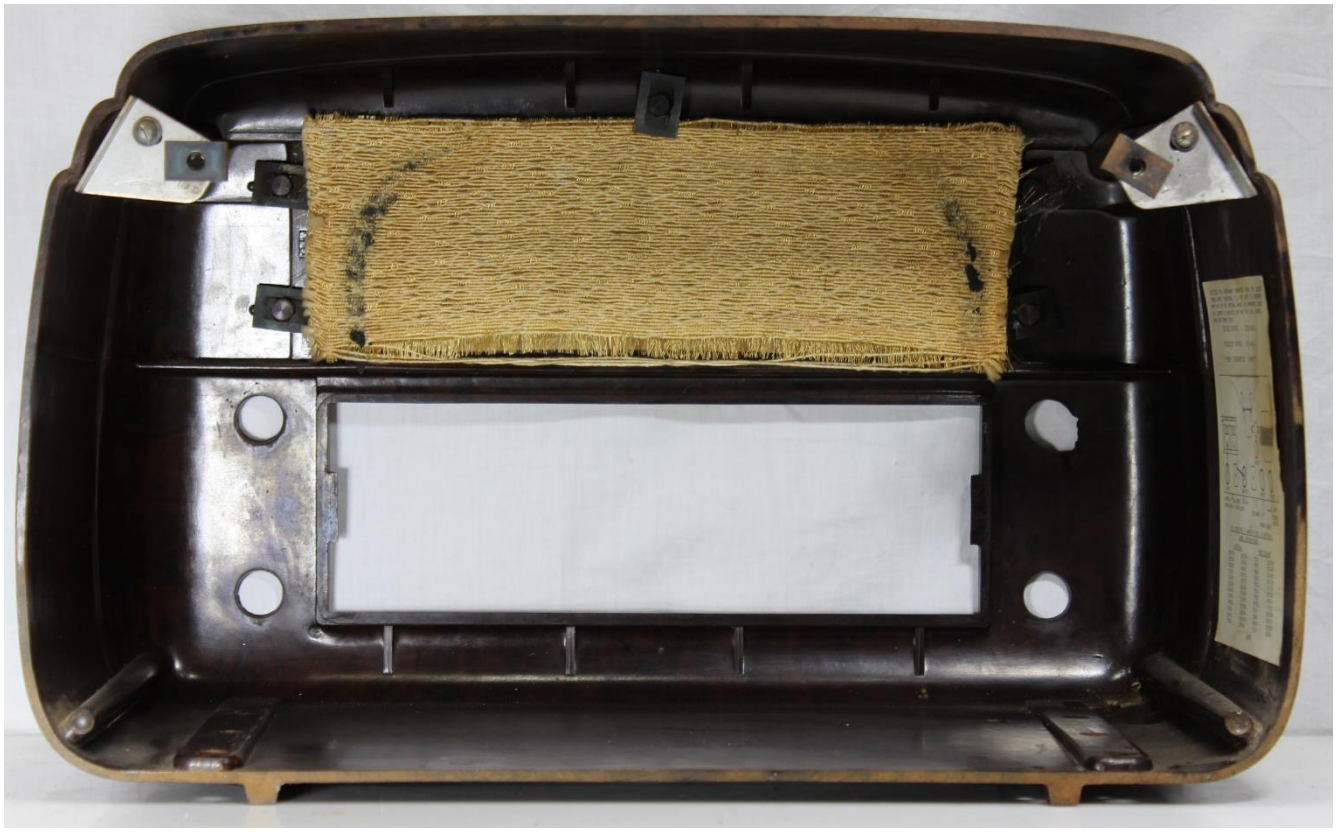
AWA 1953 model 541GA, or is it?

By Graham Parslow

To the credit of AWA they made it easy to identify a model by stamping the ID on the chassis. So, let us take a look at the back.

