

VINTAGE RADIO

By Associate Professor Graham Parslow



Tecnico-Aristocrat 1946 Model 651

A stunning radio set from the “Streamlining” era that followed the Second World War. This style took its inspiration from the geometry of Art Deco but added rounded edges reminiscent of the streamlined jet aircraft which had just been



developed. However, as so many resources had gone into winning the war, rather than developing consumer electronics, the performance is not quite as modern as the styling.

This Tecnico Aristocrat table radio looks great and sounds good. At 8.5kg it is a substantial radio, and the walnut finish of the Bakelite is particularly attractive. Although Tecnico is a minor Australian brand, the company produced some iconic radios between the 1930s and 1960s, notably the Fortress and the Pacemaker in the 1950s.

Tecnico Electronics Pty Ltd was founded in Sydney as the Electrical Speciality Manufacturing Company. Radios were marketed under either the Aristocrat or the Calstan brand.

The name Tecnico was adopted during the second world war, and the company made various military aircraft parts under license for the US Bendix Corporation. In 1951, Bendix and Tecnico formed a jointly-owned company, Bendix-Tecnico Ltd. During 1946-1951, radios were branded Tecnico Aristocrat, as on the model 651 featured here.

After 1951, the brand simply became Tecnico, as seen on the iconic Fortress and Pacemaker radios (to be described in upcoming issues).

An advertisement on page 39 of Women's Weekly, October 1946 (opposite), shows vacuum cleaners and Radios built to “aircraft quality”. The text of the advertisement proclaims that Tecnico Aristocrat radios are a brand new post-war range of receivers.

Certainly, the brand was new, but the electronics within are largely of pre-war standard. A pamphlet aimed at radio retailers heralded a new style, new features and new performance.

The model 651 is described as suitable for all but the most difficult reception areas (a sensitivity of $3\mu\text{V}$ is claimed). The same case was also used for the model 661 that included an RF stage and the model 657, a battery-powered farm radio.

All these models boasted an 8-inch speaker, which gave exceptional tonal quality. They also offered delayed automatic gain control (AGC). Sensitivity and selectivity were claimed to be greatly superior to equivalent pre-war models. Even so, Tecnico only claimed a signal-to-noise ratio (SNR) of 10:1.

In addition to the walnut finish, cases could be purchased in ivory or eau-de-Nil (greenish blue; “water of the Nile”).

The new style claim is valid in the Australian context. However, if you compare these to the 1939 Stewart-Warner Senior Varsity model from the USA, it becomes clear that the style was substantially ‘borrowed’.

Valve lineup

The set uses a 6J8 triode-heptode for the converter, a 6U7 high-gain pentode for the first IF gain stage, a 6B6 dual-diode/triode for the second IF

PERFECTION PLEASE!



**Inbuilt Aircraft Quality
is the answer...**

There's an insistence here at Technico on the most exacting precision standards at every stage of manufacture... legacy undoubtedly of the days when every Australian-built 'plane used Technico electrical equipment.

The Technico Vacuum Cleaner reflects "aircraft standards" in every feature of its precision construction. It is light, robust, silent and vibrationless thanks to its dynamically balanced power unit which ensures greatly increased life. Equipped with new type, braided flexible hose, full set of attachments: guaranteed 12 months.

Technico Aristocrat radios are a brand new post-war line of receivers. The gleaming plastic cabinet illustrated houses a variety of receivers for Australian and world-range reception — models for A.C. electric operation, also battery-powered type. All utilise 8" speakers. Hear them to-day!

