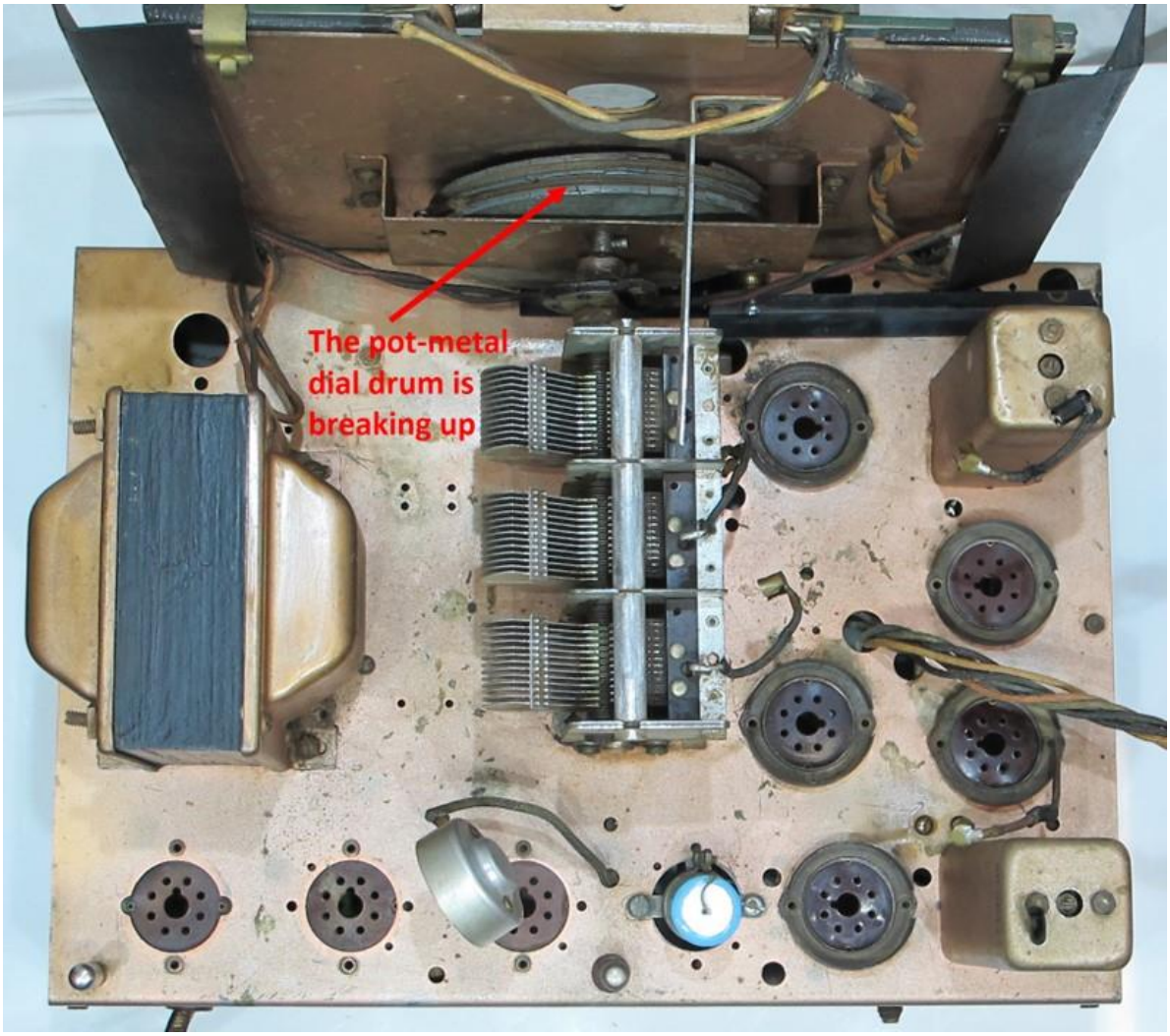
The top of the case was physically abraded and affected by heat from the valves, but otherwise the case was in reasonable condition. I stripped the entire case and

lightly stained the centre section of abraded ply-wood with a Rosewood tint. The case was then finished with polyurethane.

