VINTAGE RADIO

By JOHN HILL

A look at signal tracing, Pt.1

About 10 years ago, I drove away from a house in Melbourne with a car full of old radios and other gear. Back then I had no idea what good buying it all was for $200. At that stage of my collecting career, I was quite unaware of the value of mid-1930s Radiolettes – and there were two of them in the boot when I drove off.

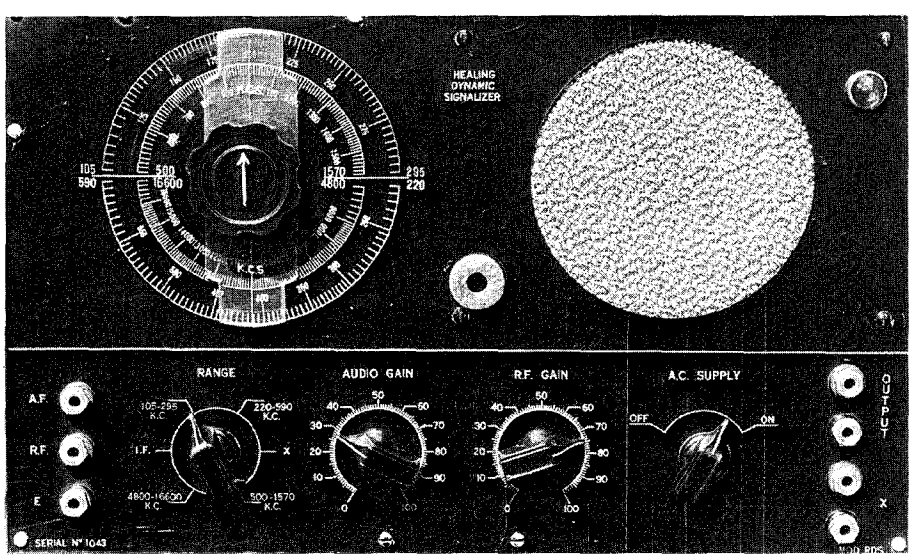
Apart from some very collectible radio receivers, my haul also included some bound volumes of *Radio and Hobbies* and a test instrument that I assumed was a radio frequency RF generator.

Only a few weeks earlier I had obtained a working RF generator which was in excellent condition. I therefore paid little attention to this latest acquisition and it was placed in a dark corner of a cupboard where it lived in forgotten limbo for nearly a decade.

However, a recent visit to a collector friend jogged my memory when he showed me his signal tracer. It looked very similar to the instrument I had assigned to the cupboard many years ago, so I checked it out as soon as I returned home.

Sure enough, when my long forgotten "RF generator" was removed from its hiding place, it turned out to be a signal tracer – and a reasonably good one at that. It was a tuned type tracer and was called a "Healing Dynamic Signalizer", to quote the name on the front panel. The old tracer appeared to be of early postwar manufacture.

Coming into vintage radio with little or no experience can be a decided disadvantage at times. In this instance I had acquired quite a useful piece of test equipment but I didn't know what it was and promptly forgot all about it.



This is the front control panel of Healing signal tracer. The output sockets connect to the speaker voice coil, while the X sockets allow an external coil to be connected to extend the instrument's range of frequencies.

Getting it going again

It was time for some restoration work. There is not much point in having a signal tracer that doesn't work.

Restoring an old signal tracer is not unlike restoring a simple radio receiver. In fact, a signal tracer will receive any strong local transmission in a broadly tuned manner, having much the same degree of selectivity as a crystal set.

The Healing has a 6D6 RF amplifier, a detector which uses the diodes in the first audio valve, two audio stages employing 6B6 and 6V6 valves, plus a high-tension DC circuit similar to most valve radios (the loudspeaker field coil is used as a choke). The rectifier is a 5Y3.

As the tracer was in almost completely original condition, its restoration was a simple matter of replacing the paper and electrolytic capacitors, plus a few carbon resistors that had gone high with age. All four tuning coils were OK, likewise the power transformer, the loudspeaker field coil and the output transformer.