The first thing to notice is the ill-fit of the rear moulding to the main case. I have come to the conclusion that this was

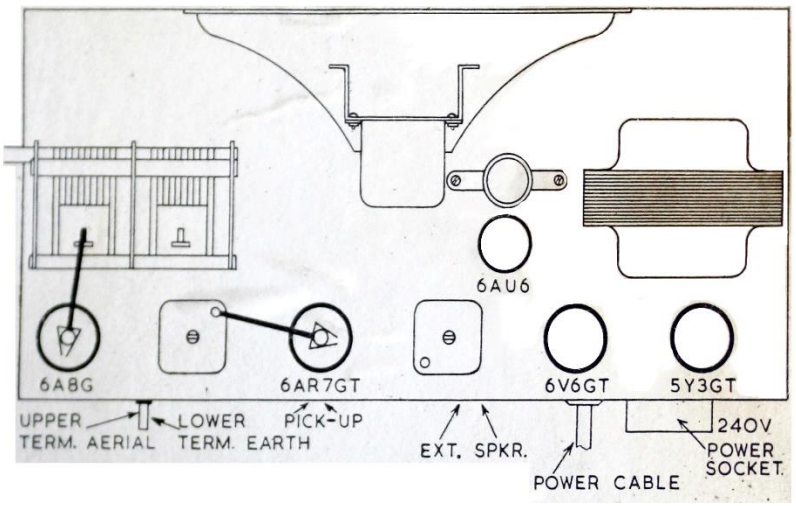


probably done by AWA rather than a mix and match by a fixit person.

My best clue that this not-quite-right shape came from the factory is the adapter plates fitted to the back of the front case to accept the bolts at the top. The adapter plates move the anchoring point inwards from the Bakelite case moulding. The neat metal engineering and use of threaded clips looks like a