

1/1/58

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From
(BYE 55412-92)

Token 40 db beam.

$$P_T = .631 \times 10^6$$

$$G_R = 1$$

$$G_T = 40 \text{ db } 10^4$$

$$F_i = 3000, \lambda^2 = .01$$

$$D_s = 3000 \text{ n. mi. (Max)}$$

$$= 5.55 \times 10^6 \text{ meters}$$

$$P_R = \frac{P_T G_T G_R \lambda^2}{(4\pi D)^2}$$

$$(4\pi D)^2 = \frac{P_T G_T G_R \lambda^2}{P_R}$$

$$(4\pi D)^2 = \frac{P_T G_T G_R \lambda^2}{P_R}$$

$$\frac{G_R}{P_R} = \frac{(4\pi D)^2}{P_T G_T \lambda^2}$$

Constants:

$$P_T = .631 \times 10^6$$

$$G_T = 10^4$$

$$\lambda^2 = .01 = 10^{-2}$$

$$D = 4.18 \times 10^6$$

$$D^2 = 1.76 \times 10^{13}$$

$$(4\pi D)^2 = 4.86 \times 10^{15}$$

at
3 KMc

$$= \frac{4.86 \times 10^{15}}{.631 \times 10^6 \times 10^4 \times 10^{-2}}$$

$$\frac{G_R}{P_R} = 7.7 \times 10^7$$

$$G_R = 7.7 \times 10^7 P_R$$

$$\frac{P_R}{G_R} = \frac{1}{7.7} = .129$$

$$-50 \text{ db } .77 = 1.12$$

$$-53 \text{ } .385 = 4.12$$

$$-56 \text{ } .158 = 7.12$$

$$-41 \text{ } 1.12 = 7.88$$

$$-44 \text{ } .77 = 4.88$$

$$-47 \text{ } .501 = 1.88$$

$$\left\{ \begin{array}{l} G_R = 7.7 \times 10^7 P_R \\ 7.7 \times 10^7 \times 10^{-8} = .77 \end{array} \right.$$

$$7.7 \times 10^7 \times .5 \times 10^{-8}$$

$$= .385$$

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Up From Horizon)

Actual Freq.

$F = 3250$

$\lambda = 9.22 \text{ cm}$

$\lambda^2 = (.0922)^2 = .85 \times 10^{-2}$

$D = 3000 \text{ MW for } 1200 \text{ mi. alt.}$

$$\frac{G_R}{P_R} = \frac{(4\pi D)^2}{P_T G_T \lambda^2}$$

~~3250 MHz~~

$$= \frac{4.86 \times 10^{15}}{.631 \times 10^6 \times 10^4 \times .85 \times 10^{-2}} = 9.05 \times 10^7$$

$\frac{P_R}{-47 \text{ dbm}}$	$G_R = 9.05 \times 10^7 P_R$	$= 9.05 \times 10^7 \times 2 \times 10^{-8} = 1.81 \times 10^{-1} = 1.81 = 2.58 \text{ db}$	$\frac{G_R}{5.58}$
-44			-8.58
-41			-4.2
-50			-3.42
-53			-6.42
-56			

800 mile alt., 2500 mi. slant range

$$2500 \text{ mi} = 1.85 \times 10^3 \times 2500 \text{ meters}$$

$$= 4.63 \times 10^6 \text{ meters}$$

$$\frac{(4\pi D)^2}{= 3.38 \times 10^{15}}$$

$$\frac{G_R}{P_R} = \frac{3.38 \times 10^{15}}{.631 \times 10^6 \times 10^4 \times .85 \times 10^{-2}} = 6.3 \times 10^7 = 1.26 =$$

$\frac{P_R}{-47 \text{ dbm}}$	$G_R = 6.3 \times 10^7 \times 2 \times 10^{-8} = 1.26 =$	$\frac{G_R}{1.0 \text{ db}}$
-44		4.
-41		7
-50		-2
-53		-5
-56		-8