GLOWING COLOURS



Technico

LIMITED



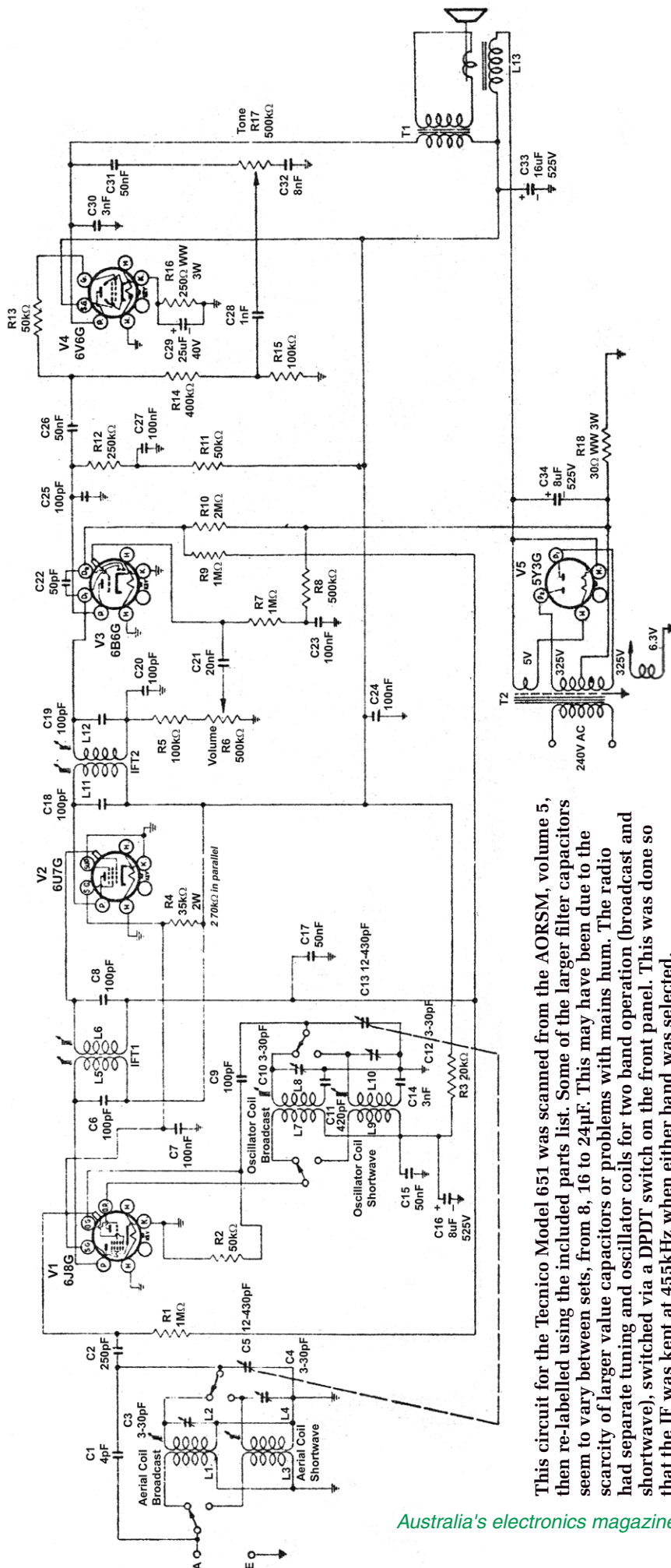
ELECTRICAL AND RADIO PRODUCTS

*available from leading
retailers throughout Australia*

ADVT. OF TECNICO LTD., CARRINGTON ROAD, MARRICKVILLE, N. S. W.

The Australian Women's Weekly—October 5, 1946

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This circuit for the Technico Model 651 was scanned from the AORSM, volume 5, then re-labelled using the included parts list. Some of the larger filter capacitors seem to vary between sets, from 8, 16 to 24µF. This may have been due to the scarcity of larger value capacitors or problems with mains hum. The radio had separate tuning and oscillator coils for two band operation (broadcast and shortwave), switched via a DPDT switch on the front panel. This was done so that the IF was kept at 455kHz when either band was selected.

gain stage, detector and AGC, a 6V6 beam-power tetrode for the Class-A output stage and a 5Y3 dual rectifier in the power supply.

The RCA description of the 6U7 is a "triple grid super control amplifier". This refers to a pentode that responds smoothly to AGC applied to the grid, unlike a sharp cut-off valve.

The 6J8 was released in 1938, as an improved version of the 6A8 from 1936. The 6U7 pentode was released in 1936. So as you can see, this is essentially a pre-war design. Accordingly, the claim of significantly superior performance to pre-war models is hard to justify.

The 6V6 is an oldie, but a goodie, giving up to 3.5W of audio power in Class-A mode. The beam tetrode design was so good that it was re-encapsulated as the 6AQ5 7-pin miniature valve for 1950s radios.

Circuit description

The circuit drawn by Tecnico appears in volume 5 of the Australian Official Radio Service Manual (AORSM). The printing quality from this source is poor, and the labels on many components are illegible.

