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This Little Nipper was a dog

HMV's "Little Nipper" was usually a reliable and pleasant companion. However, I recently had to restore one that was a real "dog's breakfast".

HMV used the name "Little Nipper" for a popular line of mantel receivers made from the 1940s through to the 1960s - just as Astor used the name "Mickey" for some of its receivers. The line-up included many different models in various formats, including the 62-52 unit featured here.

Basically, the "Little Nipper" receivers came with either four or five valves and were usually broadcast band receivers only. However, some dual-wave sets also carried the "Little Nipper" name.

These sets were all "middle-of-the-road" in terms of quality, with good performance and an attractive appearance. The various designs were well thought out and they were generally easy to work on.

Naturally, the circuit designs and the appearance evolved as time went by. The cabinets changed too, progressing from bakelite to plastic in the later years.

Restoring A 62-52

A rather sad looking Model 62-52 Little Nipper was recently brought to me for servicing. The owner didn't want me to do a complete restoration. Instead, he would restore the cabinet and find suitable knobs himself (the original knobs were either broken or missing).

The original knobs fitted to the "Little Nipper" had a tendency to break in the centre.

Unfortunately, the correct knobs for these sets are rather hard to come by and I had none spare. In use, they often break in the centre but they can be repaired using Araldite or a similar epoxy adhesive. If any of the plastic that normally surrounds the shaft is left, a greased short length of shaft from an old control can be sat in the shaft groove. The trick is to make sure it is vertical (as it would have been originally) and before sitting the shaft in place, score the plastic on the underside of the knob to give the Araldite something to adhere to.

Most of the underside of the control can then be filled with Araldite and allowed to set. The shaft can then be removed after the Araldite has set, as the grease prevents it from adhering to the shaft. The repaired knob will work as good as new and will be stronger than before.

To give even greater strength, a small key ring can be slightly spread and slid over the end of the knob's shaft. However, this will not be possible with

This view shows the Little Nipper receiver as it landed on my workbench. It was dirty and fitted with the wrong knobs – and that was just the outside.

the knobs from some sets, as the hole through the receiver's escutcheon may only be slightly bigger than the knob's shaft extension. If necessary, the split control shafts can be spread slightly so that the knobs are a firm fit and remain in place.

The process of repairing the knob can be seen in the accompanying photos.

Fortunately, this particular set hadn't had a rough life, with the knobs being the only obvious casualties over its lifetime. The cabinet was given a quick clean-up to make it a little more presentable and to make the set more pleasant to work on but it certainly wasn't a full restoration.

Getting it working

According to the owner, the set wasn't working because the power transformer had "burnt out". I had one spare, so if that was all that was wrong with it, getting it working again would not be difficult.

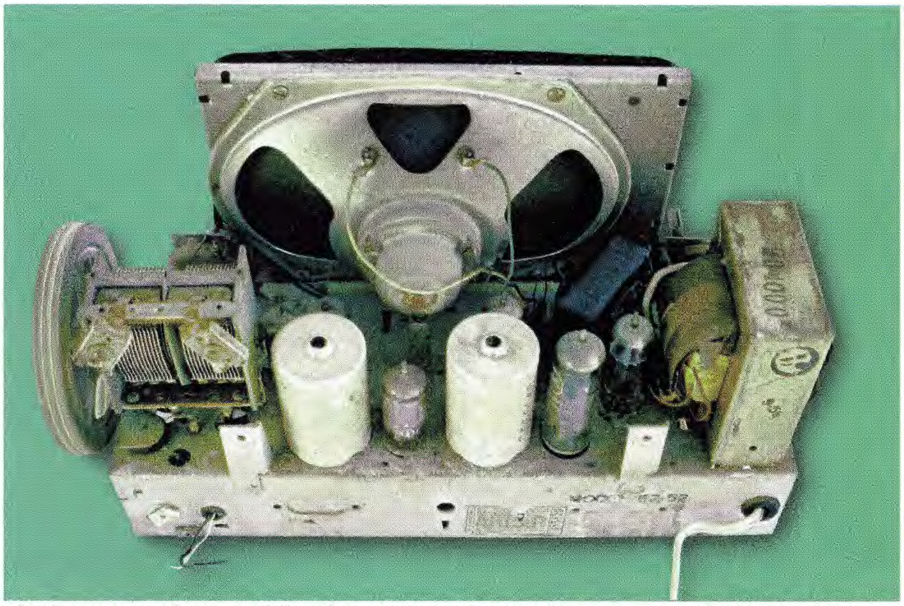
Fig.1 shows the circuit details of the set. Note, however, that this is actually the circuit for a 61-51 but it's virtually identical to the 62-52.