factory job. Looking to the paper information panel pasted inside the case reveals the valve placement of the radio, as manufactured.

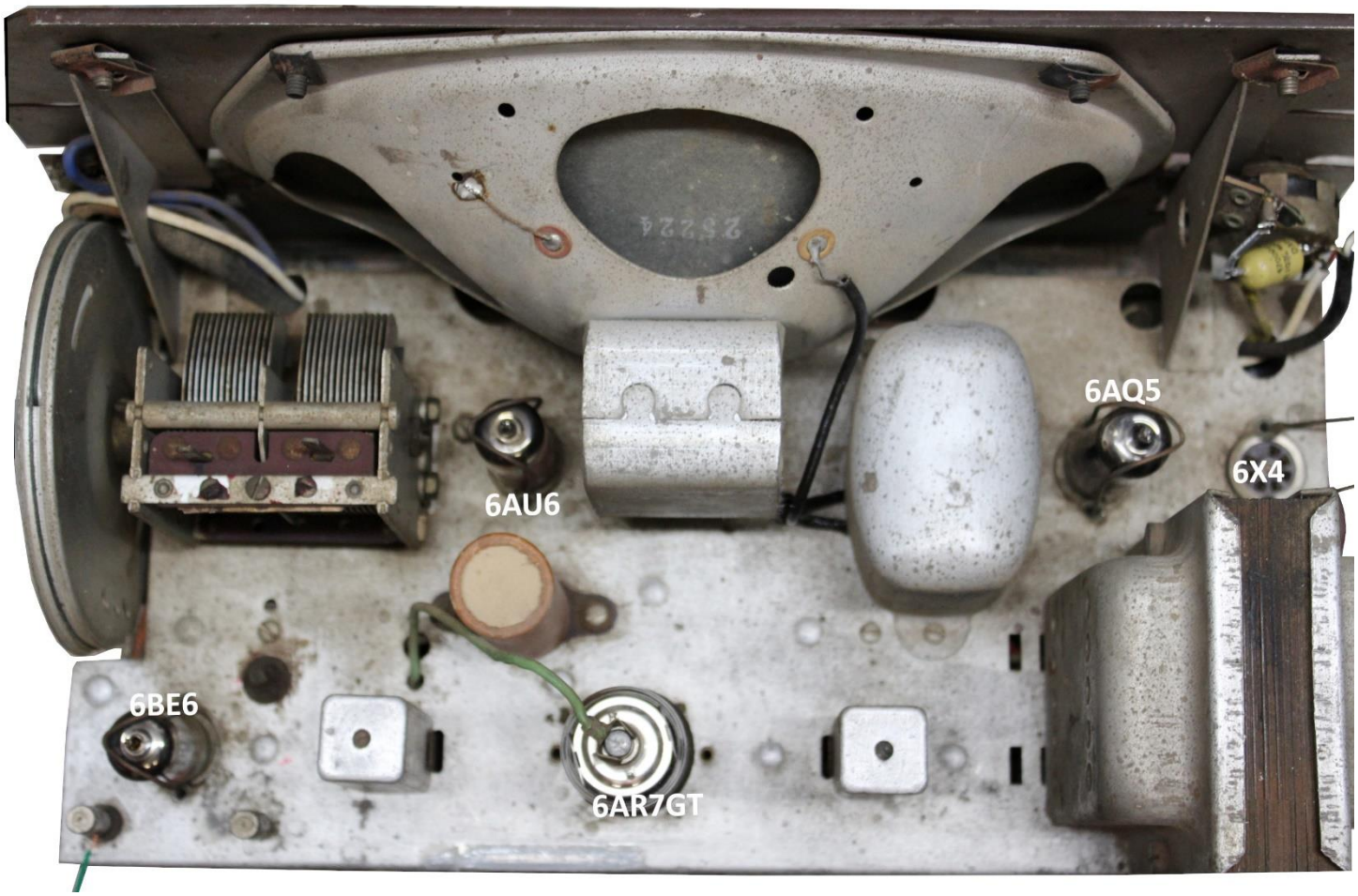
The valves 6A8G, 6AR7G, 6AU6, 6V6GT and 5Y3 are four octals and one miniature valve. This line up suggests manufacture in the years 1946-1950 before all miniature valves became common. The case is definitely Bakelite as judged by weight and appearance. The intact radio weighs a hefty 8.2kg. The Bakelite case and valves on the label together suggest pre-1950 manufacture.