The Historical Radio Society of Australia came to my rescue when a fellow member referred me to an alternative circuit at: www.kevinchant.com/tecnico1.html

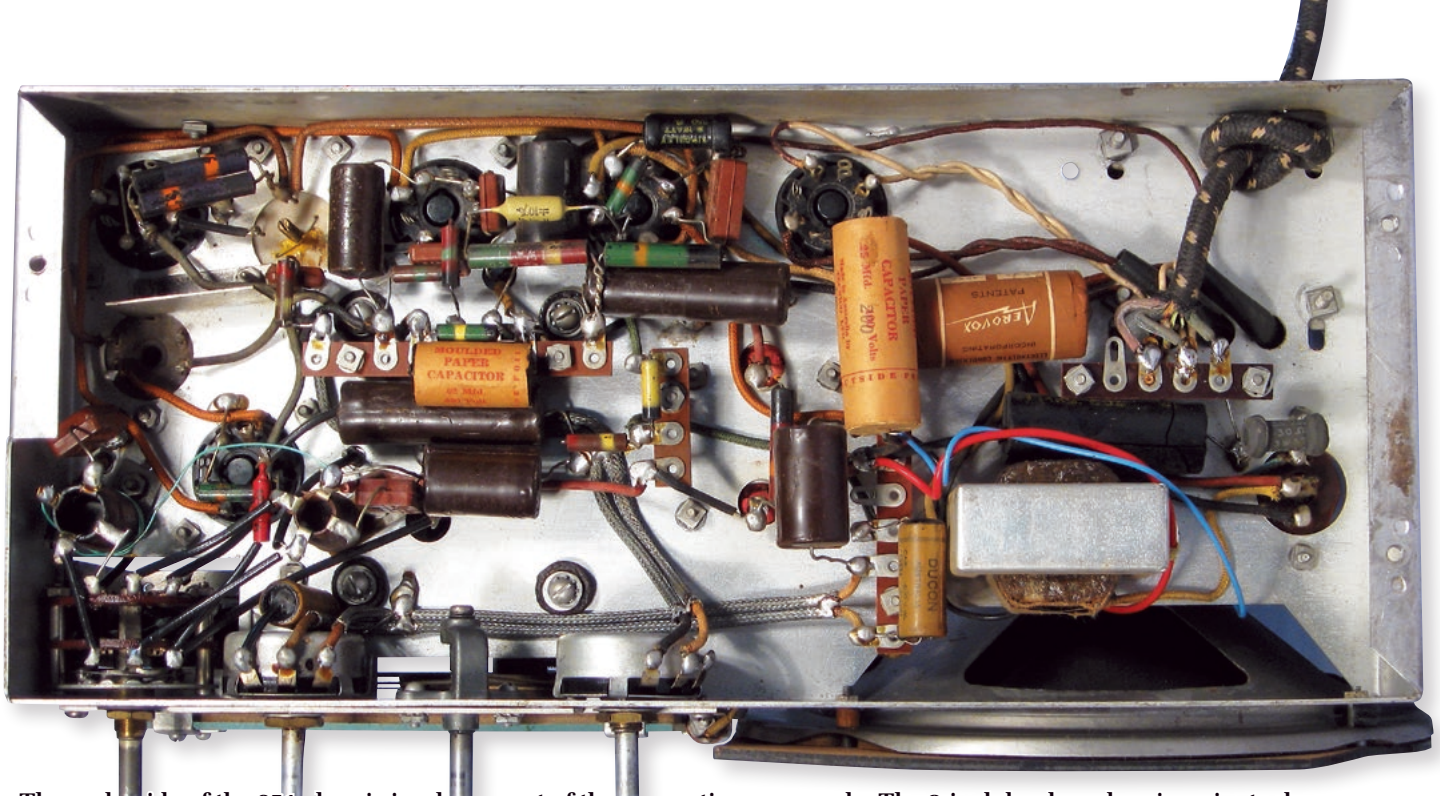
Editor's note: we've included a re-labelled scan of the AORSM circuit, as the one in the website above has quite a few differences.

This re-drawing of the circuit was apparently motivated by frustration with the unreadable Tecnico circuit, and the anonymous contributor has my gratitude for the effort. The re-drawing also records voltages and resistances that the contributor measured on the bench.

The external wire antenna is connected to one of two coils via a switch, one each for the broadcast band and shortwave. The same switch also changes the local oscillator coil, to keep the IF at 455kHz regardless of the band being tuned.

The tuned output from the secondary of the selected aerial coil feeds into the 6J8 converter valve via a top-cap connection (C2 on the circuit diagram). The RF signal is heterodyned with the output of the local oscillator, shown below the 6J8 on the circuit.