All four valves checked out as new and were in excellent condition. This is not surprising – a signal tracer is a test instrument, not a radio receiver and, as such, it would have had only intermittent use.

Because of this, one would not ex-

pect that the single gang tuning capacitor would need attention. Not so!

The problem here was that the gang had been poorly mounted and the alignment of the control shaft to the front panel was out by several degrees. In fact, the alignment was so bad that the dial cursor was touching the panel on one side while there was a 10mm gap on the other. Something had to be done as the crooked cursor looked terrible.

Perhaps the reason for this poorly installed tuning capacitor was the fact that the chassis was not jig-drilled to accurately locate the mounting holes. Instead, the original holes had been marked out using a pencil and these markings were still clearly visible. Unfortunately, the hole positions were way out from where they should have been.

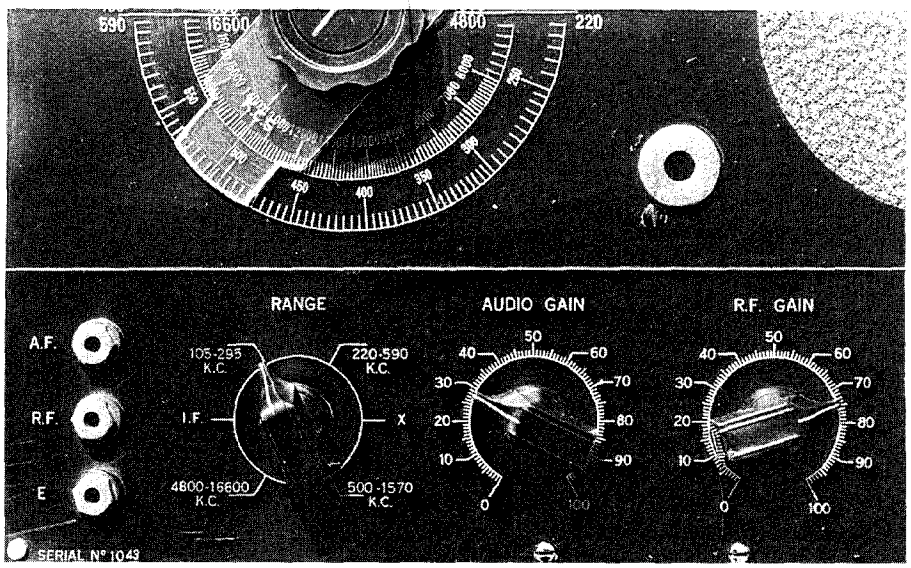
To correct this misalignment problem, the mounting holes were elongated with a small round file and the tuning capacitor raised slightly using washers. The unit was then carefully adjusted so that the control shaft was centred in the dial aperture at right angles to the front panel.

But that was not the only problem. The general construction quality of the Dynamic Signalizer was dreadful. For example, many long screw threads had been shortened with side cutters, which not only produced sharp edges but also made it difficult to remove the nuts. And connections to the front panel sockets were soldered to the threads instead of to solder tags.

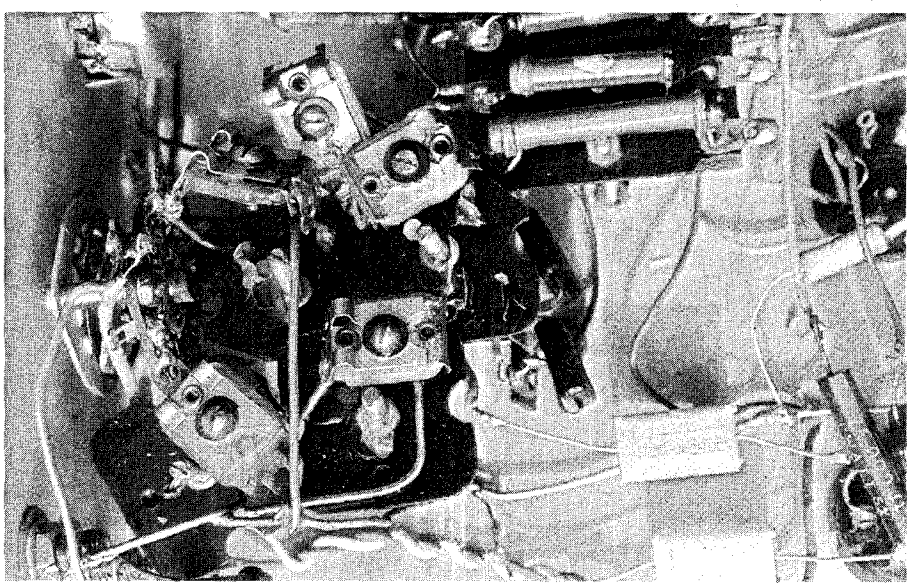
On the other hand, the front control panel looks quite good. It is painted black, with most of the control markings stencilled on in white. The frequency range selector switch and the tuning dial are colour coded for their respective frequency bands in white, blue, green and red.