Because there was no smell of burnt insulation, I wondered if the transformer really had failed." As a result, my first step was to test the transformer for any insulation breakdown using a 1000V insulation tester. This showed that there was a least 200MΩ of resistance between each of the three windings and transformer frame.

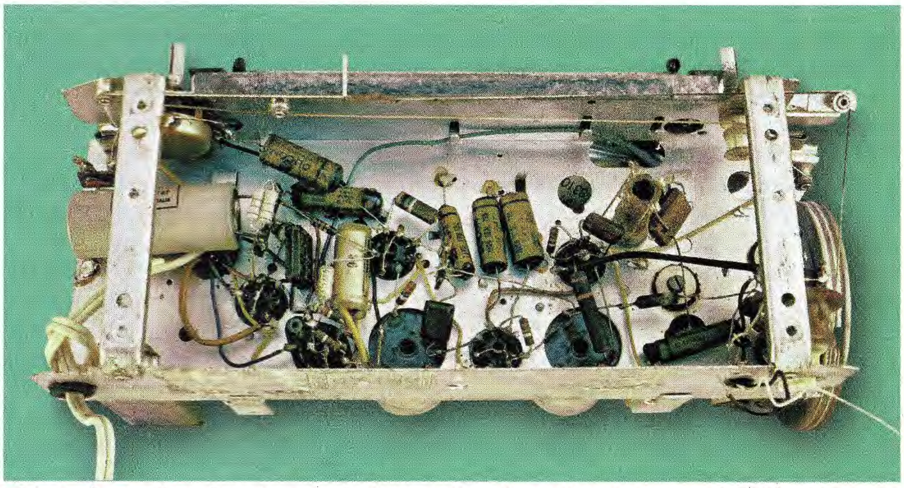
The only other thing likely was shorted turns in one of the windings. To check this, the rectifier was first removed and the set connected to power and switched on. The voltage between each end of the high-voltage winding and earth was then measured. They were within a volt or two of each other at around 350VAC, which is to be expected with no load.

This meant that the high-voltage secondary winding was probably OK. In addition, the dial lamps were alight and the voltage across the filament line was around 6.8V, which was quite reasonable as both secondary windings were lightly loaded.

What if the primary had shorted turns? In that case, the secondary voltages would probably have been higher than they were. In addition, the smell of burning insulation would have been evident and the transformer would probably have been making a



The layout on the top of the chassis is uncluttered, so access to individual parts is easy. It's just as well, because this set had more faults than you could imagine.



This is the under-chassis view before restoration. The 2-core mains flex was later replaced with a 3-core cord, so that the chassis could be earthed.

"fizzing" noise. There may even be wisps of smoke but none of these symptoms was evident.

As a result, I left the set run like this for several minutes and the transformer showed absolutely no sign of heating. It just went about its job with no fuss, so all was apparently well.

It was at this point that one of the dial lamps suddenly decided to go out. It was easily fixed – the lamp had come loose in its socket and tightening it immediately fixed this intermittent fault.

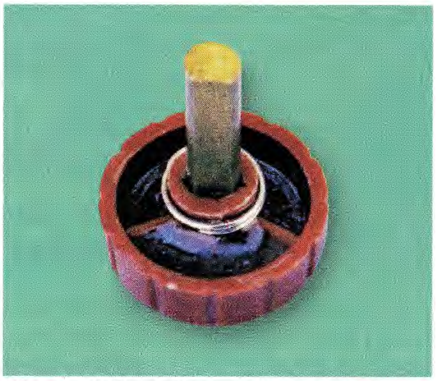
Finding an HT short

It was now time to look further into the set and try to discover why the owner thought that the transformer had burnt out. My first step here was to switch the set off and check the resistance of the HT line to earth – it measured just 80Ω which, for all practical purposes, is nearly a dead short! I then checked electrolytic capacitor C21 on the output of the rectifier but it was OK, so I set about isolating everything at that point (with the rectifier still removed).

