VINTAGE RADIO

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The AWA 719C Console; Pt.2

Last month, we took a look at the impressive AWA 719C console radio and described a typical restoration. In Pt.2 this month, we detail the alignment of this complex receiver.

All the normal restoration jobs had been completed on this particular set. I'd cleaned the chassis, replaced suspect paper capacitors, tested various other components, replaced perished wiring and had the cabinet restored to its former glory. There was really only one major job left to do – the alignment of the RF, aerial, oscillator and IF circuits.

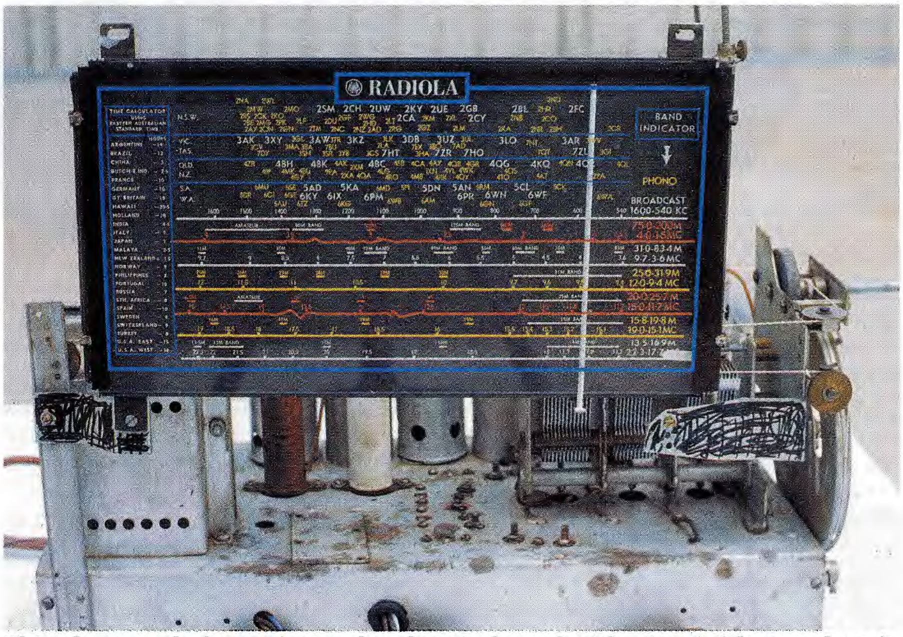
Now as anyone who has ever attempted to align one of these sets knows, it isn't a 10-minute job as it is for most superhet broadcast receivers. The average superhet set has four IF adjustments and four adjustments for the aerial and oscillator circuits, so the job is straightforward.

By contrast, the AWA "7-banders" have four IF transformer adjustments plus 19 other adjustments (and some of these are compromises) for the front end of the set. What's more, some of these adjustments have to be repeated as they tend to interact with each other. In addition, a stable RF signal generator that is well calibrated and capable of operation up to at least 23MHz is required.

Apart from the alignment taking more time, there are a few rather nasty problems that crop up during the procedure. First, the dial isn't attached to the chassis, so how do you align the front end without a dial-scale?

If you have the correct alignment data for the particular model set, it is relatively easy to do. The dial drum has a semi-circular scale around one side and there is a pointer that is alongside the scale, as can be seen in one of the photos. It's then a matter of looking up the "alignment table". For example, in one of the alignment tables, the listing for 600kHz is 19° on the drum, while for 1500kHz it is 168°.

However, as I found out, models that are claimed to be the same electrically, such as the 617T that I have and the 719C that I have been restoring, may not be identical. My set tunes from 540-1500kHz on the BC (broadcast) band, while the 719C tunes from 540-1600kHz. This means that the alignment data for my set and the 719C will be different even though the published data says they are electrically identical!



This photograph shows the two brackets (coloured with a black felt-tipped pen) that were made to hold the dial in place during alignment.

Why won't it track?

Normally, you would expect to tune the oscillator slug at the low frequency end of each band and the trimmer at the high frequency end of each band. However, while the alignment frequencies are known, the angular position of the dial drum that corresponds to the alignment frequencies is often unknown.

Initially, I went ahead and used the AWA listings but found that the coil cores and trimmers on the 719C receiver had to be altered considerably to get the set operating as per the alignment table. This seemed a bit strange, so I held the dial mechanism in approximately its correct position and attached the pointer to the dial cord. The alignment points were nowhere near where they should have been.

