DCL Construction Plans

DCL denotes a direct-coupled loop, one that is connected directly to the input stage of the receiver. Some of the properties of this antenna have been determined:

(1) The most significant is that it has extremely high gain, certainly a great deal more than a same-sized inductively coupled loop and it is conjectured more gain than the inductive loop with RF amplification,
(2) The Q is sufficiently high to produce reasonably sharp tuning,
(3) In a moderate to low signal density environment (e.g. Nebraska), the images due to strong locals are negligible,
(4) The crossarm/mast construction is identical with that of most box loop antennas,
(5) The nulls are at least as good as those on an inductive coupled loop,
(6) A 4' x 4' DCL has shown much more gain than a well-constructed and tuned 165' longwire 45' in the air.

However, there are several problems which remain to be researched:

(A) Will the DCL provide a Q sufficiently high to allow selectivity sufficient to reduce images and spurious responses from strong locals - especially in areas with large station density, e.g. Los Angeles, Boston, Chicago, New York, etc.
(B) When used with a receiver having no RF stage, will the combined mixer-osc. stage provide sufficient isolation to prevent images and responses due to overloading by the high gain of the DCL?
(C) Will a common table radio perform properly with a DCL? (This is the supreme test).

There are other problems to be researched, but this information is presented now in order that others might benefit or continue the improvement of this type antenna for BCB DXing.

It is assumed that the reader has knowledge of the physical construction of the box loop antenna - e.g., reprint A2.

Although it might be mentioned here that the formula N = 30/S provides an excellent approximation for (N) the number of turns in a box loop antenna with side length (S) measured in feet. Thus, a 2' x 2' box loop would have N = 30/2 = 15 turns. This formula has been used to construct numerous box loops of different dimensions and is based upon the assumption (I) the total length of the wire used in the winding is nearly 120', (II) the interwinding spacing is $\frac{1}{4}$", (III) the "standard" 2-section (gang) 365 mmfd (pfd) variable is used to tune the loop.

The circuitry of the DCL is perhaps not quite conventional, but it is effective and removes the serious problems associated with connecting the feedline directly across the tank circuit thus adding fixed capacitance across the circuit and severely limiting the upper tuning limit of an otherwise resonant box loop. It will be noted that with such a couple, that series capacitance did not reduce the effect sufficient to allow top-end resonance unless turns were removed - a condition to be avoided - by assumption.

A DCL is wound using an even number of turns. (Most 7-turn air-type loops should be converted to 6 or 8 turn DCL - use stranded wire in these loops!) The winding consists of two coils, (consider it one coil or winding cut in the exact center), each being wound from that point on the conventional loop described thusly. In the usual box loop construction, the middle turn of the bottom set of wires passes thru the mast itself; this point on the mast is the starting point for the winding of coils L_1 and L_2 - see FIG. A. Mount a 2-terminal terminal strip to the mast at this point, connecting ends of L_1, L_2 (L_1 equals L_2 in length) and winding as usual except one starts at the "center" (the point described) rather than at the "outside" of the box.

The circuitry of the DCL is given in Fig. B.

