

Overhauling Valve Radio Receivers

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As time passes there's increased interest in vintage radio receivers, both because of their historical and their antique value. At the same time technology marches on relentlessly, leaving the technology of yesteryear as a specialist subject. The difference between an ancient valve wireless set and the present-day radio is so great that they could have originated on two different planets! A contemporary technician would probably have had a brief look at the theory and construction of valve radios on his way to acquainting himself with modern i.c. technology, but he wouldn't have dwelt on it for long. The purpose of this brief article is to cover the main aspects of servicing a treasured antique wireless: I hope that the advice given will be of some constructive use.

Universal Receivers

Mains-powered vintage radios fall into two categories, a.c. only and a.c./d.c. or universal. We'll deal with the universal type first. With this type of receiver the valve heaters and pilot or dial indicator lamps are wired in series. Thus in the event of the receiver not lighting up, the continuity of the series chain must be checked. Start from the live side of the mains input and continue via the on/off switch, the fuse (where fitted), the mains dropping resistor, the series valve heaters and the pilot lamps, returning via chassis to the second pole of the on/off switch. This assumes that a double-pole switch is used. The switch may be of the single-pole type: in this case the negative side of the mains supply is taken straight to chassis. One item worth mentioning here is the "line-cord" resistor used instead of a mains dropper in some earlier sets, especially of the American portable variety, in order to save space. This line-cord resistor is integral with the mains lead. It often goes open-circuit. You could replace it with a ceramic resistor fitted into the cabinet area, where space for heat dissipation allows. This must of course be of the correct calculated value and wattage. A single-pole on/off switch could be replaced with a double-pole type. Take great care to insulate all screws and fittings that are accessible at the outside of the cabinet and may reach through to a live chassis. Check the continuity of the mains dropper or line cord resistor, the switch, the valve heaters, the pilot lamps and of course the mains power lead itself, which may have corroded with the passage of time.

AC-only Receivers

With a.c. only arrangements the valve heaters and dial lamps are connected in parallel and are fed from a transformer. Thus a "no joy" condition here indicates either an open-circuit mains lead, switch, fuse (where fitted) or mains transformer primary or secondary winding. With a parallel arrangement, if the heater of one valve goes open-circuit the situation will be quite obvious because it will be the only cold valve.

Voltage Checks

Whereas the valves in a parallel system operate at a heater voltage of generally 6.3V, with a series chain the

valve heaters can operate at 12V to 35V or even 50V. The h.t. voltage is much higher, often around 250V, a rectifier valve being used to obtain this supply.

Assuming that all the valve heaters are intact and that the valves are thus warm, the next thing to do is to check that the h.t. voltage is being generated – check at the cathode of the rectifier valve – and that all the valves are receiving their anode and screen grid supplies as appropriate and developing the correct cathode voltage where a bias resistor is included. Absence of anode or screen grid voltages should lead to a check on whatever is between the relevant electrode and the h.t. line. Load resistors can go open-circuit, so can the primary winding of tuned transformers in the mixer and i.f. stages.

Signal Injection Testing

Assuming that the voltages are roughly what you'd expect but there's no sound, signal injection is a simple way of finding the faulty stage. In most sets the i.f. is 465kHz. Thus a modulated 465kHz signal injected at the i.f. amplifier's grid should produce sound from the loudspeaker. A modulated r.f. signal applied to the aerial input and the mixer stages should likewise produce an audio output. If not, there could be a discontinuity in the signal path or the oscillator might not be working.

Common Defects

Apart from dud valves and faults in the heater supply, here are some common defects. The reservoir and smoothing capacitors in the h.t. supply can go open-circuit or low in value, the result being mains hum from the loudspeaker. If they are leaky the h.t. voltage will be low. The two capacitors are often contained in a single can or, in earlier sets, sometimes in a waxed cardboard container. Coupling capacitors in the audio stage(s) can become leaky or open-circuit, causing distortion or loss of signal respectively. Anode load resistors can increase or decrease in value. Where distortion is the problem, particular attention should be paid to the condition of any cathode decoupling capacitors used in the audio stages. They have a habit of going open- or short-circuit. Alternatively, as often happens, the associated cathode bias resistor may have changed value.

Where ancient valves are suspect and replacements are not readily available, the use of a similar valve with a different base can be considered. The best course is to remove the old base and connect up the new one. The values of biasing and other components may need to be adjusted.

The oscillator triode is usually contained within the same valve envelope as the mixer. A valve voltmeter can be used to check it – check for grid current, grid voltage and oscillation at the anode.

Suspect valves should be checked for interelectrode shorts between the appropriate pins, and of course shorted or open-circuit heaters.

A valve's mutual conductance (gain) can be tested by taking a current reading from a meter connected in series

with the anode feed components and referring to the valve maker's characteristics data. This assumes that the operating conditions (electrode voltages) are correct.

Cabinets

A word about cabinets. The wooden variety can be cleaned with a little meths to remove heavy deposits of grease, then French polished. Bakelite cases can be cleaned with warm detergent, dried and, where the surface

has lost its sheen, treated with a light coat of clear resin varnish. Metal speaker grilles can be removed and sprayed with a suitable aerosol. Silk mesh is best replaced.

Source of Components

A good source of genuine vintage components is The Vintage Wireless Company Ltd., Tudor House, Cossham Street, Mangotsfield, Bristol BS17 3EN (0272 565 472).
Happy renovating!