Vintage Radio

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Seyon 2D 2-valve "wireless" & an old single-valve receiver

This month, we take a look at a Seyon mid-1920s wireless set and another set of unknown age that was probably built (or rebuilt) between the 1920s and the late 1930s. Both sets are owned by Mark Bennett and I have used the term "wireless" deliberately, as these sets are definitely from the era when the term "wireless" was used instead of "radio".

ALTHOUGH FROM the same era, these two sets are quite different. The Seyon is a 2-valve receiver and was manufactured by the Noyes Brothers. How did it get its name? Well, "Seyon" is "Noyes" spelt backwards.

The other set uses a single valve only but its origin is obscure. It has "E. Mills" marked on its baseboard but it's unknown whether this was the owner, constructor or manufacturer.

The Seyon 2D

For a 2-valve wireless set from the mid-1920s, the Seyon is quite small and is remarkably well laid out. The set featured here was probably built in 1926, as the bias battery fitted to it has a warranty expiry date of 1927 and the valves specified came onto the market in 1926. In this set, however, the A425 valve (which was down on performance) has been replaced with an A415 which came out in 1927.

A card inside the back panel of the set shows the various connections for the batteries, antenna and earth. In fact, it's rather unusual for such an old receiver to have such useful information attached to it, although it's not as extensive as the information available on some later receivers. However, it still gives enough information for the average person to make the connections and get the set going.

The information card would have also minimised any errors when it came to connecting the batteries and fitting the valves. Unfortunately, it was not uncommon for batteries to be incorrectly attached to the receivers of this era and this could cause big problems. For example, attaching a high-tension (HT) battery to the valve filaments was certain to wreck the

valves, which could be heart-wrenching. Valves were very expensive in those early days!

The front-panel photo clearly shows the lack of control markings, something that was common during the early days of radio. The tuning dial is an "Indigraph" with a simple numbered dial scale.

The lefthand side of the front panel carries the regeneration control, which is a Bakelite-enclosed 360°-rotation variable capacitor. Next comes the main tuning dial and this is adjusted using a vernier drive on its lower edge. The only other front-panel component is a jack socket, used for connecting either headphones or a sensitive loudspeaker.

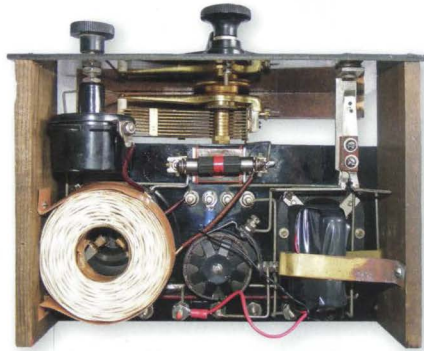
In addition, the set has a filament rheostat but this is mounted on the top of the chassis, towards the rear behind the audio interstage transformer. This rheostat has an open circuit section at one end, so that the set can be turned off.

As far as the cabinet goes, this isn't a "coffin set" as such, although it does have a lid that lifts up. However, it was innovative for its time, with a conventional chassis and an attached front panel. The entire assembly can be slipped out of the cabinet once the retaining screws in the front panel have been removed, along with the battery, antenna and earth leads (these go into Fahnstock clips along the back of the chassis).

As shown in the photos, the wiring connections are run directly to terminals bolted to the ebonite chassis (this is an insulator and so no additional insulation is needed). The speaker currently used with this receiver is a German-made Neufeldt and Kuhnke unit, made in Kiel. It is a high-impedance (1.35Ω) reflex design and is remarkably effective.

One minor problem with the underchassis layout is that both valve sockets are hidden, one under the unusual-looking tuning coil and the other under the bias battery. This makes access for servicing more difficult.

An above-chassis rear view of the 2-valve Seyon receiver. Note the large interstage audio transformer between the two valves and the row of spring terminals along the rear edge to terminate the battery connection leads.



An under-chassis view of the Seyon receiver. The grid-leak resistor (below the tuning capacitor) required replacement, while three 1.5V AA cells connected in series (and taped together) now provide the bias voltage.

The circuit

Mark doesn't have a circuit for this set so I can only surmise that it is a conventional 2-valve receiver for the era, using a Philips A425 as a regenerative detector. This is followed by an Igranic interstage audio transformer with a step-up winding ratio of about 1:3. It feeds the audio signal to an audio amplifier output stage which is based on a Philips A409 valve. Its plate circuit drives either a high-impedance speaker or a pair of headphones.

For those unfamiliar with their use, an interstage audio step-up transformer increases the signal voltage at the plate of the triode driver valve before applying it to the next stage. A step-up ratio of 1:3 is common but ratios as high as 1:7 have been used. The higher the ratio, the poorer the audio quality, so 1:3 was generally considered to give the best compromise.

