# Model Ring Current Belts*

by

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## 1. Introduction

The purpose of this note is to present some numerical results of an extensive calculation of model storm-time radiation belts or the so-called ring current belts. The models are constructed by choosing most plausible sets of the six parameters that characterize the belts.

(i) Parameters

The number density distribution $n(r_e)$ along an equatorial radius $r_e$ is given by

$$n = n_o \, e^{-g_1^2 z^2} \qquad (z < 0, \text{ for the inner part of the belt})$$
$$n = n_o \, e^{-g_2^2 z^2} \qquad (z > 0, \text{ for the outer part of the belt})$$

where $z = (r_e - r_{eo})/a$, a denotes the earth's radius, $r_{eo}$ the distance at which n attains its maximum value $n_o$.

The pitch-angle distribution $H(\theta, \alpha)$ is assumed to have a form

$$H = A(\alpha) \sin^{\alpha+1} \theta$$

where $\theta$ denotes the pitch-angle, $\alpha$ is a constant, and $A(\alpha)$ is a normalization factor.

The ring current particles are assumed to be mono-energetic, with their energy $\epsilon$. Therefore, the parameters are $r_{eo}$, $g_1$, $g_2$, $\alpha$, $n_o$, and $\epsilon$. These determine completely the characteristics of model ring current belts, so that the magnetic field $\Delta B$ of the ring current at a given point (radius $r_1$, latitude $\phi_1$) is given by

$$\Delta B = F\ (r_1,\ \phi_1;\ r_{eo},\ g_1,\ g_2,\ \alpha,\ n_o,\ \epsilon)\ .$$

The actual procedure of obtaining the ring current field $\Delta B$ is first to compute the current intensity i in a meridian plane.

$$i = \frac{1}{B\ R_c}\ (p_s - p_n) - \frac{1}{Bh_2}\ \left(\frac{\partial p_n}{\partial r_e}\right) - \frac{2\ \tan\phi}{h_1}\ \frac{\partial p_n}{\partial \phi} \qquad (1)^*$$

or

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*(i) Notation is the same as that given by Akasofu and Chapman [1961].

(ii) Dr. P. C. Kendall has pointed out that the last term in the right-hand side is overlooked in the paper by Akasofu and Chapman [1961].

$$i = \frac{m\, n_o\, w^2\, dw}{B_o\, a} \left\{ (f_o + z)^2\, e^{-g^2 z^2}\, D(\phi, \alpha) + 2g^2 z\, (f_o + z)^3 \cdot e^{-g^2 z^2}\, F(\phi, \alpha) \right\}$$

$$D(\phi, \alpha) = M/N$$

$$M = 3 \left\{ 1 - 6B(\alpha) \right\} \left\{ (\cos\phi)^{5+3\alpha} (1 + \sin^2\phi) + 6\alpha\, (B(\alpha) \sin^2\phi\, (\cos\phi)^{3\alpha+3} (3 + 5\sin^2\phi) \right\}$$

$$N = (1 + 3\sin^2\phi)^{2 + \frac{1}{4}\alpha}$$

$$F(\phi, \alpha) = \frac{2B(\alpha)\cos^{3\alpha+3}}{(1 + 3\sin^2\phi)^{\frac{1}{4}\alpha}} .$$

Let $\Delta B_x$ and $\Delta B_z$ denote respectively the components of the magnetic field of the ring current, parallel and perpendicular to the equatorial plane at the point $(r_1, \phi_1)$. They are given by

$$\Delta B = -\int\int \frac{2i}{c} \frac{\zeta}{\omega\, [(\xi + \omega)^2 + \zeta^2]} \times \left[ -K + \frac{\xi^2 + \omega^2 + \zeta^2}{(\xi - \omega)^2 + \zeta^2} E \right] dS_3$$

$$\Delta B_z = -\int\int \frac{2i}{c} \frac{1}{[(\zeta + \omega)^2 + \zeta^2]^{1/2}} \times \left[ K + \frac{\xi^2 - \omega^2 - \zeta^2}{(\xi - \omega)^2 + \zeta^2} E \right] dS_3$$

where $\omega = r_{e1} \cos^3 \phi_1$

$\zeta = r_{e1} \cos^2 \phi_1 \sin \phi - r_{e2} \cos^2 \phi_2 \sin \phi_2$

$\xi = r_{e2} \cos^3 \phi_2$

and $K(k^2)$ and $E(k^2)$ are the complete elliptic integrals of the first and second kinds for

$$k^2 = \frac{4 \xi \omega}{(\xi + \omega)^2 + \zeta^2} .$$

Note that at the earth's center, $r_{e1} = 0$, $\phi_1 = 0$, so that $k^2 = 0$ and $K = E = \pi/2$ and thus

$$\Delta B_z = - \frac{2 \pi}{c} \iint \frac{i \, dS_3}{r_{e2}}$$

In the actual computation process, the double integral for $\Delta B_x$ and $\Delta B_z$ is replaced by a double summation for about 1000 elements $d\mathbf{S}_3 = r_{e2} \cos^4 \phi_2 \, dr_{e2} \, d\phi_2 = af_2 \cos^4 \phi_2 \, adf_2 \, d\phi_2$; for example, for $\Delta B_z \, (r_1, \phi_1)$ we have

$$\Delta B_z\,(r_1, \phi_1) = \frac{-2i_o}{10a} \sum_{f_2} \sum_{\phi_2} \frac{f_2 \cos^4 \phi_2}{[\,(R+P)^2 + Q^2\,]^{1/2}}$$

$$\times \left[\, K(k^2) + \frac{R^2 - P^2 - Q^2}{(R-P)^2 + Q^2}\, E(k^2) \,\right]$$

$$\times \left[a \times \mathrm{adf}_2 \times d\phi_2\right]$$

where

$$i_o = \frac{c\, n_o\, m\, w^2}{H_o\, a} = 1.572 \times 10^{-16}\, n_o\, \epsilon\ (\mathrm{keV/cm^3}),\ \mathrm{amp}$$

$$= 1.472 \times 10^{2}\, n_o\, mw^2\ (\mathrm{erg/cm^3}),\ \mathrm{esu}$$

$$= 4.716 \times 10^{-7}\, n_o\, \epsilon\ (\mathrm{keV/cm^3}),\ \mathrm{esu}$$

and

$$\frac{2i_o}{10a} \times (a \times \mathrm{adf}^2 \times d\phi_2) = 1.572 \times 10^{-16}\, n_o\, \epsilon$$

$$\times\ (a \times 0.1a \times 0.0349) = 6.99 \times 10^{-6}\, n_o\, \epsilon$$

when $\Delta B_z$ is given in units of $\gamma$ .

and $\omega / a = P$, $\zeta/a = Q$, $\xi/a = R$. For the FORTRAN program of the computation of $\Delta B$ for an I. B. M. 7044 computer, see Appendix I.

## 2. Notation in Tables

Conversion of notation in the above to program notation

$r_{eo}/a$ = FCENT

$\phi_1$ = PHI

$g_1$ = G1

$g_2$ = G2

$\alpha$ = ALPHA

$n_o \epsilon$ = FJ

$r_1/a$ = L

$\Delta B_z$ ($n_o \epsilon = 1(\mathrm{keV/cm^3})$) = HZ

$\Delta B_x$ ($n_o \epsilon = 1(\mathrm{keV/cm^3})$) = HPI

$\Delta B_z$ (for a particular value of $n_o \epsilon$) = BHZ

$\Delta B_x$ (for a particular value of $n_o \epsilon$) = BHPI

BIGHZ = Dipole field + BHZ

BIGHPI = Dipole field + BHPI

$\mathrm{BIGH} = ((\mathrm{BIGHZ})^2 + (\mathrm{BIGHPI})^2)^{1/2}$

## 3. Results

### (a) Tables 1-3

Tables 1-3 give $\Delta B_z\ (r_e)$ and $\Delta B_x(r_e)$ for several sets of the six parameters.

| Table 1 | Table 2 | Table 3 |
|---|---|---|
| $r_{eo} = 3.0$ | $r_{eo} = 3.0$ | $r_{eo} = 2.0$ |
| $\phi_1 = 0°$ | $\phi_1 = 0°$ | $\phi_1 = 0°$ |
| $g_1 = 1.517$ | $g_1 = 2.146$ | $g_1 = 1.517$ |
| $g_2 = 1.517$, $0.759$, $0.379$ | $g_2 = 1.517$, $0.759$, $0.379$ | $g_2 = 1.517$, $0.759$, $0.379$ |
| $\alpha = 2.0$ | $\alpha = 2.0$ | $\alpha = 2.0$ |
| $\epsilon n_o = 1.0$ (keV/cm$^3$) | $\epsilon n_o = 1.0$ (keV/cm$^3$) | $\epsilon n_o = 1.0$ (deV/cm$^3$) |

The values of g ($g_1$, $g_2$) have the following meaning:

$g = 2.146$ $\quad (n/n_o = 1/100$ at $z = 1.0)$

$g = 1.517$ $\quad (n/n_o = 1/10$ at $z = 1.0)$

$g = 0.759$ $\quad (n/n_o = 1/10$ at $z = 2.0)$

$g = 0.379$ $\quad (n/n_o = 1/10$ at $z = 4.0)$

(b) Tables 4-10

In Tables 4 and 5 we choose the following sets of the parameters:

(i) $r_{eo} = 3.0$, $g_1 = 1.517$, $g_2 = 0.759$, $\alpha = 2.0$.

Table 4a ... $\Delta B_z$, $\Delta B_x$ $(r_1, \phi_1)$ for $n_o\epsilon = 1.0$

Table 4b ... BGHZ, BGHPI $(r_1, \phi_1)$
Table 4c ... BIGHZ, BIGHPI $(r_1, \phi_1)$
Table 4d ... BIGH $(r_1, \phi_1)$
} $n_o\epsilon = 4500.0$

Table 5a ... BGHZ, BGHZ, BGHPI $(r_1, \phi_1)$
Table 5b ... BIGHZ, BIGHPI $(r_1, \phi_1)$
Table 5c ... BIGH $(r_1, \phi_1)$
} $n_o\epsilon = 3500.0$

Table 6a ... BGHZ, BGHPI $(r_1, \phi_1)$
Table 6b ... BIGHZ, BIGHPI $(r_1, \phi_1)$
Table 6c ... BIGH $(r_1, \phi_1)$
} $n_o\epsilon = 2500.0$

Table 7a ... BGHZ, BGHPI $(r_1, \phi_1)$
Table 7b ... BIGHZ, BIGHPI $(r_1, \phi_1)$
Table 7c ... BIGH $(r_1, \phi_1)$
} $n_o\epsilon = 1500.0$

(ii) $r_{eo} = 2.0$, $g_1 = 1.517$, $g_2 = 0.759$, $\alpha = 2.0$

Table 8a ... $B_z$, $B_x$ $(r_1, \phi_1)$ for $n_o\epsilon = 1.0$

Table 8b ... BGHZ, BGHPI $(r_1, \phi_1)$

Table 8c ... BIGHZ, BIGHPI $(r_1, \phi_1)$ } $n_o\epsilon = 10000.0$

Table 8d ... BIGH $(r_1, \phi_1)$

Table 9a ... BGHZ, BGHPI $(r_1, \phi_1)$

Table 9b ... BIGHZ, BIGHPI $(r_1, \phi_1)$ } $n_o\epsilon = 5000.0$

Table 9c ... BIGH $(r_1, \phi_1)$

Table 10a ... BGHZ, BGHPI $(r_1, \phi_1)$

Table 10b ... BIGHZ, BIGHPI $(r_1, \phi_1)$ } $n_o\epsilon = 2000.00$

Table 10c ... BIGH $(r_1, \phi_1)$

(c) Tables 11-13

$r_{eo} = 3.0$, $g_1 = 1.517$, $g_2 = 0.259$, $n_o\epsilon = 1.0$

Table 11 ... $\alpha = 0.0$

Table 12 ... $\alpha = 1.0$
$\alpha = 2.0$ ... See Table 1.