So now it was appropriate to look at the model number on the chassis and do some searching of the AORSM and Radiomuseum to find details. The model number stamped on the chassis is 541GA. The component layout is radically different to the paper label and there are four miniature valves and one octal. The two raised rails moulded into the base of the case are designed to mate with the metal straps at the bottom of the chassis, but the spacing is wrong for the 541GA. The chassis-case combination has been made to work by drilling extra holes in the base to align the fastening holes to the chassis. An easy conclusion is that a fixit person combined



a case and chassis for a marriage of convenience.

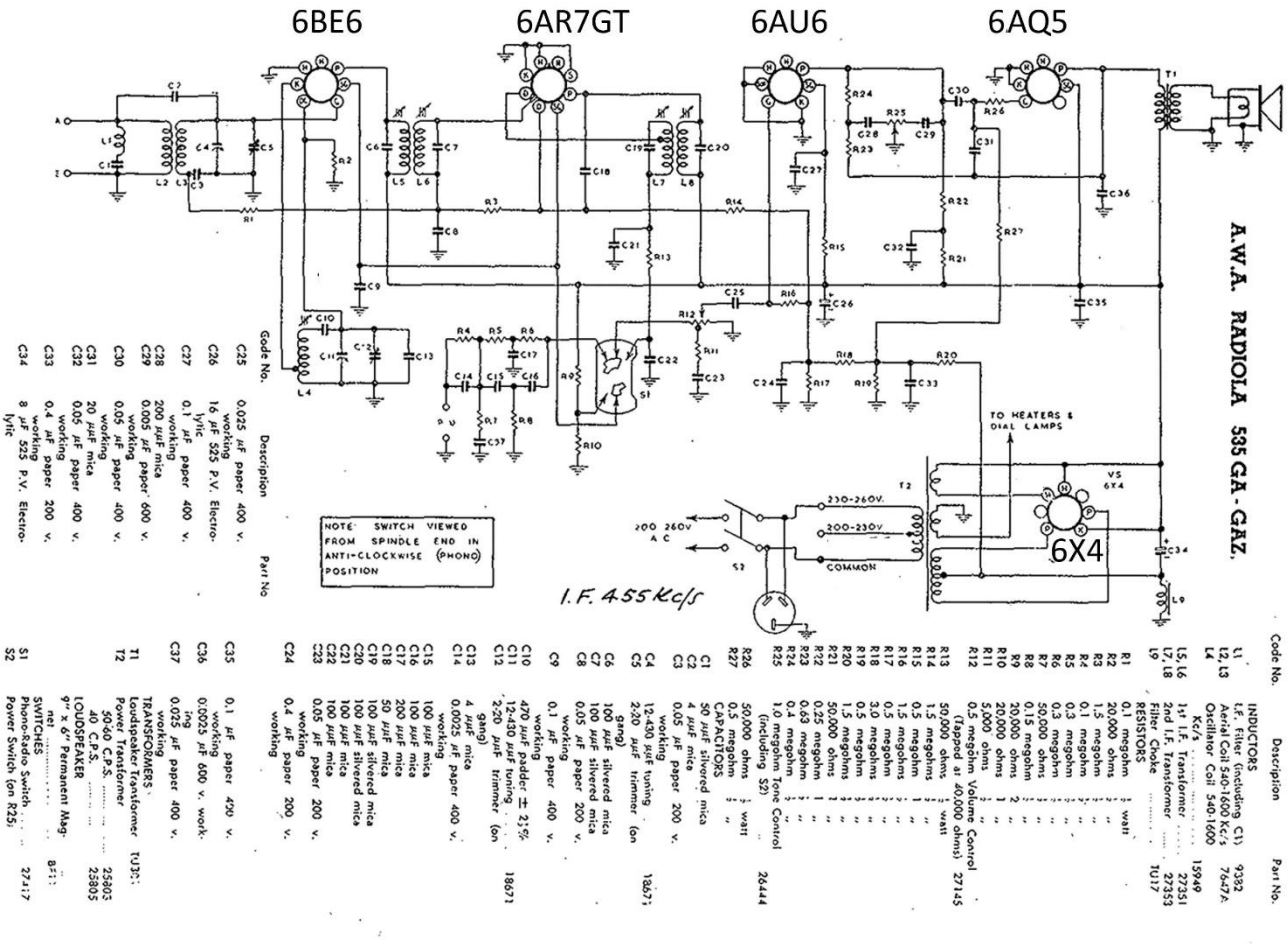
The circuit of the 541GA is not in the AORSM books. However, Radiomuseum had a brief entry that said the model was a wooden cased radiogram made 1953-1955. Radiomuseum also said that the case was the same as model 535GA and going to that model showed a photo of a plain wooden case with a lifting cover to reveal the phono unit. Snap! The dial glass of the 535GA (or more correctly perspex) matched the dial of my 541GA. It is apparent that the GA suffix stood for GRAM. I presume that the more common suffix MA stands for MANTEL.



The photo of the top of the chassis shows slightly grubby metalwork and discoloured vanes in the tuning capacitor. Initially I was keener to see if the radio worked than to spruce up the appearance. This turned out to be an unfortunate choice of priority.

