# VINTAGE RADIO

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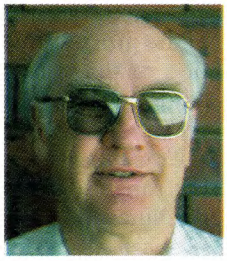


# Improvements to AM broadcast band reception; Pt.3

**In our final article this month, we look at making a practical antenna booster for AM transistor radios. The circuit is basically a separate broadcast-band tuned circuit.**

Last month, mention was made of the problems that occurred when antenna/earth connections were made to the cheaper transistor radios. Often, the reception will be made worse by these connections due to the poor selectivity of such sets.

So what can be done to make these sets quite useable with improved antennas and earths? This was a problem that exercised my mind for quite some time. The solution turned out to be relatively simple and very effective.

I reasoned that if I could improve the front-end selectivity of such receivers, their response to shortwave transmissions would diminish, if not completely disappear. But how could this be done without delving into the internals of the sets?

The answer is to connect the antenna and earth to a separate broadcast-band tuned circuit. By placing this circuit near the set, sufficient signal is then inductively coupled into the receiver's loop-stick antenna to give a worthwhile improvement.

The tuned circuit arrangement is virtually the same as for a crystal set but without the detector and headphones.

A crystal set coil and tuning capacitor tend to be rather bulky, so a ferrite loopstick antenna coil and a small tuning capacitor were wired up instead. This was connected to an antenna and earth and when the receiver's loopstick and the booster were lined up a few centimetres apart, a significant improvement in the performance was observed.

Measurements confirmed that the improvement in set performance, when used with the booster and a reasonable antenna/earth system was of the order of 14-20dB.

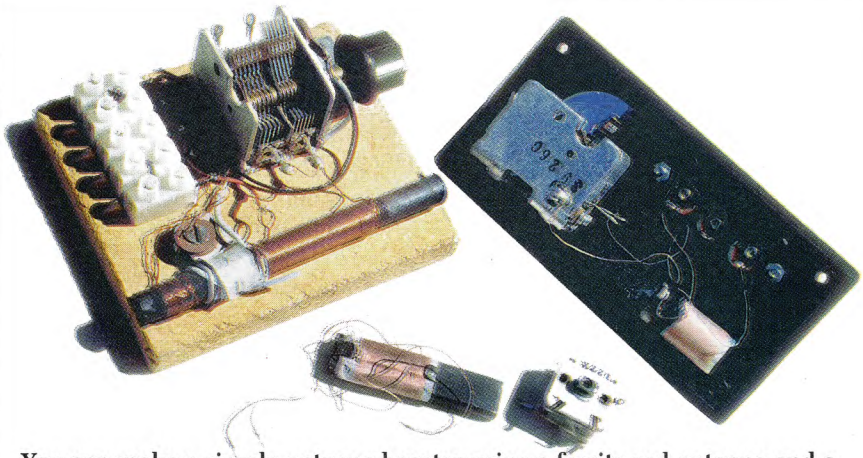
Many have been sceptical about the performance of such a simple device but I can assure you that it really does work well. For this reason, I call it the "AM Radio Reception Booster".

It can even be demonstrated that sitting a transistor set with a large (eg, 200 x 13mm) ferrite rod antenna alongside a mediocre set with a small ferrite rod antenna will boost the performance of the latter (provided that the two sets are tuned to the same station. This even applies when the larger set is turned off. Naturally, the improvement is nothing like that obtained with an outside antenna and earth attached to the booster but it does prove that sets with bigger rod antennas tend to be better performers.

The booster can be built into a small plastic project box. A ferrite rod antenna (either prewound or one which you wind the coils yourself), a tuning capacitor, a knob and a 2-way screw terminal strip are all the major parts required.

The circuit of the "deluxe" version of the booster is shown in Fig.9. Here's how to build it.

First, obtain a 100mm length of 9.5mm diameter ferrite rod and wind on 70 turns of 0.5mm diameter enamelled copper wire towards one end of



You can make a simple antenna booster using a ferrite rod antenna and a tuning capacitor to tune the AM broadcast band.

the rod. This tuned winding is tapped at 7 turns from the earthy end.

Next, you need to wind on a bifilar winding consisting of 15 + 15 turns of 0.5mm enamelled copper wire. This must be spaced 20mm from the end of the tuned winding.

