

# Vintage Radio

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## The impressive STC Capehart A8551 Radiogram



Radiograms first came into being in the late 1920s and were produced in various formats up into the 1960s. During that time, they evolved from very basic units with a record playing mechanism on the top of the cabinet to units that had changers alongside the radio section. Some of the very latest units also included a TV set and/or a tape recorder and some even had a cocktail cabinet.

**T**HE 5-BAND A8551 was probably the most up-market monophonic radiogram produced by STC. It dates from the mid 1950s and as can be seen from the photos, it is quite a big unit.

In terms of construction, it is basically a large rectangular box with ball & claw feet on it. It is a beautiful piece of furniture and the owner of this magnificent deluxe radiogram, Peter Henstridge (see last month's Vintage

Radio), is to be congratulated for the quality of the cabinet restoration.

A feature of the cabinet is that the doors can fold right back alongside the end panels, so that they are out of the way when the radiogram is in use. When closed, the speaker grill is still visible so that the set can continue operating without the sound being muffled.

The size of the cabinet and the thick-

ness of the timber mean that two strong people are required to move the unit around. The 12-inch (305mm) twin-cone speaker is housed in a sealed enclosure and this, along with the heavy timber construction, has been designed to ensure good sound quality. A plywood panel covers the back of the unit and the cables between the record changer and radio chassis run along a shelf at the back – see photo.



A Collaro 3-speed record changer is mounted at the top lefthand end of the cabinet. This unit comes in cream and maroon, which matches the finish of the cabinet. The radio receiver and its associated control panel are to the right, along with the switches for the various functions. Below the record changer and radio are two compartments for storing records.

The receiver itself is much more elaborate than used in run-of-the-mill radiograms. It tunes both the broadcast band and a shortwave band from 4.8-15.6MHz. It also has three bandspread international shortwave bands, these being the 31, 25 & 19 metre bands.

Six controls are located on the front of the receiver, on either side of the dial scale. Starting from top left, there are Treble, Bass and Volume controls, while the controls from top right are Tuning, Wave Band (five positions) and Selector (three positions).

## Circuit details

From the foregoing, it's apparent that this is an upmarket unit and is somewhat better than the average radiogram of the era. That not only applies to the cabinet but to the circuit used as well.

Fig.1 shows the circuit details. The received signal is applied in parallel to both the broadcast and the shortwave tuned circuit primary windings. However, the secondaries are each individually switched.

The bandspread shortwave bands are selected via series and parallel capacitors which are used in conjunction with the general coverage shortwave coil and tuning capacitor. The general shortwave tuning range is different to most dual-wave receivers, though. It tunes from 4.8-15.6MHz whereas most other dual-wave sets tuned from 6-18MHz.

The output of the selected tuned circuit is applied to valve V1, a 6BA6 RF (radio frequency) amplifier. Its output is applied to another tuned circuit assembly (similar to the input tuned circuits) and then to V2, a 12AH8 frequency converter.

## Oscillator section

The oscillator section of the converter employs yet another tuned circuit arrangement. This ensures that the oscillator always runs 455kHz higher than the incoming RF. Many readers will not be familiar with the 12AH8. It