At first power-up the radio took 70W, obviously excessive. However, nothing was producing signs of overheating and the power quickly reduced to 54W as the electrolytics reformed. The radio did not burst into life, but I was initially more concerned that 54W suggested that the coupling capacitor to the 6AQ5 output valve was leaky and affecting the grid bias leading to excessive conduction and possibly lack of function of the 6AQ5. That proved to be correct. The 6AQ5 cathode was strapped to the chassis and the grid measured zero Volts i.e. no negative bias. I subsequently found that the bias is supposed to be -15V. Most AWA circuits of this time using a 6AQ5 had a cathode resistor and

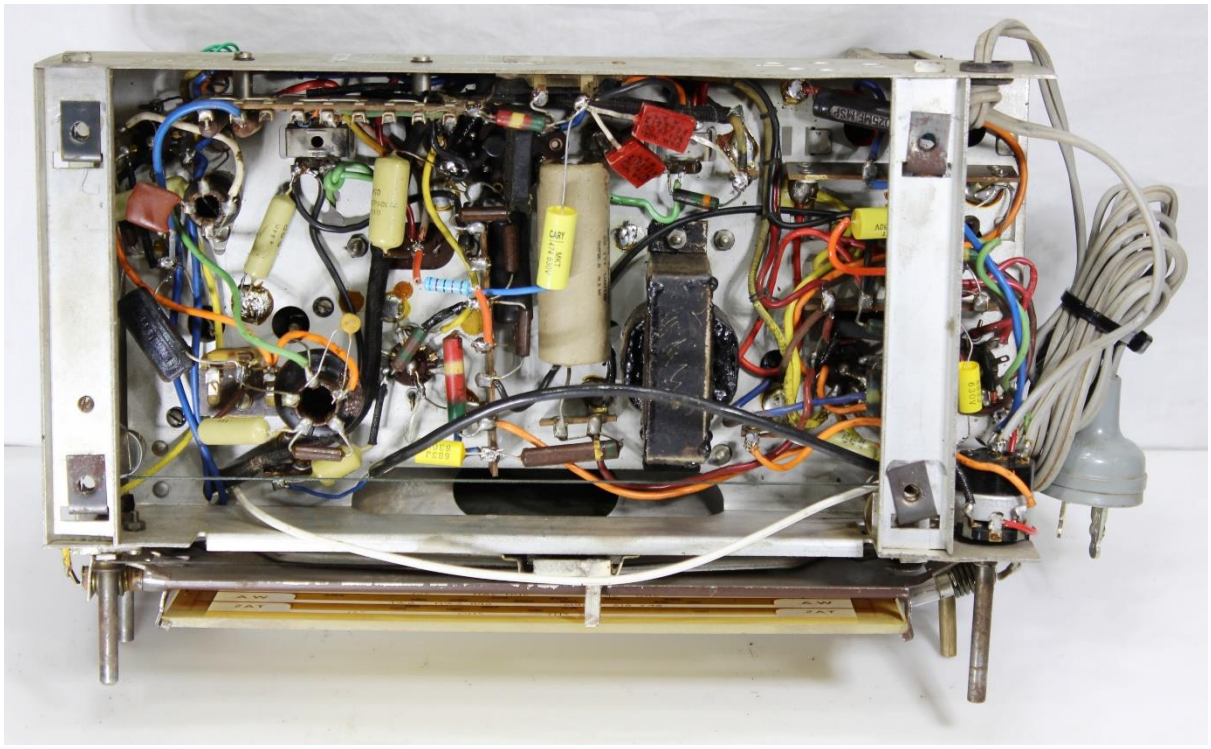
bypass capacitor to generate grid bias, but not this one. Another peculiarity that struck me was the HT filter choke was inserted between the mains transformer centre tap and the chassis in the negative HT line, rather than the positive HT line from the 6X4 cathode. Armed with these peculiarities and the valve line up I went through AORSM circuits until I found that the schematic for model 535GA-GAZ matched well. Subsequent tracing showed that it was a perfect match to all connections and component values in the 541GA. I may have arrived there earlier if I had followed up on the Radiomuseum information on the model 535GA (unfortunately time is not refunded when you realise that you could have been more efficient, after the event).



