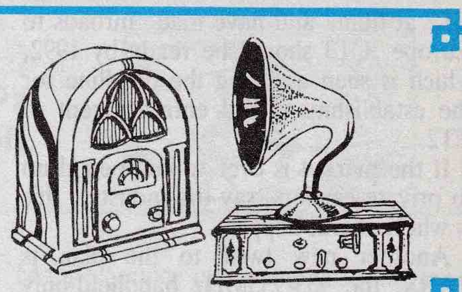
Vintage Radio

by PETER LANKSHEAR



Restoring a classic STC radio – 1

Recently, I overhauled a model 562 STC console radio, fitted with a type 56 chassis and dating from about 1933. This turned out to be a major exercise, involving many of the techniques and problems encountered in the fascinating activity of vintage radio restoration.

When it was found in a classic location, a farm shed, the old 562 was not a pretty sight. Generations of birds had roosted in the rafters above it, leaving heavy guano deposits. The knobs, one control and most of the valves had disappeared. Worse still, the inside of the cabinet was stuffed with a large quantity of straw and litter, a sure indication that rodents had nested in the chassis.

The toilet habits of mice are not very nice, and their urine is extremely corrosive – to the extent that it will even eat through nickel plating. Painted chassis such as those STC used are even more vulnerable. Areas of steel that are attacked soon become heavily pitted with rust, as can be seen in the photograph.

To restore or not?

The poor physical condition raised questions about the viability of restoration. Had the set been a common post war model, restoration would hardly have been worthwhile. However, with its angular shape and strongly patterned veneer, the STC 562 is a good example of *Art Deco* furniture, and as such, warranted a fair bit of effort and trouble to preserve.

In addition, the chassis of the 562 is historically interesting as it comes from a period when the standard 5-valve receiver was still evolving. But a final decision was deferred until the electrical condition of its major components could be ascertained.

Four large coach bolts were removed and the chassis withdrawn. I was surprised to find that the chassis ends were wooden. At least the mice hadn't affected *them*! However, a puddle of congealed wax under the power transformer looked suspicious. This was going to be a key item in the decision making.

With the aid of a vacuum cleaner and a brush, sufficient dirt and rubbish was removed to check the chassis over. The remaining valves were removed and a new power cord temporarily connected to the power transformer.

There was no sign of distress when the power was turned on. The HT voltages were checked at the anode terminals of the '80 rectifier socket and were found to be close to 400V. When loaded, these would be down to about the correct 375V. So far, so good.

Here I should inject some words of caution to those not used to working with valve equipment. This is not to frighten beginners off, but to remind them to make safety their first priority.

Fig.1: When first found, the grain of the wood was barely visible through the dirt and faded polish. But it responded well to basic treatment, as you can see.

Always be alert. Power transformers are capable of delivering lethal shocks. **Check and double check any mains connections, and if you are measuring high voltages or working on a live chassis, keep one hand in your pocket**. A mains isolating transformer is very worthwhile.

After an hour or so with the mains connected, the transformer was barely warm, indicating that it had survived the suspected overheating.

With this encouragement, the windings of the IF transformers, aerial and oscillator coils were checked for continuity. Apart from one of the oscillator coil windings, they were all intact. I wasn't too worried about the open winding, as oscillator coils of this era were usually single layer wound and easily repaired.

The remaining key item was the loudspeaker field winding. Fields were wound with fine wire, which can be open circuited by corrosion, but fortunately this one measured the correct 2500 ohms. Mounted on the speaker was the output transformer, with a primary resistance which should have been about 400 ohms. In this case it was open, but again it was not critical as I had a similar transformer salvaged from another radio. In any event, it would have been reasonably easy to rewind.

Restoration viable

All things considered, restoration seemed to be worth attempting. A close inspection of the cabinet showed that damage was largely superficial, and most of the mess was removed with a good scrubbing with detergent and water.

Although the cabinet refinishing treatment I described in the December 1988 issue of *EA* could have been used, the owner wisely wished to retain an antique appearance, and used methods employed by antique furniture restorers. These revive the original finish as much as possible by blending, reamalgamating and the judicious application of polish.