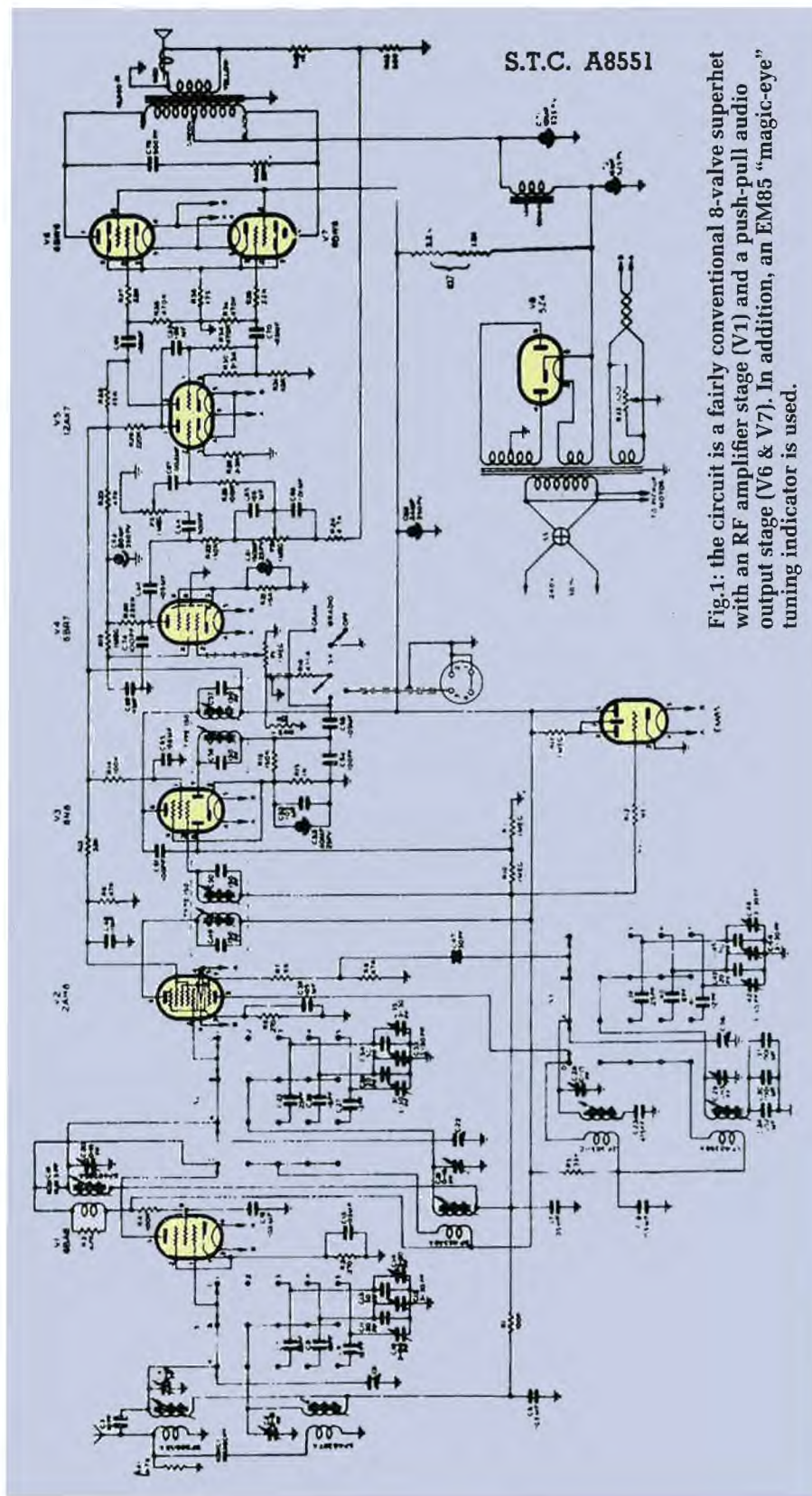


Fig.1: the circuit is a fairly conventional 8-valve superhet with an RF amplifier stage (V1) and a push-pull audio output stage (V6 & V7). In addition, an EM85 "magic-eye" tuning indicator is used.

is similar in characteristics to the more common 6AN7A but has a tapped 12V heater, so it can have either 6V or 12V applied to it.

One point that STC makes is that the

padder capacitors on shortwave are selected to make sure there is minimal frequency drift as the receiver warms up. Tuning drift during warm-up up is a very annoying problem with





This view shows the A8551's cabinet during restoration. The timber was in good condition but the finish had deteriorated quite markedly over the years.



The record changer, chassis and loudspeaker were all removed from the cabinet to make the restoration easier.

some receivers. My Kriesler 11-99, for example, is a delightful little receiver but it has this problem of drifting off station from cold.

I'll eventually get round to modifying it to overcome this problem but in the meantime, I'll live with it.

