

SELECTED EQUATIONS OF INTEREST

RF EQUATIONS:

$$1) P_r = p(d)A_{er} \text{ watts} \qquad 2) p(d) = \text{EIRP}/(4\pi d^2) \text{ watts/m}^2$$

$$3) A_e = \eta A_p \text{ m}^2 \qquad 4) \text{EIRP} = P_t G_t \text{ watts}$$

$$5) G = (4\pi A_e)/\lambda^2 \qquad 6) L_s = (4\pi d/\lambda)^2$$

$$7) f\lambda = c \text{ meters/sec} \qquad 8) 1 \text{ kilometer} \approx .6214 \text{ miles}$$

9) ANALOG (dB):

$$P_r = P_t + G_t + (\text{mi} = 83.41 \text{ or km} = 87.56) - 20\log(d) - 20\log(f) + G_r - L_o - M$$

10) DIGITAL (dB):

$$(E_b/\mathcal{N}_o) = P_t + G_t + (\text{mi} = 83.41 \text{ or km} = 87.56) - 20\log(d) - 20\log(f) + G_r - R + 228.6$$

$$- T^{\circ}_{\text{Sys}} - L_o - M$$

RECEIVER EQUATIONS:

$$11) F = (\text{SNR}_{in})/(\text{SNR}_{out}) ; T^{\circ}_{in} \text{ should be } 290^{\circ}\text{K}$$

$$12) T^{\circ} = (F-1)290^{\circ}\text{K} \qquad 13) \mathcal{N}_o = kT^{\circ} \text{ watts/Hertz}$$

$$14) k = 1.38(10^{-23}) \text{ watts}/(^{\circ}\text{K-Hertz})$$

$$15) N = kT^{\circ}W_N \text{ watts} \qquad 16) L = 1/G = F$$

$$17) F = F_1 + (F_2 - 1)/G_1 + \dots + (F_N - 1)/(G_1 G_2 \dots G_{N-1})$$

$$18) T^{\circ}_{\text{Sys}} = T^{\circ}_1 + T^{\circ}_2/G_1 + \dots + T^{\circ}_N/(G_1 G_2 \dots G_{N-1})$$