As can be seen from the photograph of Fig.1, the result was most satisfacto-

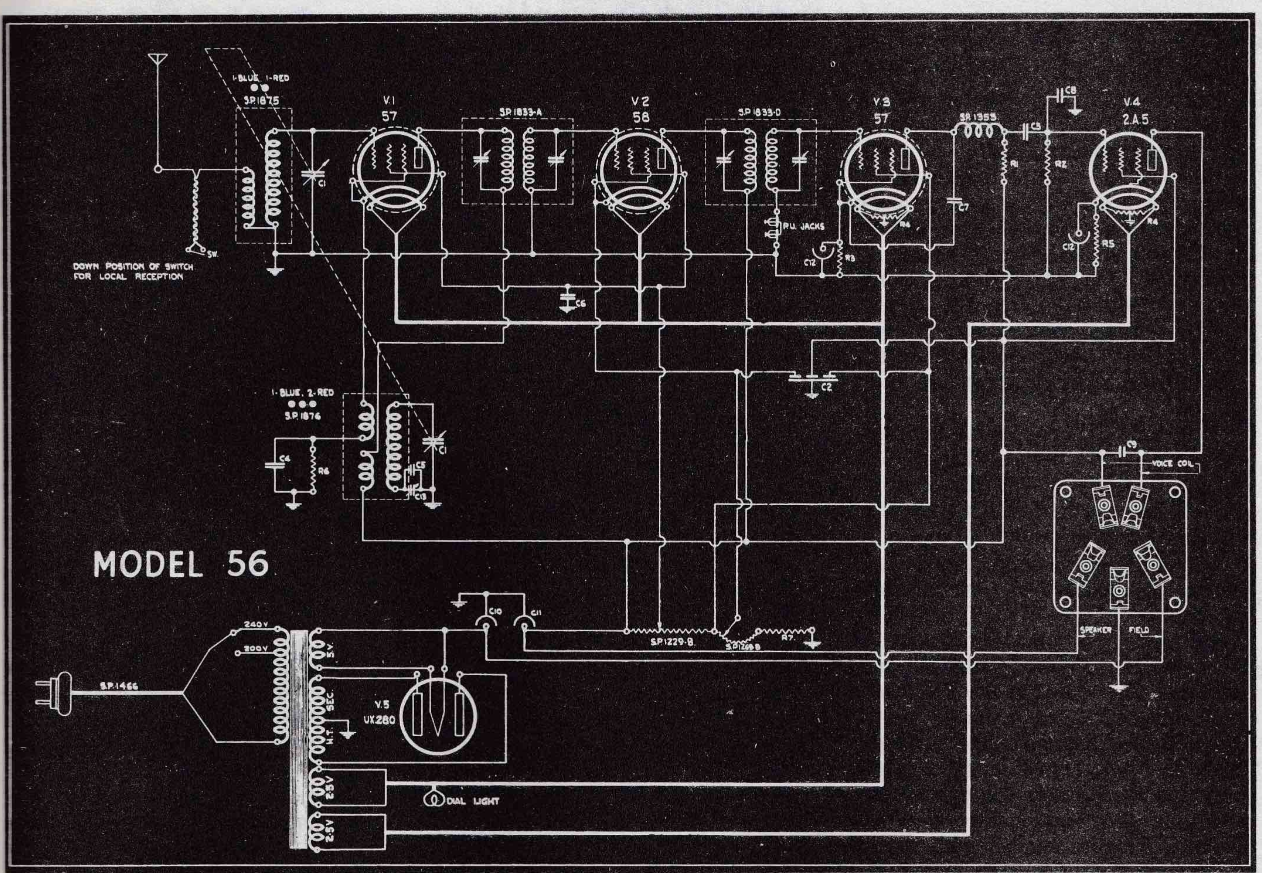


Fig.3: The circuit schematic for the model 56 chassis used in the 562 receiver. It had no AGC, and a switch was used to insert a twisted-wire 'gimmick' capacitor in series with the aerial for reception of strong local signals.

ry. The chassis however needed a lot more work.

Interesting circuit

Before describing the work on the chassis, we will take a good look at the circuit. This is quite different in many ways from those of the more familiar post-mid-1930's receivers.

A 5-valve superheterodyne, the valve lineup is typical of Australian made receivers of the period. Rather than using a pentagrid frequency converter and a combined diode-triode detector, which were only just appearing in the US, this chassis used a pair of 57 pentodes. One was used as a self oscillating mixer, and the other as a biased detector. The intermediate frequency amplifier used their variable-mu companion, the type 58. A 2A5 output pentode driving the loudspeaker and the usual '80 rectifier completed the lineup.

