The treble unit as discussed earlier has its acoustic centre at (1) which is 16 mm behind the front plate.

In a conventional crossover network the acoustic sources are assumed to be coincident in space so that the electrical signals are fed to each unit in a way which allows the energy to add at the crossover point thus ensuring a smooth amplitude response transition from LF to HF. Where the sources are not coincident measures have to be taken to take account of this.
In the case of the dual concentric the problem is fairly easy and low roll off slopes can be used. With discrete systems where acoustic sources can be widely spaced they can be aligned to a plane. Conventional ways of doing this so far are:-

1. Filler Drivers

   A technique based on complex mathematical analysis, sounds terrible and is uneconomical in the use of hardware.

2. Sloping Baffle

   Tricky cabinet build techniques, aesthetically not accepted, problems with continuous off axis listening unless height is carefully set. No real solution.

3. Stepped Baffle

   Shelves in baffle create reflective and dispersive surfaces which interfere with amplitude response. Vertical polar response terrible.

All the above solutions attempt to generate acoustic sources on a plane which is vertical and parallel to a vertical plane through the listeners ears.

This is an acceptable condition since the path length difference from observer or listener to the LF and HF units is small i.e. the angle subtended by the two units at the listener's ear is very small.
See figure 7. If the listener is midway between the two units the path length will be equal and all will be well. Apart from the disadvantage noted above all the above solutions are feasible.

Another solution which is incorporated in the Jupiter and Venus systems is to introduce a time delay into the treble unit feed so that in Figure 6 the acoustic source is pushed back a distance dl to a point (2) in the vertical plane containing the LF unit source. The disadvantages of sloping cabinet fronts, auditioning off axis, diffractions and reflections from stepped baffles and the raucous noises of filler drivers are all eliminated at a stroke.

The time delay is generated by a second order all pass network which gives negligible amplitude change but a linearly increasing phase lag with increasing frequency. The circuit has a phase change of 360° over a specified operating band depending on the component values chosen.

In the example quoted the Jupiter has a time delay difference of 70 - 20mm = 50. This represents a time delay of approximately 152 ms which can be achieved by the circuit in Figure 8. Referring to an earlier figure 5 a phase change rate that gives 180° (π) at approximately 2.6 kHz would suffice.