Radiation Resistance, Rr, For a *Short Vertical with top loading wire:**

Alter figures in BLUE only

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(a modified version of G4JNT's TeeAntCalcs SS)

Operating Frequency	0.475	*MHz*	Frac lambda				Sine of Deg	
Vertical section *(Gv)*	40	*FEET*	0.0193	WL	=	6.95122 Degrees	0.121024	(not used)
Top wires (if used)	180	*FEET*	0.0869	WL	=	31.28049 Degrees	0.519228	***=It***
Total Length	220	*FEET*	0.1062	WL	=	38.23171 Degrees	0.618843	***=lb***
Degree-Ampere Area	6.39175	*Deg-Amps*						
Fract lambda	0.0193	wl	6.9512	Degrees				

"(1)" $A = \frac{G_v}{2}\left(\frac{I_t}{I_b} + 1\right)$

(1) by LaPort's equations: Rr = 0.4964 ohms of Radiation Resistance

CALCULATION OF ERP USING Rr:

Total resistance	50	ohms	(note: OPTIONAL, this is used only for efficiency)				
Current into base of antenna	2.5	Amperes					
Efficiency	0.0099		=	0.9928	Percent		
(2) by Fritz's equations: TRP	3.82285	W	=	5.8	dBW	35.8	dBm
EIRP	11.46855	W	=	10.6	dBW	40.6	dBm
ERP	6.97600	W	=	8.4	dBW	38.4	dBm

* shorter than about 30 degrees of the wavelength at the operating frequency

(1) from page 23-24 of LaPort's *Radio Antenna Engineering*, 1952. (***Gv/2*** is the ***effective*** height of the vertical section.)
(2) from Fritz Raab's RN06-32 pdf on Total Radiated Power, page 2, equation (5). http://500kc.com/downloads/RN06-32.pdf
(3)The top wire (if used) can be a "T" and it will give the same results as an inverted-L, for the same total length.
(4) I further postulate that any arrangement of total top loading wires would have the same effect on Rr as a single inverted L wire for the same total length.

The calculations above represent the short vertical to be used in the propagation experimentation.

The current transmitter down converts a 5 watt 28.475 MHz to 20 watts on 475 kHz with appropriate filtering to prevent interference to amateur or other radio services. The 20 watt 475 kHz is feed to a RF power amplifier that produces 100 watts output to the antenna tuner assembly to supply 2.5 amps of RF current. The efficiency of the antenna would allow an EIRP of 41 dBm. The current is monitored to keep the EIRP at the proposed level.

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