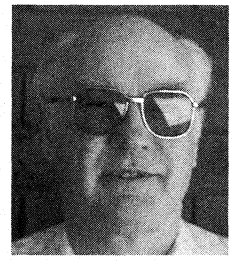
VINTAGE RADIO

By RODNEY CHAMPNESS, VK3UG



A Japanese 110V AC/DC set

Japan was exporting valve radios by the late 1950s and early 1960s, although still struggling to recover following its defeat in World War 2. The standard of the exported radios at that time was mediocre and we often looked down our noses at the sets. How times have changed!

"They'll never make radios as good as we do", was the familiar catch-cry in those days. Famous last words! The Japanese now make some of the best radio equipment in the world and Japanese electronic equipment now fills our living rooms, work places and cars. The big difference back in the 1950s and 1960s was that Japan was then a cheap labour country, so the radios were cheap to import.

A friend had a badly damaged Japanese radio set that was no use to him. Did I want it? "Yes please", I said. Being an inquisitive fellow, I wanted to see what I could find out about it.

Unfortunately, quite a bit of the cabinet had been broken and the back panel, knobs and decorative front panel were missing – hence the stick-on Dymo® labelling and hand-drawn dial calibrations shown in the photograph. In fact, one whole end of the cabinet with one loudspeaker was completely broken away (the set uses two 100mm speakers, one at each end of the cabinet.

It had obviously fallen and not bounced at all well off the floor!

I was interested to see how the receiver would perform as I hadn't seen this model before. I have no idea what brand the set is though, due to the fact that so many bits are missing and there's no chassis labelling.

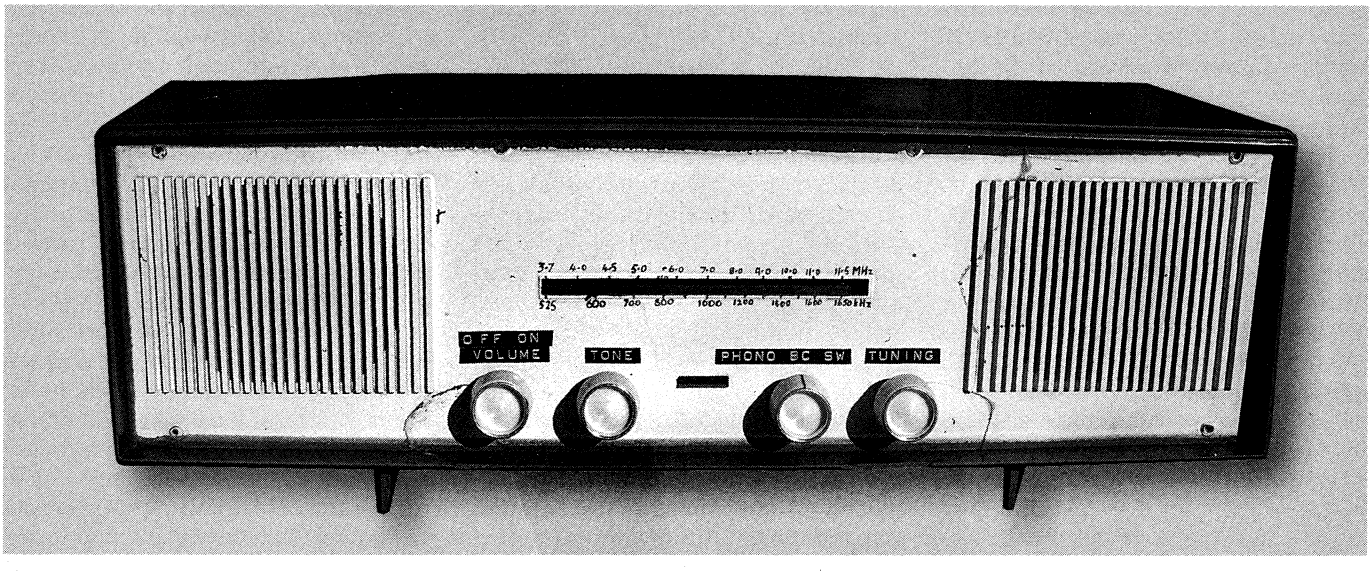
I glued the cabinet back together with plumbers blue plastic cement. I don't recommend it but this was only going to be a rough job to see how a Japanese radio of this era performed. The set was then given the once over and any minor components considered likely to create trouble were replaced.

