# VINTAGE RADIO

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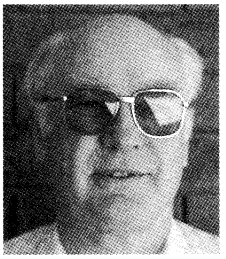


# Vintage Hifi Stereo AM Radio

**Most of our readers would probably be aware that many AM stations broadcast in stereo but apart from some car radios, few people have the facility to receive stereo AM broadcasts which are of potentially very good quality.**

But did you know that stereo AM broadcasts began in the late 1950s, long before FM stereo broadcasts began? People used to set up two AM radios to listen to the occasional broadcasts from the ABC and some commercial stations. But we're getting ahead of ourselves.

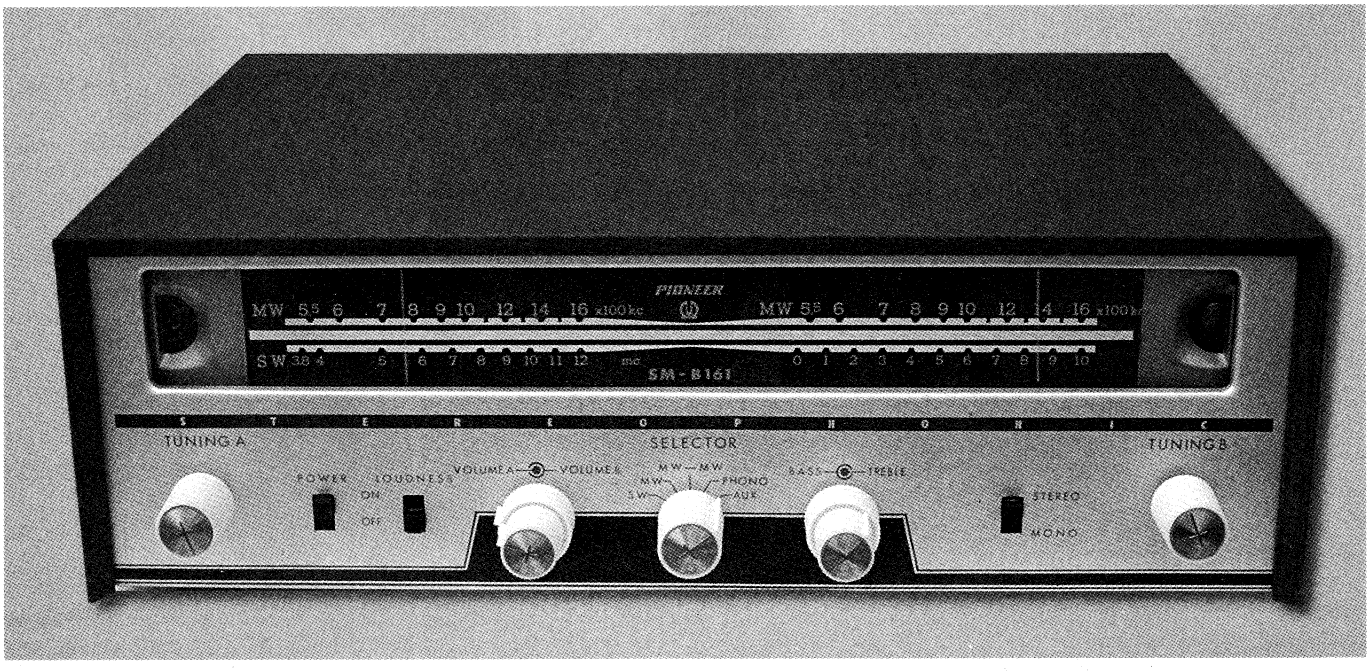
True, AM as received on the average domestic receiver is rather poor in regard to quality, often only having a frequency reproduction range of 150Hz to around 3.5kHz. The IF (Intermediate Frequency) bandwidth is usually quite narrow and the audio response of the audio amplifier in small radios is rather restricted as well. No wonder that AM radio has a reputation of being low fidelity.