The condition of the front panel paint work was excellent and it responded well to a gentle rub down with automotive cut and polish compound. A couple of small bare spots were touched up with a black "Texta" pen.

One minor problem with the front panel was a hole of about 14mm diameter in the top right corner. This somewhat roughly drilled hole detracted from the panel's otherwise good appearance. This problem was solved by fitting a green panel light, which tidied up that corner of the panel quite nicely The original panel light was disconnected.



This view shows the probe sockets (left), the range (or band) selector switch, and the audio and RF (radio frequency) gain controls. The painted-on panel markings are in very good condition for a 50-year old instrument.



This under-chassis view shows the cluster of tuning coils and their associated trimmer capacitors. These coils are connected to the selector switch at left.

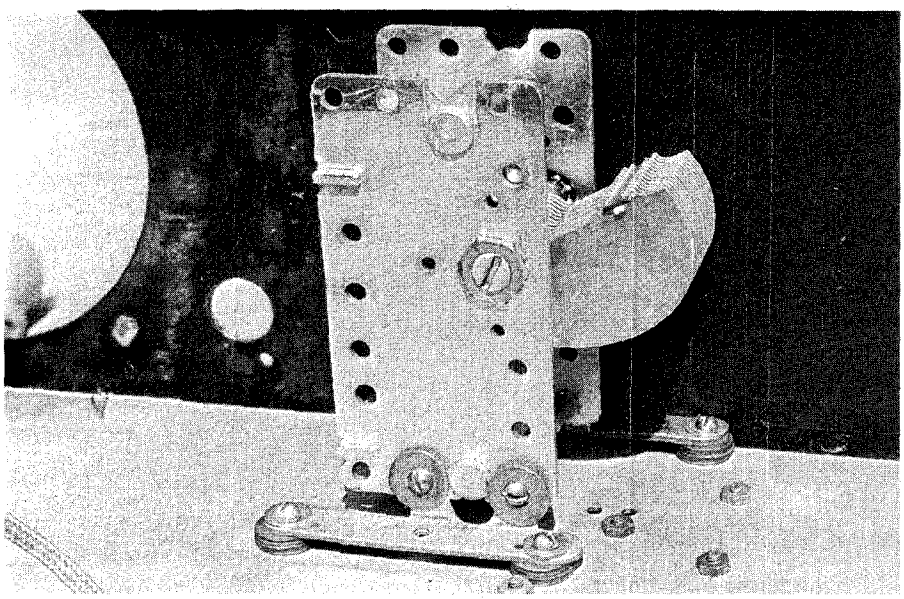
Switching on

With the restoration almost complete, it was time to see if the old Signalizer would work. At switch-on the panel light lit up, as did the four valves. After about 15 seconds or so a quiet hum could be heard from the speaker. All seemed well!

The touch of a finger on the audio socket produced a loud response from the speaker which was easily regulated by using the audio gain control. Similarly, touching a finger on the radio frequency (RF) socket brought in a soft response from a local radio station. Rotating the dial tuned in the station and it responded to both the audio and radio frequency gain controls.