The output of the frequency converter consists of several mixing products but the one of interest is the difference

between the signal frequency and the oscillator frequency, ie, 455kHz. This is applied via the first IF (intermediate frequency) transformer to the grid of V3, a 6N8 which amplifies the 455kHz IF signal. Its output then goes through another IF transformer stage and is then fed to a detector diode in the 6N8.

From there, the resulting audio signal is fed through a switch (Off-

Radio-Gram) and a volume control to valve V4, a 6BR7 low-noise pentode audio amplifier. The amplified audio is then applied to separate bass and treble controls before being fed to the first section of V5, a 12AX7.

The second section of the 12AX7 is wired as a phase splitter and this produces two signals which are 180° out of phase. These signals drive a push-pull amplifier stage based on V6 and V7, both 6BW6 valves. This then drives a centre-tapped audio output transformer which in turn drives the 12-inch twin-cone speaker.

Note that negative feedback is used to minimise distortion in the audio amplifier. This is done by feeding a sample of the output signal (ie, as applied to the speaker) back to one side of the tone control network.

## Power supply

As with the RF and audio circuitry, the power supply is a little more elaborate than seen in most domestic radios.

First, there are four windings on the transformer: a 230-250V primary and three secondaries. These secondaries provide 6.3V for the heaters of all the amplifying valves, 5V for the filament of the 5Z4 rectifier and a centre-tapped high-tension (HT) output rated at 295V-0V-295V.

The resulting DC HT line is filtered using a choke and two electrolytic capacitors and this then feeds the plates of the two 6BW6 audio output valves via the centre tap on the primary of the output transformer. The HT for the rest of the set is filtered using a resistor/capacitor network, along with other decoupling networks for the low-level audio sections.

Because this set has a better than average audio amplifier, a "hum-dinger" pot (R3) has been connected across the 6.3V heater winding, with the moving arm going to earth. This is adjusted to minimise any hum in the output. This is R33 at the bottom right of the circuit diagram.

## Automatic gain control

Automatic gain control (AGC) or as it used to be called, automatic volume control (AVC) is also fitted to this receiver. As shown in Fig.1, a small mica capacitor is connected between the plate of V3 (6N8) and one of its diodes. Normally, the 6N8's cathode is around 2.5V positive with respect to the chassis and the so diode is biased



off via R11, its DC return to chassis.

However, if the RF signal exceeds 2.5V peak, a negative voltage will be produced at the diode's output. This is then applied along the AGC line to valves V1, V2 & V3.

This is a delayed AGC system, as the RF signal has to reach quite a reasonable level for AGC to occur. This is done to ensure good signal-to-noise ratios on weak signals.

## Magic eye

Another feature of the circuit is the inclusion of an EM85 "magic eye" indicator to assist tuning. STC didn't claim this as a valve, although many other manufacturers did in their receivers.

Basically, it looks like an unusual 9-pin miniature valve. In this set, it is located just behind a small window in the back plate of the tuning dial, towards the righthand end. It produces a green "glow" that changes in shape according to the strength of incoming signals and this helps the user accurately tune stations.

When the record changer is to be used, the selector switches power to it and a light is turned on to illuminate the changer's enclosure. In addition, when the receiver is turned on, a red pilot lamp is illuminated in the middle of the cabinet (towards the bottom), so even if the doors are closed the user can see that the set is turned on.

