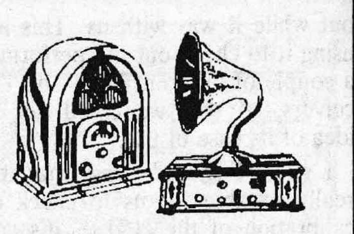


by PETER LANKSHEAR

Overhauling an AWA Radiolette

The AWA Radiolettes of the 1930's are uniquely Australian and very collectable. Recently a fellow collector rescued from oblivion one of the later versions, a dual wave R52G of 1938. He accepted my offer to overhaul it and it occurred to me that readers might be interested in the project.

This article is aimed primarily at newcomers to vintage radio work, describing methods that work for me. But I would emphasise that experienced workers will have their individual techniques, which could well differ from mine. Personally, I don't favour piecemeal fault location and testing. Another fault elsewhere can mask success in the area being worked on. My preference is to work systematically through a receiver, replacing all faulty or suspect components before even switching it on.

Servicing and restoration are related, but different. The serviceman who made his living repairing radios was usually expected to repair a specific fault only, and as economically as possible. Restoration has no such constraints, the aim being to get the set back to as close to original condition as possible. Many old time servicemen would have regarded this situation as Utopian.

Reflex complications

At first glance the circuit of the R52G appears to be that of a conventional five valve radio, but a closer look shows some complication around the 6G8G diode pentode valve.

Radiolettes made after 1933 used *reflexing*, a system originating early in radio history, when valves were very expensive. By careful separation, it is possible in one valve, to amplify radio frequency or intermediate frequency signals and then, after detection, simultaneously amplify the resulting audio signal. Although not as satisfactory as the use of separate valves, reflexing gives a valuable performance boost to small receivers.

In the case of the Radiolettes, the functions of the first audio and intermediate frequency amplifiers were combined in the pentode section of a diode pentode. The diodes were used for detection and automatic gain control. In fact this one valve performed no less than four functions! Naturally, the associated circuit is a bit more complex than that of conventional receivers.

First steps

With the receiver on the workbench, the first thing I did NOT do was to switch it on to see if it was operational. This is a natural, but unwise action. It can be dangerous if the power cord is perished or incorrectly wired, and it is possible for a short circuit to damage the power transformer.

There were some important checks to carry out before switching the set on. First the knobs and mounting bolts were removed and the bakelite cabinet stored in a safe place. This model has a back to the cabinet, with the result that the chassis was reasonably clean. The dust and dirt that had collected was removed with a small paint brush.

A careful inspection of the chassis showed no obvious problems, apart from a strange additional volume control potentiometer. Most importantly, the power transformer showed no signs of scorching or soot, indications of an expensive burnout.

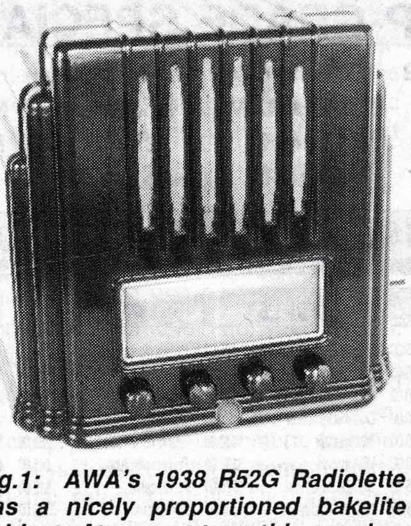


***Fig.1:** AWA's 1938 R52G Radiolette has a nicely proportioned bakelite cabinet. At some stage this one has lost its badge, but chances are that it can be replaced.*

The viability of the electrical restoration of a receiver of this type can well depend on the condition of the power transformer. Transformers can fail from shorted turns, open circuited windings or burnout from overloading. The only remedies are replacement — if a suitable transformer can be found — or rewinding, which can be expensive.

Open circuited windings are almost invariably found in HT secondary windings. Although sometimes a transformer burnout is all too obvious, an absence of external burns or melted wax is no guarantee that there is no problem. Fortunately, short circuited windings can be checked quite easily by removing all loads from the secondaries of the transformer and checking for overheating after a half hour or so of mains application to the primary.

As the power cord of the Radiolette was showing signs of perishing, I had no hesitation in first fitting a replacement. Frayed or perished cords are potentially dangerous and even if the cord looks OK, the plug connections should be checked as they may be incorrect. In the case of the 52G, to remove the back of the cabinet completely, the plug has to come off anyway.

Next all valves were carefully removed. To avoid loosening ageing adhesives, grid caps were eased off gently with the aid of sharp scriber, and valves were removed by levering under the bases. Despite my care, the grid cap of the 6U7G was loose and had to be glued with an epoxy resin as described in last April's column. Each valve had its location noted, and was checked to see if it was the type marked on the chassis. It is quite common to find valves in wrong sockets, or even unsuitable types fitted in a vain attempt to 'fix' a receiver.