It was then that I realised that the

719C covers from 540-1600kHz instead of 540-1500kHz as for my 617T, as noted above. And that explained why I couldn't get it to track correctly. The 719C I was restoring is obviously a later set due to the extended broadcast band calibrations, therefore the degree settings would be different on the dial drum.

But what settings should I use? This was getting messy.

A tuning aid

So how I could align this set without the relevant set of alignment instructions? After some thinking, I came up with the idea of mounting the dial scale onto the receiver chassis by some means. I had some scrap 24-gauge galvanised flashing (plumbers or hardware stores often have it available) and decided that I could make some simple brackets for the job. It really is a pity the chassis design wasn't similar to the 805G and other radiogram models, where the dial scale was firmly attached to the chassis assembly – alignment would have been so much easier.

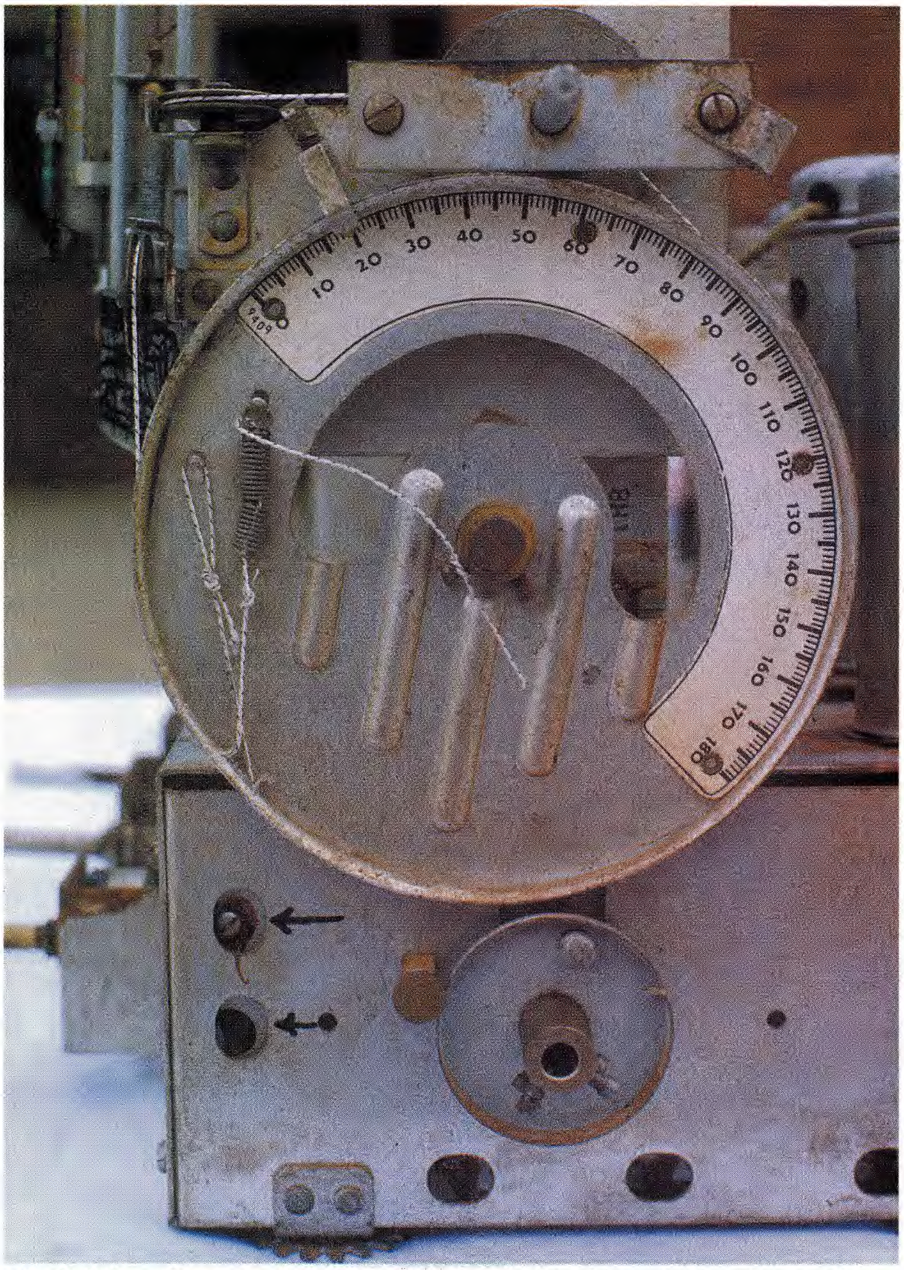
The brackets that I made can be clearly seen in one of the photos (they've been coloured black using a felt-tipped pen). At the lefthand end, one bracket is attached (using a nut and bolt) to a vertical piece of metal that supports a dial scale pulley. The other end of this bracket then goes to an existing bracket at the bottom of the dial-scale.