Code No.	Description	Part No.
	INDUCTORS	
L1	I.F. Filter (including C1)	9382
L2, L3	Aerial Coil 540-1600 Kc/s	7647A
L4	Oscillator Coil 540-1600 Kc/s	15949
	1st I.F. Transformer	27351
	2nd I.F. Transformer	27353
L5, L6	Filter Choke	7017
L7, L8		
L9		
	RESISTORS	
R1	0.1 megohm	½ watt
R2	20,000 ohms	"
R3	1.5 megohm	"
R4	0.1 megohm	"
R5	0.3 megohm	"
R6	0.3 megohm	"
R7	50,000 ohms	"
R8	0.15 megohm	"
R9	20,000 ohms	2 "
R10	20,000 ohms	1 "
R11	5,000 ohms	"
R12	0.5 megohm Volume Control (tapped at 40,000 ohms)	27145
R13	50,000 ohms	½ watt
R14	1.5 megohm	"
R15	0.5 megohm	"
R16	1.5 megohm	"
R17	0.5 megohm	"
R18	3.0 megohms	"
R19	0.5 megohm	"
R20	1.5 megohms	"
R21	50,000 ohms	"
R22	0.25 megohm	"
R23	0.63 megohm	"
R24	0.4 megohm	"
R25	1.0 megohm Tone Control (including S2)	"
R26	50,000 ohms	½ watt
R27	0.5 megohm	"
	CAPACITORS	
C1	4 μμF silvered mica	
C2	0.05 μF paper 200 v. working	
C3	50 μμF silvered mica	
C4	12-430 μμF tuning (on gang)	18671
C5	2-20 μμF trimmer (on gang)	18671
C6	100 μμF silvered mica	
C7	100 μμF silvered mica	
C8	0.05 μF paper 200 v. working	
C9	0.1 μF paper 400 v. working	
C10	470 μμF padder ± 2½%	
C11	12-430 μμF tuning	
C12	2-20 μμF trimmer (on gang)	18671
C13	4 μμF mica	
C14	0.0025 μF paper 400 v. working	
C15	100 μμF mica	
C16	100 μμF mica	
C17	200 μμF mica	
C18	50 μμF mica	
C19	100 μμF silvered mica	
C20	100 μμF silvered mica	
C21	100 μμF mica	
C22	0.05 μF mica	
C23	0.05 μF paper 200 v. working	
C24	0.4 μF paper 200 v. working	
C25	0.025 μF paper 400 v. working	
C26	16 μF 525 P.V. Electrolytic	
C27	0.1 μF paper 400 v. working	
C28	200 μμF mica	
C29	0.005 μF paper 600 v. working	
C30	0.05 μF paper 400 v. working	
C31	20 μμF mica	
C32	0.05 μF paper 400 v. working	
C33	0.4 μF paper 200 v. working	
C34	8 μF 525 P.V. Electrolytic	
C35	0.1 μF paper 490 v. working	
C36	0.0025 μF 600 v. working	
C37	0.025 μF paper 400 v. working	
	TRANSFORMERS	
T1	Loudspeaker Transformer	TU3::
T2	Power Transformer	25803
	30-0-30 C.P.S.	25805
	LOUDSPEAKER	
	9" x 6" Permanent Mag.	BF1::
	SWITCHES	
S1	Volume Control (on R12)	
S2	Phono-Radio Switch (on R25)	
	Power Switch (on R25)	27417

Locating the 6AQ5 coupling capacitor C30 was easy enough and replacing it reduced power consumption to 42W and the audio stages were now obviously working because a screwdriver on the volume control produced the expected mains hum as audio. However, the radio showed inconsistent symptoms between iterations of on-off. Sometimes some places on the tuning dial would tune at a focal point that produced several strong stations overlayered. I live in Lower Plenty only a few km from a cluster of high power AM transmitters on the banks of the Yarra river. At other times a jumble of stations would be spread across the tuning range with no focus of tuning. Eventually nothing was coming through except a burst of sound at warm up and another burst at turn off. Something was failing in a voltage dependent manner and the chief suspects were the paper capacitors that had high voltage across them. This was an unusually cluttered layout of

components with many on top of each other and most valve bases obscured by components so that voltages could not be easily measured. There was already a number of mustard capacitors indicating previous replacement. Some of the original pitch casings were cracked. It was time for a general replacement of the paper capacitors to hopefully fix the radio and clear the clutter to get access to critical measurement points. A re-cap was not the answer and operation remained voltage sensitive. All voltages at the valve bases were much as expected so it did not seem to be a problem with a resistor changing value or going open. Measuring all resistors with a digital Ohm-meter confirmed that they were close enough to correct value.



