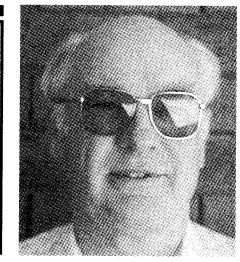
VINTAGE RADIO

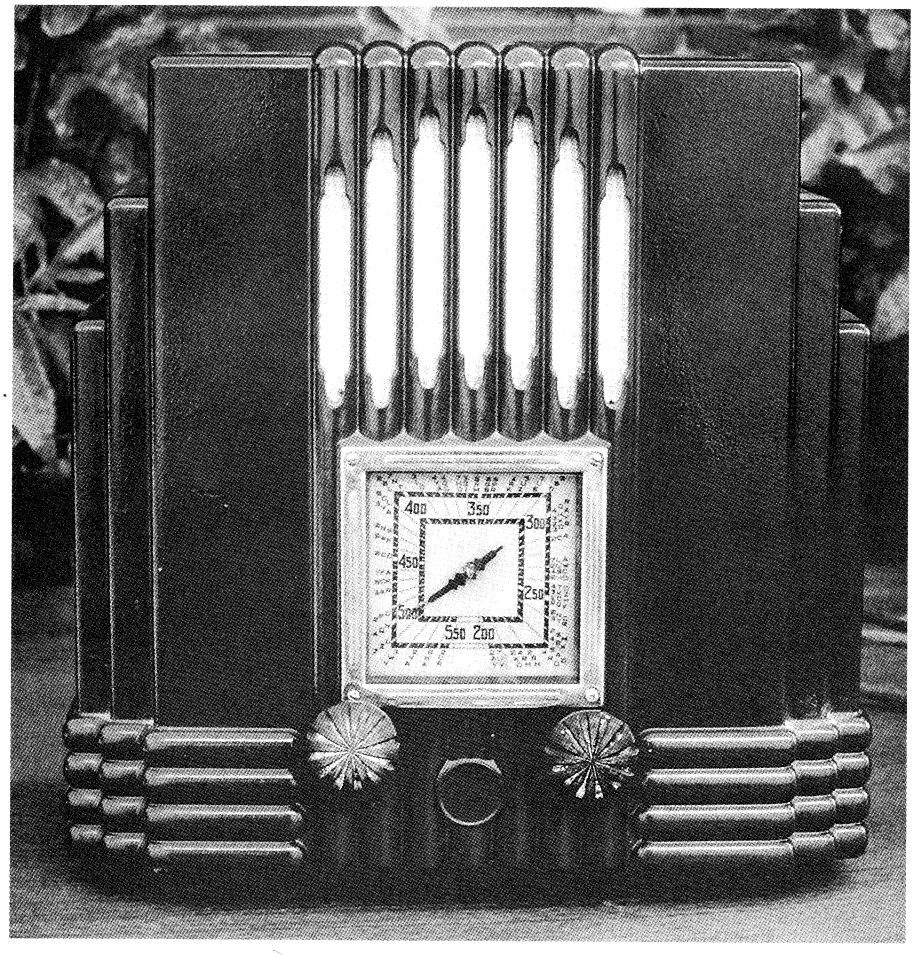
By RODNEY CHAMPNESS, VK3UG



The era of high performance sets: the Radiolette Model 31/32

Commonly called the "Empire State", the Radiolette 31/32 represented the new breed of high performance sets that were introduced in the mid-1930s. It's a 5-valve receiver with some interesting features.

By 1935, the autodyne converter and the anode bend detector were on their last legs, at least as far as their inclusion into superheterodyne receivers for the consumer market was concerned. The depression was about over too, hence there was feverish activity within the various radio manufacturing plants to design new, better and bigger sets. These would use the new pentagrid converters in lieu of the autodyne configuration and the new duo-diode triode/pentode detector and first audio valves in place of the previous anode bend detector/amplifiers.



In reality, no major improvements in domestic radio design and performance came after these two important circuits. Any developments of importance for AM radio reception had already occurred by the time octal-based valves appeared. Sure we ended up with miniature dual valves, more efficient RF/IF coils and transformers, and eventually used iron-dust and ferrite core with good results but these were refinements on what had already been invented and developed.

With the advent of ICs, a number of design variations have been introduced which have made sets quite versatile. However, that's another story.

The Radiolette Model 31/32

The Radiolette model 31/32 was one of those much-improved sets, being designed and built circa 1936. It is commonly called an "Empire State" because of the stepped arrangement of the bakelite case, as seen in the photograph. Some vintage radio buffs will, no doubt, have observed that the correct knobs are not on this particular set at this stage.

