

VINTAGE RADIO

By JOHN HILL



The 8-valve Apex receiver – a glorified sardine tin

In a past Vintage Radio story entitled “Trash or Treasure”, mention was made of a 1929 American Apex receiver. This interesting old receiver has some unusual features and posed quite a few challenges during its restoration.

This ancient imported receiver is fairly novel in some ways and has a number of firsts associated with it as far as I'm concerned.

The Apex is the first metal-cased radio I have found that has an undamaged cabinet. Most steel radio cabinets ended their days as tool boxes.

Another first is the large number of valves; no less than eight. Of all the receivers I have restored so far, this

old Apex has the highest valve count. Being originally fitted with a 240V transformer is another first, as all the other American receivers I have encountered have been 110V models.

The Apex is also the first radio in my collection with a drum dial, the first mains operated TRF (tuned radio frequency) receiver that I have restored for myself and my first with a push-pull audio output stage.

The steel cabinet fad came in during the late 1920s and went out of fashion a few years later. It wasn't in vogue for very long and was little more than a convenient and inexpensive method of housing a budget-priced radio chassis. Personally, I think a bare chassis looks far more impressive than a pressed steel cabinet.

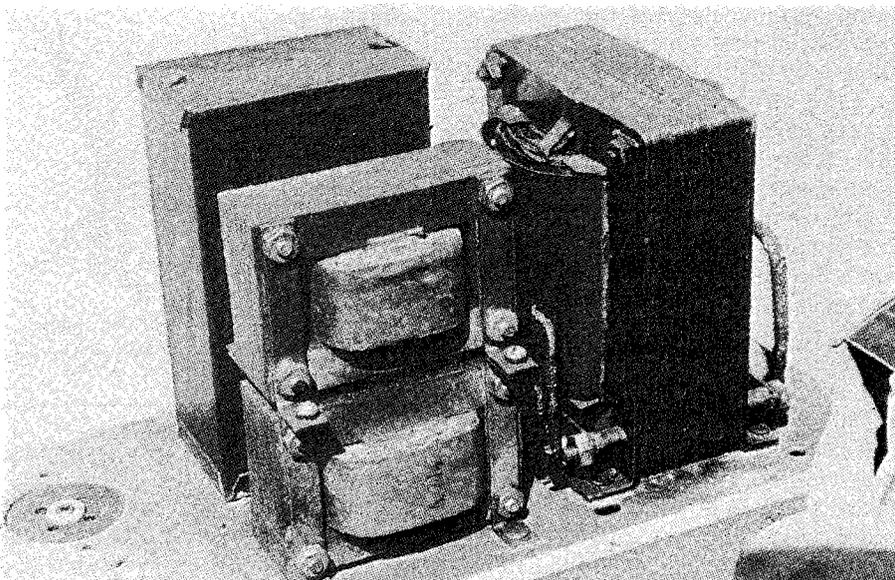
Like other American receivers of late 1920s vintage, the Apex has a very predictable valve line up: an 80 rectifier, five 27s and two 45s in the output. Just about every non-European set of that era would have used those valves.

Neutralised circuits

Neutralised type 27 valves in a TRF circuit were all the go at the time and the Apex has a metal plate attached to the power transformer cover which boldly states that the set is a “Neutrodyne” receiver. However, although labelled as such, I defy anyone to find a neutralising capacitor in any shape or form. What the nameplate says and what the set appears to be are two different things.

Some radio manufacturers did some clever things to get around paying Neutrodyne royalties but just what Apex has done is rather a mystery, especially as the set was sold as a Neutrodyne. Perhaps some well-informed Apex expert can give me an answer?

Incidentally, the Neutrodyne system was developed by Professor Hazeltine to combat the inherent instability of triode radio frequency amplifiers. The problem is caused by inter-electrode capacitance between



Removing the large cover at one end of the chassis reveals the 240V power transformer (right), two high tension chokes (front) & a large block capacitor for high tension filtering (rear). The power transformer & chokes were OK.

the grid and plate and this capacitance creates positive feedback when both the plate and grid circuits are tuned to the same frequency. The result is uncontrollable oscillation.

This oscillation problem can be overcome by introducing an equal and opposite phase voltage into the circuit to counteract the feedback voltage and a small variable capacitor is used to balance the two. It is the feedback voltage that is neutralised, not the inter-electrode capacitance.