C_A, C_B are the two sections of the "standard" variable BCB, with C_A the "smaller-number-of-plates" section. The 1 megohm resistor can be $\frac{1}{2}$ watt or $\frac{1}{4}$ watt since almost no power is dissipated in the circuit. The grid to which the coax is connected is the "control grid". This is pin 1 for a 6BA6, 6BZ6, and pin 7 for a 6BE6, 12BE6. To modify the receiver, simply disconnect all wires connected to this pin of the tube socket, run a wire from this pin to a free terminal (of the antenna strip/connector on communications receivers) mounted on the rear chassis. Connect the center of the coax to this terminal and the shield to electrical ground on the receiver. The value of C, a fixed mica capacitor, was determined experimentally and values of 1000 to 5000 mmfd proved workable, although one should select the smallest value that allows a "peak" to occur at 540 kc/s. S_C operates as it normally does in the inductive circuit, but S is closed when operating near the lower end of the BCB, and some loss in gain is experienced. The 1 megohm resistor is connected between the two terminals of the terminal strip mounted on the mast at the starting point of the winding and the center of the coax connected to one terminal and the shield to the other. The length of coax used has not exceeded 7'. C can be attached to one terminal of the same terminal strip and the other end of C attached to one terminal of S, the other terminal of S connected to the remaining terminal of the terminal strip. S can be mounted on the same board holding C_A, C_B and S_C. An 8-turn 43"-side box DCL was constructed in Lincoln, Nebraska where the station density is rather low (1240, 1400 and 1480, each 1kw, and 1530, 5kw) and all adjacent channels were readable 100% on the DCL while little or nothing was heard (except slop) on an inductive 4' NRC-type loop. During the second week of the month of Sept. at noon in Lincoln, the DCL provided 100% readable signals on 650 WSM, 670 WMAQ, 630 KXOK, 700 WLW, 720 WGN, 760 WJR, 780 WBBM (u/WJAG), 820 Texas, 830 WCCO, 840 WHAS, 850 KOA, 870 WWL, 880 WRFD, 890 WLS, 1000 KTOK, 1020 WPEO, 1030 KCTA, 1080 KRLD (u/KOAK), 1090 KAAY, 1100 WKYC (not 100% due to very strong KFAB 1110), 1120 KMOX, 1160 KSL, 1170 KVOO, 1180 WLDS, 1190 KLIF/WOWO, 1200 WOAI, 1210 WKY (very weak), and 800 XELO, and in October, a tuned 165' LW 45' above ground almost accomplishes the same.

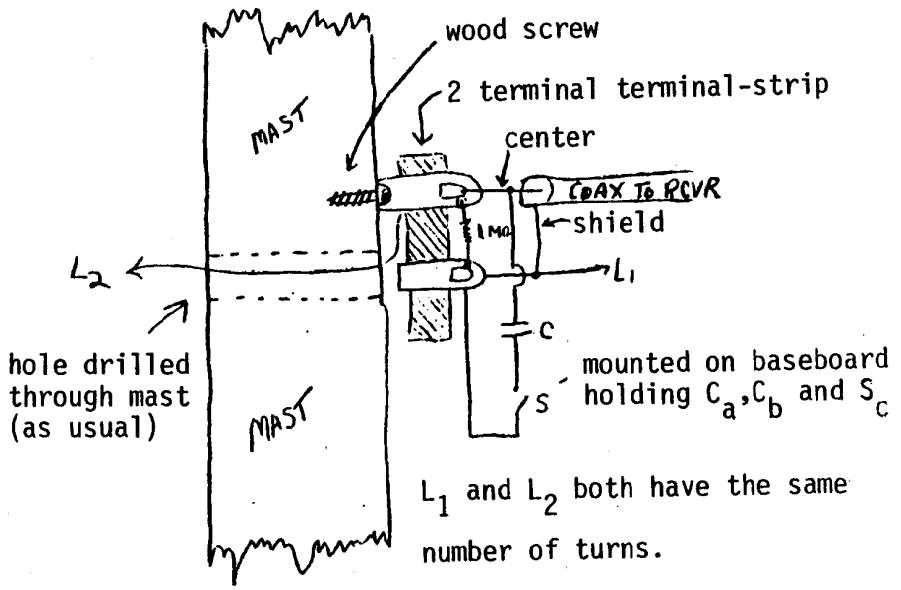

FIGURE A.

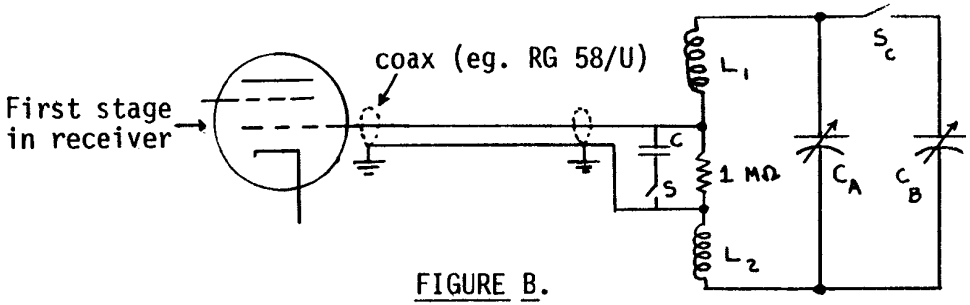

FIGURE B.