At the other end, the second homemade bracket goes between another existing dial-scale bracket and a plate which carries the dial-drive mechanism. It was necessary to drill a small hole near the front bottom of this plate to accept a nut and bolt to secure the second bracket in place.

Provided you get the brackets right, the dial drive will work quite well. Remember however, that this is a rather flimsy arrangement, so take care to ensure that no stress is applied to the assembly. It should be perfectly adequate while the alignment procedure is carried out, however.

Tuning the IF stage

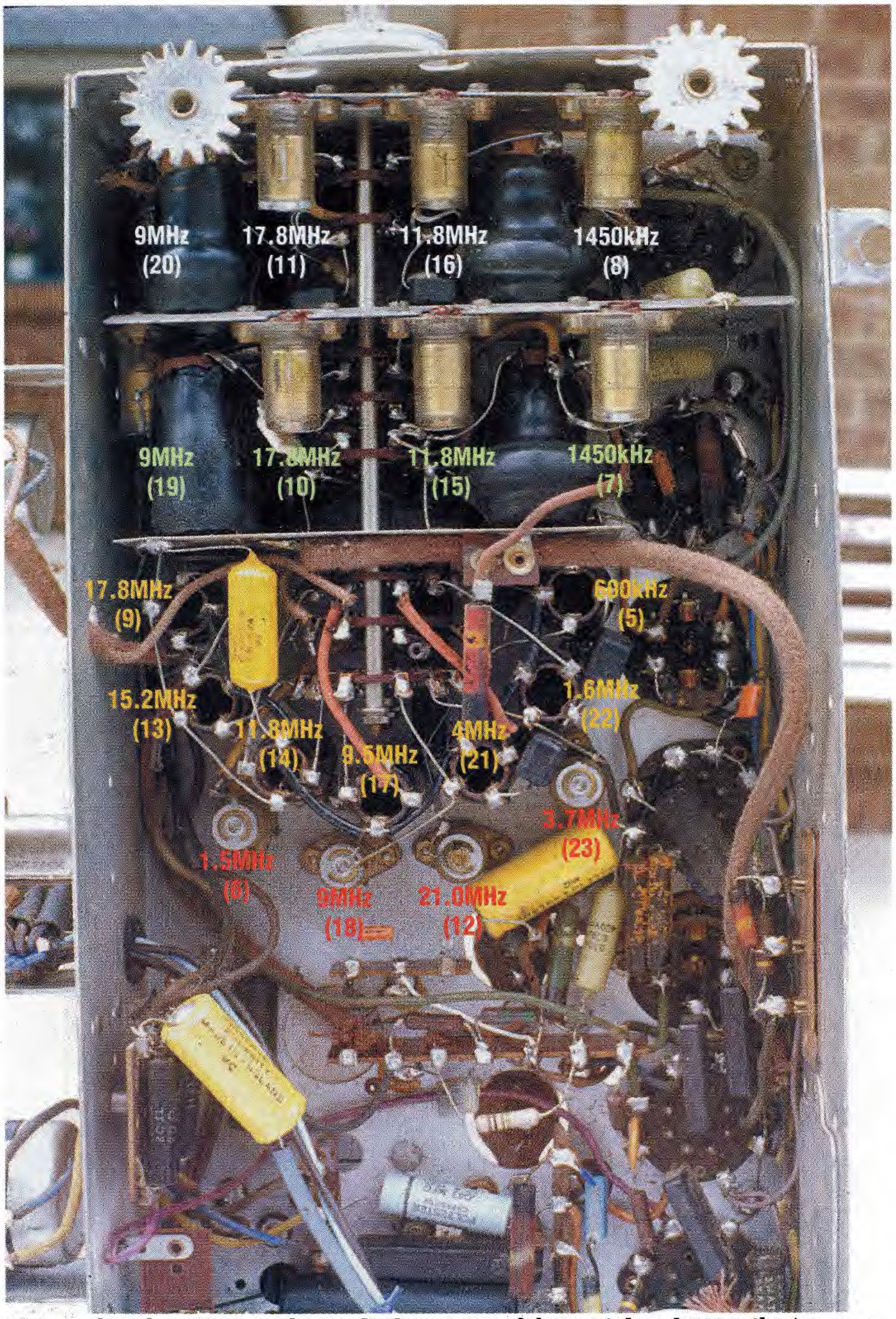
With the gang closed, the pointer is attached so that it is just below 540kHz (Kc/s) on the dial. This done, the IF transformers are tackled first. With the set turned off, attach a digital multimeter (DMM) (set to the 20V DC range) between the AGC/AVC line and chassis using clip leads. An ideal spot is across C37, with the negative lead going to the unearthed side of the capacitor. With the set turned on, the DMM should read about -3V, which is the standing bias on the front-end valves.