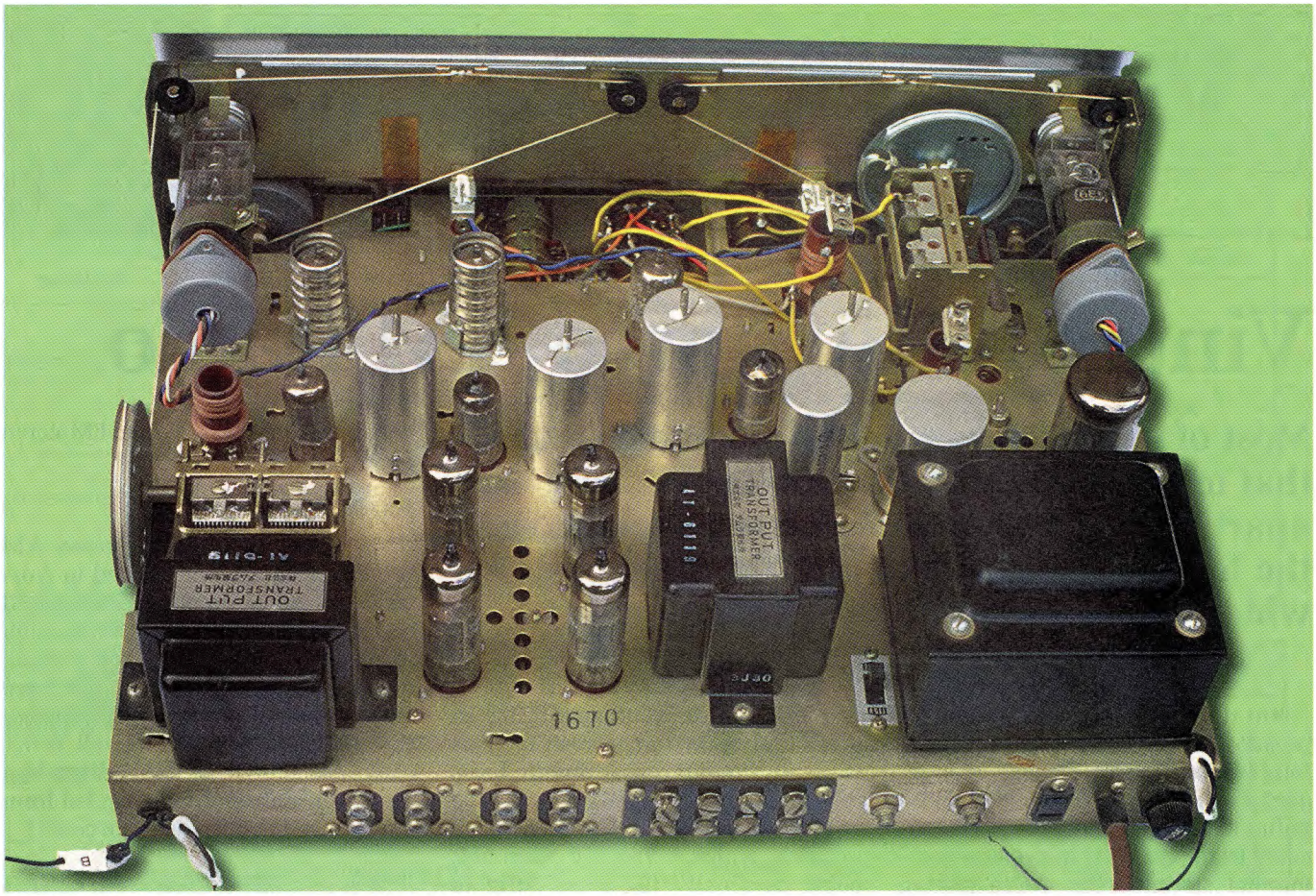
The transmitters, however, do have a much wider frequency response, being nominally flat from 50Hz to 10kHz or 12kHz, and often a lot wider than that. And the Motorola CQUAM stereo modulation which has been used by Australian AM stations since 1985 is a high quality system. Hence, with a good-quality stereo AM receiver and a low noise antenna system, it can be very difficult to tell the difference between AM stereo and FM stereo broadcasts.

## Early AM stereo

As mentioned above, stereo AM broadcasting was introduced in Australia on an experimental basis around about the late 1950s and ran through to the mid 1960s. But if you weren't an ABC listener you may not have been aware of it. In most capital cities the ABC had two 50 kilowatt co-located AM broadcast transmitters just out of the metropolitan area, fed from studios in the city.

**BELOW: two dial scales, two tuning knobs and two magic eyes made this Pioneer stereo AM receiver a knob-twiddler's delight at the time of its production in about 1964. The bass and treble controls used concentric knobs, as did the volume control. There was no balance control.**






**The top of the chassis was neat and well laid out. Note the two tuning gangs, one at the front and one at the rear, near one of the output transformers. The two magic eye tubes are mounted horizontally at each end of the front panel.**

In New South Wales, these two stations were (and still are) 2BL and 2FC while in Victoria, they were 3AR (now 3RN) and 3LO. Every so often the stereo broadcasts took place and anyone with two radios could tune one set to 3AR and the other to 3LO and receive "stereo". My parents and family lived on the South Australian border so what with selective fading at night and very ordinary radios the expected "stereo" was something none of us were convinced had really occurred!