Table 13 ... $\alpha = 3.0$

(d) Table 14a-d

Table 14 contains the quantities for the V3 model belt introduced by Akasofu and Chapman [1961]; the parameters are:

$$r_{eo} = 6.0$$

$$g_1 = g_2 = 1.517$$

$$\alpha = -0.5$$

$$n_o\epsilon = 150 \text{ keV/cm}^3$$

Table 14a ... $\Delta B_z$, $\Delta B_x$ $(r_1, \phi_1)$ for $n_o\epsilon = 1.0$

Table 14b ... BGHZ, BGHPI $(r_1, \phi_1)$

Table 14c ... BIGHZ, BIGHPI $(r_1, \phi_1)$ } $n_o\epsilon = 150.0$

Table 14d ... BIGH

## 4. Distorted Field Lines

The distorted field lines caused by the ring current are computed for the following sets of the parameters:

(a) $r_{eo} = 3.0$, $g_1 = 1.517$, $g_2 = 0.759$, $\alpha = 2.0$

Figure 1 ... $\epsilon n_o = 4500.0$

Figure 2 ... $\epsilon n_o = 3500.0$

Figure 3 ... $\epsilon n_o = 2500.0$

(b) $r_{eo} = 2.0$, $g_1 = 1.517$, $g_2 = 0.759$, $\alpha = 2.0$

Figure 4 ... $\epsilon n_o = 10000.0$

In each figure, the distorted field lines (solid) whose 'anchoring latitudes' are 10°, 20°, 30°, 40°, 50°, 60°, and 70°, are shown. The corresponding dipole field lines are included for comparison. For the FORTRAN program for an I. P. M. 7044 computer, see Appendix II.

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TABLE 1

FCENT= 3.0 PHI= 0.0 G1= 1.517 ALPHA= 2.0

| | G2= 1.517 | | G2= 0.759 | | G2= 0.379 | |
|---|---|---|---|---|---|---|
| L | HZ | HPI | HZ | HPI | HZ | HPI |
| 1.0 | -0.03704 | -0.00000 | -0.07179 | -0.00000 | -0.18664 | -0.00000 |
| 1.1 | -0.03698 | -0.00000 | -0.07171 | -0.00000 | -0.18653 | -0.00000 |
| 1.2 | -0.03689 | -0.00000 | -0.07160 | -0.00000 | -0.18638 | -0.00000 |
| 1.3 | -0.03678 | -0.00000 | -0.07146 | -0.00000 | -0.18620 | -0.00000 |
| 1.4 | -0.03665 | -0.00000 | -0.07129 | -0.00000 | -0.18597 | -0.00000 |
| 1.5 | -0.03649 | -0.00000 | -0.07109 | -0.00000 | -0.18569 | -0.00000 |
| 1.6 | -0.03631 | -0.00000 | -0.07085 | -0.00000 | -0.18537 | -0.00000 |
| 1.7 | -0.03613 | -0.00000 | -0.07060 | -0.00000 | -0.18503 | -0.00000 |
| 1.8 | -0.03600 | -0.00000 | -0.07040 | -0.00000 | -0.18471 | -0.00000 |
| 1.9 | -0.03603 | -0.00000 | -0.07032 | -0.00000 | -0.18450 | -0.00000 |
| 2.0 | -0.03635 | -0.00000 | -0.07054 | -0.00000 | -0.18455 | -0.00000 |
| 2.1 | -0.03723 | -0.00000 | -0.07127 | -0.00000 | -0.18510 | -0.00000 |
| 2.2 | -0.03897 | -0.00000 | -0.07285 | -0.00000 | -0.18646 | -0.00000 |
| 2.3 | -0.04197 | -0.00000 | -0.07566 | -0.00000 | -0.18902 | -0.00000 |
| 2.4 | -0.04663 | -0.00000 | -0.08010 | -0.00000 | -0.19317 | -0.00000 |
| 2.5 | -0.05323 | -0.00000 | -0.08644 | -0.00000 | -0.19918 | -0.00000 |
| 2.6 | -0.06184 | -0.00000 | -0.09475 | -0.00000 | -0.20710 | -0.00000 |
| 2.7 | -0.07211 | -0.00000 | -0.10467 | -0.00000 | -0.21660 | -0.00000 |
| 2.8 | -0.08326 | -0.00000 | -0.11542 | -0.00000 | -0.22684 | -0.00000 |
| 2.9 | -0.09401 | -0.00000 | -0.12570 | -0.00000 | -0.23656 | -0.00000 |
| 3.0 | -0.10277 | -0.00000 | -0.13392 | -0.00000 | -0.24414 | -0.00000 |
| 3.1 | -0.10790 | -0.00000 | -0.13845 | -0.00000 | -0.24795 | -0.00000 |
| 3.2 | -0.10806 | -0.00000 | -0.14050 | -0.00000 | -0.24984 | -0.00000 |
| 3.3 | -0.10253 | -0.00000 | -0.14166 | -0.00000 | -0.25208 | -0.00000 |
| 3.4 | -0.09143 | -0.00000 | -0.14162 | -0.00000 | -0.25452 | -0.00000 |
| 3.5 | -0.07573 | -0.00000 | -0.14014 | -0.00000 | -0.25701 | -0.00000 |
| 3.6 | -0.05704 | -0.00000 | -0.13704 | -0.00000 | -0.25942 | -0.00000 |
| 3.7 | -0.03734 | -0.00000 | -0.13224 | -0.00000 | -0.26166 | -0.00000 |
| 3.8 | -0.01850 | -0.00000 | -0.12574 | -0.00000 | -0.26362 | -0.00000 |
| 3.9 | -0.00204 | -0.00000 | -0.11761 | -0.00000 | -0.26520 | -0.00000 |
| 4.0 | 0.01110 | -0.00000 | -0.10801 | -0.00000 | -0.26632 | -0.00000 |
| 4.1 | 0.02062 | -0.00000 | -0.09717 | -0.00000 | -0.26690 | -0.00000 |
| 4.2 | 0.02669 | -0.00000 | -0.08538 | -0.00000 | -0.26687 | -0.00000 |
| 4.3 | 0.02985 | -0.00000 | -0.07295 | -0.00000 | -0.26616 | -0.00000 |
| 4.4 | 0.03081 | -0.00000 | -0.06021 | -0.00000 | -0.26472 | -0.00000 |
| 4.5 | 0.03025 | -0.00000 | -0.04750 | -0.00000 | -0.26250 | -0.00000 |
| 4.6 | 0.02876 | -0.00000 | -0.03514 | -0.00000 | -0.25947 | -0.00000 |
| 4.7 | 0.02681 | -0.00000 | -0.02339 | -0.00000 | -0.25560 | -0.00000 |
| 4.8 | 0.02470 | -0.00000 | -0.01250 | -0.00000 | -0.25088 | -0.00000 |
| 4.9 | 0.02263 | -0.00000 | -0.00264 | -0.00000 | -0.24531 | -0.00000 |
| 5.0 | 0.02068 | -0.00000 | 0.00605 | -0.00000 | -0.23890 | -0.00000 |
| 5.5 | 0.01351 | -0.00000 | 0.03142 | -0.00000 | -0.19538 | -0.00000 |
| 6.0 | 0.00939 | -0.00000 | 0.03401 | -0.00000 | -0.13828 | -0.00000 |
| 6.5 | 0.00686 | -0.00000 | 0.02775 | -0.00000 | -0.07777 | -0.00000 |
| 7.0 | 0.00519 | -0.00000 | 0.02095 | -0.00000 | -0.02384 | -0.00000 |
| 7.5 | 0.00404 | -0.00000 | 0.01582 | -0.00000 | 0.01691 | -0.00000 |
| 8.0 | 0.00321 | -0.00000 | 0.01223 | -0.00000 | 0.04241 | -0.00000 |
| 8.5 | 0.00260 | -0.00000 | 0.00968 | -0.00000 | 0.05442 | -0.00000 |
| 9.0 | 0.00214 | -0.00000 | 0.00783 | -0.00000 | 0.05666 | -0.00000 |
| 9.5 | 0.00179 | -0.00000 | 0.00643 | -0.00000 | 0.05313 | -0.00000 |
| 10.0 | 0.00151 | -0.00000 | 0.00536 | -0.00000 | 0.04703 | -0.00000 |