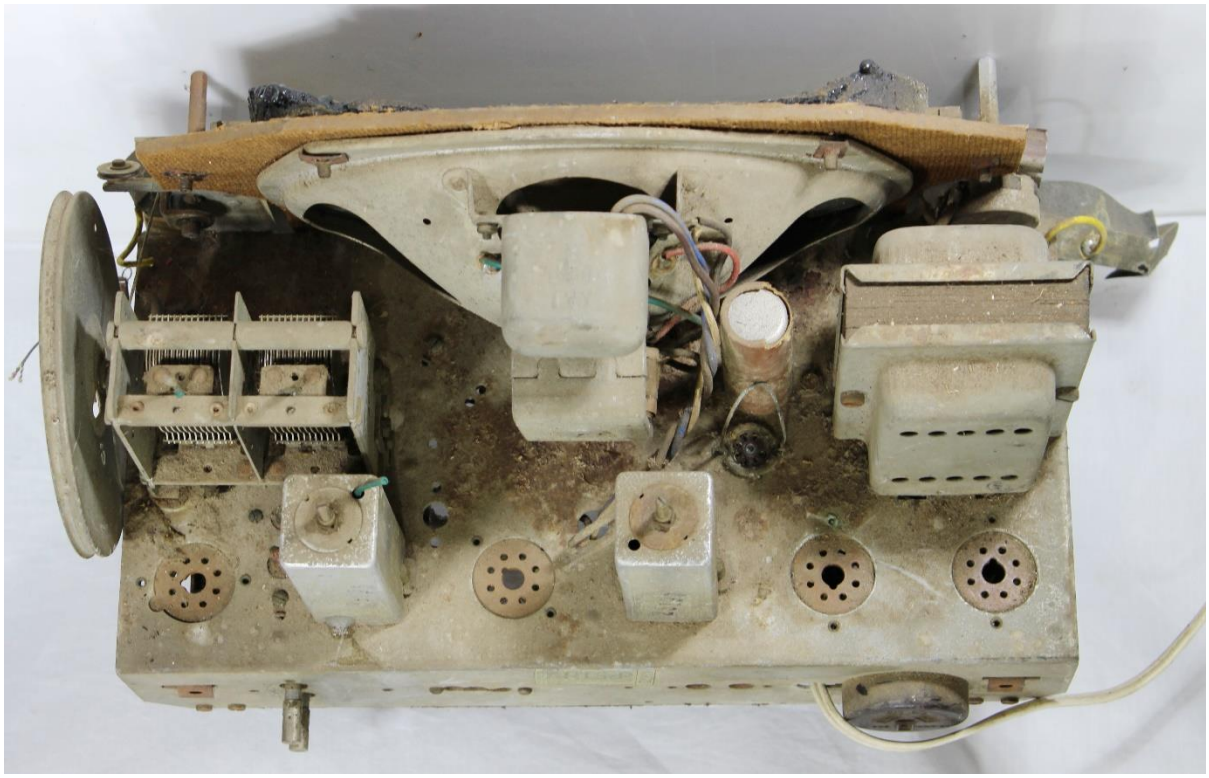
Because the radio had ceased working at the full HT of 280V the bench DC power supply was jumper-linked into circuit after removing the 6X4 rectifier. Ramping up the HT to merely 90V produced audio output of superimposed stations. The radio dropped out of function just over 200V. I expected to see a sudden change in mA of current drawn when function ceased and something broke down at high voltage. This was not so, the mA simply followed Ohms law without a jump. Because I could get audio through from the front end at conservative HT I thought it unlikely that the problem was in the IF or beyond. It was a tuning problem suggesting the circuitry around the 6BE6 mixer. There is a low frequency bypass coil L1 in the antenna circuit that may have caused a problem, but cutting it out of circuit made no change. The low frequencies bypassed include 455kHz. Fellow HRSA member Michael Justin offered me his take on this: *That first antenna coil in the circuit is actually an IF filter one the worst ideas AWA ever came up with. Its purpose was to filter out any radiated IF from the IF stage and stop it from entering back into the RF or converter stage. There are thousands of other radios and circuits without this filter and they work fine so why they had it in a lot of their circuits is beyond me. The problem with the filter is it's not sharp enough so it also attenuates the lower end of the broadcast band. So if you have a 4 valve set and the valves are tired you will find that you will turn up the volume near max to listen to 3AR and 3LO or you will add a decent length aerial wire to make up the difference. A new set of valves will also make a big difference.*

