

### **Transmitter Power Output**

KGRI has been constructed using two antennas. The directional vertical component uses a Scala YA7-FM/RM, while the horizontal uses a Scala CA2 FM/50.

The output of the transmitter is fed to a Scala 90/10 splitter, with approximately 90% of the power going to the vertical antenna, and the remainder going to the horizontal. Because the 90/10 splitter is not a precision device (the ratio, though stable, is not precisely 90/10 because of small losses in the splitter itself), transmitter power output was set using a calibrated watt meter at the input to the coax going to the antenna. For the vertical component:

Authorized ERP: 170 watts  
Scala YA7-FM/RM antenna gain: 4.841  
180 feet of Andrew 1/2" foam coax efficiency: 0.774  
2 foot RG-213 jumper efficiency: 0.912  
Power at input to coax =  $170 / 4.841 / 0.774 / 0.912 \approx 49.8 \text{ watts}^1$

A wattmeter was inserted in the circuit at the input to the coax, and the transmitter power output was adjusted so that the wattmeter read approximately 49.8 watts. The output of the transmitter at that point was 55 watts.

The same calculation was then performed for the horizontal component:

Authorized ERP: 1 watt  
Scala CA2 FM/50 antenna gain: 2.512  
70 feet of RG-213 coax efficiency: 0.746  
Power at input to coax =  $1 / 2.512 / 0.746 \approx 0.53 \text{ watt}^2$

The output of the 10% port of the 90/10 splitter is approximately 5 watts. Therefore, a 10 dB attenuator (10% efficient) was inserted in the line between the splitter and the input to the coax, resulting in approximately 0.5 watt toward the horizontal antenna.

Therefore, KGRI's Transmitter Power Output is 55 watts, resulting in an ERP of 170 watts vertical and 1 watt horizontal.

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<sup>1</sup> This result has been rounded to 49.8 watts from approximately 49.75 watts.

<sup>2</sup> This result has been rounded to 0.53 watt from approximately 0.5336 watts.