TABLE 2

FCENT= 3.0 PHI= 0.0 G1= 2.146 ALPHA= 2.0

| | G2= 1.517 | | G2= 0.759 | | G2= 0.379 | |
|---|---|---|---|---|---|---|
| L | HZ | HPI | HZ | HPI | HZ | HPI |
| 1.0 | -0.03389 | -0.00000 | -0.06864 | -0.00000 | -0.18349 | -0.00000 |
| 1.1 | -0.03384 | -0.00000 | -0.06857 | -0.00000 | -0.18339 | -0.00000 |
| 1.2 | -0.03378 | -0.00000 | -0.06849 | -0.00000 | -0.18327 | -0.00000 |
| 1.3 | -0.03370 | -0.00000 | -0.06838 | -0.00000 | -0.18311 | -0.00000 |
| 1.4 | -0.03359 | -0.00000 | -0.06823 | -0.00000 | -0.18291 | -0.00000 |
| 1.5 | -0.03346 | -0.00000 | -0.06805 | -0.00000 | -0.18266 | -0.00000 |
| 1.6 | -0.03329 | -0.00000 | -0.06783 | -0.00000 | -0.18235 | -0.00000 |
| 1.7 | -0.03308 | -0.00000 | -0.06755 | -0.00000 | -0.18198 | -0.00000 |
| 1.8 | -0.03282 | -0.00000 | -0.06722 | -0.00000 | -0.18153 | -0.00000 |
| 1.9 | -0.03253 | -0.00000 | -0.06683 | -0.00000 | -0.18100 | -0.00000 |
| 2.0 | -0.03223 | -0.00000 | -0.06641 | -0.00000 | -0.18042 | -0.00000 |
| 2.1 | -0.03200 | -0.00000 | -0.06605 | -0.00000 | -0.17987 | -0.00000 |
| 2.2 | -0.03208 | -0.00000 | -0.06596 | -0.00000 | -0.17957 | -0.00000 |
| 2.3 | -0.03289 | -0.00000 | -0.06658 | -0.00000 | -0.17994 | -0.00000 |
| 2.4 | -0.03517 | -0.00000 | -0.06864 | -0.00000 | -0.18171 | -0.00000 |
| 2.5 | -0.03994 | -0.00000 | -0.07315 | -0.00000 | -0.18589 | -0.00000 |
| 2.6 | -0.04824 | -0.00000 | -0.08115 | -0.00000 | -0.19351 | -0.00000 |
| 2.7 | -0.06060 | -0.00000 | -0.09316 | -0.00000 | -0.20508 | -0.00000 |
| 2.8 | -0.07634 | -0.00000 | -0.10850 | -0.00000 | -0.21993 | -0.00000 |
| 2.9 | -0.09306 | -0.00000 | -0.12475 | -0.00000 | -0.23561 | -0.00000 |
| 3.0 | -0.10682 | -0.00000 | -0.13797 | -0.00000 | -0.24819 | -0.00000 |
| 3.1 | -0.11324 | -0.00000 | -0.14379 | -0.00000 | -0.25328 | -0.00000 |
| 3.2 | -0.11247 | -0.00000 | -0.14491 | -0.00000 | -0.25426 | -0.00000 |
| 3.3 | -0.10623 | -0.00000 | -0.14536 | -0.00000 | -0.25579 | -0.00000 |
| 3.4 | -0.09458 | -0.00000 | -0.14477 | -0.00000 | -0.25767 | -0.00000 |
| 3.5 | -0.07843 | -0.00000 | -0.14285 | -0.00000 | -0.25971 | -0.00000 |
| 3.6 | -0.05940 | -0.00000 | -0.13940 | -0.00000 | -0.26177 | -0.00000 |
| 3.7 | -0.03940 | -0.00000 | -0.13430 | -0.00000 | -0.26372 | -0.00000 |
| 3.8 | -0.02032 | -0.00000 | -0.12756 | -0.00000 | -0.26543 | -0.00000 |
| 3.9 | -0.00366 | -0.00000 | -0.11922 | -0.00000 | -0.26681 | -0.00000 |
| 4.0 | 0.00966 | -0.00000 | -0.10945 | -0.00000 | -0.26776 | -0.00000 |
| 4.1 | 0.01932 | -0.00000 | -0.09847 | -0.00000 | -0.26820 | -0.00000 |
| 4.2 | 0.02552 | -0.00000 | -0.08655 | -0.00000 | -0.26804 | -0.00000 |
| 4.3 | 0.02879 | -0.00000 | -0.07401 | -0.00000 | -0.26722 | -0.00000 |
| 4.4 | 0.02984 | -0.00000 | -0.06118 | -0.00000 | -0.26568 | -0.00000 |
| 4.5 | 0.02937 | -0.00000 | -0.04838 | -0.00000 | -0.26338 | -0.00000 |
| 4.6 | 0.02796 | -0.00000 | -0.03594 | -0.00000 | -0.26028 | -0.00000 |
| 4.7 | 0.02607 | -0.00000 | -0.02413 | -0.00000 | -0.25634 | -0.00000 |
| 4.8 | 0.02402 | -0.00000 | -0.01318 | -0.00000 | -0.25156 | -0.00000 |
| 4.9 | 0.02199 | -0.00000 | -0.00328 | -0.00000 | -0.24594 | -0.00000 |
| 5.0 | 0.02009 | -0.00000 | 0.00546 | -0.00000 | -0.23948 | -0.00000 |
| 5.5 | 0.01310 | -0.00000 | 0.03101 | -0.00000 | -0.19579 | -0.00000 |
| 6.0 | 0.00909 | -0.00000 | 0.03371 | -0.00000 | -0.13859 | -0.00000 |
| 6.5 | 0.00663 | -0.00000 | 0.02752 | -0.00000 | -0.07800 | -0.00000 |
| 7.0 | 0.00501 | -0.00000 | 0.02077 | -0.00000 | -0.02401 | -0.00000 |
| 7.5 | 0.00389 | -0.00000 | 0.01568 | -0.00000 | 0.01677 | -0.00000 |
| 8.0 | 0.00310 | -0.00000 | 0.01211 | -0.00000 | 0.04230 | -0.00000 |
| 8.5 | 0.00251 | -0.00000 | 0.00959 | -0.00000 | 0.05432 | -0.00000 |
| 9.0 | 0.00206 | -0.00000 | 0.00775 | -0.00000 | 0.05658 | -0.00000 |
| 9.5 | 0.00172 | -0.00000 | 0.00637 | -0.00000 | 0.05307 | -0.00000 |
| 10.0 | 0.00145 | -0.00000 | 0.00531 | -0.00000 | 0.04697 | -0.00000 |

3.000000 1.517000 1.517000 2.000000 150.000000

1.00 5.00 0.10 0.00 0.00 0.00

1.0 0.0 1.00 -0. -0.3704E-01 -0.00 31994.44 31994.44 -0.5556E 01 -0.5556E 01 0.

TABLE 3

FCENT= 2.0 PHI= 0.0 G1= 1.517 ALPHA= 2.0

| | G2= 1.517 | | G2= 0.759 | | G2= 0.379 | |
|---|---|---|---|---|---|---|
| L | HZ | HPI | HZ | HPI | HZ | HPI |
| 1.0 | -0.01700 | -0.00000 | -0.03707 | -0.00000 | -0.11382 | -0.00000 |
| 1.1 | -0.01687 | -0.00000 | -0.03692 | -0.00000 | -0.11362 | -0.00000 |
| 1.2 | -0.01697 | -0.00000 | -0.03698 | -0.00000 | -0.11363 | -0.00000 |
| 1.3 | -0.01739 | -0.00000 | -0.03735 | -0.00000 | -0.11394 | -0.00000 |
| 1.4 | -0.01815 | -0.00000 | -0.03805 | -0.00000 | -0.11455 | -0.00000 |
| 1.5 | -0.01938 | -0.00000 | -0.03919 | -0.00000 | -0.11559 | -0.00000 |
| 1.6 | -0.02118 | -0.00000 | -0.04089 | -0.00000 | -0.11716 | -0.00000 |
| 1.7 | -0.02357 | -0.00000 | -0.04315 | -0.00000 | -0.11928 | -0.00000 |
| 1.8 | -0.02645 | -0.00000 | -0.04587 | -0.00000 | -0.12181 | -0.00000 |
| 1.9 | -0.02954 | -0.00000 | -0.04876 | -0.00000 | -0.12448 | -0.00000 |
| 2.0 | -0.03240 | -0.00000 | -0.05139 | -0.00000 | -0.12683 | -0.00000 |
| 2.1 | -0.03451 | -0.00000 | -0.05320 | -0.00000 | -0.12832 | -0.00000 |
| 2.2 | -0.03533 | -0.00000 | -0.05448 | -0.00000 | -0.12943 | -0.00000 |
| 2.3 | -0.03448 | -0.00000 | -0.05561 | -0.00000 | -0.13076 | -0.00000 |
| 2.4 | -0.03179 | -0.00000 | -0.05643 | -0.00000 | -0.13222 | -0.00000 |
| 2.5 | -0.02740 | -0.00000 | -0.05680 | -0.00000 | -0.13379 | -0.00000 |
| 2.6 | -0.02171 | -0.00000 | -0.05662 | -0.00000 | -0.13539 | -0.00000 |
| 2.7 | -0.01533 | -0.00000 | -0.05580 | -0.00000 | -0.13700 | -0.00000 |
| 2.8 | -0.00892 | -0.00000 | -0.05429 | -0.00000 | -0.13856 | -0.00000 |
| 2.9 | -0.00308 | -0.00000 | -0.05205 | -0.00000 | -0.14003 | -0.00000 |
| 3.0 | 0.00177 | -0.00000 | -0.04910 | -0.00000 | -0.14136 | -0.00000 |
| 3.1 | 0.00542 | -0.00000 | -0.04551 | -0.00000 | -0.14251 | -0.00000 |
| 3.2 | 0.00785 | -0.00000 | -0.04134 | -0.00000 | -0.14343 | -0.00000 |
| 3.3 | 0.00921 | -0.00000 | -0.03670 | -0.00000 | -0.14407 | -0.00000 |
| 3.4 | 0.00971 | -0.00000 | -0.03174 | -0.00000 | -0.14440 | -0.00000 |
| 3.5 | 0.00962 | -0.00000 | -0.02659 | -0.00000 | -0.14438 | -0.00000 |
| 3.6 | 0.00914 | -0.00000 | -0.02140 | -0.00000 | -0.14396 | -0.00000 |
| 3.7 | 0.00847 | -0.00000 | -0.01630 | -0.00000 | -0.14312 | -0.00000 |
| 3.8 | 0.00772 | -0.00000 | -0.01142 | -0.00000 | -0.14184 | -0.00000 |
| 3.9 | 0.00698 | -0.00000 | -0.00687 | -0.00000 | -0.14010 | -0.00000 |
| 4.0 | 0.00629 | -0.00000 | -0.00273 | -0.00000 | -0.13788 | -0.00000 |
| 4.1 | 0.00567 | -0.00000 | 0.00093 | -0.00000 | -0.13519 | -0.00000 |
| 4.2 | 0.00512 | -0.00000 | 0.00408 | -0.00000 | -0.13201 | -0.00000 |
| 4.3 | 0.00464 | -0.00000 | 0.00671 | -0.00000 | -0.12836 | -0.00000 |
| 4.4 | 0.00422 | -0.00000 | 0.00883 | -0.00000 | -0.12426 | -0.00000 |
| 4.5 | 0.00385 | -0.00000 | 0.01046 | -0.00000 | -0.11972 | -0.00000 |
| 4.6 | 0.00352 | -0.00000 | 0.01165 | -0.00000 | -0.11477 | -0.00000 |
| 4.7 | 0.00323 | -0.00000 | 0.01244 | -0.00000 | -0.10945 | -0.00000 |
| 4.8 | 0.00297 | -0.00000 | 0.01289 | -0.00000 | -0.10380 | -0.00000 |
| 4.9 | 0.00275 | -0.00000 | 0.01306 | -0.00000 | -0.09785 | -0.00000 |
| 5.0 | 0.00254 | -0.00000 | 0.01299 | -0.00000 | -0.09166 | -0.00000 |
| 5.5 | 0.00178 | -0.00000 | 0.01076 | -0.00000 | -0.05874 | -0.00000 |
| 6.0 | 0.00131 | -0.00000 | 0.00794 | -0.00000 | -0.02702 | -0.00000 |
| 6.5 | 0.00099 | -0.00000 | 0.00581 | -0.00000 | -0.00134 | -0.00000 |
| 7.0 | 0.00077 | -0.00000 | 0.00436 | -0.00000 | 0.01602 | -0.00000 |
| 7.5 | 0.00061 | -0.00000 | 0.00337 | -0.00000 | 0.02529 | -0.00000 |
| 8.0 | 0.00050 | -0.00000 | 0.00267 | -0.00000 | 0.02830 | -0.00000 |
| 8.5 | 0.00041 | -0.00000 | 0.00215 | -0.00000 | 0.02735 | -0.00000 |
| 9.0 | 0.00034 | -0.00000 | 0.00177 | -0.00000 | 0.02445 | -0.00000 |
| 9.5 | 0.00029 | -0.00000 | 0.00147 | -0.00000 | 0.02096 | -0.00000 |
| 10.0 | 0.00024 | -0.00000 | 0.00124 | -0.00000 | 0.01762 | -0.00000 |

3.000000 2.146000 1.517000 2.000000 150.000000

1.00 5.00 0.10 0.00 0.00 0.00

1.0 0.0 1.00 -0. -0.3389E-01 -0.00 31994.92 31994.92 -0.5084E 01 -0.5084E 01 0.