With the valves removed, the trans-

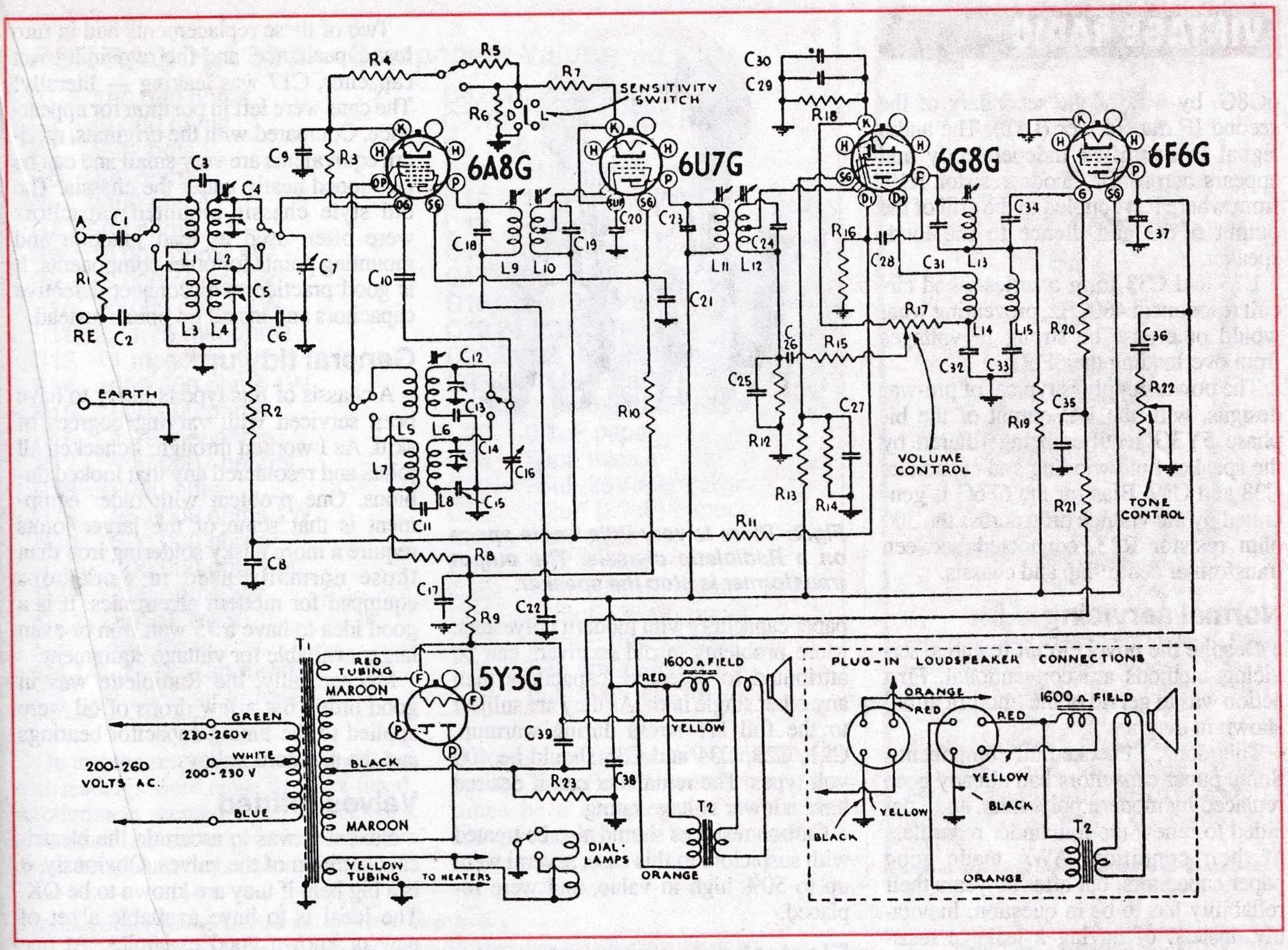


Diagram 1: The circuit of the set, drawn in somewhat unorthodox fashion with the valves upside down. Nevertheless it provides information essential for overhauling a set and correcting modifications such as that in Diagram 2.

former was tested. During normal operation, transformer cores can become hot enough to be uncomfortable to touch; but unloaded, a good transformer will not show any appreciable heating. In a defective power transformer, a shorted turn soon produces a runaway heating situation and eventually, smoke. In this case, after about half an hour, there were no signs of distress and heating of the core was barely detectable.

One very common fault to check in valve receivers is an open primary in the speaker transformer. Good windings have a resistance in the region of 400 ohms. An ohm meter check between the screen and anode pins of the 6F6G socket confirmed that the winding was intact.

