The Phasing Harness

Having built the dipoles, the next step was to add a phasing harness that would connect them to a single feedline. The common *'manifold feed system'* was used to achieve this using RG213 coax cable and 'N' series connectors. This is a reasonably straightforward method of connecting 4 x 50 Ω antennas to a single 50 Ω coax cable.

With typical 50 Ω coax matching, impedances above 50 Ω coupled to a ¼ wavelength section will transform to a new impedance value below 50 Ω. In ½ wave multiples, the impedance will transform back to the original value. Using three 'Tee' adapters, and some clean RG213/U coax cable, we can transform all four 50 Ω antennas into a single 50 Ω feedline.

It works like this: The 50 Ω dipole feeds several half-wavelength sections to extend the original 50 Ω impedance into one side of a Tee connector. The second dipole does the same into the other side of the Tee. 50 Ω in parallel with 50 Ω = 25 Ω at the Tee junction.

This 25 Ω impedance is fed via a ¼ wave section of RG213 coax so that it transforms from half to double the 50 Ω impedance (100).

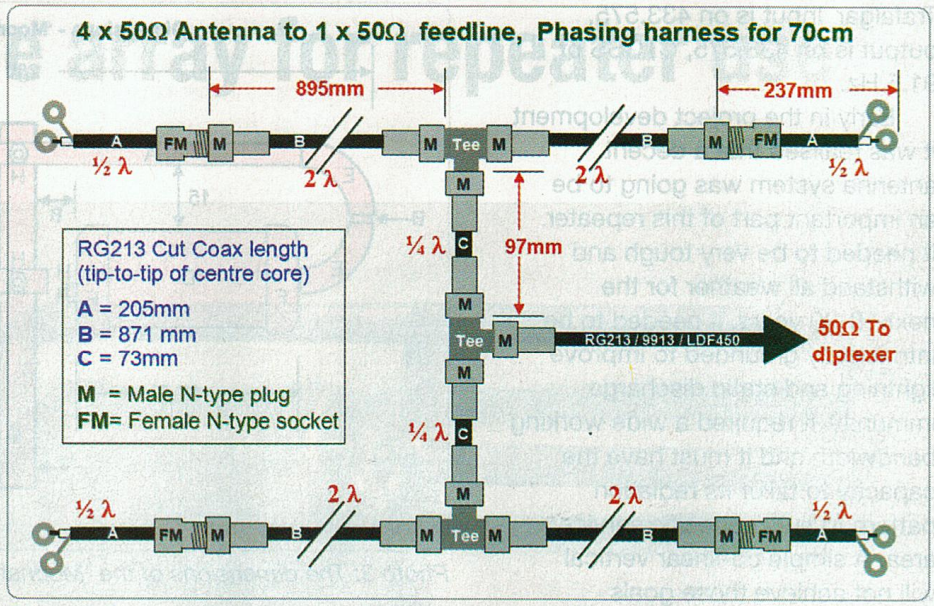

Photo 4: Diagram of the phasing harness for 70 cm.

When this 100 Ω from the first two antennas delivered to the third Tee connector, along with the 100 Ω from the second antenna pair, the 100 Ω in parallel with 100 Ω equals 50 Ω again, which is an exact impedance match to couple down to the repeater using more 50 Ω cable. We used low loss LDF450 heliax for this task.

Getting the physical length of the phasing harness correct is another onerous task that involved the correct termination of some seventeen N-type coax plugs, again carried out by Rob VK3BRS.

Mounting the antenna

Initially, the antennas were arranged in a circle around the mast at the same level. This gave a symmetrical 4-leaf-clover radiation pattern. A series of mobile signal strength tests were carried out comparing different mounting configurations with the performance of a commercial co-linear whip. There was sufficient slack in the phasing harness to allow for this experimentation.

Given that the service area had to emphasise coverage to the east and west, the dipoles were stacked to give a form of figure-8 pattern. This provided performance that exceeded the collinear reference antenna where it was needed.

Photo 5: Rob VK3BRS waterproofing the tuned antennas.