I was asked to service this set which had apparently been bought for $25 – a bargain. Yes, a few bargains are still to be had when it comes to vintage radios. My job was made easier by the fact that not a lot of work had been done on it over the years. What's more,

the work that had been done was quite professional.

With such an old set and one that is so difficult to work on in various areas, I believed it was prudent to first test all the transformers and coils for continuity. All wound components including the speaker transformer proved to be in good order and the exercise was worthwhile, even though I knew it would be a slow job doing the restoration because of accessibility problems.

For its time, the Radiolette was a very compact receiver, considering it had an RF stage and a reflexed IF-cum-audio stage. However, fitting everything into a relatively small cabinet meant that the layout became quite cramped. As a result, gaining access to many of the components can take quite a bit of work.

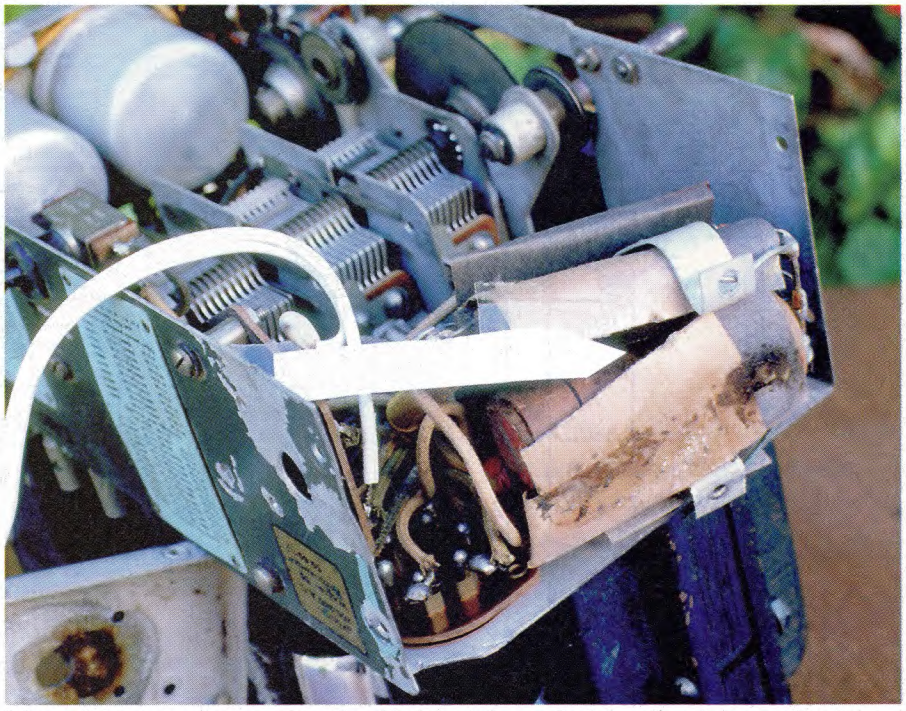
The standard of the hook-up wire used in the radio is noticeably better than that used on many sets of the same era, with no obvious signs that the rubber under the fabric had perished (although it probably has to some extent). Having tested the wound components, it was time to test and replace any leaky capacitors and out-of-tolerance resistors. All the paper capacitors would have made good resistors so they were replaced with either polyester or ceramic equivalents. The resistors generally were within tolerance which says something for their performance after 60 years.

The end of the chassis was removed by undoing four screws. This done, all the components in a wrapped cylinder (see photo) were removed from their chassis strap. The leads from this block of components go to all parts of the set and why there wasn't more interaction between the various stages is difficult to understand. A fresh block of components was made up and fitted in its place. This took up substantially less space due to the smaller size of modern components.

Various other blocks of components were also swung out for checking and the leads to these unsoldered as necessary. As previously mentioned, all the paper capacitors proved quite leaky, typically giving readings of around 2MΩ when checked on the high voltage tester.

Switching on

Having tested most of the passive components and replaced any defective ones, I fired the set up and checked all the main voltage points as the set warmed up. The voltages all nominally coincided with those marked on the data sheets and nothing got hotter than it should have. The volume control was noisy and was given a squirt of a contact cleaning fluid, after which the noise stopped. Sometime later, however, I discovered that the volume control had gone open circuit. Did the cleaning fluid dissolve the track in the volume control? I don't know; I've certainly never had this happen before.