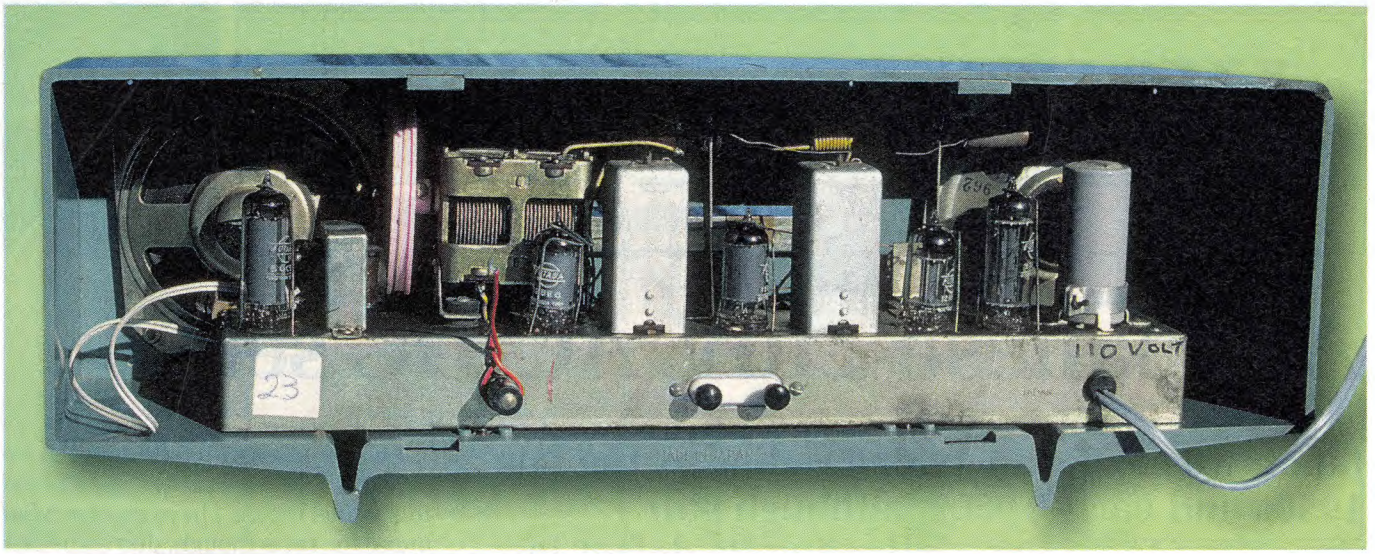
110/117V AC/DC operation

I laboriously traced out the circuit and found that it operates from 110/117V AC/DC (and that means be careful). Well, I got it up and running on both the broadcast and shortwave bands. The shortwave band tunes from 3.8-12MHz and is very much an afterthought, as there is only one adjustment for that band (and minimal adjustments for the broadcast band).

Despite the lack of adjustments in the front end, it appears to be well

Below: front view of the Japanese 110V AC/DC receiver circa 1960 with hand-drawn dial calibrations and stick-on labelling.





Rear view of Japanese 110V AC/DC receiver. The 240V-to-110V transformer was fitted at the end of the cabinet near the power lead in. Do not touch AC/DC sets unless you are very experienced and know exactly what you are doing – they can be very dangerous.

aligned, with good sensitivity. The manufacturer really did do a good job of getting the prewound coils right, so that few adjustments are needed. With a few more adjustments, the radio would no doubt work even better.