When checking the tracer's tuning ranges with an RF generator, it was found that the dial was not particularly well aligned to the tuning capacitor on all four tuning ranges. This was corrected by adjusting the tuning coils.

These coils are fitted with adjustable iron cores for aligning the low frequency end of the range and trimmers for adjustments at the high frequency end. After completing these



The Signalizer's tuning capacitor was repositioned by elongating the mounting holes and packing it with washers. The nuts on top of the chassis hold the tuning coils in place.

A Rola 5-inch (125mm) electrodynamic loudspeaker is used in the signal tracer. Note the missing mounting washer and nut – typical of the very rough building quality evident throughout the instrument.

simple alignment procedures, the dial lined up quite accurately on all four frequency bands.

The Healing Dynamic Signalizer was just about ready for trials but there was one remaining problem. After operating the unit for half an hour or so, the speaker field winding became uncomfortably hot. Field coils should operate at warm temperatures – not hot. For some reason or other the high tension current appeared to be excessive.

Substitute valves were tried one at a time but this failed to reduce the HT current. Sometimes a faulty valve can consume a lot more current than it should.

In order to reduce the HT current, the 150Ω back-bias resistor for the 6V6 output valve was increased to 250Ω. In addition to this, a 300Ω resistor was placed between the RF gain control potentiometer and the cathode of the RF valve.

Because the RF gain control is, in fact, a variable cathode resistor, it supplies no resistance (and thus no bias) at all when it is fully on (hence the 300Ω cathode resistor). Backing off the RF gain control to zero when using the audio section of the instrument helps to slightly reduce HT consumption.

These two minor circuit alterations cut back the high tension current by about 6mA. While the field coil still gets fairly warm, it runs much cooler than before.

Making the probe

All that remained at this stage was to make up some suitable probes and a chassis lead. But this simple project turned out to be more time consuming than expected.

When one lives in a small country town, shopping for items such as banana plugs, shielded wire, and RF probes can prove a difficult task. So it is usually a case of improvise with whatever is available at home or travel 80km to a major electronics dealer for suitable supplies.

The chassis lead was no trouble to make. With an old style banana plug at one end and an alligator clip at the other, it did not take long to complete. The lead itself was made of some moderately heavy, yet fairly flexible, plastic covered multi-strand wire.

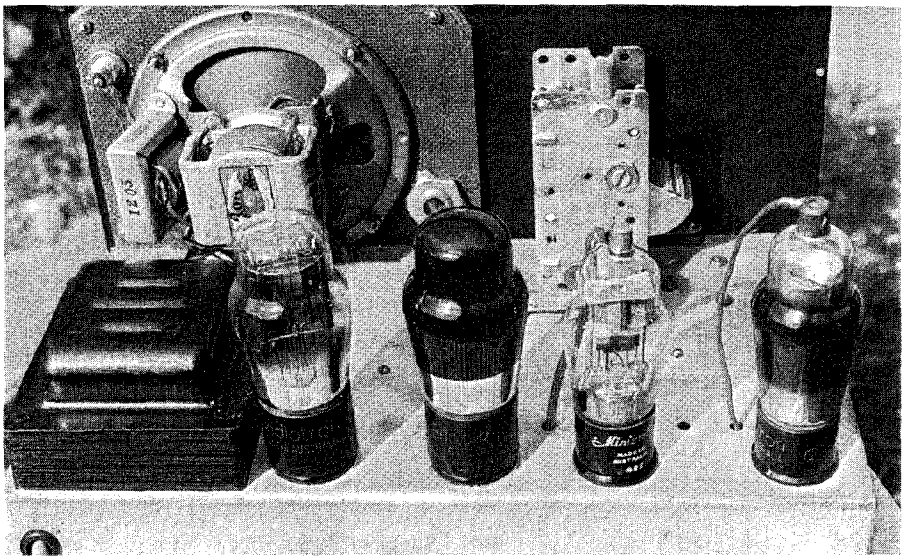
Unfortunately, I couldn't find a suitable length of shielded wire to make the audio lead. All that was available was a single length of the same wire used to make the chassis lead. And non-shielded audio leads are not usually recommended.

