IMPORTANT

Antenna Considerations with Regard to the DX-100 Transmitter

It has come to our attention that a few DX-100's have been operating into antennas of improper value. The general effect results in damage to the final tank coil, loading condensers, loading switch or all three, consequently this sheet has been prepared to help our customers avoid the unhappy results obtained by presenting a hundred watts or more of RF energy to a recalcitrant load, i.e., a mismatched antenna.

Although a Pi network tank circuit can and will abolish the necessity of a separate antenna coupler, and even aid in the suppression of harmonics, it is not a "cure all" for antenna matching and never will be. It has definite limitations regarding both the impedance and reactance that it can handle. The DX-100 will match, conservatively, antenna impedances in the range of 50 to 600 ohms, providing there is no capacitive or inductive reactance to tune out. In the same manner that tubes are rated for high frequencies, it will also handle some reactance at reduced ratins either in the form of impedance range, power, or the ability to suppress harmonics.

Since there is no way of anticipating the type antenna which will be used in conjunction with this transmitter, or even the individual characteristics of each type, the following will be strictly a general description of the "do's" and "dont's" as applicable to antennas.

A transmitter, regardless of power, is no better than its radiator, and it is far more practical to increase antenna efficiency than to jump from 100 to 1000 watts, not to mention the cost of a 10 to 1 power increase.

One step toward effective radiation is to present a load to the transmitter that is within its matching range. This means a radiator tuned to resonance and exhibiting neither high capacitance or inductive reactance. High reactance often results in high SWR, and may cause extreme voltages (2 to 4 thousand) to appear at the transmitter, thus damaging the loading capacitors and /or switch, or causing high circulating tank currents, which are heavy enough to heat the tank coil to destruction.

For example, the final tank coil of the DX-100, when properly operated, could carry 300 watts, but has, on occasion, been completely destroyed by heavy currents resulting from improper matching. The loading capacitors, which normally operate at 247 volts (at a 600 ohm impedance) and which are tested at 1200 volts AC, have been shorted by the high voltages developed.

There are no set rules for determining what type or size of antenna to use. In general any antenna consisting of a single wire, and fed, will result in a high impedance and indeterminate reactance at the transmitter. This often results in very high voltages In this case, a separate coupler should be used to bring the impedance down to a range the Pi network will accept.

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Folded dipoles, Zepp-fed Hertz, etc, also require either Balun coils or couplers to change the unbalanced transmitter output to a balanced feed. Coaxial-fed, single-wire dipoles and gamma-matched beams are acceptable as they are. Some beams also have built in coaxial baluns which are easily matched with a Pi network.

The design center of any antenna should be based on minimum SWR or standing wave ratio The optimum, of course, would represent a ratio of 1 to 1, which means that all of the energy reaching the antenna is being radiated, with none reflected back to the transmitter.

Whatever the antenna type or design, a little research on the results to be expected from it and some experimentation at low power levels may prevent serious damage to your new transmitter. There is also the increased enjoyment and pride gained from good reports.

It is to be expected that the owner of a new transmitter will be anxious to be on the air, and possibly not too careful in his choice of antennas. However, its hardly worth risking damage to your new transmitter to get on the air a few hours sooner. Many excellent articles have been written on antenna design, and the various amateur handbooks contain much information that would be useful to you Take the time to select a good antenna design and it will save trouble in the future