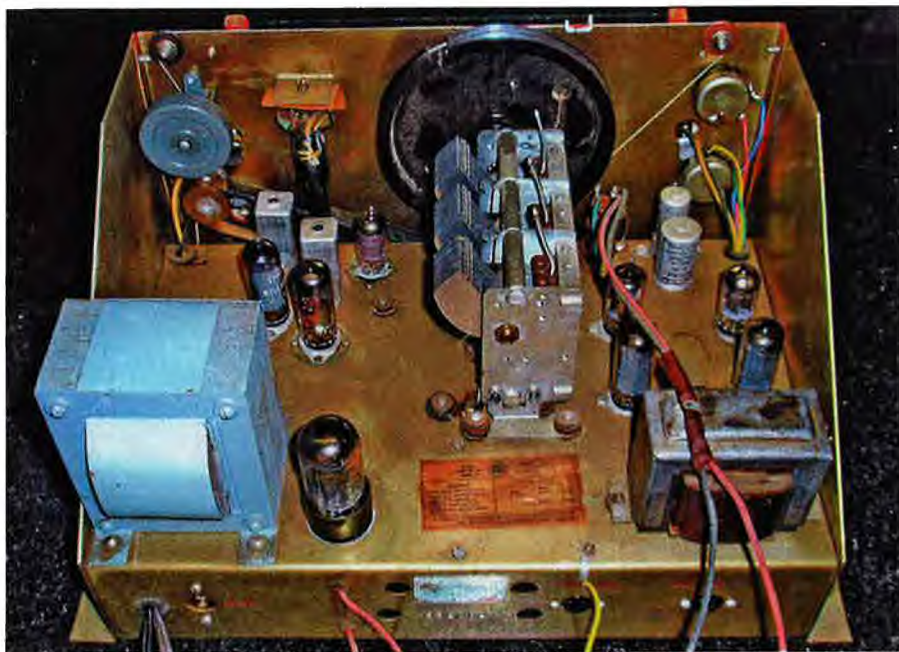
## The restoration

The cabinet finish wasn't exactly in good condition when Peter obtained the old STC. As indicated earlier, veneered solid timber is used in its construction, so there were no short-cuts to be taken here.

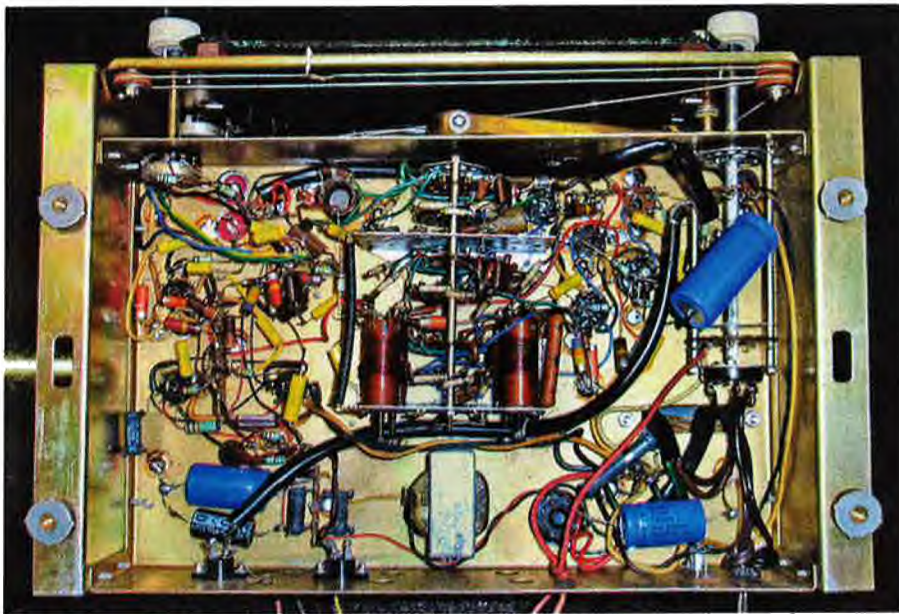
First, the chassis and other internals of the unit were removed and set aside, as were the doors, hinges and handles. Peter then set about stripping the finish off the timber with Accent Paint Stripper. This stripper is relatively mild and doesn't stain the timber like some other paint strippers do. The cabinet was then lightly sanded with a fine grade of abrasive paper.

The timber itself was in good condition and didn't require any filling. Peter points out that in order to ensure that there is no damage to the veneer, a good-quality paint stripper tool must be used along with the paint stripper liquid.

The next step was to mix a home-



Despite its age, the chassis was in remarkably good condition and looked almost new after it was cleaned up. It's a well-made unit and the top layout is clean and uncluttered.



All parts under the chassis of the STC A8551 radiogram are readily accessible despite the circuit complexity. Replacing the dial cord, the paper & electrolytic capacitors and two resistors restored the unit to full working operation.

brew stain to match the radiogram's original maple colour. Peter used a spirit-based Wattyl product, which is unfortunately now unavailable. This was mixed with an orange base stain and a little bit of black tint. However, some areas of the cabinet required a deeper tint than others, as these areas were almost white in colour after the paint stripper had done its job.