The primary winding of the oscilla-



The underside of the 651 chassis is where most of the connections are made. The 8-inch loudspeaker, is a giant when compared to the speakers commonly used in other radios of the time. As always with radios this old, it's good practice to check and replace any of the paper capacitors and carbon resistors that have drifted too far from the specified value.

tor coil is tuned by the second gang of the variable capacitor, and its output is fed to the grid of the converter triode section. The secondary of the local oscillator coil connects to the anode of the triode, to provide feedback for sustained oscillation.

A basic description of how this Armstrong oscillator configuration works can be found at: siliconchip.com.au/link/aav8

After IF amplification, the output of the second IF transformer is demodulated by the diode connected to pin 5 of the 6B6 valve. Volume control is provided by a voltage divider formed by the 500k Ω potentiometer (R6) in series with a 100k Ω fixed resistor (R5). The pot's wiper feeds demodulated audio to the 6B6's grid via a 20nF capacitor (C21).

A 50nF capacitor (C26) couples the amplified audio from the 6B6 anode to the grid of the 6V6 beam-power tetrode.

Automatic gain control (AGC) is derived from the second diode of the 6B6, at pin 4. The output from the second IF transformer is coupled to pin 4 by a 50pF capacitor (C22), to generate a negative AGC voltage proportional to the signal strength.

Approximately -1.37V DC bias is generated for the grids of the 6J8 and 6U7 by a 30 Ω resistor (R18) between the centre-tap of the HT transformer

and the set's ground. This bias is fed into the AGC line via a 2M Ω resistor (R10). It provides the initial grid bias and 'delays' the onset of AGC until a sufficiently strong signal warrants reducing amplification in the first stages. Weak signals receive maximum amplification. This is described in Tecnico literature as "compensated inverse feedback".

The operation of the 6V6 output amplifier is modified by a tone control network which consists of a 500k Ω potentiometer in series with 3nF and 50nF capacitors (C30 & C31), connected between the driven end of the speaker transformer primary (and the 6V6 anode) and ground. This feeds back to the 6V6's grid via an RC high-pass filter and a 400k Ω resistor (R14).

This has the effect of progressively cutting high frequencies as the tone pot is rotated.

Set construction

The large speaker nestles into a rebate punched into the front of the chassis and the HT choke, mounted below the chassis, can be seen through the space.

Tecnico was a significant manufacturer of capacitors, for their own use and other manufacturers. The first HT filter capacitor (C34) on this radio is branded Tecnico and marked as 8 μ F at 525V.

Rola supplied the output transformer (5k Ω /3.5 Ω) and the 8-in permanent magnet speaker, model 8L. Another hint at the 1930s heritage of this radio is the official Tecnico drawing of the speaker showing an electrodynamic type with a field coil.

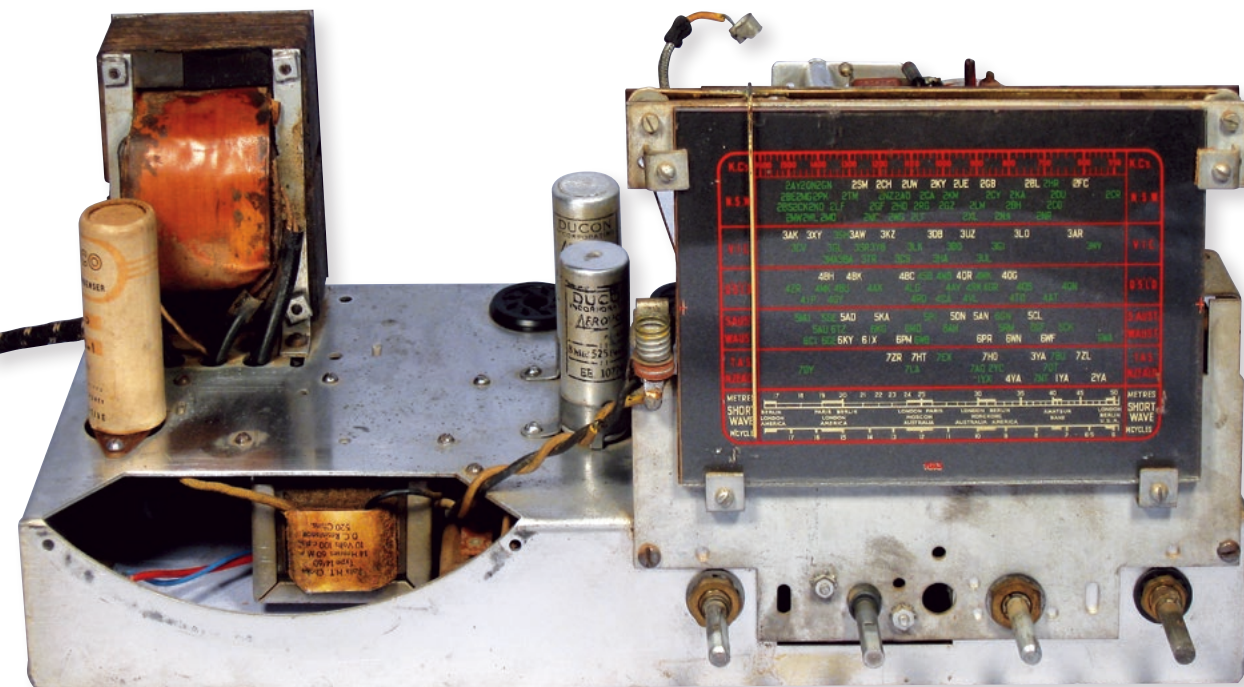
Tecnico re-labelled the field coil as a choke. Rola also supplied the HT choke that is stamped as type 14/60 (14 Henries inductance, capable of passing 60 mA).

