PW REVIEW

Having recently become plagued at his home QTH by severe interference from nearby TV receivers and home computers, Geoff Arnold G3GSR has been trying out a QRM Eliminator from S.E.M.

The principle of this type of interference eliminator is that a signal taken from an auxiliary antenna is mixed with the signal from the main antenna in such a way that the interference is cancelled out.

Ideally, if the main antenna is picking up "wanted" signal plus interference, the auxiliary antenna should pick up only the interference, otherwise some of the "wanted" signal will also be cancelled out in the mixing process. Difficult though this may sound, it is usually possible to come quite close to the ideal.

Several factors come into play here. First, much of the interference from TV sets, computers and the like is propagated by the magnetic field rather than by electromagnetic radiation, and so has a very limited range. Anyone who has tried to operate, for example, a 2m hand-held alongside a computer will have discovered this.

Secondly, a vertical auxiliary antenna will favour the reception of man-made noise such as TV timebase interference, which is generally vertically polarised, whereas a horizontal main antenna, such as a dipole, will give maximum rejection of such noise.

Finally, close to any source of electromagnetic radiation, although the famous "inverse square law" still applies, the field strength effectively falls off much more quickly than at a great distance. Perhaps a simple example will help to explain why this is so.

Imagine two identical antennas, spaced 10 metres apart, with one of them, *A*, at 10m from the source of interference, *I*, and the other one, *B*, at 20m from *I*. As the distance *BI* is twice *AI*, the interference at *B* will be only a quarter as strong as at *A* (because $2^2 = 4$). If the "wanted" signal is coming from a transmitter that is perhaps hundreds of kilometres away, an extra 10m will produce no noticeable difference between the strength of that signal picked up by the two antennas (Fig. 1).

So, though we can't prevent the auxiliary antenna picking up "wanted" signal, we can generally arrange that it picks up the interference more strongly than the main antenna. When the interference signal from the auxiliary antenna is then attenuated to the correct level to balance out the interference picked up by the main antenna, the "wanted" signal from the auxiliary antenna will be attenuated by the same amount. It should therefore be very much smaller than the "wanted" signal coming from the main antenna, which is just the state of affairs we require.

Practice

So much for the theory, now for the practice. The S.E.M. QRM Eliminator is housed in a two-part metal box measuring 158 × 60 × 58mm, with the four controls, Band-change, Gain and Phase A and Phase B, on the front panel. At the rear are three SO-239

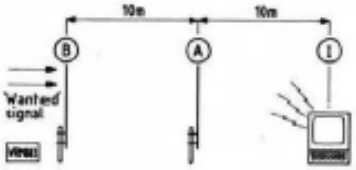

Fig. 1: A simple example of the "inverse square law"

sockets for the two antennas and receiver, plus a "phono" socket for the 12V d.c. 50mA power supply. A second "phono" socket allows the unit to be controlled and protected by the p.t.t. line of an associated transceiver.

The operating instructions (a single A4 sheet) supplied with the unit describe a simple procedure for adjustment of the Gain and Phase controls until the sharpest notch is achieved, plus advice on the selection of a suitable auxiliary antenna. Either a second h.f. antenna or the feeder of a 144MHz band antenna are suggested.

As already discussed, the ideal arrangement for the two antennas is that their pick-up of the interference field should be as different in strength as possible. It follows, therefore, that the worst arrangement is where the two antennas have to be close together and of similar layout—perhaps where your antenna farm is limited to "long wires" in a loft immediately above the operating room.

With this in mind, our testing of the review unit was carried out under what were perhaps rather unfair "worst case" conditions, with a 10 metre "long wire" in the bungalow loft for the main antenna, and an adjustable length of wire strung up to the curtain rail in the operating room for the auxiliary antenna. If the QRM Eliminator would work with this set-up, it should work virtually anywhere.

Did it work? Yes, it did, though with some pretty delicate adjustment of the three variable controls. Obviously my auxiliary antenna was much shorter than it should have been—I found that

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an odd bit of wire about 2 metres long would give a noticeable improvement in signal-to-noise ratio when TV time-base QRM was affecting the 21 and 28MHz bands, but to be effective down at 1.8 and 3.5MHz, it had to be increased to around 4 metres in length.

Although S.E.M. specify that the unit works only down to 1.5MHz, I found it still to be extremely effective at 828kHz (our local ILR station Two Counties Radio), but it had pretty well run out of steam by the time it was down to around 750kHz.

Mechanical Finish

It is a great pity that the overall impression of this very effective little unit was let down by the detail of the mechanical finish. For example, the four controls had shafts cropped to different lengths, so that each knob stood off the panel by a slightly different amount. Similarly, inside the unit, a corner of the p.c.b. had been filed off to make it fit within the case. None of these points affect the working of the QRM Eliminator but I felt that it deserves a better standard of presentation.

The QRM Eliminator is available price £85.00 including carriage and VAT from **S.E.M., Union Mills, Isle of Man, telephone 0624 851277**, to whom we give our thanks for the loan of the review unit. ***PW***