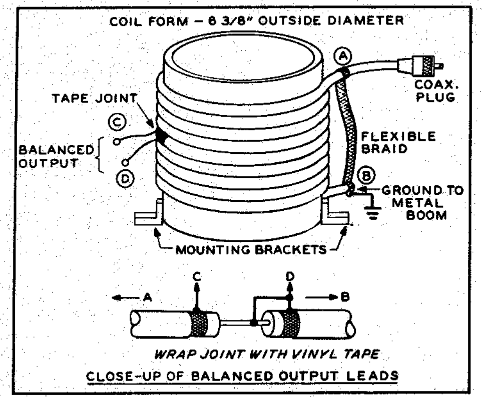

Fig. 17 Simple coaxial balun can be made of coil of RG-8/U line. Balun provides excellent balance over 3 to 1 frequency range. Center joint (C-D) is wrapped with vinyl tape to prevent water from entering the coaxial line.

The balun can be taped to the boom of the beam antenna with the balanced termination wires directly feeding the center of the driven element, as discussed in the chapter covering multiband beam antennas. The balun may also be used with equal success to feed a single band beam antenna having a split element and a 52 ohm driving point.

A similar balun for matching 72 ohm coaxial transmission line to a 72 ohm balanced load may be made up of RG-11A/U coaxial cable, following the dimensions and procedure outlined above. These baluns will handle a power level in excess of one kilowatt.

Various similar baluns may be made from other types of coaxial cable. Light duty baluns capable of power levels up to 250 watts may be wound from lengths of RG-58A/U (52 ohm) or RG-59A/U (72 ohm) coaxial line. The coil possibly may have to be redesigned to compensate for the different characteristics of the cable, such as the outside diameter. The procedure would be to adjust the length of cable and size of the coil to allow it to resonate (grid-dip) at 14 megacycles, while maintaining the required bandwidth under loaded conditions. The shorting connection, load and transmission line must all be removed when grid-dipping the coil.

A modification of this balun is shown in Figure 16C wherein the unbalanced input is applied at the center of the coil and the balanced output appears across the ends of the coil. The inner conductor of one-half the coil is unused, the ends being trimmed back to prevent accidental shorts. Additional data on the design of broad band balun coils may be found in the February, 1966 issue of *CQ* magazine.

The Inducto-Match

The driven element of a beam antenna may form a portion of a network whose input impedance over a small frequency range is close to 52 or 72 ohms. A network of this type is shown in Figure 18. The radiation resistance (input impedance) of most parasitic arrays falls in the 10 to 40 ohm range and it is possible for the driven element to be made a part of an equivalent parallel resonant circuit in which the radiation resistance appears in series with the reactive branch of the circuit. The input impedance of such a circuit varies nearly inversely with respect to the radiation resistance of

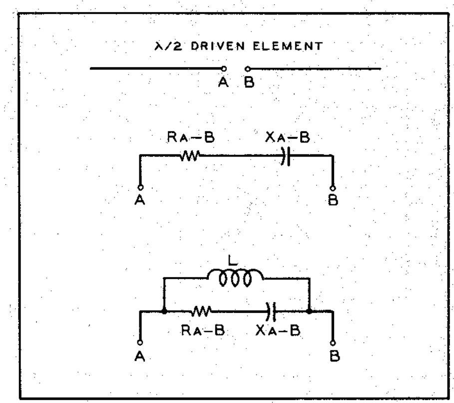

Fig. 18 Driven element radiation resistance (A-B) appears as a capacitive reactance if element is shortened past resonant length (center). Inductance placed across capacitive element produces tuned network whose input impedance may be made to match line impedance.

the antenna, thus the very low radiation resistance of the parasitic beam antenna may be transformed to a larger value which will match the impedance of the chosen transmission line.

The radiation resistance of a parasitic beam can be made to appear as a capacitive reactance at the driving point of the antenna element by slightly shortening the element past its normal resonant length. The inductive portion of the tuned network may consist of a small coil or "hair pin" placed across the driven element terminals as shown in Figure 18C, and a suitable transmission line or balun is connected across the terminals of the inductor. The L/C ratio determines the transformation ratio of the network when the LC product is parallel resonant at the operating frequency of the antenna.

In order to make convenient use of the *Inducto-Match* the radiation resistance of the antenna should be known, otherwise it may be necessary to try various combinations of parallel inductance and driven element length before a satisfactory value of resonant-frequency SWR on the feedline is obtained. Methods of determining the radiation resistance of the antenna are discussed in later chapters of this Handbook. Radiation resistance values of various beam antennas are also listed in Chapter VII.

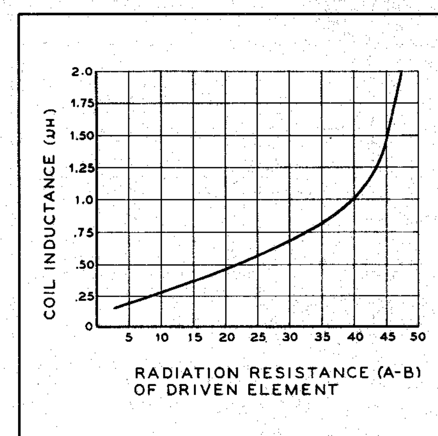

Fig. 19 Once the radiation resistance of the driven element is determined, the inductance of the shunt coil required to match the element to the transmission line can be quickly found from this graph. Coil may take the form of a "hairpin" as shown in Fig. 20.