Most of the parts in a wrapped cylinder at the end of the chassis proved to be faulty and were replaced with a fresh block of components. In addition, all paper capacitors throughout the chassis were replaced with either polyester or ceramic equivalents.

Prior to the volume control throwing in the towel, the set was aligned. The IF is on 175kHz and has only one trimmer (and thus only one tuned circuit) in each transformer. For a 175kHz IF amplifier, the tuning is relatively broad.

The tuning of the front end is quite another story. The three tuned circuits (aerial, RF and oscillator) only have one adjustment – a trimmer capacitor which is adjusted at the top end of the band (around 1400kHz). The radio is nominally intended to tune from 550-1500kHz, although by carefully positioning the dial pointer, 530-1600kHz is obtainable while still retaining the correct dial calibration. Having tuned the set at around 1400kHz, it was found that the sensitivity was around 3μV, which is very good for a receiver of that vintage.

The low frequency end of the dial was not so good. In this case, the sensitivity was around 300μV which is relatively poor. The reason for this is that sets of this era used air-cored coils which had no adjustments on them. Iron-dust adjustment cores were not common at that stage, so it simply wasn't possible to easily adjust the inductance.

However, it is always possible to squeeze more out of a receiver if it can be accurately aligned so that it tracks correctly. How should I overcome this problem? I could remove the RF and aerial coils and either add or remove turns as necessary, to get the inductance right. However, the coils are so difficult to get at that this was not considered an economically viable option.

Next, I tried adding coils and capacitors in series with the aerial coil. My aim was to alter the effective inductance of the tuned winding and hence peak the tuning. Unfortunately, this didn't give any improvement, so I didn't even bother trying the same thing with the RF stage. Perhaps it should have been tried but generally the coils in the aerial and RF stages