The dial drum has a semi-circular scale (marked in degrees) around one side and this is used in conjunction with the "alignment table" (see Table 1) when making alignment adjustments. The holes adjacent to the two arrows at bottom, left of the chassis allow access to the 9MHz aerial and RF trimmers.

Next, attach the signal generator to the aerial terminal of the receiver, set it to 455kHz with (tone) modulation and increase the power until the tone is heard from the speaker. You may have to tune around 455kHz on the signal generator to get a response, although I usually find that most sets are close enough to 455kHz in their alignment to make this step unnecessary.

Now increase the output on 455kHz (if you can hear it on that frequency) until the DMM shows an increased reading. (It is possible to "walk" the IF frequency up or down to 455kHz if it is way off frequency; eg, if there is a problem with the IF stage due to someone's fiddling or if there is a fault). That done, adjust the tuning slugs (using a small plastic screwdriver) in the top and bottom of each IF transformer



This under-chassis view shows the locations of the aerial and RF coil trimmers (white & light green type respectively), the oscillator cores (yellow type) and the trimmers (red type). The numbers in the brackets refer to the corresponding adjustment number in the alignment table.

for a maximum reading on the meter.

All being well with the IF transformers, a peak will be found within a turn or two either side of the initial settings. The screws can then be locked in position with a dab of plastic cement or nail polish.

RF, aerial & oscillator circuits

Now we come to the "fun" part – the alignment of the front-end of the set. Table 1 (at the end of this article) is an extract from a set of alignment instructions for the 611-T and a few other sets. This table can be used to tune the RF, aerial and oscillator sections of the set.

However, although I used this information to tune my 617-T, some of the component numbers for the 611-T are different.

The procedure is as follows. Using the 611-T alignment table, switch the set to the broadcast band and turn the dial drum until 19° appears under the small pointer. This is the 600kHz mark and the dial pointer should also be aligned to the 600kHz mark on the dial scale. Note that I have used "kHz" and "MHz" abbreviations in this article, whereas the dial and tuning instructions show "Kc/s" and "Mc/s".

It is now possible to either use the alignment table or do it directly from the dial-scale that has been temporarily attached to the chassis via the brackets described earlier. There is no problem in aligning the set using the bracket method. However, if you use the alignment table and the calibration table for the 611-T, it may be correct for the model that you are aligning, or it may not be – as was the case with the 719C.

The alignment table is used for each band but the dial calibrations and not the degree settings must be used to align the circuits correctly. I feel much more confident this way.

The location of each of the adjustments is not shown on any literature that I've been able to access, so diagrams 2 and 3 have been drawn to show where each of the 19 adjustments are located. This has made it much easier for me to do this job and should help you too.

Note that the oscillator adjustments are all made from above the chassis, while the RF and aerial trimmers are under the chassis, as can be seen in the photograph at left. Note also that the 9MHz aerial and RF trimmers are accessed through the end of the chassis, as shown by the arrows in the photograph of the dial scale.

The broadcast band is aligned as per steps 5, 6, 7 & 8 of the alignment table. I connect the receiver to a "typical" antenna, then clamp the output lead from the signal generator over the insulation on the antenna lead. That way, the generator has little effect on the tuning of the aerial coils, although the generator does have to be wound up further to get a reasonable level into the receiver to actuate the AGC.

