are beaming in West, and a juicy DX station is off the side of your beam, and is just audible within your preamp in, but not audible with it out. You can turn your beam onto him, and up he comes. When you have nailed him you will probably be able to take the preamp out. This facility can be very important in contest operating. If you are running 400W at the masthead, it becomes vital to use the best coax you can afford, not just to reduce the required output power of the linear, and thus reduce its intermod., but to decrease the loss between a masthead preamp and the receiver. This allows you to use a lower gain preamp. However, the loss of the coax will, of course, be cutting down the output level of a preamp, and thus reduce the system RFIM. There is just one final point which is worthwhile mentioning, this being the hold-on time of an RF sensed preamp, whether it is built into a linear, or on its own. You will go mad on SSB if it is clanking on and off between every word, and you will also be introducing annoying interruptions on transmit, with the beginnings of some words disappearing into thin air! On FM, though, a rapid return to receive is important, if you get just a very short, snappy comment from the other end. It is ideal, therefore, to have a system which is switchable between an almost instantaneous return for FM, and a hold-time of at least 1 second, and perhaps 2 seconds, for SSB. I do not know of any RF sensed pre-amp which has a remotely controllable sensing time, but there are linear amp/preamp combinations which can be switched to FM or SSB sensing, which is most useful.

Preamp tuning

Most of the preamps were at least quite well aligned. The SEM *Sentinel,* however, was so badly aligned as to be almost ridiculous, and the Moulding was peaked above 146MHz. A few words about alignment might be useful here, since many users do tend to have a twiddle now and then. My first advice to you is never to attempt any alignment unless you have a very good reason to believe that the manufacturer has got it wrong, or that the shop who sold it to you, or the person you bought it from secondhand has 'been at it'. Alignment is, in fact, quite difficult, and is often wrong unless it is done with appropriate test equipment. To

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do it in just a minute or two after the box has been opened is almost impossible, unless you have an immaculate noise source which chops on and off at least a few times every second. If you don't have such test equipment, and if you really must make adjustments, here are one or two suggestions. The ear is much more sensitive to minute changes in noise figure on FM than on CW or SSB. Furthermore, it is much easier to adjust the input circuits on an extremely weak signal. Since band noise is quite high, you should first put a high quality 20dB aerial attenuator in line as close to the preamp as possible. It is absolutely vital that this attenuator should be of the same rated impedance as that of your coax and aerial. This will reduce the band noise to well below any audibility, and also allow you to receive stations that are suitably weak. The reason why FM is to be preferred, is that on a very weak signal the rate of change of noise figure is perhaps 1/3 to 1/2 that of the apparent signal-to-noise ratio change. At around the 10dB SINAD ratio point you will get at least a 1dB improvement in ratio for every ½dB of noise figure improvement, provided you have effectively removed band noise. On the other hand, overall gain is better adjusted by using the 'S' meter on your rig when you have tuned to a signal which is about half scale. Many rigs have 'S' meters which vary rapidly in level with only small RF level changes on FM. If you look at the preamp circuit you will usually see trimmers on the input and output circuits. The output trimmer should normally be adjusted for maximum gain in the centre of the band, as a kick off. The input trimmer, however, will normally adjust for minimum noise figure at a position well away from the maximum gain point, and this is what is meant by 'noise matching' rather than 'gain optimising' an input. You may have to go backwards and forwards between input and output trimming, adjusting input for best signal-to-noise ratio, and output for best gain. Using this method, you should be able to get within half a dB or so of optimum performance, unless you have cloth ears! This method will only work properly, though, with the attenuator in the input circuit, for without it you will probably end up by adjusting for maximum gain, and you would also find the input trimmer to be much flatter in adjustment, as the null would be incredibly difficult to hear with all the band noise present. Matching the input for optimum gain normally results in the input impedance being lowered, and when this is near 50 ohms you should have the best power match. Best noise figure though, and thus best noise match, occurs when the input has a somewhat higher impedance, and at this point the internal noise has dropped more than the signal level has. The signal level has dropped at this point because of negative feedback which exists within any transistor. Neutralisation, incidentally, when added in a circuit, can bring optimum gain and noise match positions rather closer together, but correct neutralisation in a preamp is very difficult to achieve without appropriate test equipment. While writing this article, Myles Capstick, G4RCE, tried adjusting one or two of my preamps by ear, and then checked them on a Hewlett Packard noise figure and gain measurement system.