Interstage audio transformers were suited to the relatively low-gain triode valves of the era. If the practical gain of

Inside of the Seyon receiver with the lid raised. The label attached to the rear panel shows how the batteries, antenna and earth are connected to the set.

the A425 was 20 and the transformer had a step-up ratio of three, then the overall gain would be 60.

One drawback was that these transformers were expensive to produce. As a result, they disappeared as higher gain tetrode and pentode valves came onto the scene and RC interstage coupling became popular. For example, the 6AU6 valve has a gain of up to 371, so why would you bother with a transformer when a few low cost components would do a better job! Manufacturers ceased using interstage transformers when valves such as the 6AU6 came on the market.

Even humble triodes like the 6AV6 will amplify signals by up to around 70 times in a practical RC-coupled circuit. What's more, the resulting audio quality is much better than through the best audio transformer.

Despite its age, the original bias battery, a Yale flashlight type, still had an output of 1.3V.

Battery triodes

Both the A409 and the A425 are 4-pin battery triodes with 4V filaments, each drawing 65mA. The A409 has a theoretical gain of nine although it will be probably be around seven in most practical circuits. A plate voltage of up to 100V can be used and the valve will draw 8mA with a bias of up to -9V.

By contrast, the A425 has a theoretical gain of 25, although this will be reduced to around 20 in practice. It can be used with up to 120V on the plate and will draw around 1mA with a bias of around 1V.

Power for the Seyon receiver was supplied by a 4V lead-acid accumulator for the filaments, a 4.5V battery for the bias and two dry batteries tapped at various voltages for the high tension (HT). The original filament and HT batteries had long since been discarded when Mark obtained the set but the original bias battery (a Yale No.117 flashlight type) was still there. A test of this battery revealed that it could still muster 1.3V – this some 85 years after it was manufactured (the warranty expired in December 1927).

Mark now uses a mains-operated power supply with the set, along with three 1.5V AA cells to supply the bias voltage. These AA cells are taped together, clamped under the chassis and connected via the only plastic insulated wire in the set. Sometimes, wire that's authentic for a particular era is not easily obtainable.

The external mains-operated supply provides the two HT voltages required by the set, plus the 4V supply for the filaments.

Restoration

As indicated previously, the original A425 valve was down in performance. Mark replaced it with an A415 which although lower in gain, still works well in this receiver. In addition, the grid leak resistor, like many of that era, had gone open circuit. As a result, it was dismantled and re-cored with a small, modern resistor. The capacitor in that assembly was also checked with a high-voltage tester and found to be in working order.

Performance

Once the repairs had been completed, the Seyon performed quite well for a 2-valve receiver. It does not need a large antenna and it will drive a high-impedance speaker to reasonable volume when tuned to local radio stations. The regeneration is controlled primarily by the regeneration control on the front panel, with further control afforded by adjusting the filament rheostat.

Like most sets of the era, the dial scale is marked 0-100. As a result, most listeners made up a chart showing the stations and their corresponding numbers on the tuning dial. This enabled them to quickly tune to a particular station at any time.

The 1-valve set

I'm uncertain as to the origin of this little set but I'm inclined to think that it was home-made rather than commercially manufactured. The reason for this is that the circuit assembly could hardly be described as first class, especially when compared to the Seyon. On the other hand, the cabinet was obviously made by someone who knew what they were doing although it was rather dilapidated when Mark came by the set.

As shown in one of the photos, the

various controls are arranged across the ebonite front panel. These are, from left to right: the regeneration control, the tuning control and a filament rheostat with an on-off position. Underneath the tuning control are two terminals which are used to connect the headphones or a horn speaker to the set.

The battery leads are fed directly out of the battery compartment and the antenna and earth points are connected via flying leads to terminals on the lefthand side of the cabinet.

Circuit details

This 1-valve set is typical, both in circuitry and cabinet style, of the many simple receivers built in the 1920s and 1930s. It uses a single type 30 valve in a regenerative circuit (see Fig.1) and this directly drives a pair of high-impedance headphones or, if the received station is strong enough, a high-impedance horn speaker. In fact, Mark uses this set from time to time with a Browns horn speaker.

The 30 valve is classed as a detector/amplifier triode. It has a 2V 60mA filament, can be used with up to nearly 160V HT, requires a bias of up to -15V and will draw 1-3mA of plate current, depending on the operating parameters selected by the designer.

The gain of the valve in class-A mode is around nine, which is quite modest. However, when used as a regenerative detector, this low gain is largely made up for by the feedback network. A pair of 30 valves arranged in a class-B push-pull configuration can give an audio output of 2.1W, which is similar to that derived from 19 or 1J6G twin-triode valves used in the same way.

In this set, the 30 valve has a 25Ω rheostat in the filament line and this acts as a subsidiary regeneration control and on-off switch. It certainly suggests that the 30 will work quite well with less voltage on its filament than 2V. Indeed, if the rheostat is set to full resistance, there will only be about 1.2V across the filament.