The radio worked, so it was left without electrical modification. The electrolytics and most paper capacitors had been replaced previously. Those previous replacements included the out-of-keeping blue axial capacitor added above chassis in place of a canned electrolytic. The enjoyment of this project started me on the path to acquiring many more vintage radios and more knowledge about them.



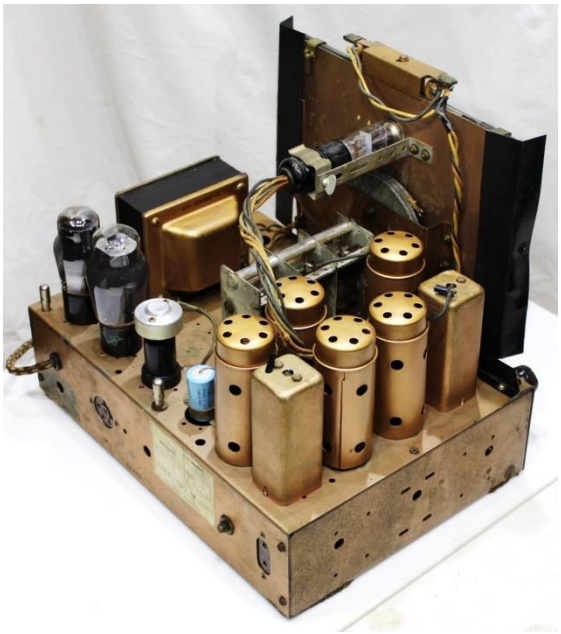
This radio stopped working in 2010 when it was producing only 50Hz hum. It was relegated from the dining room to a spare room, waiting for a rainy day. That day was precipitated by Michael Justin (HRSA auction manager) who restored a comparable console



radio and was ecstatic about the quality of the sound it produced. I was prompted to revisit my favourite console radio.

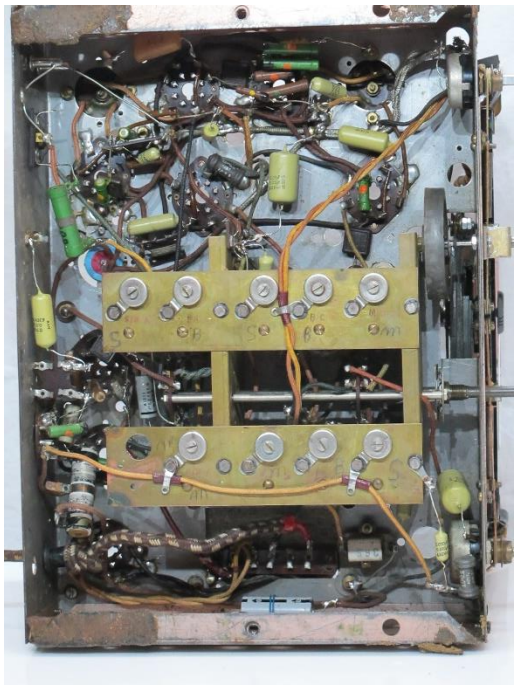
The chassis and speaker of the model 831 were installed on my work bench while the case was left in the spare room. This seemed like the heaviest chassis I had ever carried and it probably is. It weighed 10. 6kg which is around twice the weight of most valve mantel radios. The power transformer on this radio is hefty and accounts for much of the weight. Everything about this chassis is solidly engineered. This radio is dense with components and built in three dimensions. Assembling stacked components is fine in the factory, but it makes repair work a challenge. Murphy's Law (at least one variant of it) states that any faulty component will be highly inaccessible. Murphy must have trained on this model radio.

The first operation in revisiting the radio was a thorough clean of everything above and below the chassis. Copper-tinted enamel spray paint was then used to bring the shield cans and other corroded items back to good appearance. All valves were removed to expedite this process and the hope was that it was only a poor valve pin connection that had caused the failure.



And so it proved to be. First power up was without the high tension rectifier. This tests the power transformer for stable operation and lights up the dial lamps (all came on). When the valves and speaker were added the radio worked. This was good news, but the distortion and crackle were not so welcome. Power consumption at this time was 72W; high but not too surprising. The first fault to tackle was the distortion. My immediate suspect was low bias to the 6L6 output pentode.