It didn't take long to discover the problem – when I lifted the speaker transformer clear of the chassis, the short disappeared. A quick check with a multimeter showed that it had a low-resistance short from its primary winding to the frame. So this was the "burnt out" transformer.

Obviously, a replacement transformer was needed, so I rummaged through my collection of speaker transformers.

The control knobs can usually be repaired using Araldite (or a similar epoxy adhesive), a small key ring and a scrounged (greased) control shaft. The control shaft is removed after the Araldite has set.



The Araldite is "poured" into the underside of the control knob, while the keyring prevents the centre boss from breaking again.

Unfortunately, I couldn't find one with a 7000Ω to 3.5Ω impedance ratio that was small enough to fit into the available space.

In the end, I used a transformer with a 5000Ω to 3.5Ω impedance ratio and installed a small resistance in series with the secondary. This gave an ideal match to the audio output stage, although the total audio output to the speaker would be reduced by a few percent.

By the way, please note that for safety reasons, all sets should be switched off and the power lead removed from the power point before doing any work on the circuitry; eg, soldering or desoldering leads, etc.

Disintegrating valve socket

During the course of my investigations, the four leads from of the speaker transformer had to be disconnected (by desoldering them). Three came off as expected but the fourth which went to the plate of the 6M5 valve just came out of the socket. In fact, the whole wafer socket just disintegrated, which is something I haven't seen before.

This meant that before I could wire in the new transformer, I had to replace the valve socket. To avoid errors later on, I drew a diagram of the wiring before removing the wrecked socket by drilling out its retaining rivets and replacing it with a moulded insulation type.

The only problem was that when I went to fit the new socket, I found that the mounting holes were in different positions relative to the valve pins as compared to the previous socket. This problem was solved by cleaning the chassis and then soldering the mounting lugs in the new position, so that the socket pins were in the same place as before.

The leads from the valve were then resoldered to the socket except that I made one small modification. Originally, pin 6 of the 6M5 was connected to chassis. This pin is shown as an "Internal Connection" in the valve data books, which means that it may be used as a support for various elements within the valve. As a result, it should be left free even though nothing was connected to it with this particular 6M5.

A replacement valve might have something connected to it, however – such as the plate!

Testing resistors & capacitors

With all this completed, it was now time to test the audio coupling and AGC capacitors. The audio coupler (C18) from the plate of the 6AV6 to the grid of the 6M5 had no measurable leakage but someone had previously replaced it with one a tenth of the correct value. This was replaced, as were audio coupler C16 and the two AGC capacitors (C3 and C9), which were all leaky.

Note that in this circuit, C9 must be replaced with the same value, as it is part of a bridge neutralisation circuit in the intermediate frequency (IF) amplifier.

Moving on to the resistors, R7, R8, R9 and R13 had all gone high and were way out of tolerance. They were also replaced, so what was originally supposed to be a simple servicing job was becoming quite involved. And I still hadn't even turned it on with the

These are just some of the parts that were replaced in the set. It's a good idea to replace paper capacitors as a matter of course.

rectifier in place to see how it was going!

Switching on

It was time for the smoke test but before switching on, I removed the 6M5 and inserted the 6X4 rectifier into its socket. That done, I checked for a short-circuit between the HT line and earth. This was necessary because it was possible for the 6X4 to have a filament to cathode short after being subjected to output transformer short circuit. There was no short with the valve cold, so I gingerly turned the set on and checked the voltages in the set.

The DC voltages all came up as they should and the 6X4 was apparently none the worse for the savage overload it had experienced.

By the way, early 6M5 valves experienced silver migration between pins 1 and 2 of the valve after some use, which causes a positive voltage to appear on the grid. To overcome this, I lightly scored the glass with a sharp scriber between these two pins to break up any silver film between them (in fact, I always do this whether there is a problem or not). That done, I plugged the 6M5 valve into its socket but there were immediate problems. The set came on with a howl and was whistling, even with the volume control turned down.

