KKMV 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 3 kW.

The antenna system consists of a circularly polarized Nicom BKG/77 antenna. The antenna has a power gain of 2.1 at 106.1 mHz. Therefore, an antenna input power of 1,429 watts is required to achieve 3 kW.

The transmission line used to get from the isocoupler to the antenna input is Andrew HJ5-50 (7/8 inch) air dielectric heliax. With 67 meters of length, the transmission line attenuation is 0.87 dB yielding an efficiency of 81.8%. Therefore, a power of 1,746 watts is required at the output of the isocoupler. The isocoupler has in input loss of 0.1 dB yielding an efficiency of 97.8%. Therefore, a power of 1,786 watts is required at the input of the isocoupler. The transmission line used to get from the transmitter to the input of the isocoupler is Andrew HJ7-50 (1 5/8") air dielectric heliax. With 100.5 meters of length, the transmission line attenuation is 0.74 dB yielding an efficiency of 84.4%. Therefore, a power of 2,116 watts is required at the transmitter output in order to achieve the authorized effective radiated power. After rounding, a transmitter power output of 2,100 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 (67 meters)
Insertion Loss = 0.87 dB (at 106.1 mHz)

Isocoupler
Insertion Loss = 0.1 dB

Andrew HJ7-50 Heliax (100.5 meters)
Insertion Loss = .74 dB (at 106.1 mHz)

TOTAL INSERTION LOSS: 1.71 dB
TOTAL EFFICIENCY: 67.5%

Antenna Gain:

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

Nicom BKG/77
Power Gain: 2.1 dB

TPO Calculations:

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

$$\frac{3\text{ kW}}{(2.1 * 67.5\%)} = \textbf{2.116 kW = 2.1 kW TPO}$$