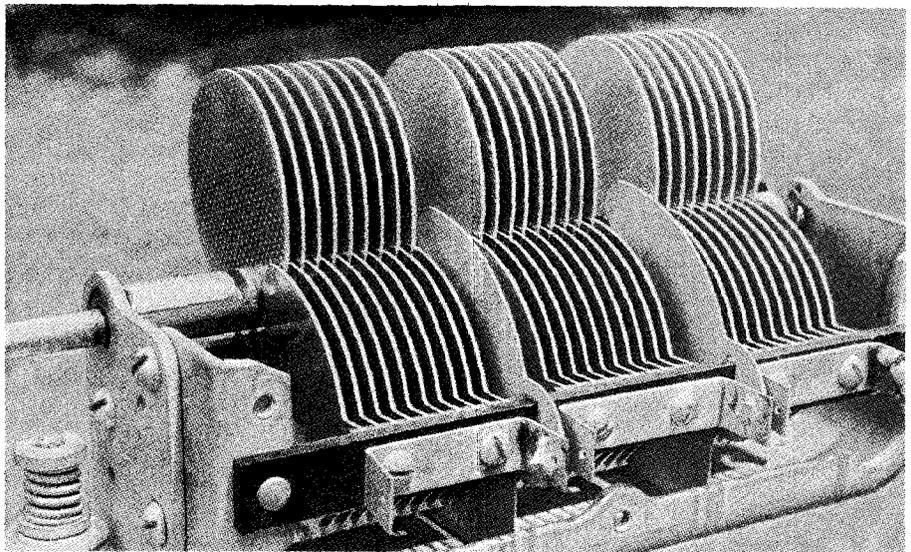
If the Apex has any neutralising capacitors then they are not at all obvious and have been cunningly concealed. The only small adjustable capacitors to be found are those attached to the 3-gang tuning capacitor and they are the crudest trimmers you ever did see! They are nothing more than tabs that are adjusted by bending them one way or the other. These tabs are connected to the fixed plates and to chassis.

Untuned RF amplifier

The Apex circuit has a few interesting oddities, the first being the stage of untuned radio frequency amplification. In this circuit, the aerial goes straight to the grid of the first RF valve.

Such a setup could perhaps be described as an untuned aerial coupling device. While offering less gain, it allows the following tuned stages to track, regardless as to whether a long or short aerial is used and whether or not there is an earth connection.

Conversely, TRF receivers with a tuned RF stage often had a manual



The tuning capacitor was completely dismantled in order to clean it & lubricate the spindle bearings. Note the three "bend-a-tab" trimmers along the front.

trimmer on the first stage so that that section could be tuned to suit whatever aerial length was being used.

The Apex's untuned RF stage is followed by two stages of tuned RF amplification before the resulting signal is fed into a leaky grid detector. An audio frequency interstage transformer is then used to couple the detector to the first audio amplifier which, in turn, drives the two output valves via a push-pull coupling transformer with a centre-tapped secondary winding – see Fig.1.

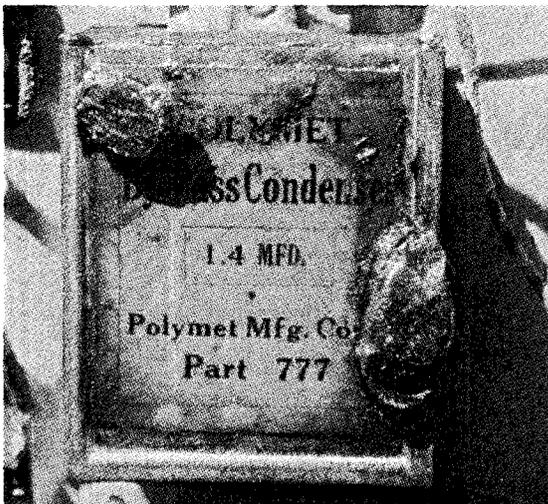
The output stage is a little unusual (though perhaps not unusual for 1929) in that it uses a centre-tapped choke to feed the high tension to the plates of the output valves. The output trans-

former does not have a centre-tapped primary as is usually the case.