The whistling 6M5

So what was wrong? The output stage (6M5) has negative feedback applied from the secondary of the speaker transformer via C22. Of course, it is necessary to wire the transformer so that the feedback is negative but I'd managed to get positive feedback! This was easily fixed - all I had to do was swap the two leads on the secondary of the transformer.

That done, the audio amplifier stage was stable, although it appeared to have some hum. And it still had annoying crackles and some hiss (but no stations) when the volume control was turned up.

I tried moving the valves in their sockets and this made the crackling worse so it appeared that the socket contacts were causing problems. It was time to turn the set off and clean and tighten the valve socket pins.

The pins were cleaned with "Inox" lubricant, after which a sharp "modified" screwdriver was pushed in alongside each socket pin and the two sides levered closer together. The valves were then re-inserted and the set turned on again.

That stopped the valves from making extra noises when they were moved but it wasn't the complete cure - the set was still full of "crackles". I then tried tapping around various parts of the set with the plastic handle of a small screwdriver and this caused the crackling to vary in intensity, es-

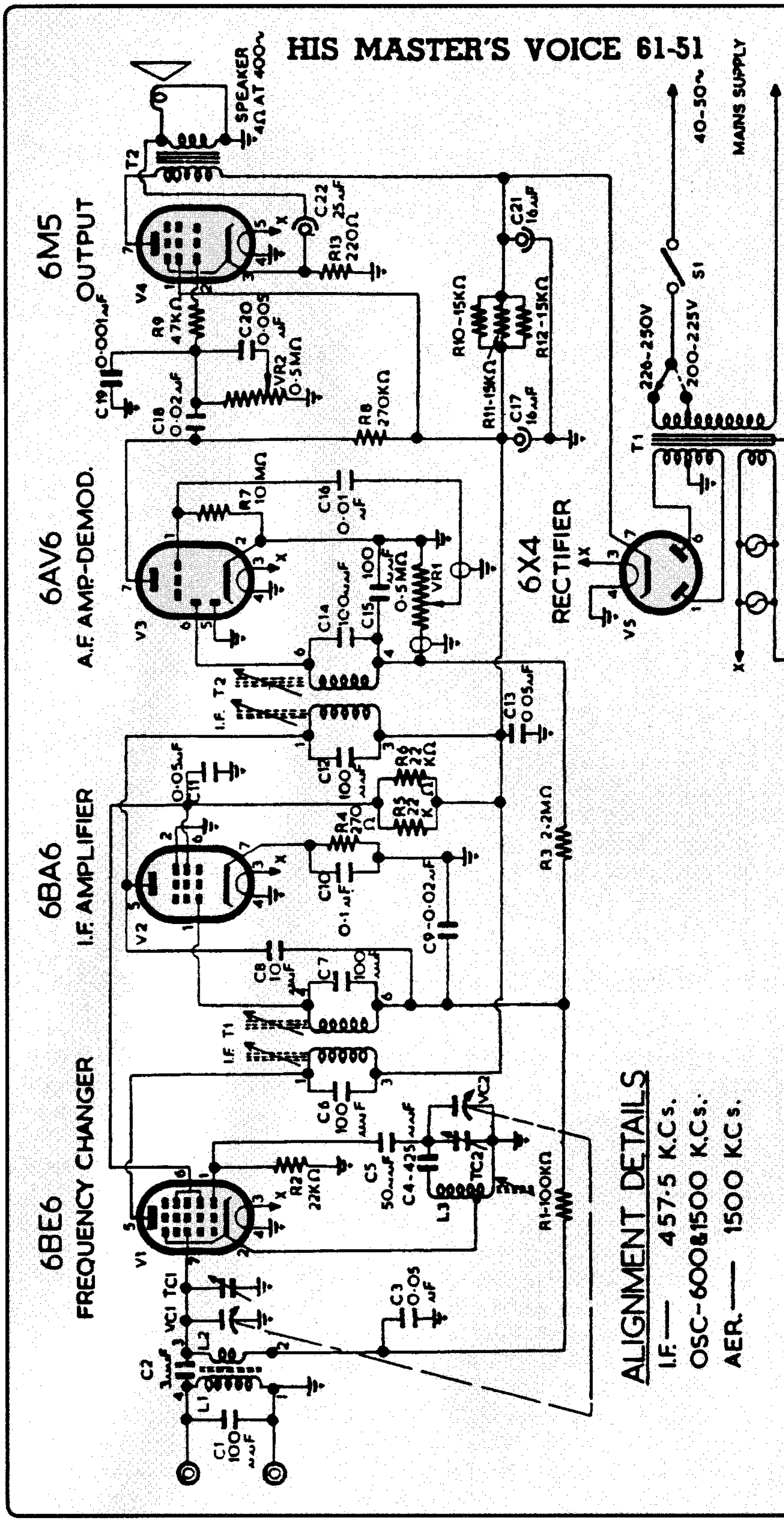


Fig.1: the "Little Nipper" is a fairly conventional 5-valve superhet.

Photo Gallery: 1933 Essenay M447

Produced by the Essenay Manufacturing Company Pty Ltd in 1933, this compact wooden receiver was fitted with five valves and tuned the medium-wave broadcast band. A feature of the cabinet was the ornate speaker opening and the "peep-hole" dial. The valve line-up was as follows: 57 autodyne mixer, 58 IF amplifier, 57 anode bend detector, 2A5 audio output, and 80 rectifier. Photo: Historical Radio Society of Australia, Inc.

pecially when I tapped around the first IF transformer.

Fun in the IF amplifier

To diagnose this problem, I first fed a high-level tone-modulated 455kHz signal into the antenna terminal. This gave some output from the speaker, which varied with the tapping. Using a digital multimeter, I then measured the voltage across C9 and initially it was negative. However, after running the set for a few minutes, it gradually increased to 0V and then started to climb in a positive direction.

During this time, the output variations seemed to remain consistent and the output from the detector was still negative. Thinking that there must be some leakage resistance between the two windings in the IF transformer which occurred as the set warmed up, I disconnected the secondary winding and checked for leakage using a high-voltage tester. However, even with the high-voltage tester applying 500V between the two windings, no measurable resistance was observed.