TABLE 4A

FCENT= 3.0 G1= 1.517 G2= 0.759 ALPHA= 2.0 FJ= 1.0

| | DEGREE 0 | | 10 | | 20 | | 30 | | 40 | | 50 | | 60 | | 70 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L | HZ | HPI | HZ | HPI | HZ | HPI | HZ | HPI | HZ | HPI | HZ | HPI | HZ | HPI | HZ | HPI |
| 1.0 | -0.072 | -0.000 | -0.072 | 0.000 | -0.072 | 0.000 | -0.072 | 0.000 | -0.072 | 0.000 | -0.072 | -0.000 | -0.072 | -0.000 | -0.072 | -0.000 |
| 1.5 | -0.071 | -0.000 | -0.071 | 0.001 | -0.072 | 0.001 | -0.073 | 0.001 | -0.073 | 0.001 | -0.073 | -0.000 | -0.072 | -0.001 | -0.071 | -0.001 |
| 2.0 | -0.071 | -0.000 | -0.072 | 0.003 | -0.075 | 0.004 | -0.078 | 0.005 | -0.078 | 0.001 | -0.076 | -0.003 | -0.072 | -0.004 | -0.069 | -0.003 |
| 2.5 | -0.086 | -0.000 | -0.089 | 0.011 | -0.095 | 0.015 | -0.092 | 0.004 | -0.084 | -0.007 | -0.075 | -0.010 | -0.068 | -0.008 | -0.064 | -0.006 |
| 3.0 | -0.134 | -0.000 | -0.129 | 0.017 | -0.114 | 0.006 | -0.097 | -0.014 | -0.081 | -0.022 | -0.069 | -0.017 | -0.061 | -0.012 | -0.057 | -0.008 |
| 3.5 | -0.140 | -0.000 | -0.130 | 0.002 | -0.108 | -0.021 | -0.086 | -0.039 | -0.069 | -0.032 | -0.059 | -0.022 | -0.053 | -0.015 | -0.049 | -0.009 |
| 4.0 | -0.108 | -0.000 | -0.097 | -0.021 | -0.077 | -0.051 | -0.064 | -0.053 | -0.054 | -0.036 | -0.048 | -0.024 | -0.044 | -0.016 | -0.042 | -0.010 |
| 4.5 | -0.048 | -0.000 | -0.043 | -0.041 | -0.040 | -0.066 | -0.042 | -0.053 | -0.041 | -0.035 | -0.038 | -0.023 | -0.036 | -0.015 | -0.035 | -0.009 |
| 5.0 | 0.006 | -0.000 | 0.001 | -0.046 | -0.014 | -0.061 | -0.026 | -0.046 | -0.029 | -0.032 | -0.030 | -0.022 | -0.030 | -0.014 | -0.029 | -0.009 |
| 5.5 | 0.031 | -0.000 | 0.021 | -0.039 | -0.001 | -0.048 | -0.015 | -0.038 | -0.021 | -0.027 | -0.024 | -0.019 | -0.024 | -0.013 | -0.024 | -0.008 |
| 6.0 | 0.034 | -0.000 | 0.023 | -0.029 | 0.004 | -0.036 | -0.009 | -0.030 | -0.016 | -0.023 | -0.019 | -0.017 | -0.020 | -0.012 | -0.020 | -0.007 |
| 6.5 | 0.028 | -0.000 | 0.020 | -0.020 | 0.005 | -0.026 | -0.005 | -0.024 | -0.011 | -0.019 | -0.015 | -0.015 | -0.016 | -0.010 | -0.017 | -0.007 |
| 7.0 | 0.021 | -0.000 | 0.016 | -0.014 | 0.005 | -0.020 | -0.003 | -0.019 | -0.009 | -0.016 | -0.012 | -0.013 | -0.014 | -0.009 | -0.015 | -0.006 |
| 7.5 | 0.016 | -0.000 | 0.012 | -0.010 | 0.005 | -0.015 | -0.002 | -0.016 | -0.006 | -0.014 | -0.009 | -0.011 | -0.011 | -0.008 | -0.012 | -0.005 |
| 8.0 | 0.012 | -0.000 | 0.010 | -0.008 | 0.004 | -0.012 | -0.001 | -0.013 | -0.005 | -0.011 | -0.008 | -0.009 | -0.010 | -0.007 | -0.011 | -0.005 |
| 8.5 | 0.010 | -0.000 | 0.008 | -0.006 | 0.004 | -0.010 | -0.000 | -0.010 | -0.004 | -0.010 | -0.006 | -0.008 | -0.008 | -0.006 | -0.009 | -0.004 |
| 9.0 | 0.008 | -0.000 | 0.007 | -0.005 | 0.003 | -0.008 | -0.000 | -0.009 | -0.003 | -0.008 | -0.005 | -0.007 | -0.007 | -0.005 | -0.008 | -0.004 |
| 9.5 | 0.006 | -0.000 | 0.005 | -0.004 | 0.003 | -0.006 | 0.000 | -0.007 | -0.002 | -0.007 | -0.004 | -0.006 | -0.006 | -0.005 | -0.007 | -0.003 |
| 10.0 | 0.005 | -0.000 | 0.005 | -0.003 | 0.003 | -0.005 | 0.000 | -0.006 | -0.002 | -0.006 | -0.004 | -0.005 | -0.005 | -0.004 | -0.006 | -0.003 |

TABLE 4B

FCENT= 3.0 G1= 1.517 G2= 0.759 ALPHA= 2.0 FJ= 4500.0

| | DEGREE | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | 10 | | 20 | | 30 | | 40 | | 50 | | 60 | | 70 | |
| L | BGHZ | BGHPI | BGHZ | BGHPI | BGHZ | BGHPI | BGHZ | BGHPI | BGHZ | BGHPI | BGHZ | BGHPI | BGHZ | BGHPI | BGHZ | BGHPI |
| 1.0 | -323 | -0 | -323 | 0 | -323 | 0 | -324 | 0 | -324 | 0 | -324 | -0 | -324 | -0 | -323 | -0 |
| 1.5 | -319 | -0 | -321 | 2 | -324 | 3 | -327 | 3 | -328 | 3 | -329 | -0 | -325 | -4 | -320 | -4 |
| 2.0 | -317 | -0 | -322 | 11 | -337 | 18 | -350 | 22 | -351 | 5 | -339 | -14 | -322 | -17 | -309 | -13 |
| 2.5 | -388 | -0 | -402 | 47 | -425 | 69 | -412 | 20 | -376 | -33 | -336 | -44 | -305 | -36 | -287 | -25 |
| 3.0 | -602 | -0 | -578 | 76 | -515 | 27 | -437 | -63 | -363 | -97 | -308 | -76 | -275 | -54 | -255 | -34 |
| 3.5 | -630 | -0 | -586 | 8 | -484 | -96 | -385 | -174 | -311 | -144 | -264 | -98 | -237 | -65 | -221 | -40 |
| 4.0 | -486 | -0 | -435 | -96 | -347 | -230 | -285 | -238 | -244 | -161 | -216 | -106 | -198 | -70 | -187 | -42 |
| 4.5 | -213 | -0 | -191 | -183 | -180 | -294 | -188 | -239 | -182 | -157 | -172 | -104 | -163 | -68 | -157 | -42 |
| 5.0 | 27 | -0 | 5 | -208 | -63 | -275 | -116 | -208 | -132 | -141 | -135 | -96 | -133 | -64 | -131 | -39 |
| 5.5 | 141 | -0 | 93 | -177 | -5 | -217 | -69 | -170 | -96 | -122 | -105 | -86 | -109 | -58 | -110 | -36 |
| 6.0 | 153 | -0 | 105 | -130 | 17 | -161 | -40 | -136 | -69 | -104 | -83 | -75 | -89 | -52 | -92 | -33 |
| 6.5 | 124 | -0 | 89 | -90 | 24 | -118 | -23 | -108 | -51 | -87 | -66 | -65 | -73 | -46 | -77 | -29 |
| 7.0 | 94 | -0 | 70 | -63 | 24 | -89 | -13 | -86 | -38 | -73 | -52 | -56 | -60 | -40 | -65 | -26 |
| 7.5 | 71 | -0 | 55 | -45 | 22 | -68 | -7 | -70 | -29 | -61 | -42 | -48 | -50 | -35 | -55 | -23 |
| 8.0 | 55 | -0 | 44 | -34 | 20 | -53 | -3 | -57 | -22 | -51 | -34 | -42 | -42 | -31 | -47 | -20 |
| 8.5 | 43 | -0 | 35 | -26 | 17 | -42 | -1 | -47 | -17 | -43 | -28 | -36 | -36 | -27 | -40 | -18 |
| 9.0 | 35 | -0 | 29 | -21 | 15 | -34 | -0 | -39 | -13 | -37 | -24 | -31 | -30 | -24 | -35 | -16 |
| 9.5 | 28 | -0 | 24 | -17 | 13 | -28 | 0 | -33 | -11 | -32 | -20 | -27 | -26 | -21 | -30 | -14 |
| 10.0 | 24 | -0 | 20 | -13 | 11 | -23 | 0 | -28 | -9 | -27 | -17 | -24 | -22 | -18 | -26 | -12 |