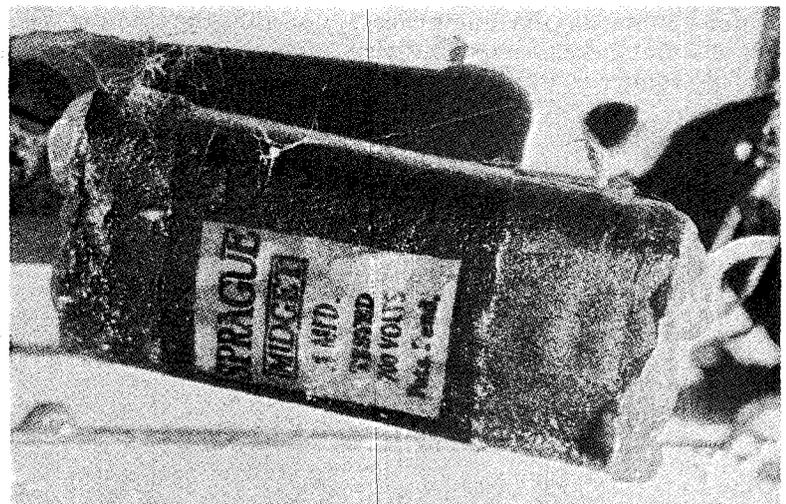
Following the output choke, a normal output transformer is used to couple the signal to the loudspeaker. In this case, the output transformer is housed in the base of the loudspeaker stand. The loudspeaker's field coil winding is wired to a separate lead which connects to a pair of terminals at the back of the chassis marked "Field".

Restoration problems

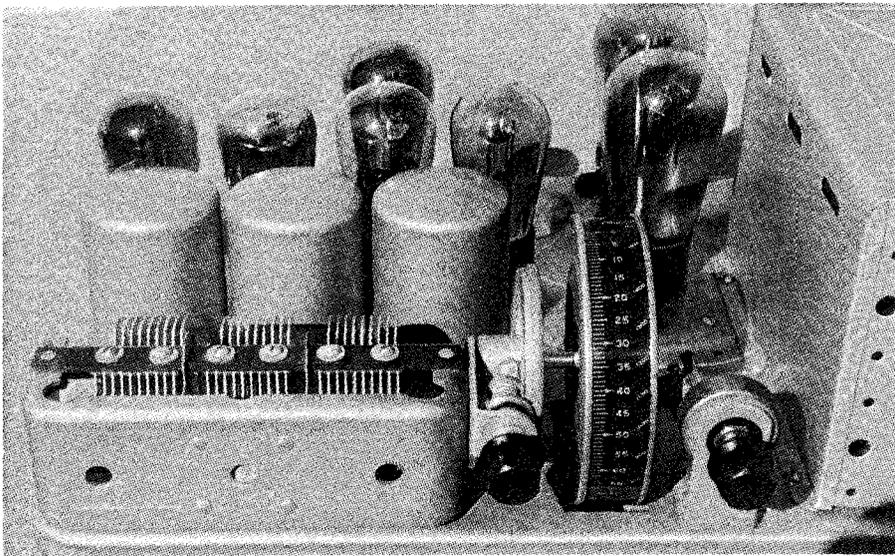
As is usually the case with a receiver of this age, there were a few problems with the restoration, the main one being the totally derelict state of the loudspeaker.



The two wax stalactites descending from this paper capacitor give a good indication of its condition. It was replaced with a modern capacitor of equivalent value.



The old Apex receiver had a number of small paper capacitors throughout the circuit. Once again, the wax that has been pushed out of the ends of this capacitor tells the story as to its condition. All paper capacitors were replaced.



The 65-year old chassis cleaned up rather well. Note the drum dial with the tuning & volume controls to either side. The push-pull 45s in the audio output stage are the two large valves at the rear of the chassis, adjacent to the transformer cover.

Another problem was caused by the removal of the chassis from its cabinet. Although everything had been disconnected, the chassis would not budge. A bit of "gentle force" released whatever was holding it and out it came.

Oh dear! – there on the bottom of the cabinet were several blobs of wax. In the largest of these was embedded a rather important wire – the centre-tap connection of the previously mentioned output choke.