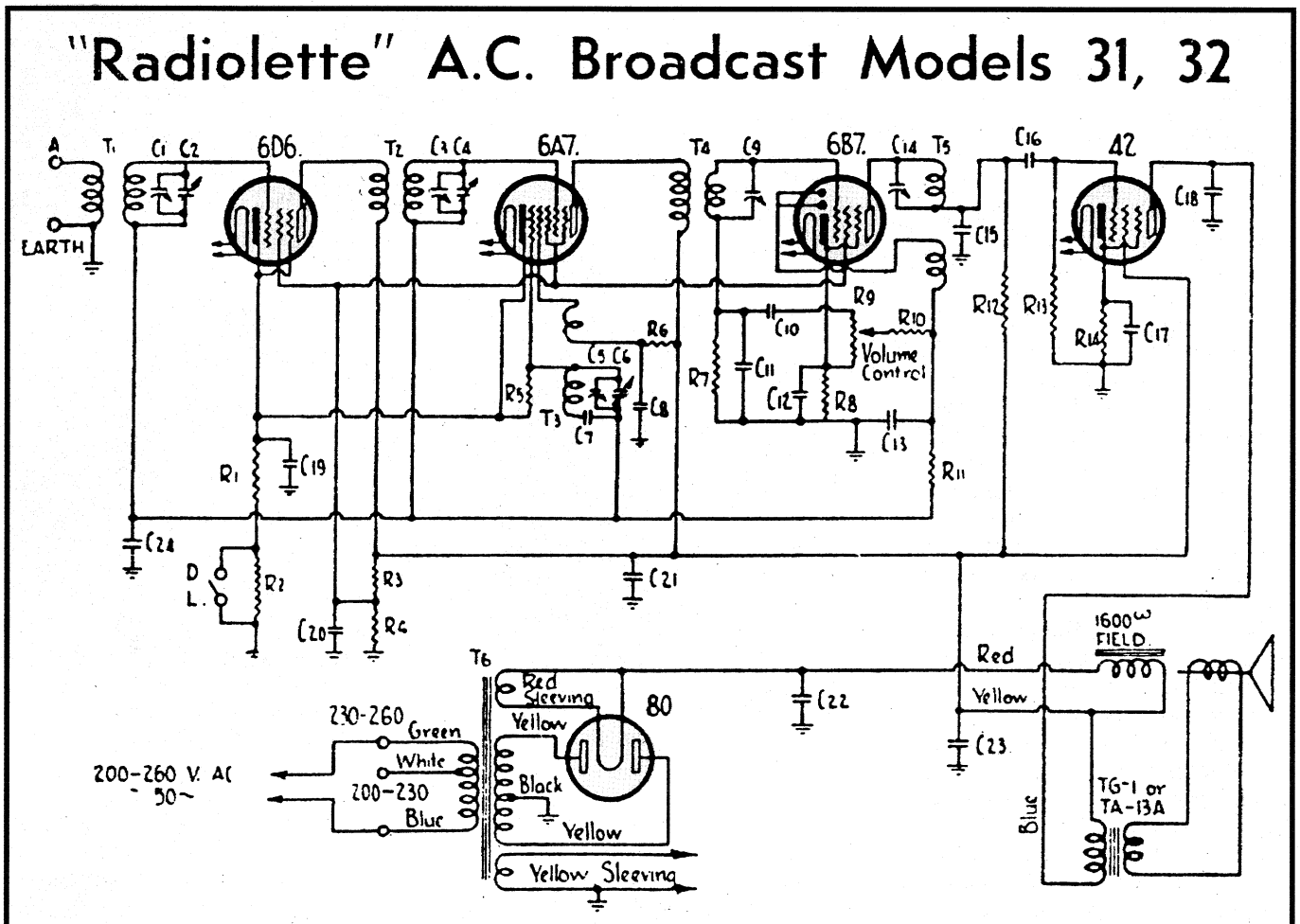


Fig.1: the circuit diagram for the Radiolette Model 31/32.

are reasonably well matched.

So it seemed that the set would be left with very good performance at one end of the dial and mediocre performance at the other. But wait – in some sets there is a minor modification that often improves the performance of the oscillator stage and hence the overall performance of the receiver. Sets using 6A7 converters, as in the Radiolette, often benefit from this alteration.

That said, I don't normally contemplate modifying vintage radios unless there is a very good reason to do so. Indeed, some manufacturers published lists of alterations that could be carried out to improve performance.

Getting back to the Radiolette, if the oscillator circuit is altered to the configuration shown in Fig.2, the grid current will be more constant across the band and the conversion efficiency will be improved. If you compare the complete circuit (Fig.1) and the amended oscillator circuit, it will be seen that the major difference is the placement of the padder capacitor. In this case, the performance of the set was improved at the low frequency end of the band and is now quite acceptable.

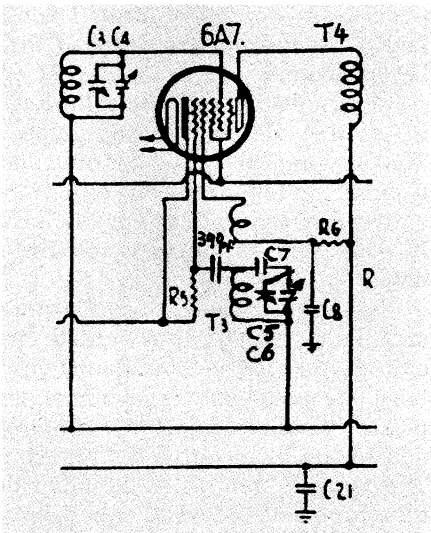
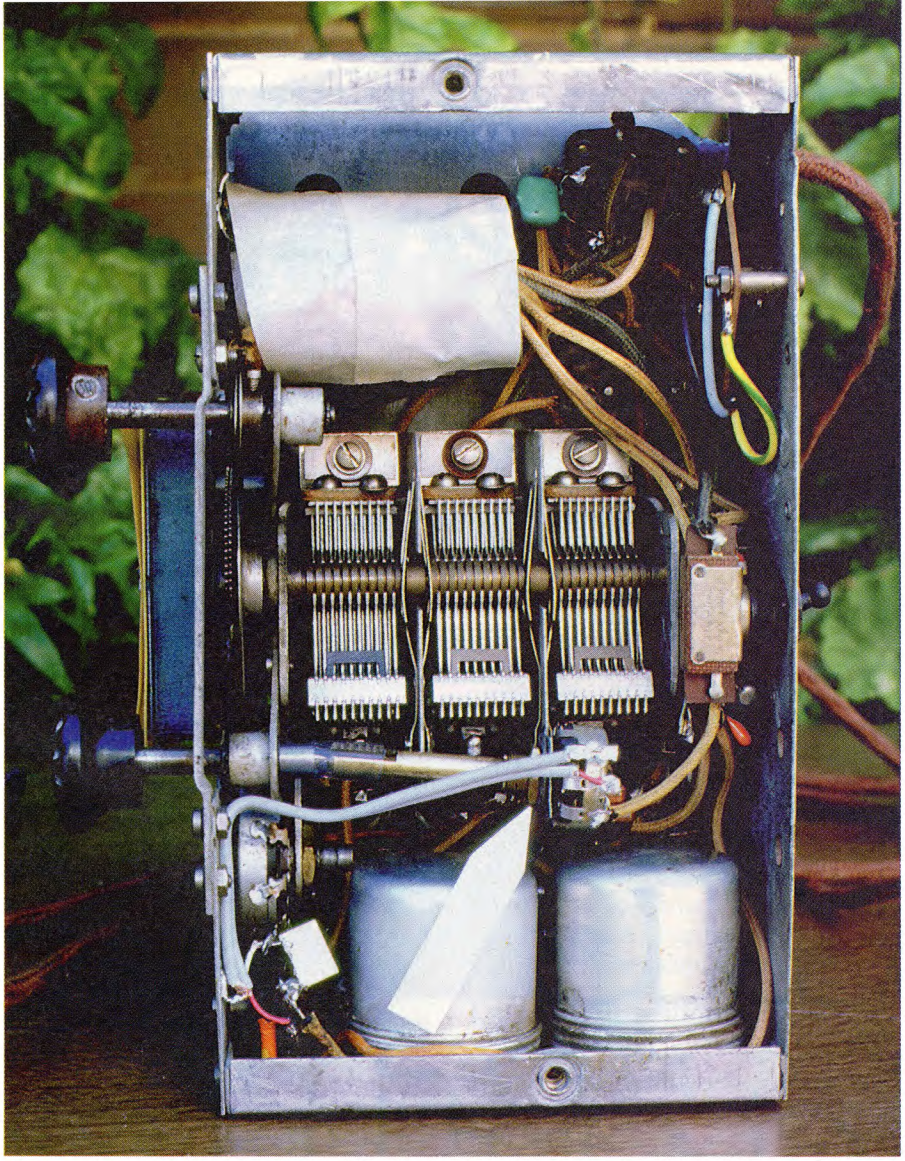