TABLE 4C

FCENT= 3.0 G1= 1.517 G2= 0.759 ALPHA= 2.0 FJ= 4500.0

| | DEGREE 0 | | 10 | | 20 | | 30 | | 40 | | 50 | | 60 | | 70 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L | BIGHZ | BIGHPI | BIGHZ | BIGHPI | BIGHZ | BIGHPI | BIGHZ | BIGHPI | BIGHZ | BIGHPI | BIGHZ | BIGHPI | BIGHZ | BIGHPI | BIGHZ | BIGHPI |
| 1.0 | 31676 | -0 | 28781 | -16416 | 20446 | -30853 | 7675 | -41568 | -7989 | -47270 | -24659 | -47270 | -40324 | -41569 | -53093 | -30854 |
| 1.5 | 9161 | -0 | 8302 | -4861 | 5829 | -9138 | 2043 | -12313 | -2600 | -14002 | -7539 | -14006 | -12177 | -12320 | -15956 | -9146 |
| 2.0 | 3682 | -0 | 3315 | -2040 | 2258 | -3838 | 649 | -5173 | -1309 | -5903 | -3381 | -5923 | -5322 | -5213 | -6906 | -3870 |
| 2.5 | 1659 | -0 | 1460 | -1003 | 903 | -1905 | 99 | -2640 | -867 | -3058 | -1893 | -3069 | -2865 | -2697 | -3664 | -1999 |
| 3.0 | 582 | -0 | 499 | -531 | 254 | -1115 | -141 | -1603 | -647 | -1848 | -1209 | -1827 | -1756 | -1594 | -2210 | -1177 |
| 3.5 | 115 | -0 | 92 | -374 | -0 | -816 | -199 | -1144 | -490 | -1246 | -832 | -1200 | -1170 | -1035 | -1452 | -760 |
| 4.0 | 13 | -0 | 19 | -352 | -22 | -712 | -160 | -888 | -364 | -900 | -596 | -845 | -823 | -719 | -1012 | -524 |
| 4.5 | 137 | -0 | 127 | -363 | 47 | -633 | -100 | -695 | -266 | -676 | -439 | -623 | -602 | -525 | -736 | -380 |
| 5.0 | 283 | -0 | 237 | -339 | 102 | -521 | -52 | -540 | -194 | -520 | -329 | -475 | -453 | -397 | -553 | -286 |
| 5.5 | 333 | -0 | 268 | -276 | 119 | -402 | -21 | -419 | -142 | -406 | -252 | -370 | -349 | -308 | -427 | -222 |
| 6.0 | 301 | -0 | 239 | -206 | 113 | -303 | -3 | -328 | -105 | -322 | -195 | -294 | -274 | -245 | -336 | -175 |
| 6.5 | 241 | -0 | 195 | -149 | 99 | -231 | 5 | -259 | -79 | -259 | -154 | -237 | -219 | -197 | -269 | -141 |
| 7.0 | 187 | -0 | 155 | -110 | 85 | -179 | 9 | -208 | -60 | -210 | -123 | -194 | -177 | -162 | -219 | -116 |
| 7.5 | 147 | -0 | 124 | -84 | 71 | -141 | 11 | -168 | -47 | -173 | -100 | -160 | -145 | -134 | -180 | -96 |
| 8.0 | 117 | -0 | 101 | -66 | 60 | -113 | 11 | -138 | -37 | -143 | -82 | -134 | -120 | -112 | -150 | -80 |
| 8.5 | 95 | -0 | 83 | -53 | 51 | -92 | 11 | -114 | -30 | -120 | -68 | -113 | -101 | -95 | -126 | -68 |
| 9.0 | 79 | -0 | 69 | -43 | 43 | -77 | 10 | -96 | -24 | -102 | -57 | -96 | -85 | -81 | -107 | -58 |
| 9.5 | 66 | -0 | 58 | -36 | 37 | -64 | 9 | -81 | -20 | -87 | -48 | -82 | -73 | -69 | -92 | -50 |
| 10.0 | 56 | -0 | 49 | -30 | 32 | -54 | 8 | -69 | -16 | -74 | -41 | -71 | -62 | -60 | -79 | -43 |

TABLE 4D

FCENT= 3.0 G1= 1.517 G2= 0.759 ALPHA= 2.0 FJ= 4500.0

| L | DEGREE 0 BIGH | 10 BIGH | 20 BIGH | 30 BIGH | 40 BIGH | 50 BIGH | 60 BIGH | 70 BIGH |
|---|---|---|---|---|---|---|---|---|
| 1.0 | 31676 | 33134 | 37013 | 42271 | 47941 | 53316 | 57914 | 61408 |
| 1.5 | 9161 | 9621 | 10839 | 12481 | 14242 | 15907 | 17323 | 18391 |
| 2.0 | 3682 | 3892 | 4453 | 5213 | 6046 | 6820 | 7450 | 7916 |
| 2.5 | 1659 | 1771 | 2108 | 2642 | 3179 | 3606 | 3935 | 4174 |
| 3.0 | 582 | 729 | 1144 | 1609 | 1958 | 2191 | 2372 | 2504 |
| 3.5 | 115 | 385 | 816 | 1161 | 1339 | 1460 | 1562 | 1639 |
| 4.0 | 13 | 353 | 712 | 902 | 970 | 1034 | 1093 | 1140 |
| 4.5 | 137 | 385 | 635 | 702 | 726 | 762 | 799 | 829 |
| 5.0 | 283 | 414 | 531 | 543 | 555 | 578 | 603 | 623 |
| 5.5 | 333 | 385 | 420 | 420 | 431 | 448 | 466 | 481 |
| 6.0 | 301 | 316 | 324 | 328 | 339 | 353 | 368 | 379 |
| 6.5 | 241 | 246 | 251 | 259 | 271 | 283 | 295 | 304 |
| 7.0 | 187 | 190 | 198 | 208 | 219 | 230 | 240 | 248 |
| 7.5 | 147 | 150 | 158 | 169 | 179 | 189 | 198 | 204 |
| 8.0 | 117 | 120 | 129 | 138 | 148 | 157 | 165 | 170 |
| 8.5 | 95 | 98 | 106 | 115 | 124 | 132 | 139 | 144 |
| 9.0 | 79 | 81 | 88 | 96 | 105 | 112 | 118 | 122 |
| 9.5 | 66 | 68 | 74 | 82 | 89 | 95 | 101 | 104 |
| 10.0 | 56 | 58 | 63 | 70 | 76 | 82 | 87 | 90 |

TABLE 5A

FCENT= 3.0 G1= 1.517 GZ= 0.759

ALPHA= 2.0 FJ= 3500.0

| L | DEGREE 0 BGHZ | 0 BGHPI | 10 BGHZ | 10 BGHPI | 20 BGHZ | 20 BGHPI | 30 BGHZ | 30 BGHPI | 40 BGHZ | 40 BGHPI | 50 BGHZ | 50 BGHPI | 60 BGHZ | 60 BGHPI | 70 BGHZ | 70 BGHPI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.0 | -251 | -0 | -251 | 0 | -251 | 0 | -252 | 0 | -252 | 0 | -252 | -0 | -252 | -0 | -251 | -0 |
| 1.5 | -248 | -0 | -249 | 2 | -252 | 2 | -254 | 2 | -255 | 2 | -256 | -0 | -253 | -3 | -249 | -3 |
| 2.0 | -246 | -0 | -251 | 8 | -262 | 14 | -272 | 17 | -273 | 4 | -264 | -11 | -250 | -13 | -240 | -10 |
| 2.5 | -302 | -0 | -313 | 36 | -330 | 53 | -320 | 15 | -292 | -26 | -261 | -34 | -237 | -28 | -223 | -19 |
| 3.0 | -468 | -0 | -450 | 59 | -400 | 21 | -340 | -49 | -282 | -75 | -239 | -59 | -214 | -42 | -199 | -27 |
| 3.5 | -490 | -0 | -455 | 6 | -377 | -75 | -300 | -135 | -242 | -112 | -205 | -76 | -184 | -51 | -172 | -31 |
| 4.0 | -378 | -0 | -338 | -74 | -270 | -179 | -222 | -185 | -190 | -125 | -168 | -82 | -154 | -54 | -146 | -33 |
| 4.5 | -166 | -0 | -149 | -142 | -140 | -229 | -146 | -186 | -141 | -122 | -133 | -81 | -127 | -53 | -122 | -32 |
| 5.0 | 21 | -0 | 3 | -161 | -49 | -213 | -90 | -161 | -103 | -110 | -105 | -75 | -104 | -50 | -102 | -30 |
| 5.5 | 109 | -0 | 72 | -138 | -3 | -168 | -53 | -132 | -74 | -95 | -82 | -67 | -84 | -45 | -85 | -28 |
| 6.0 | 119 | -0 | 81 | -101 | 13 | -125 | -31 | -105 | -54 | -80 | -64 | -59 | -69 | -40 | -71 | -25 |
| 6.5 | 97 | -0 | 69 | -70 | 18 | -92 | -18 | -84 | -39 | -67 | -51 | -51 | -57 | -36 | -60 | -23 |
| 7.0 | 73 | -0 | 54 | -49 | 19 | -69 | -10 | -67 | -29 | -56 | -41 | -44 | -47 | -31 | -50 | -20 |
| 7.5 | 55 | -0 | 43 | -35 | 17 | -53 | -5 | -54 | -22 | -47 | -33 | -37 | -39 | -27 | -43 | -18 |
| 8.0 | 42 | -0 | 34 | -26 | 15 | -41 | -3 | -44 | -17 | -40 | -27 | -32 | -33 | -24 | -36 | -16 |
| 8.5 | 33 | -0 | 27 | -20 | 13 | -33 | -1 | -36 | -13 | -34 | -22 | -28 | -28 | -21 | -31 | -14 |
| 9.0 | 27 | -0 | 22 | -16 | 11 | -26 | -0 | -30 | -10 | -29 | -18 | -24 | -24 | -18 | -27 | -12 |
| 9.5 | 22 | -0 | 19 | -13 | 10 | -22 | 0 | -25 | -8 | -24 | -15 | -21 | -20 | -16 | -23 | -11 |
| 10.0 | 18 | -0 | 16 | -10 | 9 | -18 | 0 | -21 | -7 | -21 | -13 | -18 | -17 | -14 | -20 | -9 |