The circuit diagram is quite standard, even allowing for the fact that it is an AC/DC set. The valves all use 0.15A heaters and are strung in series across the 110/117V mains.

The valve line-up is as follows: 12BE6, 12BD6, 12AV6, 50C5 and 35W4. Note that the first two numbers indicate the voltage of the heater. The 50C5, a 7-pin miniature type, gets extremely hot. Its heater dissipates 7.5W compared to 3W for the 6AQ5/6V6GT and that's even before the plate and screen dissipation is taken into account. The 50C5 is designed to work quite well with between 110-130V DC on the plate and screen.

Converter

The converter stage uses the 12BE6. This is a standard pentagrid converter and uses a tapped coil in the cathode for the oscillator. The aerial coil arrangement is also standard but very austere, with few adjustments as mentioned earlier. The intermediate frequency (IF) amplifier is a basic 455kHz system using a 12BD6 which is a 7-pin miniature valve similar to a 6BH5.

The 12AV6 is used as the detector stage and this has its two diodes strapped together. The AGC line runs from the grid to the bottom of the fist IF coil secondary. The 470kΩ potentiometer in the AGC line functioned as a crude volume control.

The first audio stage is quite conventional, as is the audio output stage. The main points of interest here are the use of a 50C5 and the unbypassed 160Ω cathode resistor which gives some degeneration.

As an aside, some of the audio circuitry is enclosed in a small hybrid block of components. This method of reducing the time to wire sets wasn't used for long. Instead, radios using PC boards and individual components proved much more popular. The main drawback was that if one component became faulty, it was not always easy to isolate, As a result, the components in the hybrid circuit were usually all replaced and the unit thrown in the rubbish bin.

Power supply

The power supply is the conventional half-wave rectifier system used in AC/DC sets. Incidentally, if the set is used on DC, it is necessary to make sure the above-chassis input lead is positive otherwise the set won't work (yes, the valves light up but the valves get no high tension (HT) voltage).

Because a half-wave rectifier is used, the filter capacitors for the HT rail are larger than normal at 30μF each (all three of them) to reduce the ripple. Any interference on the mains is poorly filtered using just two .01μF capacitors.

The chassis of the set can be earthed as it is not directly connected to either side of the mains. Instead, the "earthy" side of the mains (ie, the Neutral) runs around the chassis as a wire bus and is connected to the chassis via one of the .01μF capacitors.

However, this set does have one potential "bitie" and that's the earth terminal of the phono input which is connected to one side of the mains. Just imagine this braided earth lead going up to the earthed metal work of the turntable! If the active side of the mains was on the "earthy" side of the input (ie, the active and Neutral were transposed), this could be lethal. How manufacturers ever got away with such things is beyond me!

This model set was imported into Australia as a 110V receiver. So how was it used here? Well, in Australia, it was converted to 240V AC by fitting a 240V-to-110V power transformer into spare space in the cabinet. It was roughly fitted I might add but at least it made the set safe as far as shocks from the phono earth terminal were concerned.

Summary

This radio is reasonably typical of the standard of receivers manufactured in Japan at that stage. I had a Lafayette HE-30 receiver of the same general vintage and while it was better than this set, it isn't all that much better. Japan is now light years ahead of that mediocre standard, as we all know.

In summary, this was a rough and ready set but it is stable and works quite satisfactorily. However, I wonder how well it would go in an electri-

cally noisy environment with virtually no noise filtering on the mains input.

It's an interesting little set – part of the history of the era – but it certainly isn't one of my favourites.

Safe servicing AC/DC sets

Although AC/DC sets were quite common in America and in Europe, we in Australia and New Zealand have been rather wary of dealing with "hot" chassis sets. However, they were produced in small numbers in Australia and New Zealand to suit some of the small townships that had DC power only but which might be converted to AC later on.