With the transformer rewired into circuit, my next step was to check the valve itself. A new 6BA6 was fitted and that fixed the positive grid voltage problem, so the original 6BA6 was faulty (gassy maybe?). The IF amplifier was now amplifying as it should but the crackling was still quite evident.

A new 6BE6 frequency changer enabled the set to now tune stations. However, it didn't fix the crackling and the set would even occasionally "jump" off station. I initially thought that this might be due to poor contacts between the moving surfaces of the tuning gang, thus causing the frequency to jump. Unfortunately, lubricating these made no difference so I checked to see if the gang plates were shorting.

At first glance, they didn't appear to be, so I put a strong light in line with the tuning gang vanes and looked through the gangs from the other side. This showed that two plates were probably shorting so I carefully bent one away from its neighbour which gave some improvement.

Closer inspection then revealed that some of the other plates were close (perhaps too close) to their neighbours as well. To check this, I disconnected the tuning gang from all other parts of the circuit (including the trimmer capacitors) and connected a high-voltage tester set to the 1000V volt range across each gang section in turn and rotated the tuning shaft. As I rotated the shaft, there were occasional "flickers" in the reading, indicating where the shorts were.

A little more judicious bending of the plates finally cured the crackles problem once and for all.

However, that wasn't the end of the story as the frequency jump problem was still occurring. I'd checked all the soldered joints and the moving points on the tuning gang and all appeared to be in good order, so the problem wasn't here. I even swapped the 6BE6 but it made no difference, so I took a close look at the oscillator circuit.

Sleuthing the oscillator

It was about this time that the crackles also reappeared. Obviously, there was a problem with the oscillator circuit but which component could be causing it?

L3, C4 and TC2/VC2 are all frequency determining components, so this was they obvious place to start. TC2 and VC2 had been previously attended to, so I assumed they were OK. C4, however, consisted of two mica capacitors in parallel, one a much larger than the other. Perhaps the low value one was intermittently going open circuit, thus causing the oscillator to change frequency?