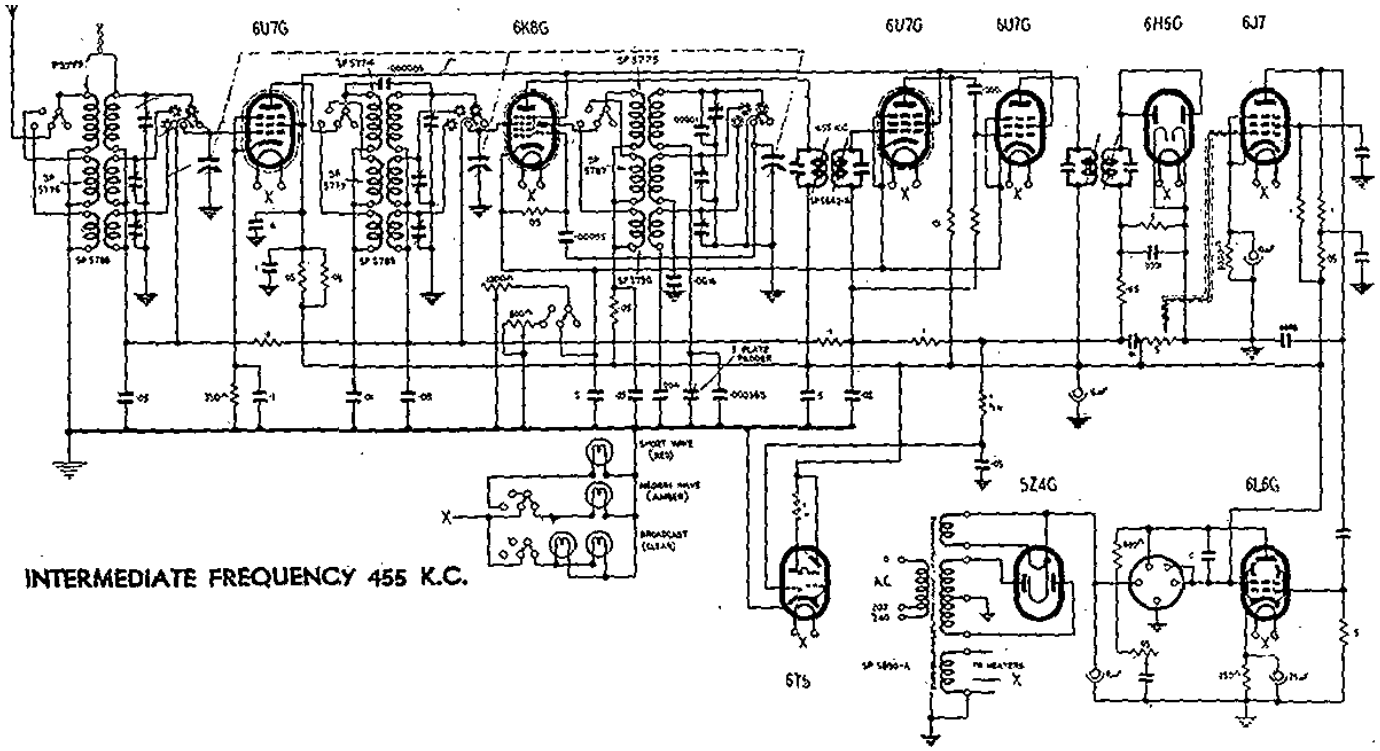
The relevant voltages for the 6L6 were: Cathode +1. 2V, grid +1. 9V. This means that the bias was +0. 7V and easily explained the distortion. The cathode resistor was a custom-made wire wound unit measuring 32 Ω, surprisingly low. The Radiotron Valve data book (AWV 1944) suggests using 220 Ω, so this value was installed. The cathode voltage rose to +9. 0V, but the grid also rose to +4. 2V. This indicated a leaky coupling capacitor between the 6L6 and the 6J7 preamplifier. Replacing the 10nFcapacitor (unfortunately buried at a low level and not replaced during the previous recapping) brought the grid back to 0V. The effective grid bias was then -9V. Power decreased from 72W to 67W. The radio was now producing sound with good fidelity, but there was constant crackle. I have learnt that mica capacitors are the most likely source of crackle. Happily, the crackle was fixed first time by replacing the 200pF mica capacitor that decouples high frequencies from the plate of the 6J7 audio preamplifier to ground.



