

KUUU AUX 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 0.4 kW.

The antenna system consists of a circularly polarized ERI MPX-1AE antenna. The antenna has a power gain of 0.4611 at 92.5 MHz. Therefore, an antenna input power of 712.250 watts is required to achieve 0.4 kW.

The transmission line used to get from the transmitter to the antenna input is Andrew HJ5-50 (7/8 inch) air dielectric heliax. With 18 meters of length, the transmission line attenuation is 0.22 dB yielding an efficiency of 95.11%. Therefore, a power of 868.07 watts is required at the input of the transmission line.

Prior to the transmission line, an EMR model FM63A12/SBH-2 bandpass filter is installed which has an attenuation is 0.3986 dB yielding an efficiency of 91.27%. Therefore, a power of 912.7 watts is required at the input of the bandpass filter which is also the transmitter output, to achieve the authorized effective radiated power. After rounding, a transmitter power output of 1000 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 HJ5-50 Heliax (18 meters)
Insertion Loss = 0.22 dB (at 92.5 MHz)

Band Pass Filter Efficiency

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

EMR model FM63A12/SBH-2
Insertion Loss = 0.3986 dB (at 92.5 MHz)

Antenna Gain:

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

ERI MPX-1AE

Power Gain: 0.4611 dB

TPO Calculations:

$$\frac{\text{Effective Radiated Power}}{\text{(Antenna Power Gain * Feed System Efficiency)}} = \text{TPO}$$
$$\frac{0.4 \text{ kW}}{(0.4611 * 86.74\%)} = \underline{\underline{1.0 \text{ kW TPO}}}$$