As with most early AC-powered receivers, there were numerous cans full of leaky paper capacitors that needed replacing. Other repairs and incidentals included testing the valves, cleaning and lubricating the tuning capacitor and dial mechanism, and replacing the volume control – these in ad-

dition to the normal routine cleaning and other minor tidy-up jobs. The main problem at this stage was the damaged centre-tapped output choke.

The choke was repaired by subjecting it to major surgery. The outer insulation was cut open with a knife, the centre-tap found and a new lead-out wire soldered to it. The wound was then closed with a liberal application of contact adhesive and held together with rubber bands until the incision had fully healed. This simple operation made the choke serviceable once again.

Both of the interstage transformers checked out OK but the original loudspeaker was totally wrecked. Because of this, the receiver was temporarily connected (via a suitable output transformer) to an 8-inch (200mm) permag

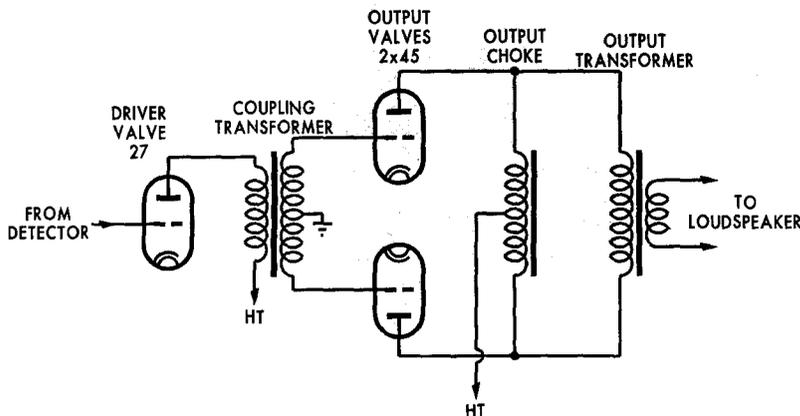


Fig.1: the output stage is unusual in that it uses a centre-tapped choke to feed the high tension to the plates of the output valves. Note that the output transformer does not have a centre-tapped primary as is usually the case.

speaker mounted on the wall of my den.

A 2k Ω 20W resistor was substituted for the original field coil winding. This component was soldered to the underside of the field coil terminals and can easily be removed when a suitable loudspeaker is found. Any increased hum that may have been caused by this modification is certainly not objectionable. The HT circuit still has two built-in chokes and accompanying filter capacitors.

Alignment

Alignment of the receiver was not without its problems, mainly because of the rough manufacture of the 3-gang tuning capacitor. The bend-to-align trimmers were no problem to adjust but when they were adjusted, the frequency settings were off at the other end of the dial.

This alignment problem was remedied by using the trimmers at the high frequency end and bending capacitor plates at the low frequency end. Eventually, the receiver was tracking fairly accurately over the full range of the dial – and the old set performed very well indeed!

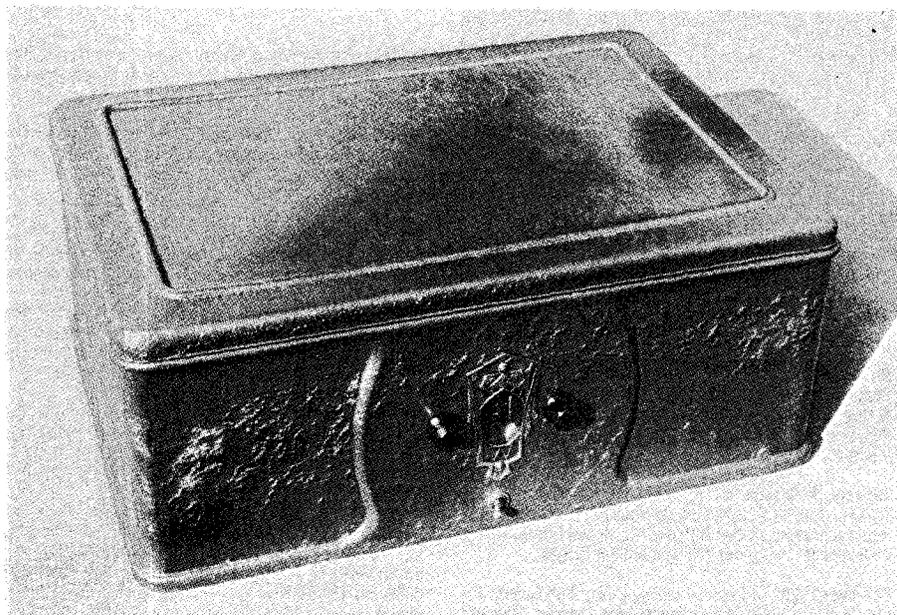
However, it was later found that the receiver went out of tune a little at the high frequency end of the tuning range when it was installed in its metal cabinet. This was due, no doubt, to the capacitance effect of such a large area of sheet steel. No wonder the steel cabinet idea was abandoned!

