KOAS 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 1.12 kW.

The antenna system consists of a Jampro JCPD antenna. The antenna has a power gain of 3.2 at 105.7 mHz. Therefore, an antenna input power of 350 watts is required to achieve 1.12 kW.

The transmission line used to get from the band pass filter the antenna input is Andrew LDF4-50 (1/2 inch) low density foam heliax. With 51.8 meters of length, the transmission line attenuation is 1.19 dB yielding an efficiency of 76.06%. Therefore, a power of 460.2 watts is required at the output of the filter, which is the transmission line input, to achieve the authorized effective radiated power.

A Jampro RCBC 003 Band Pass Filter is utilized in the transmission system and has an insertion loss of 0.35 dB at 105.7 mHz yielding an efficiency of 92.4%. It is therefore necessary to have 498 watts at the input to the combiner to achieve the authorized effective radiated power.

Finally, the transmission line used to get from the transmitter to the multi-station combiner is Andrew FSJ4-50B (1/2 inch) superflex. With 2.4 meters of length, the transmission line attenuation is 0.12 dB yielding an efficiency of 97.32%. Therefore, a transmitter power output of 511 watts is to achieve the authorized effective radiated power.

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 LDF4-50 (51.8 meters)
Instertion Loss = 1.19 (at 105.7 mHz)

Jampro RCBC 003 Triple Cavity Bandpass Filter
Insertion Loss = 0.35 db (at 105.7 mHz)

Andrew FSJ4-50 Heliax (2.4 meters)
Insertion Loss = 0.12 dB (at 105.7 mHz)

Total Insertion Loss: 1.66 dB

Feed System Efficiency: 68.3%

Antenna Gain:

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

Jampro JCPD
Power Gain = 3.2

TPO Calculations:

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

$$\frac{1.12\text{kW}}{(3.2 * 68.3\%)} = \textbf{0.511 kW TPO}$$