So far so good. Physically the set was in good condition, and the power transformer was OK. Repairing the Radiolette seemed to be a viable proposition.

Further inspection

At this stage I like to sit down and compare an unfamiliar chassis with its circuit, locating and identifying each component. This is time well spent. Defective components may be spotted, unusual circuit features become apparent, and most importantly, any modifications can be identified. For example in this case I discovered in the process of checking that C30 was missing.

Be especially alert for unofficial modifications. Attempts to improve performance have often led to misguided experimentation, typified in this case by the extra volume control wrapped in friction tape and tucked under the chassis. This rather strange alteration is illustrated in diagram 2.

A bit of study helps to work out details of a set's operation. The first stage of the dual-wave Radiolettes is a pentagrid first detector, or frequency converter, in this case a 6A8G. RF Coils L1/2 and L3/4 along with oscillator coils L5/6 and L7/8 are switched to provide the coverage.

Next follows a conventional 6U7G IF amplifier stage. The cathode bias resistors of the first two valves are connected to a local/distance switch and a section of the wavechange switch. R4 is the 6A8G bias resistor, and R5 is added in series by the wavechange switch to reduce gain on the Medium Wave band. R7 is the bias resistor for the 6U7G. To reduce gain on strong signals, both stages have extra bias generated by an additional resistor R6, controlled by the sensitivity switch.

Reflex stage

So far, the circuit is quite conventional, but the stage incorporating the diode pentode valve, in this case the 6G8G, distinguishes AWA reflexes from 'run of the mill' receivers.

The 6G8G valve amplifies the signal from the second IF transformer L11/L12 and passes it on to the third IF transformer L13/L14. Diode 1 is the AGC source fed conventionally from the anode via C28, whilst diode 2 is a standard AM detector coupled to the volume control pot R17. The operation of the receiver to this point is quite typical, but now the reflexing introduces differences.

Normally, the volume control would feed a separate audio amplifier stage. Instead, here the volume control output is fed back into the control grid of the

6G8G, by way of the secondary of the second IF transformer (L12). The audio signal is amplified independently and appears across the anode resistor R19, from where it is coupled to the grid of the output 6F6G and thence to the loudspeaker.

L15 and C33 form a series-tuned circuit resonant at 460kHz, preventing what would otherwise be strong IF voltages from overloading the 6F6G.

The power supply is typical of pre-war designs, with the DC output of the biphase 5Y3G rectifier being filtered by the speaker field winding and capacitors C38 and C39. Bias for the 6F6G is generated by the voltage drop across the 300 ohm resistor R23, connected between transformer centre-tap and chassis.

Normal servicing

Despite the novel circuit features, servicing methods are conventional. First action was to get rid of the 'modification' shown in diagram 2.

This done, I checked all components. Some paper capacitors had already been replaced by modern polyesters, and I decided to renew the remainder regardless of their condition. AWA made good paper capacitors, but after 50 years their reliability has to be in question. Inevitably, instead of having a leakage resistance of at least 100 megohms, moisture will have reduced this seriously. In this case, C35 was down to 50k ohms and C34 read only 1 megohm. Both would have had a disastrous effect on the bias of the 6F6G, creating distortion and high anode current.

Frankly, in cases like this I have no hesitation in ruthlessly replacing all

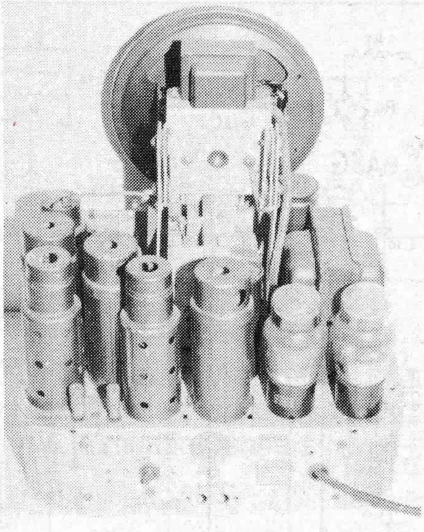


Fig.2: There is very little waste space on a Radiolette chassis. The output transformer is atop the speaker.

paper capacitors with modern polyesters. More problems in old receivers can be attributed to defective capacitors than any other single item. As they are subject to the full HT stress during warmup, C21, C22, C34 and C36 should be 400 volt types. The remainder can if desired have a lower voltage rating.

Carbon resistors should also be treated with suspicion. In this case, several were up to 50% high in value, and were replaced.

Electrolytics renewed

In a receiver of this age, it is unlikely that the original electrolytic capacitors will have survived. I found that two of the three original chassis-mounted 8uF wet HT filters, and the 25uF dry electrolytic cathode bypass C29 had been replaced by more modern small tubular types.