Fig.2: modifying the oscillator circuit as shown here improves the set's performance at the low-frequency end of the band.

Volume control

Replacing the volume control is a major job in these radios. The set has to be virtually dismantled and a particularly narrow potentiometer installed, otherwise the floating subchassis will be shorted to the main chassis. In this case, however, a normal potentiometer was installed (as shown in the under-chassis view), coupled with a piece of heavy-walled plastic tubing as a universal coupling. This meant that the control had to be offset so that it didn't foul the tuning capacitor.

A small piece of galvanised steel sheet was used to support the new volume control and this sheet was soldered to a metal dividing panel on the gang. Actually, I'd rather not have had to do this but there was no other easy solution. Sometimes things like



The replacement volume control was larger than the original and was mounted on a separate steel bracket and offset to avoid fouling the tuning capacitor. A piece of plastic tubing functions as a universal coupling between the pot shaft and the control spindle.

this just have to be done.

The dial scale is usually a casualty of the heat from the dial lamp, which sits immediately behind it. It buckles and cracks and often fouls the dial pointer. This set was no exception and the dial was glued and clamped to the metal dial-mounting trough.

To help keep things cool, a 9mm hole was drilled in the bottom of the trough to allow better ventilation around the globe and the dial scale. In addition, a 10Ω 1W resistor was installed in series with the globe to lower its dissipation. The amount of illumination is not as great as before but the dial is now unlikely to buckle and crack any further.

Performance

The Radiolette is a very good performer, even by modern standards. It's puzzling though as to how they got away with the wiring layout they had, with inputs running alongside outputs and long unshielded grid leads. Was it a matter of good luck or genius?

Luck probably played the biggest role. Each stage would have had relatively low gain in the RF and IF sections, due to the inferior coils and transformers used and the relatively low gain of the valves employed. A normal 5-valve set has only four active stages but in this case there are five, due to the reflexed IF/audio stage based on the 6B7.

The lack of tuning adjustments at the low-frequency end of the tuning range meant that a receiver that was potentially a hot performer failed to reach its full potential. What a shame; it could have been one of the very best sets of the time.

Awkward design

Basically, the radio is well put together but its mechanical design and layout are a disaster. Why do some manufacturers have to make things so difficult for the serviceman (and now the restorer) when with a little more thought the set could have been very good.

OK, no doubt the designers had to fit the radio into a cabinet of a shape and size that the sales people dictated. However, there is some spare space that could have been used if they had applied more lateral thinking. Thankfully, the set appears to be a reliable model.

This is a highly sought-after set and considering its performance, it deserves to be. However, it falls down in some mechanical areas, the main drawbacks being poor accessibility and complicated assembly. The circuitry used could be improved with very little real change and this did occur in later models. **SC**