The Moscow Muffler Reviewed

No, this isn't a device for squelching out Radio Moscow on 7MHz, or even an ICBM complex description. It is Advanced Electronic Application's (AEA) latest box of tricks for dealing with the phenomena which has earned the nickname of the 'Woodpecker', and which causes so much aggravation on the higher frequency bands. It fits in the antenna lead of your transceiver, so doesn't need any modification to the circuitry. And it works!

by Tony Bailey G3WPO

The characteristic rattle of pulses from the over-the-horizon radar system sounding like a woodpecker at work, is now familiar to all HF operators, especially those who inhabit 20 & 15 metres. At times the strength can be well over S9, which prevents virtually any reception while it lasts, especially if your AGC has a fairly long time constant.

The origin of these signals is primarily from two sources — one in European USSR (Kiev region) and at least one other further East somewhere near Siberia. They are used for long range military purposes, to obtain early warning of moving objects in the shape of ICBM's, by reflection from the ionosphere — all this is denied of course, but they are there all the same. With reputed power outputs of 4 Megawatts it is not difficult to see why so much havoc is caused.

The frequency coverage of the transmissions is around 10-30MHz, and the signals appear to follow the MUF (Maximum Usable Frequency) up and down the spectrum — there is also quite often more than one transmission being radiated at a time. With a bandwidth of around 50kHz and the pulse repetition frequency usually 10Hz (although sometimes 16Hz or even higher), and the pulse width typically 15 S, the interference is difficult to blank on a communications receiver, as it is very different to the type of interference that most noise blankers were designed to overcome.

Conventional noise blankers

Most modern transceivers have a noise blanker facility, sometimes with adjustable threshold, or, in the latest models, with adjustable blanking width. These are primarily designed to eliminate man-made interference, typically pulse-type ignition noise. This type of interference has high amplitude, with a very short rise time and fairly short duration — around 500 microseconds or less.

These pulses are amplified early on in the receiver chain, typically straight after the first mixer and before any filtering, by an amplifier which looks for these fast rising, short duration pulses. They are used to generate a control signal which is applied to a gate that shuts off the signal path, which has had a slight delay applied to it, for the duration of the pulse. With most modern blankers, the elimination of the interference is very effective; for most of the time it is practically inaudible to the user, because the ear ignores the very short silenced periods.

However, the normal noise blanker cannot cope effectively with the Woodpecker, as the pulses are very much longer, and the received pulses do not look much different to a strong signal as far as the detecting circuitry is concerned (they don't have a very fast rise time). The individual pulses are also themselves composed of further pulses of varying amplitude, and some of these may not be of sufficient strength to actuate the blanking amplifier unless it is of very high gain. Hence, although some of the interference will be suppressed, a lot will still be left.

The AEA solution

A number of different answers have appeared over the past few years in efforts to get over this problem, some of which have proved very effective. Unfortunately, one of the best requires significant alterations to existing receiver circuitry which may not appeal to everyone. The AEA *Moscow Muffler* is an attempt at providing the solution as an in-line device between the receiver (or transceiver) and the antenna, thus removing the need for any modifications.

The only paperwork supplied by AEA is a three-page instruction sheet on how to use the device, but with no circuit details, so the following notes are derived from a delve inside the box. The principle behind it is that of the 'Synchronous Blanker', described a while back by VK1DN in the American magazine, *Ham Radio*.

All previously described blankers aimed at getting rid of this phenomena use the fact that the Woodpecker signal consists of very strong, evenly spaced pulses, and these are used to generate blanking pulses in the normal way, but of much longer duration than before. Some of the latest transceivers have variable width blanking controls (such as the FT102, reviewed in the February issue) for this very purpose.

The *Moscow Muffler* uses another principle — the pulse