But stereo AM did occur and no doubt in the metropolitan areas the stereo was well received. Setting up the receivers was a bit of a problem, and overall it was a messy way of receiving stereo AM. Some of our entrepreneurial Japanese manufacturers could see a lucrative market for hifi stereo AM receivers and commenced to build them. There were not too many models but there was at least one built by Pioneer, as featured here, and one by Kenwood.

But double AM stereo wasn't a commercially successful experiment. People found it too tricky for them to get the hang of, even though it did work quite well. You would not think it would be hard to properly tune radios to different stations but there you are. Hence there are very few of these early stereo receivers around.

I recently had the pleasure of restoring a Pioneer SM-B161 AM (circa 1964) stereo receiver. What is immediately different about this receiver compared to the run of the mill sets of the era in that it has two complete independent AM receivers in the one case. It had two slide-rule AM dials and two tuning knobs.

The audio amplifiers are typical high quality of the era, with a push-pull class AB1 amplifier in each channel, putting out around 8-10 watts RMS. The output transformers for the audio stages are quite large – about the size of a small power transformer in a typical 1950s mantle receiver. They are certainly not called speaker transformers in such a set!

Preamplifiers are provided for low level magnetic phono cartridges, as well as ceramic (crystal) cartridges. Considerable care has been taken to shield the inputs and the cables to the 12AX7 stages which functioned as preamplifiers. The earth leads go to various points around the chassis to minimise hum loops and the heaters of the valves are balanced to earth by preset potentiometers to minimise any residual hum.

Pioneer have been very successful in reducing hum to such a level that it is inaudible at full volume and no input. Could that be said of many of the radios that we restore? Certainly not! The attention to detail to achieve high quality performance is obvious.

One of the photos in this article shows the front panel layout which has the two dial scales. One is purely the AM broadcast band while the other is the broadcast band plus a shortwave band from 3.8 to 12MHz.

## Magic eye tuning

The converter in each receiver is the ubiquitous 6BE6, feeding a single IF stage using a 6BA6 which then goes

to a germanium diode detector (OA81). From the AGC line of each receiver a 6E5 "magic eye" is used to assist tuning of each receiver independently. The 6E5 is also handy for aligning the receiver, as it is only necessary to observe the fluorescent screen of the appropriate 6E5 while the RF and IF tuning adjustments are made.

The output of each receiver then goes into a large switch which combines, separates or selects the receiver, record pick ups or auxiliary inputs; this is a large and busy switch. From this switch, the signals are either separated or combined go to the respective tone control network and audio amplifiers and thence to the speakers.

Fig.1 is a block diagram showing how the receivers and amplifiers are interconnected.

**This photograph shows the great handful of components which had to be replaced. As can be seen, most of the electrolytics were faulty.**

