14.3MHz (test signals 7.2 and 7.1MHz) showed a response some 2 – 5dB worse than the normal 3rd order 50kHz spacing test.

TRANSMITTER MEASUREMENTS

CW Keying Performance

Fig 2 shows the CW keying spectrum at 40WPM. Fast and slow QSK gave similar good results.

Power Output

The power output was variable down to zero. The forward power meter was only accurate to within 20% and increasingly less accurate below 25W. Low level sidebands at about –70dB were seen at +/-1.2kHz with lower levels at +/-2.4kHz, +/-3.6kHz etc.

SSB Performance

The distortion is rather poor on the higher bands but does not degrade when the processor is switched in. The carrier suppression on the review sample was only 44dB on USB, 26dB on LSB although the specification is 60dB. This was most likely due to incorrect alignment.

ON-THE-AIR PERFORMANCE

PRIOR TO RECEIVING the review radio, I had great expectations for the Omni-VI due to its reputation and pedigree. Certainly I was not disappointed. The radio performed impeccably. It was a joy to use in crowded band conditions and the receiver performed very well in and around pileups. The 'warts' noted in the measurements, such as poor image response, were really not significant. However, the 15m 'birdies' were evident on a quiet band, although not moving the S meter, and on 10m the noise floor lifted whilst turning the tuning knob. The main virtue of the receiver, the excellent close-in adjacent channel performance, really made for a clean sounding receiver. Also, the filter skirts were excellent and well worth the cost of fitting the narrow second IF option.

The ergonomics were very good and well thought out and clearly the true needs of the DX and contest operator have been well researched. The tuning was entirely free of clicks and other quirks although there was a noticeable drift for the first minute after switch-on whilst the oven stabilised. Selecting slow AGC, when that speed had not been used for some time paralysed the receiver for up to 4s. I normally used fast AGC in all situations and it seemed to have an ideal characteristic.

The auto-notch filter was rather amazing. On SSB it completely eliminated multiple and drifting heterodynes and much of the deliberate QRM sadly experienced on DXpedition operations. It is not so effective for removing CW interference on SSB as it takes a brief time to lock on. Similarly, it is not suitable to use on CW mode as it tends to eliminate the wanted signal, but the manual notch filter is effective in this situation. Both notch filters suffer from the problem common to all audio notch filters, in that strong carriers still capture the AGC and reduce sensitivity.

The transmit performance was also excellent. Good quality reports were received on SSB with and without the processor, and the CW spectrum was clean and narrow. Fast QSK on CW also performed very well with no character shortening experienced.

Overall I find it difficult to find fault with this radio other than some really rather minor points.

CONCLUSIONS

THE TEN-TEC OMNI-VI is a very interesting radio. For serious competitive HF working it ranks amongst the very best. In terms of the close-in dynamic range, it is probably the best radio on the amateur market at the present time, with reciprocal mixing and two-tone dynamic ranges approaching 90dB at only 2kHz spacing. It is also a joy to use, with well thought out ergonomics. Although there are some technical imperfections, these are quite minor in comparison.

The current list price is £2599 inc VAT with microphone, PSU and CW filters extra. The additional IF filters cost £69 each. To the non-discerning this may seem a high price to pay for a radio without general coverage operation, AM etc. Indeed, the complete package price in the UK is similar to the top of the range Japanese radios with dual receivers.

ACKNOWLEDGEMENTS

THANKS TO Waters and Stanton for the loan of the equipment.

Technical Topics

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and scattering from the head; (c) 45% of the power is lost in the head at both 900 and 1900MHz. It is suggested that on average a system loss of 3 – 4dB should be included in a link budget, and there is considerable fading, even in a radio-anechoic chamber, when users move around in a natural manner.

MONOPOLE LOADED WITH FOLDED DIPOLE

ON A NUMBER OF OCCASIONS in the past, *TT* has discussed antennas loaded with resistances in order to widen the effective bandwidth. an interesting and novel derivative of this approach is described by Dr Edward E Altshuler (Hanscom AFB) in 'A monopole antenna loaded with a modified folded dipole' (*IEEE Trans Ant & Prop*, July 1993, pp 871-876). This notes that a travelling-wave distribution of current can be produced on a linear antenna by inserting a resistance of approximately 240Ω one-quarter wavelength from its end to form an antenna which is very broadband and has much weaker mutual coupling than a conventional linear antenna. A travelling-wave antenna or section of an antenna is where the current and voltage remains substantially the same along its length as in the terminated rhombic or terminated long-wire antenna. Travelling-wave antennas may also have directional properties useful for special applications, such as Beverage-type antennas. Dr Altshuler points out that the main disadvantage of the resistance-loaded travelling-wave antenna is that it is only about 50 per cent efficient because part of the input power is absorbed by the resistor [unless the element(s) are very long so that most of the energy is radiated before it reaches the resistive termination – *G3VA*]. He points out that it is possible to replace the resistor with a resonant antenna having a radiation resistance approximately equal to the matching resistor, ie in this case about 240Ω. the input section still has a travelling-wave distribution of current up to the inserted element, but the power previously dissipated in the resistor will now be radiated, although since the impedance of the folded element is more frequency sensitive than that of the resistor, the antenna will not be so broadband as with purely resistive loading.

This new form of loaded antenna may be implemented either as a loaded dipole or a loaded monopole over a ground plane. The article describes a model monopole antenna (1.2GHz) in which the folded section is a modified folded dipole; by adjusting the length of this element, a radiation resistance of about 240Ω can be obtained.

The horizontally polarized patterns are similar to those of a horizontal dipole over a ground plane, and vertically polarized patterns in a plane orthogonal to the folded element are similar to those of a monopole over a ground plane. Dr Altshuler presents input impedance, current distribution and radiation patterns as computed using the Numerical Electromagnetics Code (NEC); input impedance and radiation patterns were also measured in a model antenna range. Results are obtained for half-lengths varying from 0.35 to 2.0 wavelengths at a frequency of 1.2GHz on a monopole antenna loaded with a modified folded dipole as shown in **Fig 9**.

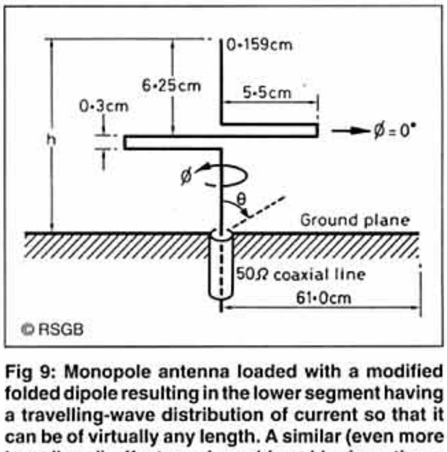

Fig 9: Monopole antenna loaded with a modified folded dipole resulting in the lower segment having a travelling-wave distribution of current so that it can be of virtually any length. A similar (even more broadband) effect can be achieved by inserting a non-inductive 240Ω resistor (of suitable wattage) in place of the folded dipole, but this will reduce radiated power by up to 50%. Dimensions are for the 1.2GHz antenna were measured in a model antenna range. Such antennas can be implemented as monopoles or dipoles etc.

CORRECTION

STEVE ORTMAYER, G4RAW, points out that the 'Tuna Checker' circuit (*TT*, Dec 98, Fig 8) should have the output pin of the 74LS73 as 9 (not pin 8 which is unconnected) and the 5.1V connected to pin 14. ***G3VA***