The missing control turned out to have been a single pole rotary on/off aerial attenuator switch, for coping with strong local signals. It simply inserted a small amount of capacitance in series

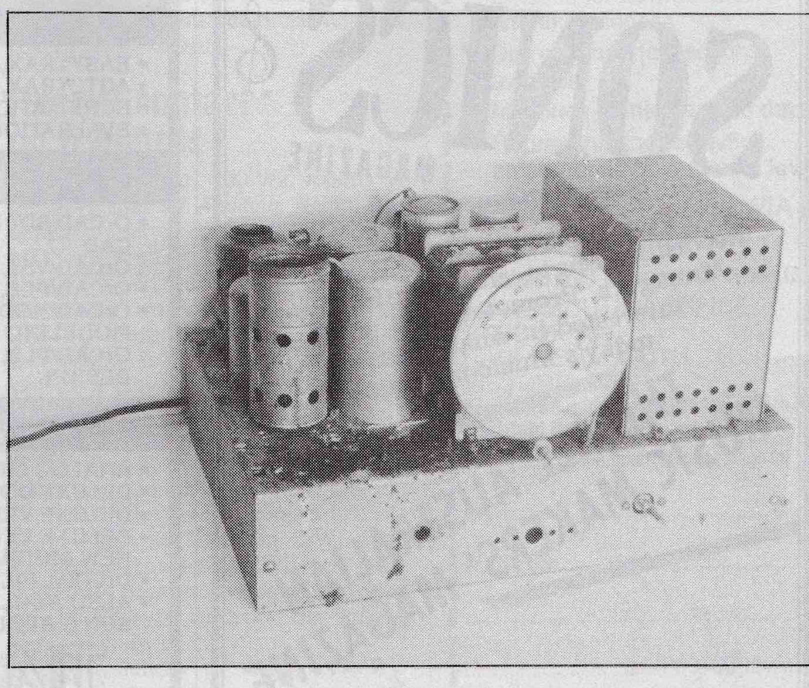


Fig.2: Bad storage and rodents had left the chassis in a very rusty state. But it too was to respond to treatment, as the author explains.

Vintage Radio

with the aerial. The twisted wires symbol on the circuit indicates that the capacitor was just 3 or four 4 turns of wire around the aerial lead.

Normally, a 5-valve set of this period would have used a three section tuning capacitor, with two aerial tuning circuits to overcome the problem of images resulting from the use of the commonly used low intermediate frequency (IF) of 175kHz. Without preselection, as it was called, a strong signal 350kHz above the desired programme could produce interference.

In this case STC anticipated the radio industry's later universal change to a higher IF, by using 460kHz. This increased the image frequency difference to 920kHz and simplified the model 56 by requiring only a single tuned aerial circuit, and hence a two 'gang' tuning capacitor.

Capable of very good performance on the broadcast band, the 'autodyne' self-oscillating mixer used in the STC was a popular frequency converter during the early 1930's. Basically, the autodyne mixer is a valve biased nearly to cutoff, with tuned oscillator and coupling windings connected between the anode and cathode. Readers familiar with transistor receivers will recognise the similarity of the autodyne to today's mixers.

Related to the autodyne mixer, the biased pentode detector was popular until displaced by combined diode-triode and diode-pentode valves. It is capable of fully driving a pentode output stage with only a volt or so of input signal, but one of its shortcomings is its inability to generate AGC voltages. This requires the volume control to be placed very soon after the aerial.

As the gain of an autodyne mixer cannot be readily varied, the earliest point of control in the STC 56 is the cathode voltage of the 58 IF amplifier valve.

With the prior amplification of the uncontrolled mixer stage, the IF stage gain control cannot cope with strong local signals. This is where the aerial attenuator switch comes in. It works, but is an inelegant solution and contrasts with the progressive use of a high frequency IF.

A method used by many manufacturers at the time, and later by STC, would have made the switch unnecessary. In this the control is divorced from the voltage divider and one end is connected to the aerial. The other end is connected to the cathode of the IF amplifier and the moving arm is earthed. As the bias on the valve is increased, the aerial is also progressively loaded down, resulting in a smooth double acting wide range control.

The output stage was the traditional pentode with cathode bias. Equally conventional was the power supply using the inevitable '80 rectifier.

During the 1930's few mains powered receivers used permanent magnet speakers. Instead, electromagnetic fields were standard, with the windings doubling as filter chokes. Many Australasian manufacturers, including STC, favoured fields of 2500 ohms and the resulting voltage drop required power transformers to have HT voltages of about 375 volts.

All low value resistors were wire-wound on small bobbins, whilst the high value types were Australian brand 'Chanex' with ceramic bodies and cast metal ends. The few paper capacitors were again 'Chanex' brand, with C2 (the main bypass block) of STC's own make.

The loudspeaker proved to be interesting, with an unusual frame in front of the cone. Fortunately, the mice had left the cone intact, and apart from replacing the output transformer, the speaker required no attention.

Next month the actual servicing and restoration work on this receiver will be described. EA