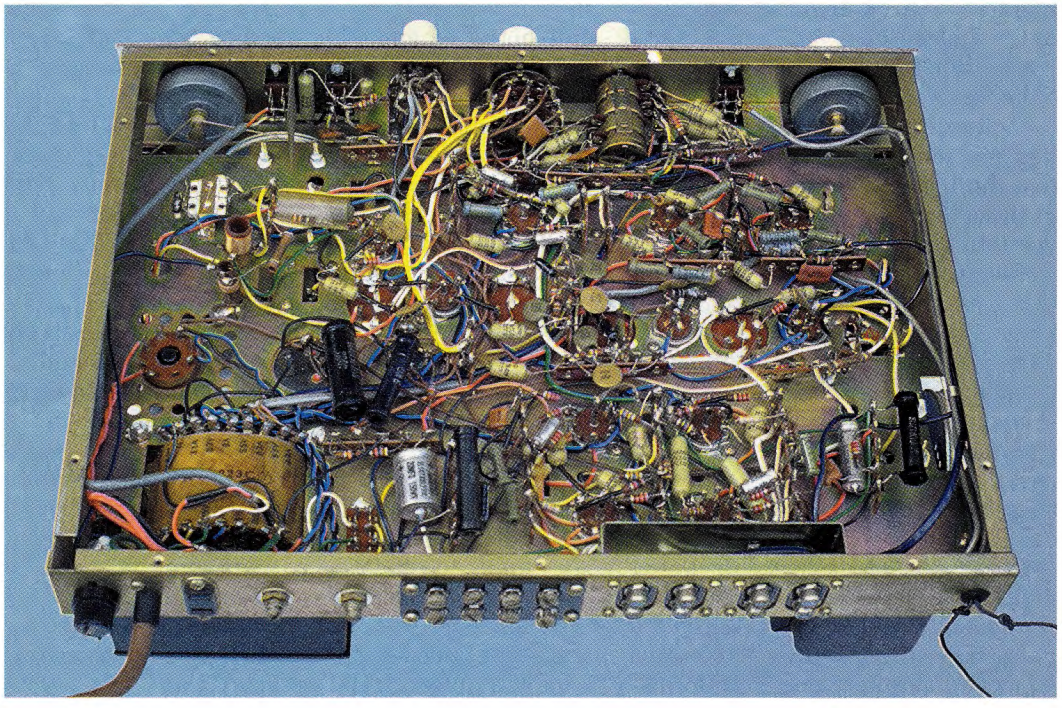
## Servicing the SM-B161

The top and bottom covers of the receiver come off easily, allowing ready access to the componentry. It is a complex piece of equipment with 14 valves, including the rectifier and the two magic-eye tuning devices. From the under-chassis view it can be seen that there are a lot of passive components. I had to replace around 30 leaky electrolytic capacitors and a few out of tolerance resistors. Care is needed in replacing the components. I replaced them one at a time so as to not get any in the wrong spots.

When I first opened up the set I found that wax had been dripping out of one of the audio output transformers. This suggested that it had overheated for some reason or another. I then checked the capacitors around the particular twin 6BM8 output stage and found that the cathode bypass electrolytic capacitor had emptied its insides out. This almost certainly means that the valves had been drawing a lot of current. The grid capacitors were then found to be quite leaky so that was likely to be the reason for the high current through the 6BM8s and the cathode resistor.

It was also obvious at this stage that a few other capacitors had spilled their insides around the underside of the chassis, as can be seen in one of the photos. The set was designed for 115V or 230V AC operation and there were three ordinary paper capacitors of 400V rating from mains to earth – depending on which way the mains supply was connected.

For 230/240VAC operation this is a



**The under-chassis view shows the crowded point-to-point wiring of the era. Access is good though and replacing parts is straightforward provided you do just one at a time.**