In practice, the generator is set to each of the frequencies shown in the alignment data in turn. Note that it's necessary to repeat the adjustments again for maximum reading on the DMM. In fact, you may need to repeat the procedure several times before you are happy that there is no interaction between the individual adjustments.

After the broadcast band been completed, the 17.7-22.3MHz band can be aligned. This involves setting the dial to 17.8MHz (or 18°) and doing adjustments 9, 10 & 11. You then set the dial to 21MHz and do adjustment 12.

On the 15.0-19.0MHz band there is only one adjustment and that is the oscillator at 15.2MHz (adjustment 13).

On the 11.7-15.0MHz band, all the circuits are adjusted at 11.8MHz. The adjustment numbers are 14, 15 & 16.

Moving now to the 9.4-12.0MHz band, again there is only one adjustment and that is the oscillator on 9.5MHz (adjustment 17).

On the 3.6-9.7MHz band, the dial is set to 9MHz and you do the adjustments 18, 19 & 20. The dial is then set to 4MHz for adjustment 21. Personally, I would do 21 first (which is conventional wisdom), then 18 and then go between these two until I was satisfied that the oscillator was tracking correctly before doing adjustments 19 and 20.

We are now nearly at the end of the alignment procedure. On the 1.5-4MHz band there are two adjustments, both involving the oscillator. Adjust the oscillator core at 1.6 MHz (adjustment 22) and then the trimmer (adjustment 23) at 3.7MHz. Re-check after adjusting both that the first one is still correct and if not, readjust it.

The other adjustment will quite likely be out again but not as much as before. Going between the two adjustments will quite quickly get the oscillator circuit tracking fairly accurately across the band. This technique applies to any of the bands where the oscillator is adjusted at both the low and high ends of the band.

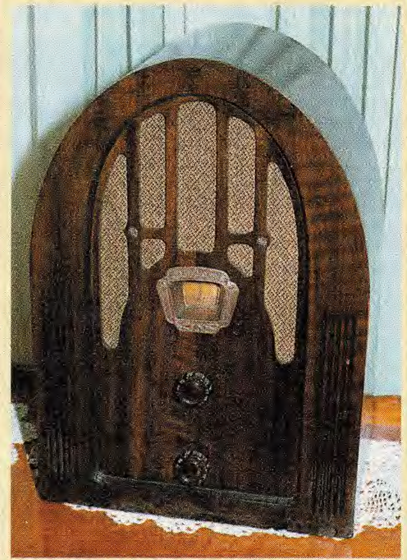
Finally, recheck the broadcast band alignment if the 21MHz oscillator trimmer has had to be altered. Note that the information on the 611-T indicates that the trimmer is C9 but in the 617T and 719C it is C12.

The compromises

Normally, the front end of a set with seven bands and an RF stage will have six adjustments per band, making a total of 42 adjustments. However, there are only 19 adjustments in these particular sets. There are several reasons for this.

First, there are no aerial or RF stage adjustments at the low-frequency end of each band. This means that if the coils are not exactly matched, the performance at the low-frequency end of

Photo Gallery



AIRZONE MODEL 300: manufactured by Airzone (Sydney) in 1934, the Model 300 features a classic wooden "Cathedral" style cabinet. The circuit is a 4-valve superhet with the following valve types: 57 autodyne mixer, 58 IF amplifier, 59 anode bend detector/ audio output and an 80 rectifier.