I removed the capacitor and checked it using both a capacitance meter and the high-voltage tester but it checked OK. In addition, a substitute capacitor made no difference, so padder capacitor C4 was OK. So much for that theory!

Coil L3 was my next suspect – perhaps it had an intermittent 1-turn short circuit in the winding?

A multimeter test was inconclusive but pulling the coil out, I decided to check R2 and C5. These components are not part of the tuned circuit but they do have an effect on the oscillator frequency to a small degree.

R2 was in tolerance and even with the multimeter and showed no variation in resistance over time. Similarly, C5 tested OK for capacitance (50pF) and no leakage resistance was detected using a digital multimeter.

However, C5 was a different story when tested on the 500V range of the high voltage tester. This showed a leakage resistance of about one megohm , with the meter needle regularly flickering slightly. Eureka! - the rotten little beast tested OK on all bar the high voltage tester, so you can understand why I consider this an essential item of test equipment.

I have had very few faulty mica capacitors in receivers but when they do become faulty, some weird symptoms can appear. A noisy oscillator, as in this case, can give some very misleading symptoms.

Alignment

Having cured the circuit faults, the next step was to align the IF amplifier, antenna and oscillator circuits. This was done using a signal generator and this showed that the IF amplifier was well out of alignment. It responded well to adjustment but in the course of endeavouring to lock one of the cores with core-locking compound, it shattered at the end of the adjustment slot. As a result, the alignment was completed with one core slightly out of tune.

Despite all my "playing around" with the oscillator circuit, it was almost perfectly aligned, with the stations appearing on the correct spots. Well at least something went right with the overhaul!

Improving the hum

From the very beginning, this set had exhibited a background hum, even with the volume control turned right down. My first suspects were filter capacitors C17 and C21 in the power supply. They were both down slightly at 14μF but not enough to warrant replacement. However, I found that I could reduce the background hum by paralleling these two capacitors with similar values.

The real cure lay in modifying the plate circuit of the 6AV6. This was made similar to other many older receivers by adding a 33kΩ resistor in series with the bottom end of R8 and installing a 1μF 350V electrolytic capacitor from the junction of these two resistors to earth.

This simple modification cleared the hum up nicely. It appears that the ripple filtering circuitry in many later receivers was the minimum that manufacturers thought that they could get away with.

A microphonic valve

The "Little Nipper" receiver was now running quite well. It was sensitive, stable, the audio sounded good and there was virtually no hum.

As a final check, I decided to test the valves by gently tapping them with the plastic handle of a small screwdriver. All went well until I tapped the 6AV6, which then squealed and crackled.

This is not an uncommon fault in valves. In this case, one of the grid welds had probably come loose, causing the valve to become very microphonic. What's more, as the grid wire scratched against the failed weld, it became "crackly" as well. A new valve soon fixed the problem.

Power lead

Before starting work on this set, I had attached an earthed lead to the chassis as a safety measure (eg, in case the power transformer developed a short to chassis). With the restoration work now completed, the final job was to fit a 3-core power lead, since there's no longer a risk of it getting marked on a dirty work bench.

A 3-metre 3-core extension lead can be used as the new lead. These extension leads can be obtained for around $3-4. You simply cut off the socket and wire the lead into the set.

Note that the power leads in most radios from the valve era were knotted where they left the chassis, to prevent the cord from being pulled out. Today the lead should be clamped into position, for legal and safety reasons.

An even cheaper proposition than using a modified extension lead, is to scrounge a lead from a defunct electrical appliance (provided it is in good condition). Of course, if you keep a clean workbench, the cord can be replaced at the start of the restoration.

Summary

The "Little Nipper" 62-52 is a typical 5-valve mantel set from the 1950s and 1960s. It is easy to work on, is a good performer and generally gives little trouble.

However, there is the occasional set from any make that proves to be a real "dog" and it requires all the restorers knowledge and patience to get it working properly. A set like this one will be a severe test for a newcomer to electronic restoration.

The important thing is not to go "bush-ranging" through a set, replacing parts willy-nilly, as the results are usually disappointing. Don't give up and if possible enlist the aid of someone more experienced than yourself if you get a "dog" like this one. That way, you can share the headache! **SC**