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$$P_R = \frac{P_T G_T G_R \lambda^2}{(4\pi D)^2}$$

$$(4\pi D)^2 = \frac{P_T G_T G_R \lambda^2}{P_R}$$

$$D = \frac{\sqrt{\frac{P_T G_T G_R \lambda^2}{P_R}}}{4\pi}$$

$$F = 3150$$

$$G_T = 40 \text{ db}$$

$$G_{r, \text{loss}} = 2 \text{ db } (.631)$$

$$\lambda^2 = .908 \times 10^{-2}$$

$$\text{Target Sig: } -51 \text{ dbm}$$

$$\text{Trigger: } +6 \text{ db}$$

$$-45 \text{ dbm}$$

$$= 3.162 \times 10^{-8} \text{ w}$$

$$= \frac{\sqrt{\frac{6.31 \times 10^3 \times 10^4 \cdot 1.908 \times 10^{-2}}{3.162 \times 10^{-8}}}}{4\pi}$$

$$= \frac{1.81 \times 10^{14}}{4\pi} = \frac{4.26 \times 10^7}{4\pi} = 3.39 \times 10^6 \text{ meters}$$

$$\text{Slant Range} = \frac{3.39 \times 10^6}{1.853 \times 10^3} = \underline{\underline{1830}} \text{ miles}$$

<u>H</u>	<u>Slant Range</u>	<u>Ground Range</u>
200		820
300		1030
400		1200
500		1400
600		1600
700		1820
800		2000
900		2200
1000		2400
1100		2600
1200		2800
1300		3000
1400		3200
1500		3400
1600		3600
1700		3800
1800		4000
1900		4200
2000		4400
2100		4600
2200		4800
2300		5000
2400		5200
2500		5400
2600		5600
2700		5800
2800		6000
2900		6200
3000		6400
3100		6600
3200		6800
3300		7000
3400		7200
3500		7400
3600		7600
3700		7800
3800		8000
3900		8200
4000		8400
4100		8600
4200		8800
4300		9000
4400		9200
4500		9400
4600		9600
4700		9800
4800		10000
4900		10200
5000		10400
5100		10600
5200		10800
5300		11000
5400		11200
5500		11400
5600		11600
5700		11800
5800		12000
5900		12200
6000		12400
6100		12600
6200		12800
6300		13000
6400		13200
6500		13400
6600		13600
6700		13800
6800		14000
6900		14200
7000		14400
7100		14600
7200		14800
7300		15000
7400		15200
7500		15400
7600		15600
7700		15800
7800		16000
7900		16200
8000		16400
8100		16600
8200		16800
8300		17000
8400		17200
8500		17400
8600		17600
8700		17800
8800		18000
8900		18200
9000		18400
9100		18600
9200		18800
9300		19000
9400		19200
9500		19400
9600		19600
9700		19800
9800		20000
9900		20200
10000		20400

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4 db Antenna

$D_1 = \sqrt{4db} \quad D = \sqrt{2.512}$

$D_1 - \text{Slant Range} = 1,585 \cdot 1830 = 2980 \text{ mi}$

H Slant Range Ground Range

200	2980	25°	Line
400			of
600			
800			1740
1000			
1200		35	2100 mi
1400		33.1	1990
1600		31	1860
1800		28.8	1730
2000		26.2	1570

2 db Ant

$D_2 = \sqrt{2db} \quad D = 1.26 \cdot 1830 = \underline{\underline{2300 \text{ miles}}}$

200	2300		
400			
600			
800		29°	1740
1000		27°	1620
1200		25°	1500
1400		22.9°	1370
1600			
1800			

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Diameter: Equatorial = 7,926.68

Polar = 7,899.99

Mean = 7,918

Circumference: Equatorial = 24,902.37 -

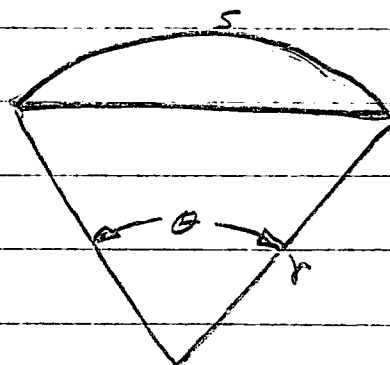
Meridional 24,860.74

Inclination: 23° 27' 3.3"

Rotation: 1,038 miles/hr. at the equator

Chord: $S = \frac{\pi r \theta}{180}$ *

length of chord
 $= 2r \sin \frac{1}{2} \theta$



* $S = r \theta$ θ in radians

$$S = \frac{\pi \cdot 4000 \cdot \theta}{180} = 1500 \text{ miles}$$

3000

400 miles high

$$\frac{24^\circ \pi \cdot 4}{180} = 1680$$

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100 mi

Radar Range = T/S Alt.

<i>Inches</i>		<i>1430 max</i>
11.2	2800	1000
9.93	2480	
9.73	2410	800
		760
8.48	2120	600
		400
5.9	1475 n mi	300
		200

100 mi

200 mi

9.73	2410	760	<i>T/S less 3 db</i>
5.9"	1475	300	

400 mi

6.85	1710	400	<i>T/S less 6 db</i>
5.9"	1475	300	

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