TABLE 5B

FCENT= 3.0 G1= 1.517 G2= 0.759 ALPHA= 2.0 FJ= 3500.0

| L | DEGREE 0 BIGHZ | BIGHPI | 10 BIGHZ | BIGHPI | 20 BIGHZ | BIGHPI | 30 BIGHZ | BIGHPI | 40 BIGHZ | BIGHPI | 50 BIGHZ | BIGHPI | 60 BIGHZ | BIGHPI | 70 BIGHZ | BIGHPI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.0 | 31748 | -0 | 28853 | -16416 | 20518 | -30853 | 7747 | -41568 | -7917 | -47270 | -24587 | -47270 | -40252 | -41569 | -53021 | -30854 |
| 1.5 | 9232 | -0 | 8373 | -4862 | 5901 | -9138 | 2115 | -12314 | -2526 | -14003 | -7466 | -14006 | -12105 | -12320 | -15885 | -9145 |
| 2.0 | 3753 | -0 | 3387 | -2043 | 2333 | -3842 | 727 | -5178 | -1231 | -5904 | -3306 | -5919 | -5250 | -5209 | -6837 | -3867 |
| 2.5 | 1745 | -0 | 1549 | -1013 | 998 | -1920 | 191 | -2644 | -783 | -3051 | -1818 | -3060 | -2797 | -2688 | -3600 | -1994 |
| 3.0 | 716 | -0 | 627 | -548 | 368 | -1121 | -43 | -1589 | -566 | -1826 | -1141 | -1810 | -1695 | -1582 | -2153 | -1169 |
| 3.5 | 255 | -0 | 222 | -376 | 107 | -794 | -113 | -1105 | -420 | -1214 | -773 | -1178 | -1117 | -1020 | -1402 | -751 |
| 4.0 | 121 | -0 | 116 | -331 | 54 | -661 | -97 | -835 | -309 | -864 | -548 | -821 | -779 | -704 | -970 | -515 |
| 4.5 | 184 | -0 | 170 | -323 | 87 | -567 | -58 | -642 | -225 | -641 | -401 | -600 | -566 | -509 | -701 | -371 |
| 5.0 | 277 | -0 | 236 | -293 | 116 | -460 | -26 | -494 | -164 | -488 | -299 | -453 | -424 | -382 | -524 | -277 |
| 5.5 | 302 | -0 | 247 | -236 | 120 | -354 | -5 | -382 | -120 | -379 | -228 | -351 | -325 | -295 | -402 | -213 |
| 6.0 | 267 | -0 | 216 | -177 | 109 | -268 | 5 | -298 | -89 | -299 | -177 | -277 | -254 | -233 | -315 | -168 |
| 6.5 | 213 | -0 | 175 | -129 | 94 | -204 | 10 | -235 | -67 | -240 | -139 | -223 | -202 | -187 | -252 | -135 |
| 7.0 | 166 | -0 | 139 | -96 | 79 | -159 | 12 | -188 | -52 | -194 | -112 | -181 | -164 | -152 | -204 | -110 |
| 7.5 | 131 | -0 | 112 | -74 | 66 | -126 | 13 | -153 | -40 | -159 | -90 | -150 | -134 | -126 | -168 | -91 |
| 8.0 | 105 | -0 | 91 | -58 | 56 | -101 | 12 | -125 | -32 | -132 | -74 | -125 | -111 | -105 | -139 | -76 |
| 8.5 | 86 | -0 | 75 | -47 | 47 | -83 | 11 | -104 | -26 | -111 | -62 | -105 | -93 | -89 | -117 | -64 |
| 9.0 | 71 | -0 | 62 | -38 | 40 | -69 | 10 | -87 | -21 | -93 | -52 | -89 | -78 | -75 | -99 | -54 |
| 9.5 | 59 | -0 | 52 | -32 | 34 | -58 | 9 | -74 | -17 | -80 | -44 | -76 | -67 | -65 | -85 | -47 |
| 10.0 | 50 | -0 | 45 | -27 | 29 | -49 | 8 | -63 | -14 | -68 | -37 | -66 | -57 | -56 | -73 | -40 |

TABLE 5C

FCENT= 3.0 G1= 1.517 G2= 0.759 ALPHA= 2.0 FJ= 3500.0

| L | DEGREE 0 BIGH | 10 BIGH | 20 BIGH | 30 BIGH | 40 BIGH | 50 BIGH | 60 BIGH | 70 BIGH |
|---|---|---|---|---|---|---|---|---|
| 1.0 | 31748 | 33197 | 37052 | 42284 | 47929 | 53282 | 57864 | 61345 |
| 1.5 | 9232 | 9683 | 10878 | 12494 | 14229 | 15872 | 17271 | 18329 |
| 2.0 | 3753 | 3955 | 4495 | 5229 | 6031 | 6780 | 7396 | 7855 |
| 2.5 | 1745 | 1851 | 2164 | 2651 | 3150 | 3559 | 3880 | 4116 |
| 3.0 | 716 | 833 | 1180 | 1589 | 1912 | 2140 | 2319 | 2450 |
| 3.5 | 255 | 437 | 801 | 1111 | 1285 | 1409 | 1513 | 1591 |
| 4.0 | 121 | 351 | 663 | 840 | 918 | 987 | 1050 | 1098 |
| 4.5 | 184 | 365 | 574 | 645 | 679 | 721 | 761 | 793 |
| 5.0 | 277 | 376 | 475 | 495 | 515 | 543 | 571 | 593 |
| 5.5 | 302 | 342 | 374 | 382 | 398 | 419 | 439 | 456 |
| 6.0 | 267 | 279 | 289 | 298 | 312 | 329 | 345 | 358 |
| 6.5 | 213 | 218 | 225 | 235 | 249 | 263 | 276 | 286 |
| 7.0 | 166 | 170 | 178 | 189 | 201 | 213 | 224 | 232 |
| 7.5 | 131 | 134 | 142 | 153 | 164 | 175 | 184 | 191 |
| 8.0 | 105 | 108 | 116 | 126 | 136 | 145 | 153 | 159 |
| 8.5 | 86 | 88 | 96 | 105 | 114 | 122 | 129 | 134 |
| 9.0 | 71 | 73 | 80 | 88 | 96 | 103 | 109 | 113 |
| 9.5 | 59 | 62 | 67 | 74 | 81 | 88 | 93 | 97 |
| 10.0 | 50 | 52 | 57 | 64 | 70 | 75 | 80 | 84 |

TABLE 6A

FCENT= 3.0 G1= 1.517 G2= 0.759 ALPHA= 2.0 FJ= 2500.0

DEGREE

| L | 0 BGHZ | 0 BGHPI | 10 BGHZ | 10 BGHPI | 20 BGHZ | 20 BGHPI | 30 BGHZ | 30 BGHPI | 40 BGHZ | 40 BGHPI | 50 BGHZ | 50 BGHPI | 60 BGHZ | 60 BGHPI | 70 BGHZ | 70 BGHPI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.0 | -179 | -0 | -179 | 0 | -179 | 0 | -180 | 0 | -180 | 0 | -180 | -0 | -180 | -0 | -179 | -0 |
| 1.5 | -177 | -0 | -178 | 1 | -180 | 2 | -181 | 1 | -182 | 1 | -182 | -0 | -180 | -2 | -178 | -2 |
| 2.0 | -176 | -0 | -179 | 6 | -187 | 10 | -194 | 12 | -195 | 3 | -188 | -7 | -179 | -9 | -172 | -7 |
| 2.5 | -216 | -0 | -223 | 26 | -236 | 38 | -229 | 11 | -209 | -18 | -186 | -24 | -169 | -20 | -159 | -14 |
| 3.0 | -334 | -0 | -321 | 42 | -286 | 15 | -243 | -35 | -202 | -54 | -171 | -42 | -152 | -30 | -142 | -19 |
| 3.5 | -350 | -0 | -325 | 4 | -269 | -53 | -214 | -97 | -172 | -80 | -147 | -54 | -131 | -36 | -122 | -22 |
| 4.0 | -270 | -0 | -241 | -53 | -192 | -127 | -158 | -132 | -135 | -89 | -120 | -59 | -110 | -38 | -104 | -23 |
| 4.5 | -118 | -0 | -106 | -102 | -100 | -163 | -104 | -133 | -101 | -87 | -95 | -58 | -90 | -38 | -87 | -23 |
| 5.0 | 15 | -0 | 2 | -115 | -35 | -152 | -64 | -115 | -73 | -78 | -75 | -53 | -74 | -35 | -73 | -22 |
| 5.5 | 78 | -0 | 51 | -98 | -2 | -120 | -38 | -94 | -53 | -68 | -58 | -48 | -60 | -32 | -61 | -20 |
| 6.0 | 85 | -0 | 58 | -72 | 9 | -89 | -22 | -75 | -38 | -57 | -46 | -42 | -49 | -29 | -51 | -18 |
| 6.5 | 69 | -0 | 49 | -50 | 13 | -65 | -13 | -60 | -28 | -48 | -36 | -36 | -40 | -25 | -42 | -16 |
| 7.0 | 52 | -0 | 39 | -35 | 13 | -49 | -7 | -48 | -21 | -40 | -29 | -31 | -33 | -22 | -36 | -14 |
| 7.5 | 39 | -0 | 30 | -25 | 12 | -37 | -4 | -38 | -16 | -34 | -23 | -27 | -28 | -19 | -30 | -12 |
| 8.0 | 30 | -0 | 24 | -19 | 11 | -29 | -2 | -31 | -12 | -28 | -19 | -23 | -23 | -17 | -26 | -11 |
| 8.5 | 24 | -0 | 19 | -14 | 9 | -23 | -0 | -26 | -9 | -24 | -15 | -20 | -20 | -15 | -22 | -10 |
| 9.0 | 19 | -0 | 16 | -11 | 8 | -19 | -0 | -21 | -7 | -20 | -13 | -17 | -17 | -13 | -19 | -9 |
| 9.5 | 16 | -0 | 13 | -9 | 7 | -15 | 0 | -18 | -6 | -17 | -11 | -15 | -14 | -11 | -16 | -8 |
| 10.0 | 13 | -0 | 11 | -7 | 6 | -13 | 0 | -15 | -5 | -15 | -9 | -13 | -12 | -10 | -14 | -7 |

TABLE 6B

FCENT= 3.0 G1= 1.517 G2= 0.759 ALPHA= 2.0 FJ= 2500.0

| L | DEGREE 0 BIGHZ | BIGHPI | 10 BIGHZ | BIGHPI | 20 BIGHZ | BIGHPI | 30 BIGHZ | BIGHPI | 40 BIGHZ | BIGHPI | 50 BIGHZ | BIGHPI | 60 BIGHZ | BIGHPI | 70 BIGHZ | BIGHPI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.0 | 31820 | -0 | 28925 | -16416 | 20590 | -30853 | 7819 | -41568 | -7845 | -47270 | -24515 | -47270 | -40180 | -41569 | -52949 | -30854 |
| 1.5 | 9303 | -0 | 8445 | -4862 | 5973 | -9139 | 2188 | -12314 | -2453 | -14004 | -7393 | -14006 | -12032 | -12319 | -15813 | -9144 |
| 2.0 | 3823 | -0 | 3458 | -2045 | 2408 | -3846 | 805 | -5183 | -1153 | -5905 | -3230 | -5916 | -5179 | -5205 | -6768 | -3864 |
| 2.5 | 1831 | -0 | 1639 | -1024 | 1093 | -1936 | 282 | -2649 | -699 | -3043 | -1744 | -3050 | -2729 | -2680 | -3536 | -1988 |
| 3.0 | 850 | -0 | 756 | -565 | 483 | -1127 | 53 | -1575 | -486 | -1805 | -1072 | -1793 | -1634 | -1569 | -2096 | -1162 |
| 3.5 | 396 | -0 | 353 | -378 | 214 | -773 | -27 | -1066 | -351 | -1182 | -714 | -1157 | -1064 | -1006 | -1353 | -742 |
| 4.0 | 229 | -0 | 212 | -309 | 131 | -609 | -33 | -782 | -255 | -828 | -500 | -797 | -735 | -688 | -928 | -505 |
| 4.5 | 232 | -0 | 212 | -282 | 127 | -502 | -16 | -589 | -185 | -606 | -362 | -576 | -529 | -494 | -666 | -362 |
| 5.0 | 271 | -0 | 235 | -246 | 130 | -399 | -0 | -448 | -135 | -457 | -269 | -432 | -394 | -368 | -495 | -268 |
| 5.5 | 270 | -0 | 226 | -197 | 121 | -306 | 9 | -344 | -99 | -352 | -205 | -332 | -301 | -282 | -378 | -205 |
| 6.0 | 233 | -0 | 193 | -148 | 105 | -232 | 14 | -268 | -74 | -276 | -158 | -260 | -234 | -221 | -295 | -161 |
| 6.5 | 185 | -0 | 155 | -109 | 89 | -178 | 15 | -211 | -56 | -220 | -125 | -208 | -186 | -177 | -235 | -128 |
| 7.0 | 145 | -0 | 124 | -82 | 74 | -139 | 15 | -169 | -43 | -178 | -100 | -169 | -150 | -143 | -190 | -104 |
| 7.5 | 115 | -0 | 99 | -64 | 61 | -111 | 14 | -137 | -34 | -146 | -81 | -139 | -123 | -118 | -155 | -86 |
| 8.0 | 93 | -0 | 81 | -51 | 51 | -90 | 13 | -112 | -27 | -121 | -66 | -115 | -101 | -98 | -129 | -71 |
| 8.5 | 76 | -0 | 67 | -41 | 43 | -73 | 12 | -93 | -22 | -101 | -55 | -97 | -85 | -82 | -108 | -60 |
| 9.0 | 63 | -0 | 56 | -34 | 37 | -61 | 10 | -78 | -18 | -85 | -46 | -82 | -72 | -70 | -91 | -51 |
| 9.5 | 53 | -0 | 47 | -28 | 31 | -51 | 9 | -66 | -15 | -72 | -39 | -70 | -61 | -60 | -78 | -43 |
| 10.0 | 45 | -0 | 40 | -24 | 27 | -44 | 8 | -57 | -12 | -62 | -33 | -60 | -52 | -52 | -67 | -37 |