To make the bifilar winding, first put one end of two 500mm pieces of the wire into a vyce. Place the other ends into the chuck of a small hand-drill and rotate the drill whilst keeping modest tension on the wires, until the wires are wound together with a twist every 2-3mm. These two wires are then wound onto the rod (15 turns) and are connected together so that they are in series.

The junction of the start of one winding and the end of the other becomes the centre tap, which may go to earth in some instances. The start of each winding is shown by a dot on the circuit diagram. Nail polish or other "plastic" glues will hold the windings in position. You may care to slip the first and last turns of each winding under the adjacent one to make it just that bit firmer.

One of the accompanying photographs shows a couple of variations of the booster. If you are using a plastic case, the ferrite rod can either be glued in position or tied to the lid using short lengths of spaghetti sleeving (this passes through holes drilled in the lid). The tuning gang needs to have a maximum capacitance of 300pF and is attached to the lid using machine screws.

The commonly available twin-gang plastic capacitors are quite suitable for this job, if both sections are paralleled and the trimmers set at minimum capacitance. A few more turns may be required on the tuned winding if one of these is used, in which case the antenna tap should also be moved up the winding. Make sure that a knob comes with the capacitor otherwise it will be difficult to find a knob to suit.

## Testing it

Having assembled the AM Radio Reception Booster, now is the time to try it. The deluxe version gives the user several options for obtaining the best noise-free reception.

First, the booster may have an ordinary antenna and earth connected to the terminals shown on the bottom of the circuit in Fig.9. A loop antenna could also be connected across these two terminals. However, better results with a loop may be obtained by using the "Ant 1" and "Ant 2" terminals at the top of the diagram. An earth is optional but in a noisy situation may give sufficient improvement to be worthwhile.

**If you really want to keep costs down, you can make a booster using the parts from a defunct AM pocket portable transistor set.**

With the booster connected to the antenna and earth, move it close to a transistor radio and adjust the tuning knob for an improvement in the received signal. Initially, the set and the booster can be close together while you adjust the tuning. However, if your antenna system is large, the amount of signal coupled into the set from the booster may be enough to cause overload. If this happens, just move the booster away from the set.

Make sure that the booster is oriented for best performance - the loop stick in the receiver and the booster should both be horizontal.

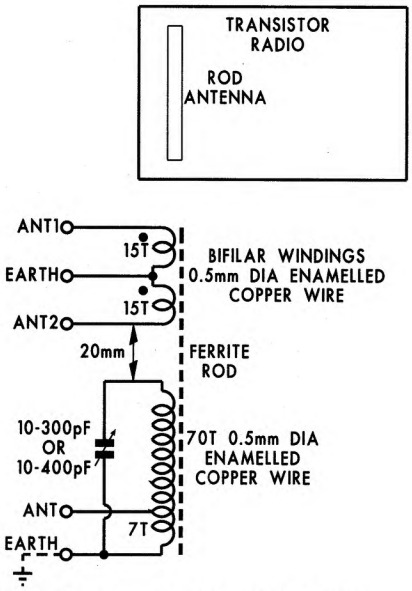



**Fig.9: the circuit of the AM Radio Reception Booster.**

Although the deluxe version gives the user a variety of options, it is usually not necessary to go to that amount of trouble. For example, instead of winding your own ferrite coil, try using a prewound ferrite loop antenna. These have four wires coming out of the windings and the pair with the greatest resistance, as measured using an ohmmeter, are attached to the tuning capacitor. The other two wires go to the antenna system.

Adjust the coil on the rod so that complete coverage of the broadcast band is achieved (you may also have to connect both sections of the tuning gang in parallel). Note that the performance of this simple version will not be quite as good as the deluxe version.

If you really want to keep costs down, you can make a booster using the parts from a defunct AM pocket portable transistor set. Open up the set, remove the speaker and the battery carrier, and mount a terminal strip near the ferrite rod antenna.

Next, undo the PC board mounting screws so that you have access to the antenna leads where they connect to the base circuit of the converter transistor. Unsolder these and connect them to the new terminal strip. Finally, reassemble the set, connect the external antenna system to two terminals on the front (or back) of the set as shown in the photo, and your booster is complete.

This is surely one of the most inexpensive methods ever to improve radio reception. It costs just one terminal strip and two self-tapping screws, plus a defunct set that you already own! **SC**