As an aside, many "do-it-yourself" designs published during the era used a 1.5V torch cell to provide the filament voltage. The valve worked quite well with this lower voltage and 45mA of filament current.

Getting it working

Despite looking a bit tatty, the circuit breadboard didn't require any major work other than fixing a faulty grid-leak resistor and cleaning up some wiring connections. The grid-leak resistor was fixed by removing it from its case (by drilling it out), then sliding in a new resistor and soldering its leads to the capped ends. This is a neat method that keeps the components looking original.

The mica capacitor across the grid leak resistor is a different type to that used in the Seyon and it checked OK. However, some of the wiring had deteriorated so much that it had to be replaced. In addition, some of the wiring connections had corroded, so these were cleaned up and the terminals re-tightened. The 30 valve was in working order, as were the remaining passive components.

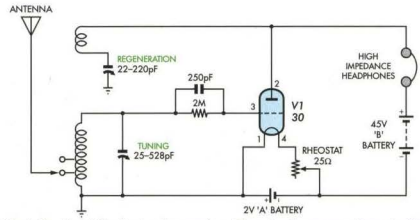
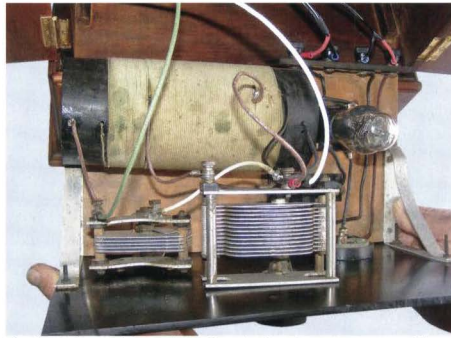


Fig.1: the circuit for the 1-valve receiver. It's a simple regenerative set with a type 30 triode valve used as detector/amplifier. This directly drives a pair of high-impedance headphones or a high-impedance loudspeaker.



The chassis layout of the 1-valve set is as simple as it gets. It was restored by replacing the grid-leak resistor and cleaning up some of the wiring connections.

Power supply

To power this set, Mark uses a small 12V sealed lead acid (SLA) battery and a linear regulator circuit to provide 2V for the filament. This may not be an efficient method of supplying the filament current but it is convenient, as the set is not used a great deal.

By contrast, the 45V HT for the plate circuit is provided by five 9V 216 batteries wired in series. These are daisy-chained together to give a spare terminal at each end which is then connected to the receiver. A battery snap connector cut in half makes the

The cabinet for the 1-valve set was restored by stripping off the gold paint, then sanding and staining the timber. The doors and hinges were replaced.

This Browns horn speaker is often used by Mark with the 1-valve set.

connections to the battery terminals.

As shown in one of the photos, the 9V batteries are taped together and sit in the cabinet's battery compartment.

Cleaning the controls

The next step in the restoration involved cleaning the control knobs. This was done using soapy water and a small scrubbing brush. The knobs were then polished (using car polish) and rubbed clean with a soft cloth to remove any old oxidised Bakelite.

The markings on the knobs had disappeared long ago so the indents in each control were then hand-painted in white. The paint was initially applied over the indentations with no particular care and the knobs then wiped using a cloth moistened with turpentine. This removed all the paint except from the indentations and grooves, leaving a neat finish. This technique proved so successful that the controls now look like new.

Cabinet restoration

The cabinet restoration required a considerable amount of work. The original cabinet (doors included) was covered with ugly, gold-coloured paint which really looked out of place, especially as the timber underneath was quite attractive. As a result, the cabinet was dismantled along all hinged edges, so that all the corners and edges could be easily reached during the restoration work.

As well as being covered in gold paint, the doors were also in rather poor condition. These were replaced by two new doors made by Dennis, a friend of Mark, while another friend (Marcus) turned up a new catch. In addition, all the old hinges were discarded and new brass hinges of the same general style obtained to go with the cabinet.

The rest of the cabinet was restored by first applying paint stripper to remove the gold paint. The cabinet was then sanded down along the wood grain using progressively finer grades of sandpaper to obtain a smooth finish. A product called "Feast Watson" (a wax-enriched timber oil) was then applied to the cabinet using a soft cloth and this gave the timber a rich golden-brown finish.

The batteries for the 1-valve set sit in a special battery compartment at the bottom of the cabinet.

Summary

Mark, with help from Marcus and Dennis, has restored both of these early receivers to good working order. Generally, Mark ferrets out suitable sets for restoration, Marcus does the technical restoration and Dennis does the cabinet work. So it's a collaborative effort.

The Seyon receiver is particularly interesting because it uses a chassis, with components mounted both above and below it. This construction technique wasn't all that common when the Seyon was manufactured.

Both sets are quite collectable, particularly the 2-valve Seyon. It offers better performance than the 1-valve set but the latter has a more impressive cabinet. SC