TABLE 6C

FCENT= 3.0 G1= 1.517 G2= 0.759 ALPHA= 2.0 FJ= 2500.0

| L | DEGREE 0 BIGH | 10 BIGH | 20 BIGH | 30 BIGH | 40 BIGH | 50 BIGH | 60 BIGH | 70 BIGH |
|---|---|---|---|---|---|---|---|---|
| 1.0 | 31820 | 33259 | 37092 | 42298 | 47917 | 53249 | 57814 | 61283 |
| 1.5 | 9303 | 9745 | 10918 | 12507 | 14217 | 15838 | 17220 | 18267 |
| 2.0 | 3823 | 4018 | 4538 | 5245 | 6017 | 6741 | 7343 | 7793 |
| 2.5 | 1831 | 1932 | 2223 | 2664 | 3123 | 3513 | 3826 | 4057 |
| 3.0 | 850 | 944 | 1226 | 1576 | 1869 | 2089 | 2266 | 2397 |
| 3.5 | 396 | 517 | 802 | 1067 | 1233 | 1359 | 1464 | 1543 |
| 4.0 | 229 | 376 | 623 | 782 | 866 | 941 | 1007 | 1057 |
| 4.5 | 232 | 353 | 518 | 589 | 633 | 681 | 724 | 758 |
| 5.0 | 271 | 341 | 420 | 448 | 476 | 509 | 539 | 563 |
| 5.5 | 270 | 300 | 329 | 344 | 366 | 390 | 412 | 430 |
| 6.0 | 233 | 243 | 255 | 268 | 286 | 305 | 322 | 336 |
| 6.5 | 185 | 190 | 199 | 212 | 227 | 243 | 257 | 268 |
| 7.0 | 145 | [illegible] | 157 | 170 | 183 | 196 | 208 | 217 |
| 7.5 | 115 | [illegible] | 127 | 138 | 150 | 161 | 170 | 178 |
| 8.0 | 93 | 96 | 103 | 113 | 124 | 133 | 141 | 147 |
| 8.5 | 76 | 79 | 85 | 94 | 103 | 111 | 118 | 124 |
| 9.0 | 63 | 65 | 71 | 79 | 87 | 94 | 100 | 105 |
| 9.5 | 53 | 55 | 60 | 67 | 74 | 80 | 86 | 90 |
| 10.0 | 45 | 47 | 51 | 57 | 63 | 69 | 74 | 77 |

TABLE 7A

FCENT= 3.0 G1= 1.517 G2= 0.759 ALPHA= 2.0 FJ= 1500.0

DEGREE

| L | 0 BGHZ | 0 BGHPI | 10 BGHZ | 10 BGHPI | 20 BGHZ | 20 BGHPI | 30 BGHZ | 30 BGHPI | 40 BGHZ | 40 BGHPI | 50 BGHZ | 50 BGHPI | 60 BGHZ | 60 BGHPI | 70 BGHZ | 70 BGHPI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.0 | -107 | -0 | -107 | 0 | -107 | 0 | -108 | 0 | -108 | 0 | -108 | -0 | -108 | -0 | -107 | -0 |
| 1.5 | -106 | -0 | -107 | 0 | -108 | 1 | -109 | 1 | -109 | 1 | -109 | -0 | -108 | -1 | -106 | -1 |
| 2.0 | -105 | -0 | -107 | 3 | -112 | 6 | -116 | 7 | -117 | 1 | -113 | -4 | -107 | -5 | -103 | -4 |
| 2.5 | -129 | -0 | -134 | 15 | -141 | 23 | -137 | 6 | -125 | -11 | -112 | -14 | -101 | -12 | -95 | -8 |
| 3.0 | -200 | -0 | -192 | 25 | -171 | 9 | -145 | -21 | -121 | -32 | -102 | -25 | -91 | -18 | -85 | -11 |
| 3.5 | -210 | -0 | -195 | 2 | -161 | -32 | -128 | -58 | -103 | -48 | -88 | -32 | -79 | -21 | -73 | -13 |
| 4.0 | -162 | -0 | -145 | -32 | -115 | -76 | -95 | -79 | -81 | -53 | -72 | -35 | -66 | -23 | -62 | -14 |
| 4.5 | -71 | -0 | -63 | -61 | -60 | -98 | -62 | -79 | -60 | -52 | -57 | -34 | -54 | -22 | -52 | -14 |
| 5.0 | 9 | -0 | 1 | -69 | -21 | -91 | -38 | -69 | -44 | -47 | -45 | -32 | -44 | -21 | -43 | -13 |
| 5.5 | 47 | -0 | 31 | -59 | -1 | -72 | -23 | -56 | -32 | -40 | -35 | -28 | -36 | -19 | -36 | -12 |
| 6.0 | 51 | -0 | 35 | -43 | 5 | -53 | -13 | -45 | -23 | -34 | -27 | -25 | -29 | -17 | -30 | -11 |
| 6.5 | 41 | -0 | 29 | -30 | 8 | -39 | -7 | -36 | -17 | -29 | -22 | -21 | -24 | -15 | -25 | -9 |
| 7.0 | 31 | -0 | 23 | -21 | 8 | -29 | -4 | -28 | -12 | -24 | -17 | -18 | -20 | -13 | -21 | -8 |
| 7.5 | 23 | -0 | 18 | -15 | 7 | -22 | -2 | -23 | -9 | -20 | -14 | -16 | -16 | -11 | -18 | -7 |
| 8.0 | 18 | -0 | 14 | -11 | 6 | -17 | -1 | -19 | -7 | -17 | -11 | -14 | -14 | -10 | -15 | -6 |
| 8.5 | 14 | -0 | 11 | -8 | 5 | -14 | -0 | -15 | -5 | -14 | -9 | -12 | -12 | -9 | -13 | -6 |
| 9.0 | 11 | -0 | 9 | -7 | 5 | -11 | -0 | -13 | -4 | -12 | -8 | -10 | -10 | -8 | -11 | -5 |
| 9.5 | 9 | -0 | 8 | -5 | 4 | -9 | 0 | -11 | -3 | -10 | -6 | -9 | -8 | -7 | -10 | -4 |
| 10.0 | 8 | -0 | 6 | -0 | 3 | -7 | 0 | -9 | -3 | -9 | -5 | -8 | -7 | -6 | -8 | -4 |

TABLE 71

FCENT= 3.0 G1= 1.517 G2= 0.759 ALPHA= 2.0 FJ= 1500.0

| | DEGREE 0 | | 10 | | 20 | | 30 | | 40 | | 50 | | 60 | | 70 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L | BIGHZ | BIGHPI | BIGHZ | BIGHPI | BIGHZ | BIGHPI | BIGHZ | BIGHPI | BIGHZ | BIGHPI | BIGHZ | BIGHPI | BIGHZ | BIGHPI | BIGHZ | BIGHPI |
| 1.0 | 31892 | -0 | 28997 | -16416 | 20662 | -30853 | 7891 | -41569 | -7773 | -47270 | -24443 | -47270 | -40108 | -41569 | -52878 | -30854 |
| 1.5 | 9374 | -0 | 8516 | -4863 | 6046 | -9140 | 2261 | -12315 | -2380 | -14005 | -7320 | -14006 | -11960 | -12318 | -15742 | -9143 |
| 2.0 | 3894 | -0 | 3530 | -2048 | 2483 | -3850 | 883 | -5188 | -1075 | -5907 | -3155 | -5913 | -5107 | -5201 | -6699 | -3861 |
| 2.5 | 1918 | -0 | 1728 | -1034 | 1187 | -1951 | 374 | -2653 | -616 | -3036 | -1669 | -3040 | -2661 | -2672 | -3473 | -1983 |
| 3.0 | 984 | -0 | 885 | -582 | 597 | -1133 | 150 | -1560 | -405 | -1783 | -1004 | -1776 | -1573 | -1557 | -2039 | -1154 |
| 3.5 | 536 | -0 | 483 | -380 | 322 | -751 | 57 | -1027 | -282 | -1150 | -655 | -1135 | -1012 | -991 | -1304 | -733 |
| 4.0 | 337 | -0 | 309 | -288 | 208 | -55? | 29 | -729 | -201 | -792 | -452 | -774 | -691 | -672 | -887 | -496 |
| 4.5 | 279 | -0 | 255 | -241 | 167 | -436 | 25 | -536 | -144 | -571 | -324 | -553 | -493 | -479 | -631 | -352 |
| 5.0 | 265 | -0 | 234 | -200 | 144 | -338 | 25 | -401 | -105 | -425 | -239 | -410 | -364 | -354 | -466 | -260 |
| 5.5 | 239 | -0 | 206 | -157 | 123 | -25? | 24 | -306 | -78 | -325 | -181 | -312 | -276 | -269 | -353 | -197 |
| 6.0 | 199 | -0 | 169 | -119 | 102 | -196 | 23 | -237 | -58 | -253 | -140 | -244 | -214 | -209 | -275 | -153 |
| 6.5 | 158 | -0 | 135 | -89 | 83 | -151 | 21 | -187 | -45 | -201 | -110 | -194 | -170 | -166 | -217 | -122 |
| 7.0 | 124 | -0 | 108 | -68 | 68 | -119 | 18 | -150 | -35 | -162 | -88 | -156 | -136 | -134 | -175 | -98 |
| 7.5 | 99 | -0 | 87 | -54 | 56 | -95 | 16 | -121 | -27 | -132 | -71 | -128 | -111 | -110 | -143 | -80 |
| 8.0 | 80 | -0 | 71 | -43 | 47 | -78 | 14 | -100 | -22 | -109 | -59 | -106 | -92 | -91 | -118 | -67 |
| 8.5 | 66 | -0 | 59 | -35 | 39 | -64 | 12 | -83 | -18 | -91 | -49 | -89 | -77 | -76 | -99 | -56 |
| 9.0 | 55 | -0 | 49 | -29 | 33 | -53 | 10 | -70 | -15 | -77 | -41 | -75 | -65 | -65 | -84 | -47 |
| 9.5 | 46 | -0 | 42 | -24 | 28 | -45 | 9 | -59 | -12 | -65 | -35 | -64 | -55 | -55 | -71 | -40 |
| 10.0 | 40 | -0 | 35 | -21 | 24 | -38 | 8 | -50 | -10 | -56 | -30 | -55 | -47 | -47 | -61 | -35 |