Continuing the hunt for a fault, replacing C2 (aerial high frequency shunt) made no difference. The aerial coil checked out in every way for continuity and connections. Likewise, the oscillator coil could not be faulted. Was it the 6BE6? No, a substitute 6BE6 was not the answer. C3 and C10 provide DC isolation from the tuned coils associated with the gangs of the tuning capacitor, so an Ohm-meter can easily check if the plates are separated. The slightly grubby state of the tuning capacitor at this time is shown in the top view photograph of the chassis. The plates did not make contact because both gangs remained at greater than 4M between the plates as the capacitor was swung through its range. With no reason to expect a miracle I decided to clean the tuning capacitor with a brush and turpentine then blow with compressed air. It certainly looked better after cleaning. A MIRACLE! To my amazement the radio now worked at full voltage, crisply tuning stations across the MW band. Just as well because the slugs were immovable in the IF cans, so I could not change the alignment.

There must be a reason why the dirty tuning capacitor caused both detuning and voltage sensitivity, but it is not apparent to me. I was content to know that I had restored the radio to working condition. I asked Michael Justin if he had encountered anything similar in his years as a professional restorer. He replied: *Tuning gangs can give you some nasty faults. I had one that caused the oscillator to be intermittent. It had grown fine hairs that were invisible to me. The only reason I knew they were there is when I disconnected the gang from the circuit I applied 240V mains across the capacitor with a 240V lamp in series and when I slowly turned the gang I could see these tiny little sparks light up as the 240V blew them away like cob webs and that fixed the fault. But I sure did spend a lot of time on it. I am reluctant to recommend this to others because it is a very dangerous method for disposing of whiskers. For a start there is a 50% chance that you will have a live chassis. If gang plates are touching there's a chance you may weld them together.*

WHAT PROMPTED THIS RESTORATION?

My wife has rules that I reluctantly accept. I am not allowed to build a new shed or create other spaces to grow my collection of radios and parts. This is reasonable considering the 600 or so radios I have plus other treasures. If anything comes in, something has to go. To create space I occasionally go to my salvage shelves, pick a chassis and strip it to dispose of the bits that are unlikely to be used. Due to time thrust on me by Covid I selected an AWA model 527MA chassis for this treatment. Inspection before disassembly revealed that the speaker was an early elliptical type and surprisingly it was electrodynamic with a field coil.



The 527MA has four octal valves and one miniature valve, which is the same configuration shown on the label inside the Bakelite cabinet that houses my 541GA chassis. Checking the data on the 527MA on Radiomuseum showed that it was made in the period 1950 -1952, a little later than I would have expected. The valve types in the 527MA check out with the paper label in my case. The 527MA case shown on Radiomuseum matches my Bakelite case and shows the genuine AWA knobs rather than the non-originals fitted to my radio.

The chassis-stripping was the starting point that got me to climb a ladder to retrieve the brown Bakelite AWA radio from the shelf it had occupied for 15 years.

My radio can now be described as a 541GA in a 527MA case.