Several layers of Wattyl Stylewood 50/50 grade clear lacquer were then ap-

plied with a spray gun. And although not strictly necessary, the cabinet was sanded using 0000-grade steel wool between some layers. This ensured a really smooth finish and gave a really professional result.

Peter makes the point that the lacquer should only be applied on warm days with low humidity or the results will be disappointing. He makes his own cabinet polish and this was then applied, after which the cabinet was





This view shows the fully-restored unit with the doors open and swung fully back along the sides of the cabinet. Note the two record storage areas.



When the doors are closed, the speaker grill is still visible so that the set can continue operating without the sound being muffled. The cabinet finish is excellent and the old STC now looks like new.

rubbed down with some good quality Orange Oil. This removed any excess polish and gave the cabinet an excellent finish.

Next, the handles and hinges were all cleaned and polished. These were then given a coating of clear lacquer to keep them looking clean and reat-

tached to the cabinet.

### Overhauling the changer

Having completed the cabinet restoration, Peter's next task was to overhaul the record changer. Because of its age, the oil that's normally used to lubricate the moving parts had long

since dried out and any grease that remained had congealed into a sticky mess. As a result, the mechanism was well and truly seized up.

The old grease was removed using kerosene, after which lanoline spray was used to lubricate the bearings and other parts. Some light machine oil was then applied to any bearings and shafts. In addition, oil was applied to the felt wick around the phosphor-bronze motor bearings and this now runs smoothly again and will last for many years.

Fortunately, the plater was in good condition and there were no flat spots on the rubber idler pulley. The latter was cleaned with methylated spirits on a clean cloth and the whole assembly given a light coat of lanoline to keep everything operating smoothly.

Finally, the pick-up cartridge and styli were replaced. The mechanism was then tested and it all worked perfectly.

### Chassis restoration

It was now time to tackle the radiogram chassis. As previously stated, the receiver is quite a complex unit, with a total of nine valves. However, the chassis is quite large and is well laid out, with all parts easy to access (see photo). Even the wave-change switch and the components around it are relatively easy to get at.

The paper and electrolytic capacitors were all replaced so that no unexpected problems would arise in the future. The resistors were largely within tolerance and only one or two needed replacement. The dial cord also needed replacement as it had broken but the valves were all in working order.

Once this work had been done, the set was tested and it worked normally. Its sensitivity was excellent and the quality of the audio was very good, so no work was required on aligning the RF and IF stages.

In short, STC had really got it right and the amount of work required to get the chassis working again was quite minimal.

### Summary

The quality of radiograms at the end of the mono era was quite variable. Some were just ordinary broadcast mantel receivers fitted into a larger cabinet with a bigger speaker. Although they did sound a little better





A rear view of the cabinet with the record changer and radiogram chassis mounted in position. The connecting cables between them run along a shelf at the back of the unit. This unit is much more elaborate than the average radiogram of the mid-1950s era.

than the mantel set versions, they tended to be "bassy" in their response and could easily be driven into noticeable distortion if the volume control was wound up.

However, there were a few radiograms like the STC Capehart where the chassis and the components were designed to give good-quality reproduction. This set uses negative feedback in the audio stage together with a pair of push-pull output valves and features a twin-cone 12-inch (30cm) speaker in a sealed enclosure, so STC was evidently serious about the audio quality.

In addition, the RF (radio frequency) section of the set is quite sensitive and a nice touch is the compensation

**The Collaro 3-speed automatic record changer required a good clean-up plus some fresh lubrication to make it run smoothly again. The pick-up cartridge and styli were also replaced.**



used in the oscillator tuned circuit to prevent drift on the shortwave bands as the set warms up.

The only criticisms of this set are that it would have been quite expensive and it is big. However, it really

is a beautiful piece of furniture and I would certainly like one in my collection if I had the room.

Acknowledgement: photographs by Peter Henstridge. **SC**