It was decided to make up a dual-purpose RF/AF probe using unshielded wire. The probe would allow the tracer to be tested and a shielded lead could be fitted at some stage in the future. The idea behind the dual-purpose strategy was that the probe could be changed from RF to AF at the flick of a switch.

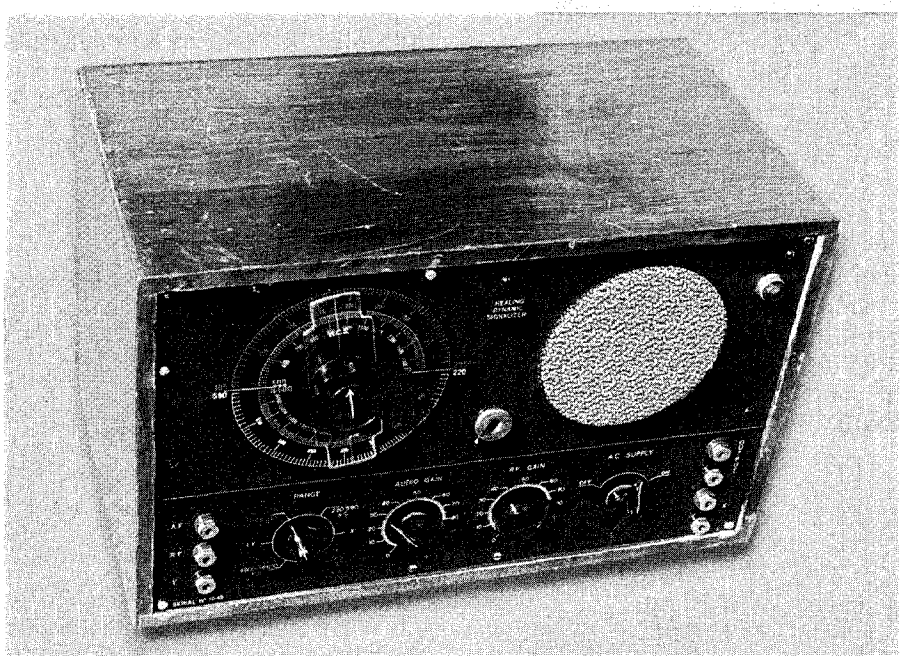
A suitable RF probe for a signal tracer, such as the Dynamic Signalizer, requires a small high-voltage capacitor of 3-5pF to be mounted in the probe tip itself. This is necessary to prevent the probe lead from loading the receiver's RF circuits and detuning them.

Unfortunately, I didn't have a suitable capacitor available and so I decided to make one by twisting two short lengths of enamel-covered copper wire together. With the aid of a capacitance meter and a high voltage megohmmeter, the home-made 4pF 1000V capacitor passed all tests.

The probe was made up by installing the home-made capacitor and the



The restored chassis cleaned up quite well, as this top view shows. The valves, from left, are: 5Y3, 6V6, 6B6 and 6D6.



The fully-restored unit retains its original cabinet finish. The unit should prove invaluable for tracing problems in old radio receivers.

switch in a "Texta" pen body. The completed probe was then tested with an ohmmeter. When the switch was in the RF probe position, the capacitor was switched into circuit and the ohmmeter indicated open circuit. Conversely, with the switch in the AF probe position, the capacitor was shorted and the meter responded accordingly.

All that remained was to try the probe with the Signalizer to see if it worked properly. As an RF probe, the unit functioned perfectly. But when switched to the AF position and plugged into the audio socket, the hum was overpowering.

However, because the audio section of the Signalizer has two stages, it is not necessary to operate the gain control at full on; a setting of 20 on a scale of 100 is where the instrument works best. At that level of amplification the hum is barely audible and I won't bother to make another probe with a shielded lead.

So the old Healing Dynamic Signalizer is now fully operational. Next month we will try it out and trace through the circuit of a receiver. **SC**