

2m preamps under scrutiny

Putting in a preamp, though, always degrades the RF intermodulation performance, and so the design of the preamplifier has to be a compromise between an improved overall noise figure and an amount of gain which is not so high as to cause bad RFIM

relay and the first RF stage, you will probably see a moderate improvement, but there are two snags to this. You will probably have a permanent grossly excessive gain and, therefore, strong signals on the band will start spreading more, and ruin

equivalent to a $0.1\mu\text{V}$ RF input level. If the disturbing signals were both raised by just over 10dB to 1mV, then the equivalent RF input level of the same IM product would be increased to at least $1.1\mu\text{V}$ (ie. +21dB), and perhaps to as high as $4\mu\text{V}$ (ie. +32dB). An RFIM product at $0.1\mu\text{V}$ is not too disturbing, although it might be a slight nuisance if you are trying to receive a very weak station, but a $4\mu\text{V}$ product is going to be near the S9 level which, frankly, will be extremely annoying, and yet the disturbing signals have only gone up by just over 10dB. Supposing you just have one SSB signal at 15kHz off channel which is developing slight spreading. The chap then throws in his linear, and the signal goes up by 10dB. His transmitted IM products shoot up if he is using a nasty linear, but whether his linear is good or bad, your receiver will be generating at least a 20dB inferior IM ratio. If you have a rig such as an IC251E, or FT221, and you have fitted a Mutek board in it, then your front end will be almost bomb proof, since the IM products even at highish levels are very low. But supposing your rig has a bad RFIM performance? When the other station puts in his clean linear and goes up 10dB, you'll go bananas, as you won't be able to hear that elusive HB9 any more! If you have provided the facility for bypassing your internal added preamp, you might be able to suffer the situation, for the intermod. products will drop by at least 20dB when you take out the preamp, whereas you might only lose 3dB, or so, of input sensitivity. There is another snag, though, in putting the preamp inside the rig. You are not overcoming the loss of the input SO239 socket, the input circuitry to the relay which may include lossy filters, the loss of the relay itself, followed by more loss in the circuit to the internal preamp. On a very good rig, such as one with a Mutek front end, the input

There are, unfortunately, many rather deaf rigs around. These can usually be improved greatly as far as input sensitivity is concerned, by the addition of an RF preamplifier, either in the rig or external to it.

problems. This compromise between preamp noise figure and gain is quite difficult to make, and in any particular installation the first rule to observe when adding a preamp is to use the minimum amount of gain required for the preamp just to overcome the input noise of the main receiver.

Intermodulation

Before looking more closely at the seven preamps reviewed in this article, let's have a look at all these compromises in great detail, and the different ways in which a preamp can be used. If you put the preamp inside the rig between the aerial changeover

your reception of weak signals. Remember that for every dB of additional gain before the front end, the intermod. product ratios will be degraded by at least 2dB. In some cases, if the RFIM performance of the receiver is poor because there are contributions from both the mixer and other stages you will find that above a certain quite moderate level, intermod. products may actually go up by 3 or more dB for every dB increase in the input RF level of the strong station.

Let's have an example of this by considering a rig that has two strong signals, each of $300\mu\text{V}$. Let's say that the 3rd order product would be

A pride of preamplifiers!