The band select switch is a 4-position oak switch with multiple wafers. Two of the positions are identical in function and tune the broadcast band. Presumably off-the shelf wafers to perform the multiple switching tasks came in 4-position sets. The band switch on this radio was not always making solid contact first time when switching bands. After 78 years it is no surprise that some of the contacts became unreliable through corrosion and dirt. My response was to spray the contacts with WD-40. This spray lubricant has remarkable cleaning and penetrating properties and I had never encountered any problem when I had used it on other wave change switches.

There is a first time for everything. At switch on the middle wafer loudly arced then stopped arcing as the radio warmed up. Ignoring the arcing was not really an option as it became worse at each new switch on, presumably due to carbonising the wafer

substrate to create conductive paths. The arcing was not a simple point to point discharge either, but multi-focal. The most accessible set of switches on the wafer selected combinations of different dial lamps to receive 6. 3V depending on the selected band. It was possible that the 6. 3V line, which is capable of high current, was causing the sparking and burning. This was the easiest cause to investigate so the 5Z4 rectifier was removed to eliminate high tension circuits. It was soon evident that the 6. 3V was not the source of the arcing. There were three more switch sections on the wafer.



The semi-enclosed unit containing the wafer switches has all of the band-dependant coils and associated alignment capacitors built in. It must have been assembled as a pre-fabricated unit before installation and is fiendish to work on. Some patient wire-tracing established that one section of the middle wafer fed high tension to the plate of the 6U7 RF preamplifier plate. The high tension passes through one of three alternative coupling transformers linking the RF preamplifier to the input of the 6K8 mixer-oscillator.

The most practical way forward was to disconnect the three sources of HT from the wafer and observe. That was the answer, no more arcing. Since I was happy enough to have the radio dedicated to broadcast only the short wave feeds were insulated and left floating. The high tension Broadcast feed was hard wired direct to the 6U7 RF-preamplifier plate.

The raw high tension produced by the 5Z4 rectifier in this radio is a staggering 465V. Because the 5V cathode of the rectifier is directly heated it functions immediately producing maximum voltage that feeds through to all components in the high tension lines. After warm up, when valves begin conducting, the filter circuitry and series resistors drop the voltages throughout the set to the working values. The plate voltage at the 6U7 RF preamplifier was measured at switch on and immediately went to 465V, then fell to 140V after warm up. The 20 seconds or so in between is when the wafer arcing problem had occurred.

The onset of the arcing coincided with spraying WD-40, so it was likely that this was the cause. The web relates numerous examples of WD-40 causing problems with electrical equipment, while other users have had no problems. WD-40 is known to leave an oily residue and that residue may have been involved. After sharing my experience with Michael Justin he replied *A lot of people use WD40. I have tried to warn people of it, but they swear by it until they find what has happened to you. Years ago my father lubricated the wafer switch on his stereogram with WD40 and that was the end of it. I tried everything to fix it but it made the wafers conductive and no matter what I did I couldn't fix it. I could even measure the conductivity between contacts with a multimeter. In the end I had to change it.*

For the future I will use CRC NF electronic cleaning solvent that is meant for such an application and leaves no residue after cleaning is finished.

The radio had become a one-band radio. Sadly it also progressed to a radio with restricted station selection. The elegant dial with a pointer sweeping through 270 degrees is driven by a gearing system enclosed in a pot-metal dial drum. The pot metal is now breaking up and the internal gears no longer mesh as freely as they should. The result is that the dial drum is hard to rotate. This can be done manually by directly turning the drum by reaching over the chassis. However, when using the tuning knob the high internal friction of the gears causes the dial cord to slip on the spindle connected to the tuning knob. Adding extra tension to the dial cord did not entirely rescue the situation. In warm weather the tuning knob is completely ineffective in rotating the drum. In colder weather some control of rotation returns, but never over the full bandwidth. The radio can at least be left tuned to a favourite station.

The radio remains in the spare room where it can be enjoyed, from time to time, to listen to ABC Radio National. The good news is that It sounds like the high-end radio that it truly is.