The other two metal-can electrolytics are 8 μ F each (one is listed as 16 μ F on the circuit) and surprisingly, supplied by Ducon-Aerovox. The three 8 μ F capacitors in this radio are likely on-the-shelf leftovers, before new post-war stock became available.

Even though these provide minimal ripple filtering, this radio has low mains hum at the speaker, helped by the filter choke. I was tempted to replace the 8 μ F units with higher capacitance electrolytics, but it was not necessary, so the originals were left as-is.

In the early 30s, 8 μ F capacitors were state-of-the-art. Higher values became available later as the theory and materials science improved. It is interesting to note that electrolytic capacitors were a serendipitous evolution of early electrolytic AC rectifiers.

The "chocolate-dip" capacitors used in the set were made by Tecnico, and



Left: the chassis shown from the front without the speaker, valves or knobs attached.

Below: the unrestored chassis shown in the case. The Bakelite case used for the 651 was also shared with the Model 657 and 661.

few have distinct values printed on them. The more-common MSP types (made by AWA), by contrast, have clearly visible values moulded in the cases.

Restoration

The photo below shows the original condition of the back of the radio. The radio is made as a stand-alone unit with the speaker attached to the chassis. Only the knobs need to be removed to separate the radio from the case. Most of the restoration effort was cleaning and polishing. Only one significant component had failed.

In general, the layout is excellent for servicing with few components obstructing others. The soldering is commendably neat.

I found that the band switch contacts on the rotary switch were affected by corrosion and needed a spray of CRC contact cleaner to restore their function.

I had a metre-long piece of wire handy when first working on the radio and installed that as the aerial. It worked so well on local stations that it remained as the aerial.

The radio worked at switch-on, but used 56W of power (slightly high) and sounded distorted. I measured +15.4V at the grid of the 6V6, indicating over-conduction, which suggested that the 50nF audio coupling capacitor was leaking HT from the 6B6 anode.

Replacing this capacitor brought instant happiness with excellent sound and reduced the total power consump-

tion to a more normal 47W.

The three-core power cable covered with patterned cotton is not true to 1946, and the person who installed this replacement used a knot inside the chassis to secure the cord (subsequently altered in this restoration to a much safer and legally acceptable chassis clamp).

Another clue that the cord is not original is a peculiar rule at the time that a three-wire line could only be installed if a DPDT switch isolated both Neutral and Active lines. This radio does not have a mains switch, so it would originally have been fitted with twin-core flex.

The speaker grille fabric was stained, so I removed and washed it. It was reinstalled using craft glue.

The dial is calibrated by screen-printed glass installed behind the pointer. The front screen was made of celluloid and had aged to brown. A

clear plastic replacement allowed the dial to show its true colours.

The speaker cone was faded and water-stained. Some flat black acrylic paint restored the appearance without any audible changes.

So with relatively little effort, I was able to bring this set back to its original glory.

What happened to Tecnico?

While continuing an association with Bendix USA, Pye Ltd of Cambridge, England bought half of Tecnico's shares in 1955. The brand "Pye-Tecnico" was used until 1959, after which their products were branded Pye and were made from designs used internationally by Pye.

The Pye company became over-committed to TV products in the 1960s and collapsed, leading to the closure of Pye-Tecnico as a radio manufacturer in 1967.

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