SECRET

(From BYE 55412-62)

Token 4066 beam.

$P_T = .631 \times 10^6$

$G_R = 1$

$G_T = 4066 \quad 10^4$

$F_1 = 3000 \quad \lambda^2 = .01$

$D_s = 3000$ n. mi. (Max)

$= 5^{-}.55 \times 10^6$ meters

$(4\pi D)^2 = 4.86 \times 10^{13}$

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

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

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

Constants:

$P_T = .631 \times 10^6$

$G_T = 10^4$

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

$D = 4.18 \times 10^6$

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

$(4\pi D)^2 = 4.86 \times 10^{13}$

at 3KMc $= \dfrac{4.86 \times 10^{13}}{.631 \times 10^6 \times 10^4 \times 10^{-2}}$

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

$G_R = 7.7 \times 10^7 P_R$

| $P_R$ | $G_R$ | $G_R$ (db) |
|---|---|---|
| -50 dbm | .77 | -1.12 |
| -53 | .385 | -4.12 |
| -56 | | -7.12 |
| -41 | | 7.88 |
| -44 | | 4.88 |
| -47 | 1.54 | 1.88 |

so $\begin{cases} G_R = 7.7 \times 10^7 P_R \\ 7.7 \times 10^7 \times 10^{-8} = .77 \end{cases}$

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

$-53 \quad = .385$

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HANDLE VIA
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CONTROL SYSTEM ONLY
(Cont'd)

7 Oct 58

(2)

SECRET

° Up From Horizon)

Actual Freq.

$F = 3250$

$\lambda = 9.22$ cm

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

$D = 3000$ Mi for 1200 mi. alt.

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

At 3250 Mc.

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

$G_R = 9.05 \times 10^7 P_R$

| $P_R$ | | $G_R$ |
|---|---|---|
| -47 dbm, | $= 9.05 \times 10^7 \times 2 \times 10^{-8} = 18.1 \times 10^{-1} = 1.81 =$ | 2,58 db |
| -44 | | 5.58 |
| -41 | | -8.58 |
| -50 | | -.42 |
| -53 | | -3.42 |
| -56 | | -6.42 |

800 mile alt., 2500 mi. ~~Cont~~ range

2500 mi = $1.85 \times 10^3 \times 2500$ meter

$= 4.63 \times 10^6$ meters

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

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

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

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[redacted]
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Oct 20 (3)

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

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

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

$F = 3150$
$G_T = 40$ db
$G_T$ loss = 2 db (.631)
$\lambda^2 = .908 \times 10^{-2}$

Targ. Sig: $-51$ dbm
Trigger: $+6$ db
$-45$ dbm
$= 3.162 \times 10^{-8}$ w.

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

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

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

| H | Slant Range | Ground Range |
|---|---|---|
| 200 | | 820 L of S. |
| 300 | | 1030 |
| 400 | | 1200 L of S. |
| 600 | | 1400 |
| 800 | | 1320 |
| 1000 | | 1200 |
| 1200 | | 1050 |
| 550 | 1830 | 1440 |

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(4)

4 db Antenna

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

$D_1$ – Slant Range = 1.585 · 1830 = 2980 mi

| H | Slant Range | | Ground Range |
|---|---|---|---|
| 200 | 2980 | 25° | Line of Sight |
| 400 | | | |
| 600 | | | |
| 800 | | | |
| 1000 | | | |
| 1200 | | 35 | 2100 mi |
| 1400 | | 33.1 | 1990 |
| 1600 | | 31 | 1860 |
| 1800 | | 28.8 | 1730 |
| 2000 | | 26.2 | 1570 |

2 db Ant

Slant Range: $D_2 = \sqrt{2db}$ $D = 1.26 \cdot 1830 = 2300$ miles

| | | | |
|---|---|---|---|
| 200 | 2300 | | |
| 400 | | | |
| 600 | | | |
| 800 | | 29° | 1740 |
| 1000 | | 27° | 1620 |
| 1200 | | 25° | 1500 |
| 1400 | | 22.9° | 1370 |
| 1600 | | 20 | 1200 |
| 1800 | | 13.3 | 800 |

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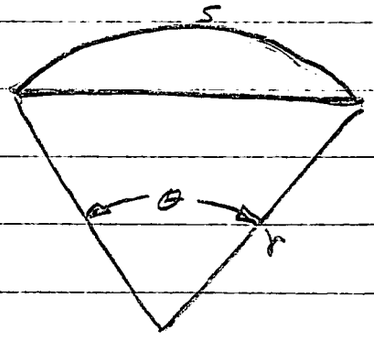
Diameter: Equatorial = 7,926.68
Polar = 7,899.99
Mean = 7,918

Circumference: Equatorial = 24,902.37 —
Meridional 24,860.44

Inclination: 23°27'3.3"

Rotation: 1038 miles/hr. at the equator

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




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

* $S = r\theta$ θ in radians

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

3000

400 miles high

$\frac{24° \pi \cdot 4}{180} = 1680$

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1000 mile R

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Radar Range : T/S | Alt.

| Inches | | 1 grid ranges | |
|---|---|---|---|
| | | 2350 | 1430 max |
| 11.2 | 2800 | | 1000 |
| 9.93 | 2480 | | |
| 9.73 | 2410 | | 800 |
| | | | 760 |
| 8.48 | 2120 | | 600 |
| | | | 400 |
| 5.9 | 1475 nmi | | 300 |
| | | | 200 |

~~900 x 200~~

| | | | |
|---|---|---|---|
| 9.73 | 2410 | 760 | T/S loss 3 db |
| 5.9" | 1475 | 300 | |

400 mw

| | | | |
|---|---|---|---|
| | | | T/S loss 6 db |
| 6.85 | 1710 | 400 | |
| 5.9" | 1475 | 300 | |

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