TABLE 1: ALIGNMENT TABLE

Alignment Order	Test Ins. Connect To Receiver	Frequency Setting	Band Setting	Calibration Scale Setting	Circuit To Adjust	Adjustment Symbol	Adjust To Obtain
1	6J8G Cap*	455kHz	Broadcast	0	2nd IF Trans.	Core L36	Max. Peak
2	6J8G Cap*	455kHz	Broadcast	0	2nd IF Trans.	Core L35	Max. Peak
3	6J8G Cap*	455kHz	Broadcast	0	1st IF Trans.	Core L34	Max. Peak
4	6J8G Cap*	455kHz	Broadcast	0	1st IF Trans.	Core L33	Max. Peak
Recheck 1, 2, 3 & 4							
5	Aerial	600kHz	Broadcast	19	Oscillator**	Core L31	Calibration
6	Aerial	1500kHz	Broadcast	168	Oscillator	C11	Calibration
7	Aerial	1450kHz	Broadcast	158	Radio Freq.	C27	Max. Peak
8	Aerial	1450kHz	Broadcast	158	Aerial	C7	Max. Peak
Recheck 5, 6, 7 & 8							
9	Aerial	17.8MHz	22.3-17.7MHz	18	Oscillator	Core L19	Calibration
10	Aerial	17.8MHz	22.3-17.7MHz	18	Radio Freq.**	C24	Max. Peak
11	Aerial	17.8MHz	22.3-17.7MHz	18	Aerial	C4	Max. Peak
12	Aerial	21.0MHz	22.3-17.7MHz	149	Oscillator	C9	Calibration
13	Aerial	15.2MHz	19.0-15.0MHz	27	Oscillator	Core L21	Calibration
14	Aerial	11.8MHz	15.0-11.7MHz	25	Oscillator	Core L23	Calibration
15	Aerial	11.8MHz	15.0-11.7MHz	25	Radio Freq.**	C25	Max. Peak
16	Aerial	11.8MHz	15.0-11.7MHz	25	Aerial	C5	Max. Peak
17	Aerial	9.5MHz	12.0-9.4MHz	24	Oscillator	Core L25	Calibration
18	Aerial	9.0MHz	9.7-3.6MHz	156	Oscillator	C13	Calibration
19	Aerial	9.0MHz	9.7-3.6MHz	156	Radio Freq.**	C26	Max. Peak
20	Aerial	9.0MHz	9.7-3.6MHz	156	Aerial	C6	Max. Peak
21	Aerial	4.0MHz	9.7-3.6MHz	19	Oscillator	Core L27	Calibration
Recheck 18, 19, 20 & 21							
22	Aerial	1.6MHz	4.0-1.5MHz	15	Oscillator	Core L29	Calibration
23	Aerial	3.7MHz	4.0-1.5MHz	153	Oscillator	C14	Calibration
Recheck 22 & 23							

Finally, recheck broadcast band. This is necessary only if the setting of C9 has been altered.
* Rock the tuning control back and forth through the signal.
** With grid clip connected. A .001uF capacitor should be connected in series with the "high" side of the test instrument.
The column headed "Calibration Scale Setting" refers to the 180 degree scale on the ganged tuning capacitor drive drum. In taking readings on this scale, read from the right-hand edge of the pointer; ie, the edge nearest the rear of the chassis. Check the setting of the drum before taking readings. The zero mark should be opposite the pointer with the tuning capacitor fully closed.

the band can be inferior to that obtained at the high-frequency end.

Second, on some bands, there are only adjustments for the oscillator at both ends of the band; eg, the 1.5-4.0MHz band which has no RF or aerial coil adjustments at all. This can be quite a compromise if the coils aren't accurately matched.

In fact, I found that if I wanted good performance at the high end of the band in the 719C, I had to compromise with the oscillator frequency. For this particular receiver, I found that in order to get good RF sensitivity, I had to adjust the oscillator so that the receiver was actually on 3.65MHz when the dial said it was 3.7MHz.

Third, on the 9.4-12.0MHz and 15.0-19.0MHz bands, there is only one adjustment and that is for the oscillator at the low-frequency end. Hopefully the set will track correctly across each of these bands but that's really a faint hope I'm afraid. The value of C15 is quite critical and by altering it, it is possible to correct the tracking to some degree.

C1 and C22 could also be played with to improve the tracking of the RF and aerial circuits on shortwave as well. However, it is not an easy task and unless you are a bit of a masochist, it is left well alone.

Summary

These sets overcome the deficiencies in their tuned circuits by sheer brute force but are not as sensitive as some sets. In addition, the tuning mechanism is free-running and tuning shortwave stations is a dream compared to the "hair's-breadth" tuning on a conventional dual-wave set. And although the tuning accuracy isn't as good as it should be, it is better than on most receivers. Most listeners rarely knew the frequencies of the shortwave stations they wanted to listen to anyway.

Finally, they are an impressive receiver to look at and well worth a place in your vintage radio collection. If you've always wanted to align your AWA 7-bander, this article should be all the incentive you need. SC

Photo Gallery

GENERAL ELECTRIC MODEL 110: this receiver was made by AWA (Sydney) in 1932 and has the distinction of being the first to be housed in an Australian-made Bakelite cabinet. The same chassis was also marketed under the AWA brand as the Model C87. The circuit is a 4-valve TRF with the following valves: 35 RF amplifier, 24 detector, 47 output and an 80 rectifier.