These sets were also bought by people who shifted around and could not be sure if the next town they were going to had AC or DC power. Some of the last valve portables also were "hot" chassis sets, having one side of the mains connected to chassis when they were used on mains in lieu of batteries.

The first comment to be made in regard to servicing such sets is be careful – exercise extreme caution and double check everything. **Do not touch these sets unless you are very experienced and know exactly what you are doing – they can be death traps.**

Depending on the circumstances, there really isn't a great deal of difference between grabbing the chassis of a "hot" chassis set and earth at the same time as grabbing 400V DC HT in a receiver and chassis earth. The effects can be identical – death.

So be careful with all receivers. They can be lethal if you are careless.

With an AC/DC set, first check which pin of the mains plug goes to chassis or, if it is a better designed set, to the negative bus that is insulated from the chassis. Make absolutely sure that it is the Neutral that goes to the bus or to the chassis. Also, check the capacitor that goes between the chassis and the negative bus in the receiver. This should have a rating of 250V AC working and must be in good order (in fact, it's probably best to replace it, just to make sure).

However, never assume that the chassis will be at Neutral potential when plugged into just any power point. If the power point is wired incorrectly (eg, Active and Neutral transposed), the chassis could be live (and that includes the pot shafts)!

Additionally, even if you are quite sure that the set is wired in a safe manner, use a rubber mat to stand on and don't touch any parts, including the chassis, while the set is on (the chassis will only be safe to touch if it is actually connected to mains Earth). Many people use a 240V-to-240V isolation transformer to be even more certain. A core balance detector such as recommended in Vintage Radio for May 1998 is cheap insurance.

One thing that cannot be done is to run the set with a valve missing. That's because the valve heaters are wired in series and if one valve is out of the set, all the heaters go out. This means that it isn't possible to test the output stage with the other valves removed as can easily be done with receivers using parallel wired heaters.

Another problem is wiring in dial lamps (this set has none). They cannot simply be wired in series with the heaters, as these have low resistance at switch on (ie, when cold) and draw a heavy current. If you did connect them in this manner, the dial lamps would light up brightly – for a few seconds – and then expire.

So how did the set manufacturers overcome this problem? In the case of the radio featured here, a dial lamp could be wired between pins 4 and 6 of the 35W4 valve. The voltage drop across this portion of the 35W4 heater will be nominally correct for a 6-8V 150mA dial lamp.

Note however that the socket would need to be well insulated to ensure there were no shorts or shocks, as both sides of the socket would be at virtually full mains voltage above the chassis or negative bus.

High-voltage valves

In Australia, we did not have the range of high-voltage valves that were available in America and Europe. As a result, although the valve heaters were wired in series, the voltage drop across them was much less than 240V. Resistors wired in series with the heaters accounted for the rest of the voltage drop and often, in a higher quality set, a barreter or current regulator would be used as well.

A barreter consisted of an iron-wire resistor mounted in a glass bulb containing hydrogen. This device gave a constant current for a wide range of applied voltages.

For example the 161 has a constant current of 0.16A through it for applied voltages of 100-200V. This was handy, as it meant that the huge inrush current through cold heaters was avoided and dial lamps could be wired in series with the mains (provided a 6.3V dial lamp had less than 6.3V across it to ensure long life). Additionally, there was no need for a voltage tapping for different voltages between 200V and 250V - the current regulator took care of all of this.

A 240V set using 0.15A heaters required about 36W for the heaters and series resistors. The HT circuit probably required a further 12-15W, making a total of about 50W - typical of even AC-operated receivers of that particular era. However, for some strange reason, a few manufacturers used 0.3A heaters, which meant that the heater and series resistors used 72W before any HT current was taken into account.

These would have been cosy sets to operate in the middle of winter, as the inside of the case really did get quite hot. By contrast, the receiver described in this article only used about 22W from a 110-117V mains supply. **SC**