Restoration of the cabinet was a relatively simple procedure. The outside of the cabinet had been originally painted a brown colour. "Crinkle Brown" should identify the paint work reasonably well and it seemed to be in keeping with the 1920s trend of crinkle finishes on metal surfaces.

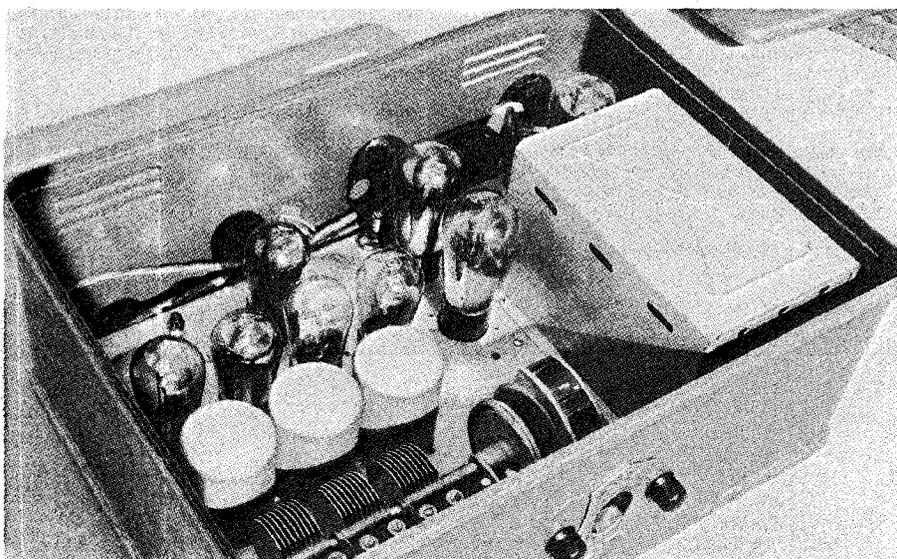
After cleaning, the bare spots were primed with an anti-rust metal primer which was applied quite thickly with a toothbrush. Teasing up the partly dry primer with the toothbrush produced a reasonable crinkle effect which is perhaps a better technique than allowing the paint to dry smooth.

While the primed patches were drying, the inside of the cabinet was spray painted to improve its appearance. After that, the primed spots were touched up with brown paint so that they would not show through the final coat of paint.

The top coat was applied sparingly



A major part of the restoration involved painting the metal cabinet to give it an authentic "crinkle brown" appearance. It's no wonder that so many metal radio cabinets ended up as tool boxes. All they needed was a carrying at handle each end.



A bird's-eye view of the Apex receiver with the top cover removed. Although designed as a budget-priced receiver, it performs very well indeed.

with a short bristled brush and it was put on with a stabbing action rather than a brushing action. The drying paint was worked with the brush until it was almost dry. Doing this prevents the paint from filling in the crinkly surface and also dulls off the surface finish.

Although the cabinet refurbishing was really only a quick touch-up job, the overall effect was quite pleasing. It looks clean and tidy, is not glossy, and maintains its original crinkle finish.

Outwardly, the old Apex looks the

genuine article and under the bonnet it is running well on all eight cylinders, so to speak. However, the restoration cost was fairly high as the two replacement output valves alone cost \$100. It would have cost a lot more if some of those interstage transformers had been open circuit.

All I need now is an appropriate loudspeaker and the Apex will be a complete outfit. In the meantime, this relic from the past works quite well with my wall-mounted speaker should I wish to demonstrate it or listen to a favourite program. **SC**