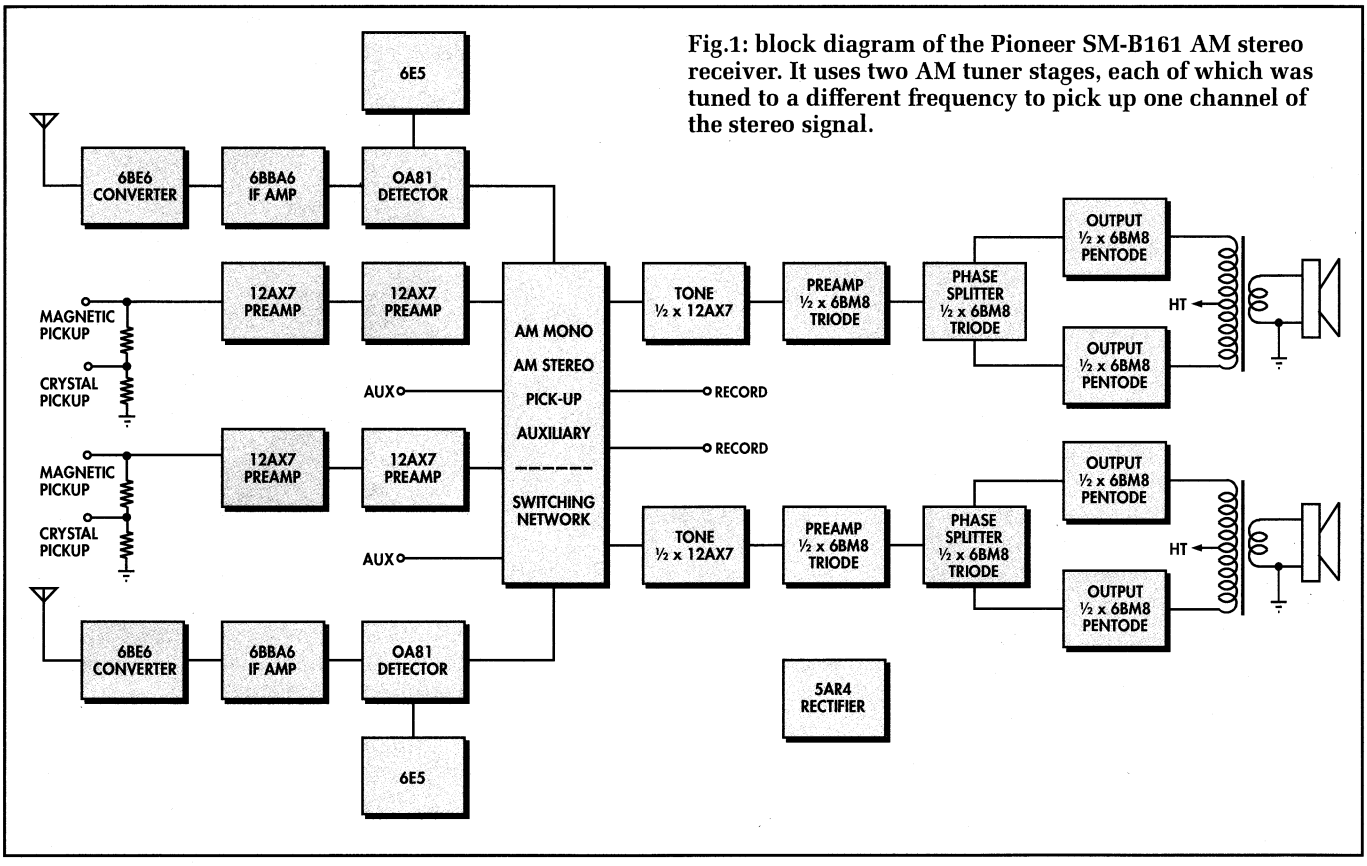



**Fig.1: block diagram of the Pioneer SM-B161 AM stereo receiver. It uses two AM tuner stages, each of which was tuned to a different frequency to pick up one channel of the stereo signal.**

dangerous practice as the ratings of the capacitors *will* be exceeded often, due to spikes and surges on the mains, even though the peak voltage on 240VAC mains is only around 340V. Even a 600V DC rating capacitor is insufficient as the spikes are often greater than 1000V and there can be problems with corona discharge within the dielectric.

So while DC-rated capacitors were often used in this application, only capacitors rated for 250VAC operation are safe. However, as it turned out, the fitting of suitable capacitors in these locations made no improvement in noise suppression so they were left out of the set.

It was found also that the mains plug had been wired so that the power switch was in the Neutral lead rather than the Active. This was corrected! It is always wise to check the wiring of mains leads to make sure that in the past no-one has put mains Active to chassis or some other equally dangerous thing.

The top of chassis view shows a set which is easy to access with major components well labelled. While the photo may not show it well, the valve types and similar pieces of information are stamped onto the chassis. This would have been most useful if any of the valves were missing.

When the set was at last turned on, the voltages were monitored carefully around the set, particularly in the power supply and in the audio output stage where wax had dripped from the transformer. All was well and several hours of operation showed no further trouble in that stage.

As was common practice at the time, each channel has one of the 6BM8 triodes used as a phase splitter for the following pentode output stages. The 47kΩ resistors used for plate and cathode loads in this stage were way out of tolerance. This would mean that the drive to the output pentodes was unequal and hence the fidelity of the output would be adversely affected. So these resistors were replaced too, to solve this problem.

The RF alignments were touched up using the magic eyes to show peak alignment. The performance was quite satisfactory. For best performance, each tuner must be used with its own aerial as connecting both receivers to the one aerial causes signal "suck out" and other undesirable effects. This is a bit of a nuisance and probably was another reason why the product concept didn't really catch on.

## Summary

Pioneer produced a very good twin AM tuner cum stereo amplifier, of high quality for the era of its construction. It is a bit crowded under the chassis but everything can be got at.

The received audio quality on radio stations is excellent. On the downside the bandwidth is so good that 9kHz inter-station heterodyne whistles are quite obvious at night. 9kHz notch filters would no doubt eliminate this problem.

We had 10kHz station spacing at the time this set would have come to Australia and perhaps the 10kHz whistles may not have been so obvious. Some high performance AM sets did have these filters, however. Certainly it is an interesting instrument which the Japanese entrepreneurs hoped would suit the stereo system that appeared might take on in Australia.

There would be very few of this style of twin AM stereo receiver in Australia so they are well worthwhile collecting. It would be worth keeping an eye out for one in your local branch of Cash Converters. **SC**