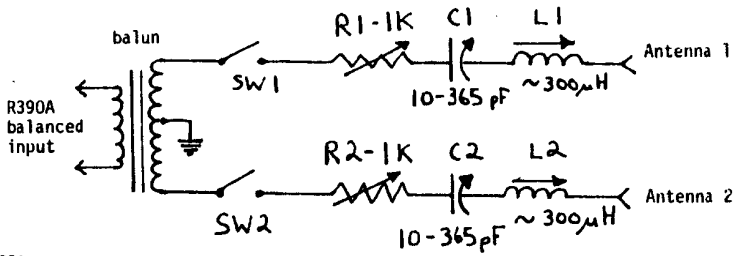
Phased Longwire Antennas (from Mark Connelly)

Some may recall seeing Chuck Hutton's article in DX News of September 25, 1978 (now available as NRC reprint A28) which discussed "Two Wire Phased Antennas". He was referring to Beverage antennas in this article, but Mark Connelly has found that it's possible to combine the signals of two longwire (rather than Beverage) antennas and obtain nulls on some signals using a phasing unit. A respectable degree of nulling can be achieved with wires as short as 20 meters in length. Wires of equal length should be used, although nulls may usually be obtained regardless of the directions of the two wires. Nulling high angle skip is difficult because of the constantly fluctuating arrival angle (the same applies to loops). The best nulls are obtained with long wires over 200 meters in length. These are usually run parallel to each other, about 5 meters off the ground and 10 meters apart. These may be terminated (grounded either direct or through a resistor) or floating; optimum configurations consist of one terminated Beverage and one floating Beverage, such as Bill Bailey's system described in Hutton's article.

The phasing system:



Notes:

A) Switches must be of a type suited to RF work; in other words, they must have a low open-condition leakage capacitance. (most types would be OK at these frequencies--ed)
B) Note that neither side of the capacitors are grounded. Most types therefore must be mounted on wood or plastic rather than a grounded metal case.
C) L1 and L2 are slug tuned types mounted in grounded aluminum cans.
D) All parts are mounted inside a standard aluminum box
E) Adjusting R1, R2, C1 and C2 may become quite touchy. "Fine tuning" controls may need to be added. C1 and C2 could be paralled by 5-20 pF variables and R1 and R2 could have 20 ohm pots placed in series with them.

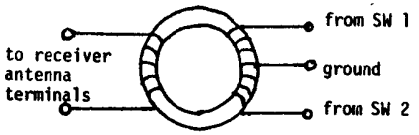
Procedure:

1) Switch in Ant. 1 with SW2 to open. Set R1 ant minimum resistance. Tweak C1 for peak signal, note S meter reading.
2) Switch in Ant. 2 with SW1 to open. Set R2 at minimum resistance . Tweak C2 for peak signal, note if S-meter reading is higher or lower than peaked Ant.1 reading.
3) If Ant. 1 reading is greater than Ant. 2 reading, adjust R1 to equalise the readings, then go back to step 1.

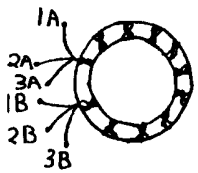
If Ant 2 reading is greater than Ant. 1 reading, adjust R2 to equalise the readings.

4) Flip SW1 and SW2 to connect both Ant1 1 and Ant. 2 to the balun coil (null mode). Carefully adjust the pot just used to equalise signals to reduce the strength of the undesired station. If no null is obtained, re-equalise strength (step 3). Adjust the other pot with both Ant. 1 and Ant. 2 connected for a null. Touching up the capacitors slightly (here's where the trimmers come in handy) will deepen the null. Continue adjusting R1 or R2, C1, C2 to obtain the best null.

The balun transformer can be wound on a 125 permeability ferrite core as follows.

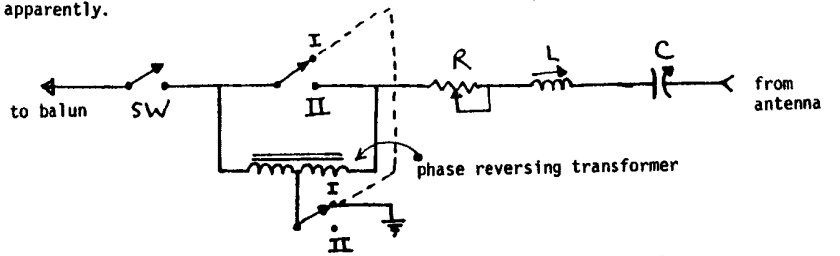


A 1:1 turns ratio will work. Some experimentation will be required as to the number of turns. Try 10 on each side for starters. This is used with the balanced input of the R-390A, but it might be interesting to try a receiver with an unbalanced antenna input on this set up. Or a bifilar 4:1 balun (see the Radio Amateur's Handbook or the ARRL Data Book for further info) might be used.



Another article by Chuck Hutton on phased beverages appeared in December 17, 1979 DX News. He describes Mark's system and his own balun transformer using a trifilar winding on a toroid. This winding is made by taking 3 pieces of enamelled wire, each one foot long, marking the ends with tags of tape (1A, 1B etc.) and twisting the three wires together. Wind the twisted wires around a toroid core (type not specified, but one best for a BCB frequency range), solder 1B to 2A--this is your center tap to ground. 1A and 2B could be connected to SW1 and SW2. 3A and 3B are connected to the receiver. This is used with two Beverage antennas, so there may be room for experimentation if you use longwires.

A phase reversing transformer might be switched into one of the sides of the phasing unit for added flexibility. Switch it in after step 4 of "procedure" to see if it gives a better null; if not switch it out. Again, consult the "Handbook" or ARRL Data Book for further details; 84 turns of wire center-tapped on a toroid core works fine apparently.



Phased wires used at West Yarmouth, MA:

This is an aerial constructed initially for amateur band use. It takes the form of a halfwave dipole for 3.8 mHz. On medium wave, with the phasing unit, the feedline and element of one side of the dipole (18 m feedline and 19 m flat-top), effectively a 37 m longwire, is worked against the other side of the feedline and the other side of the flat-top to produce nulls. Yard space does not permit the dipole to run in a straight line. Average height of dipole approximately 9 m.