Improve Your DX by Phasing Nonidentical Antennae

by Mark Connelly

As a preface to this article, the reader should become familiar with phasing units & techniques: this can be done by reading "Practical Phased Beverages" by Chuck Hutton (DX News, 17 DEC 1979) & "IRCA Technical Column" by Nick Hall-Patch (DX Monitor, 19 JAN 1980).

Some recent experimentation at the "DX Lab" in West Yarmouth, MA. has involved phasing aerials of similar length but having different skip-angle reception properties. In particular, one of the aerials used in the phasing was a wire lying on the ground; this was tied to a ground rod at the far end. The second aerial used for phasing was of similar length (about 37 m.) but at a height of 10 m.

One might initially think that the antenna on the ground would have much less overall pickup than the wire 10 m. in the air, but it actually produced domestic skip signals of levels comparable to those of the other longwire. It should be noted that the ground at the site is somewhat lossy, being deep sand similar to that of Long Island & eastern New Jersey, but unlike Conn., Mass. west of Boston, or R. I.

Before commencing actual phasing, just flipping between the two wires yielded considerable differences on Latin American (LA) stations. The wire on the ground was obviously more short-skip oriented; domestics from the Eastern & Central time zones were very strong; long-skip domestics & all foreign stations were poor. On the aerial mounted 10 m. off the ground, Caribbean / Latin American stations were much more evident.

For the following discussion, we'll refer to the aerial 10 m. above the ground as Antenna A and the longwire on the ground as Antenna B. Previous phasing experience has usually involved two parallel equal-length, equal-height wires producing very similar receptions as they were switched back and forth. Very often it was found that, as phasing was attempted on a channel with a domestic (e. g. WLS) & a co-channel LA (e. g. HJCE) of comparable strength, the LA would get phased out much more readily than the domestic arriving at a higher skip angle. Obviously, the desired goal was not being achieved. The concept of using the wire on the ground (Antenna B) came about when I noticed that a wire wrapped around a cold-water pipe in the cellar produced good short-skip reception, but was lousy for TA & LA DX. I reasoned that if you have a "good" antenna that produces WLS -890 at S9+30 dB & HJCE - 890 at S9 + 20 dB and a "bad" antenna (the ground-longwire) giving WLS at S9 + 30 dB & negligible HJCE (maybe S6 or so, but utterly buried under WLS) , phasing these two wires against each other will likely cause cancellation of WLS, but not of HJCE. In previous discussions of phasing it was noted that the signal to be nulled should be about equal on Antenna A & Antenna B. By extending that logic based upon the subtractive nature of phasing, a signal <u>not to be nulled</u> should <u>not</u> be at the same level on both antennae.

With two "good" antennae phased against each other, it is theoretically possible to phase out either WLS or HJCE. As there is greater vertical skip-angle variation (shifting) on a short-skip station, however, the null on WLS is harder to hold than that on HJCE. With a "good" LA antenna phased against a "bad" LA antenna, HJCE cannot be easily nulled: in the worst case, the S6 Antenna B signal subtracted from the S9 + 20 dB Antenna A signal would still leave about S6-7 worth of the Colombian, assuming 6 dB per S-unit.

The testing was conducted in May, a month known for relatively poor foreign conditions. Short-skip was very dominant at the time, even on Antenna A. Even with skip-angle variation, WLS can be nulled well below S6 most of the time. Using two normal longwires, HJCE may have also been reduced drastically at the same phasing unit control settings as those which nulled WLS. This is not the case when the "good" 10 m. - high wire is worked against the "bad" wire on the ground: here on Cape Cod, HJCE (and/or HIPJ, TV etc.) are copyable for an hour or more at a time without having to re-adjust phasing controls - even on nights when WLS has a good signal. Using this scheme, skip angle shifting tends to reach insurmountable proportions only if the domestic to be nulled is closer than 300 mi./ 500 km.

