KLGL Transmission System

Transmitter Power Output Calculations

This exhibit has been included to explain the basis for the transmitter power output utilized to achieve the authorized effective radiated power of 66 kW.

The antenna system consists of a circularly polarized ERI SHPX-8 antenna. The antenna has a power gain of 3.3 at 93.7 mHz. Therefore, an antenna input power of 20,000 watts is required to achieve 66 kW.

The transmission line used to get from the transmitter to the antenna input is Andrew HJ8-50 (3 1/8 inch) air dielectric heliax. With 57.9 meters of length, the transmission line attenuation is 0.3 dB yielding an efficiency of 93.43%. Therefore, a power of 21,406 watts is required at the input of the transmission line, which is also the transmitter output, to achieve the authorized effective radiated power. After rounding, a transmitter power output of 21,400 watts is needed to achieve the permitted ERP.

Feed System Efficiency:

In calculating the Feed System Efficiency, the following values were used based on the insertion loss data provided by each manufacturer.

Andrew HJ8-50 Heliax (57.9 meters)
Insertion Loss = 0.3 dB (at 93.7 mHz)

Antenna Gain:

In calculating the Antenna Gain, the following value was used based on data provided by the manufacturer:

ERI-SHPX-6
Power Gain: 3.3 dB

TPO Calculations:

$$\frac{\text{Effective Radiated Power}}{(\text{Antenna Power Gain} * \text{Feed System Efficiency})} = \text{TPO}$$

$$\frac{66\text{ kW}}{(3.3 * 93.43\%)} = \mathbf{21.406\text{ kW} = 21.4\text{ kW TPO}}$$