Two of these replacements had in turn lost capacitance, and the remaining wet capacitor, C17 was leaking — literally! The cans were left in position for appearance. Compared with the originals, modern equivalents are very small and can be positioned neatly under the chassis. The old style chassis mounted capacitors were often used as lead junction and mounting points for other components. It is good practice to disconnect defective capacitors and install tie points instead.

General tidy up

A chassis of this type is likely to have been serviced with varying degrees of skill. As I worked through, I checked all joints and resoldered any that looked dubious. One problem with older equipment is that some of the larger joints require a more husky soldering iron than those normally used in workshops equipped for modern electronics. It is a good idea to have a 75 watt iron or even larger available for vintage equipment.

Mechanically, the Radiolette was in good order, but a few drops of oil were applied to the tuning capacitor bearings and the dial cord pulleys.

Valves refitted

Next step was to ascertain the electrical condition of the valves. Obviously, it is a big help if they are known to be OK. The ideal is to have available a set of new or known good examples. At one time the nearest service shop would have had a tester available, but this is no longer likely. This leaves the restorer with a bit of a problem. One practical solution is to try the valves in working radios using the same types. Contact with other collectors can often be of assistance.

When refitting the valves, care should be taken to make sure that they are all in their correct sockets. As in this case, when the one type of socket is used throughout a set, it is very easy to make a mistake. Make sure that the pins are clean and that valve shields do not contact grid leads or caps.

Switching on

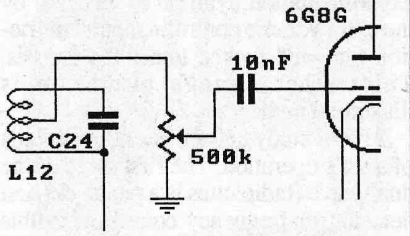
After a final look round, I connected the test meter set to the 500 volt range from the HT line to earth. The mains was switched on and I kept a close eye on the meter. Within a few seconds, the 5Y3G had heated up and the HT voltage quickly rose to about 350. As the other valves heated up, the voltage dropped to the expected 250 and by now the speaker was showing signs of life. A voltmeter check around the valve sockets showed that the voltages were reasonably close to those listed.

Strange modification

This somewhat puzzling modification, comprising a 0.5M pot and 10nF series capacitor could well be a candidate for a vintage 'Serviceman' column. Someone had gone to a lot of trouble when installing it, even using shielded wire for the connections.

Its purpose can only be guessed at, but the chances are that it was an attempt to get around a bothersome characteristic of these receivers. Due to the reflexing, it is impossible to silence the speaker completely — even with the volume control set at zero.

The modification would have been more successful without the 10nF capacitor. As it was, the grid of the valve had no return to earth and would have blocked up, completely cutting off the anode current.



Restorers should always be on guard for such 'improvements'. Without a circuit diagram, even experienced servicemen can be caught by traps set by experimenters. One of the usual benefits of belonging to a vintage radio society is gaining access to a pool of servicing data.

FISK RADIOLA 52G — Component Values

R1,2	100,000 ohms	C6,8,11	.05uF (50nF) paper
R3	40,000 ohms	C7,16	Tuning capacitor
R4	450 ohms	C9	0.1uF paper
R5	200 ohms	C10	110pF mica
R6	2000 ohms	C12	16-34pF air trimmer
R7	900 ohms	C13	440pF mica (padder)
R8	10,000 ohms 1W	C15	3.5nF mica (padder)
R9	15,000 ohms 2W	C17	8uF 450V electrolytic
R10	20,000 ohms 1W	C18,23	115pF mica
R11,12	1.75 megohms	C19,24	130pF mica
R13	1 megohm 1W	C20,21,22	0.1uF paper
R14	250,000 ohms 1W	C25,32	110pF mica
R15	500,000 ohms	C26,34	.01uF (10nF) paper
R16	1.75 megohms	C27	0.1uF paper
R17	500,000 ohm pot	C28	50pF mica
R18	2000 ohms	C29	25uF 25V electrolytic
R19	250,000 ohms 1W	C30	.02uF (20nF) paper
R20	500,000 ohms	C31	70pF mica
R22	100,000 ohm pot	C33	115pF mica
R23	300 ohms 3W	C35	.05uF (50nF) paper
C1,2	500pF mica	C36	.035uF (35nF) paper
C3	4pF mica	C37	.005uF (5nF) paper
C4,14	2-10pF air trimmer	C38	8uF 450V electrolytic
C5	2-20pF air trimmer	C39	8uF 500V electrolytic

On test the set seemed to be lively and dial readings were close to those listed. Realignment seemed to be unnecessary, as it often is if the original settings have never been disturbed. Unfortunately, this is not always the case. Alignment without the maker's instructions can sometimes be a complex and trap-ridden activity and will have to be covered in a future article. ■