WBAL - 1090 can quite readily be nulled to yield YVSZ/HJBC; WHAM - 1180 can be knocked out to get a Reloj Cuban/ VOA FL./YVNU & others. WCAU - 1210 is on the close-in border of easy nulling. It can sometimes be "dumped" for 3 to 5 minutes without phasing-unit retweaking, usually revealing 2 YV's, a Haitian, & a Cuban.

On the other hand, New York City stations arriving on strong short skip with residual groundwave are nearly impossible to null. In this case, auroral conditions are needed to dispose of the high-angle skywave. This leaves groundwave which, although still strong, can be easily nulled. Groundwave nulling is best done with two "good" antennae. The wire on the ground discriminates against low-angle signals, including domestic groundwave as well as desirable foreign DX. It would be more difficult to get equal level groundwave signals for the nulling process if the ground-longwire & the wire 10 m. in the air were used instead of dual 10 m. high wires.

Over the past year, more international DXers have been building & using phasing units. It seems to be an appropriate time to address the question "Will phasing longwires or Beverages really get me more DX than I'm presently hearing with my loop?" This is a question that cannot be answered in general terms. Neil Kazaross has been using a phasing unit on his coastal Beverage installation in Narragansett, R. I.: sometimes the phased-Bev's bring up DX not heard on the Sanserino loop, on other occasions the loop offers unique loggings. Bill Bailey in Holden, MA. - again using full-length Beverages - has probably logged more East European stations behind the Iron Curtain than any other US DXer in recent history. I have been using two much shorter wires (each about 37 m. long) in my phasing scheme at W. Yarmouth, MA. The main advantages I have noted there are (1) you can null out an undesired station in the same direction as a desired station at a different distance, leaving the desired station relatively in the clear. Also, during AU CX when domestic skip is not a problem, one LA can often be nulled to get another co-channel LA. (2) nulls of short/medium skip domestics are longer-term & steadier than those possible with SM2 or MW-1 ferrite loops. (3) phasing of outdoor wires can be done in a cellar , in a steel-frame building, or in a car/van/ trailer where use of a loop would be doomed to failure.

Reception diversity seems to offer the greatest range of DX possibilities. There are times when TA & eastern LA signals show earlier sunset-period fade-in times on the phased longwire system; on other occasions, the loop yields earlier fade-in times. Atmospheric noise problems vary similarly: tolerable reception on one system, impossible static crashes on the other. Nulling WJR-760 on the loop might yield HJAJ/YVQQ whilst, at the same instant, nulling WJR by phasing the longwires might produce Guyana, the Reloj Cuban, or something else.

One interesting instance (of practical concern): the house across the street (Trowbridge Path, W. Yarmouth) has an obnoxious light dimmer. As luck & Murphy's Law would have it, the offending dimmer is to the east. On the SM2, effectively nulling the noise kills all interesting sunset-period DX including TA's & far-east LA's (e. g. Windward Islands, Surinam, Guyana, north coast Brazil). The phasing unit produces a superior null on the noise to start with; in addition, although weakened considerably, Africans on 765, 1349, & 1404 and several Surinam stations still make it through at sunset. ZBVI - 780, St. Kitts - 825, and the usual bunch of Venezuelans quickly follow. Looping dimmer noise, TV QRM, & the like is more difficult than phasing it because of interference re-radiation from house-wiring : the loop falters when presented with noise arriving from several different directions simultaneously. The phased longwires, being outdoors, "see" the manmade noise as emanating more from a single point source than the indoor loop ever could.

The loop has earned its keep by being consistently better on European sunrise/ local midnight period highband TA DX than the phased 37 m. wires.

From the above discussion, the serious foreign DXer should go into the DX battle armed with one or more good loops, a phased parallel-longwire (or Beverage) system, and a phased "good long-skip" vs. "poor long-skip" longwire arrangement. By doing this, the DXer should have configurations at his disposal to deal with such varied band conditions as short-skip conditions, aurora, and good TA nights.

INTERNATIONAL IRCA RADIO CLUB