TABLE 7C

FCENT= 3.0 G1= 1.517 G2= 0.759 ALPHA= 2.0 FJ= 1500.0

| L | DEGREE 0 BIGH | 10 BIGH | 20 BIGH | 30 BIGH | 40 BIGH | 50 BIGH | 60 BIGH | 70 BIGH |
|---|---|---|---|---|---|---|---|---|
| 1.0 | 31892 | 33322 | 37133 | 42311 | 47905 | 53216 | 57763 | 61221 |
| 1.5 | 9374 | 9807 | 10959 | 12521 | 14206 | 15803 | 17169 | 18205 |
| 2.0 | 3894 | 4081 | 4582 | 5263 | 6004 | 6702 | 7290 | 7732 |
| 2.5 | 1918 | 2014 | 2284 | 2680 | 3098 | 3468 | 3772 | 3999 |
| 3.0 | 984 | 1059 | 1281 | 1568 | 1828 | 2040 | 2213 | 2343 |
| 3.5 | 536 | 614 | 818 | 1029 | 1184 | 1311 | 1416 | 1496 |
| 4.0 | 337 | 423 | 596 | 729 | 817 | 896 | 964 | 1016 |
| 4.5 | 279 | 351 | 467 | 536 | 589 | 641 | 687 | 723 |
| 5.0 | 265 | 308 | 368 | 402 | 438 | 475 | 508 | 533 |
| 5.5 | 239 | 259 | 285 | 307 | 334 | 361 | 386 | 405 |
| 6.0 | 199 | 207 | 221 | 238 | 260 | 281 | 300 | 315 |
| 6.5 | 158 | 162 | 173 | 188 | 206 | 223 | 238 | 249 |
| 7.0 | 124 | 128 | 138 | 151 | 165 | 179 | 192 | 201 |
| 7.5 | 99 | 102 | 111 | 123 | 135 | 147 | 157 | 164 |
| 8.0 | 80 | 83 | 91 | 101 | 111 | 121 | 130 | 136 |
| 8.5 | 66 | 69 | 75 | 84 | 93 | 101 | 108 | 114 |
| 9.0 | 55 | 57 | 63 | 70 | 78 | 85 | 92 | 96 |
| 9.5 | 46 | 48 | 53 | 60 | 67 | 73 | 78 | 82 |
| 10.0 | 40 | 41 | 45 | 51 | 57 | 62 | 67 | 70 |

TABLE 8A

FCENT= 2.0 G1= 1.517 G2= 0.759 ALPHA= 2.0 FJ= 1.0

| L | DEGREE 0 HZ | 0 HPI | 10 HZ | 10 HPI | 20 HZ | 20 HPI | 30 HZ | 30 HPI | 40 HZ | 40 HPI | 50 HZ | 50 HPI | 60 HZ | 60 HPI | 70 HZ | 70 HPI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.0 | -0.037 | -0.000 | -0.037 | 0.000 | -0.037 | 0.000 | -0.038 | 0.000 | -0.038 | 0.000 | -0.038 | -0.000 | -0.037 | -0.000 | -0.037 | -0.000 |
| 1.5 | -0.039 | -0.000 | -0.040 | 0.002 | -0.041 | 0.002 | -0.041 | 0.001 | -0.040 | -0.001 | -0.038 | -0.002 | -0.036 | -0.002 | -0.035 | -0.002 |
| 2.0 | -0.051 | -0.000 | -0.051 | 0.004 | -0.049 | 0.002 | -0.045 | -0.003 | -0.041 | -0.006 | -0.036 | -0.006 | -0.033 | -0.005 | -0.031 | -0.003 |
| 2.5 | -0.057 | -0.000 | -0.055 | 0.001 | -0.050 | -0.006 | -0.043 | -0.013 | -0.036 | -0.013 | -0.031 | -0.010 | -0.028 | -0.007 | -0.027 | -0.004 |
| 3.0 | -0.049 | -0.000 | -0.046 | -0.007 | -0.040 | -0.018 | -0.033 | -0.022 | -0.029 | -0.016 | -0.025 | -0.011 | -0.023 | -0.007 | -0.022 | -0.005 |
| 3.5 | -0.027 | -0.000 | -0.025 | -0.015 | -0.023 | -0.026 | -0.022 | -0.024 | -0.020 | -0.016 | -0.019 | -0.011 | -0.018 | -0.007 | -0.017 | -0.005 |
| 4.0 | -0.003 | -0.000 | -0.004 | -0.019 | -0.009 | -0.026 | -0.013 | -0.021 | -0.014 | -0.015 | -0.014 | -0.010 | -0.014 | -0.007 | -0.014 | -0.004 |
| 4.5 | 0.010 | -0.000 | 0.007 | -0.016 | -0.001 | -0.021 | -0.007 | -0.017 | -0.010 | -0.012 | -0.011 | -0.009 | -0.011 | -0.006 | -0.011 | -0.004 |
| 5.0 | 0.013 | -0.000 | 0.009 | -0.012 | 0.002 | -0.015 | -0.004 | -0.013 | -0.007 | -0.010 | -0.008 | -0.007 | -0.009 | -0.005 | -0.009 | -0.003 |
| 5.5 | 0.011 | -0.000 | 0.008 | -0.008 | 0.002 | -0.011 | -0.002 | -0.010 | -0.005 | -0.008 | -0.006 | -0.006 | -0.007 | -0.004 | -0.007 | -0.003 |
| 6.0 | 0.008 | -0.000 | 0.006 | -0.005 | 0.002 | -0.008 | -0.001 | -0.008 | -0.003 | -0.007 | -0.005 | -0.005 | -0.005 | -0.004 | -0.006 | -0.002 |
| 6.5 | 0.006 | -0.000 | 0.005 | -0.004 | 0.002 | -0.006 | -0.000 | -0.006 | -0.002 | -0.005 | -0.004 | -0.004 | -0.004 | -0.003 | -0.005 | -0.002 |
| 7.0 | 0.004 | -0.000 | 0.004 | -0.003 | 0.002 | -0.004 | -0.000 | -0.005 | -0.002 | -0.004 | -0.003 | -0.004 | -0.004 | -0.003 | -0.004 | -0.002 |
| 7.5 | 0.003 | -0.000 | 0.003 | -0.002 | 0.001 | -0.003 | -0.000 | -0.004 | -0.001 | -0.004 | -0.002 | -0.003 | -0.003 | -0.002 | -0.003 | -0.002 |
| 8.0 | 0.003 | -0.000 | 0.002 | -0.002 | 0.001 | -0.003 | 0.000 | -0.003 | -0.001 | -0.003 | -0.002 | -0.003 | -0.002 | -0.002 | -0.003 | -0.001 |
| 8.5 | 0.002 | -0.000 | 0.002 | -0.001 | 0.001 | -0.002 | 0.000 | -0.003 | -0.001 | -0.003 | -0.002 | -0.002 | -0.002 | -0.002 | -0.002 | -0.001 |
| 9.0 | 0.002 | -0.000 | 0.002 | -0.001 | 0.001 | -0.002 | 0.000 | -0.002 | -0.001 | -0.002 | -0.001 | -0.002 | -0.002 | -0.002 | -0.002 | -0.001 |
| 9.5 | 0.001 | -0.000 | 0.001 | -0.001 | 0.001 | -0.001 | 0.000 | -0.002 | -0.001 | -0.002 | -0.001 | -0.002 | -0.002 | -0.001 | -0.002 | -0.001 |
| 10.0 | 0.001 | -0.000 | 0.001 | -0.001 | 0.001 | -0.001 | 0.000 | -0.002 | -0.000 | -0.002 | -0.001 | -0.001 | -0.001 | -0.001 | -0.002 | -0.001 |

TABLE 8B

FCENT= 2.0 G1= 1.517 G2= 0.759 ALPHA= 2.0 FJ= 10000.0

DEGREE

| L | 0 BGHZ | 0 BGHPI | 10 BGHZ | 10 BGHPI | 20 BGHZ | 20 BGHPI | 30 BGHZ | 30 BGHPI | 40 BGHZ | 40 BGHPI | 50 BGHZ | 50 BGHPI | 60 BGHZ | 60 BGHPI | 70 BGHZ | 70 BGHPI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.0 | -370 | -0 | -371 | 1 | -374 | 2 | -376 | 2 | -377 | 0 | -376 | -2 | -372 | -4 | -368 | -4 |
| 1.5 | -391 | -0 | -397 | 20 | -407 | 24 | -410 | 12 | -400 | -9 | -383 | -21 | -364 | -21 | -350 | -16 |
| 2.0 | -513 | -0 | -507 | 42 | -486 | 18 | -451 | -31 | -407 | -63 | -364 | -61 | -332 | -47 | -313 | -31 |
| 2.5 | -568 | -0 | -548 | 10 | -498 | -62 | -429 | -127 | -364 | -129 | -314 | -95 | -283 | -66 | -265 | -42 |
| 3.0 | -491 | -0 | -459 | -65 | -395 | -181 | -334 | -216 | -285 | -164 | -251 | -111 | -230 | -74 | -217 | -46 |
| 3.5 | -265 | -0 | -246 | -152 | -226 | -264 | -218 | -239 | -204 | -164 | -191 | -111 | -181 | -74 | -174 | -45 |
| 4.0 | -27 | -0 | -40 | -186 | -87 | -262 | 127 | -211 | -140 | -146 | -142 | -101 | -141 | -68 | -139 | -42 |
| 4.5 | 104 | -0 | 67 | -162 | -12 | -209 | -69 | -168 | -95 | -123 | -106 | -87 | -110 | -60 | -111 | -37 |
| 5.0 | 129 | -0 | 91 | -117 | 15 | -150 | -37 | -129 | -65 | -100 | -79 | -74 | -86 | -52 | -89 | -33 |
| 5.5 | 107 | -0 | 78 | -78 | 23 | -105 | -19 | -98 | -45 | -80 | -60 | -62 | -68 | -44 | -72 | -28 |
| 6.0 | 79 | -0 | 60 | -52 | 22 | -75 | -9 | -75 | -32 | -65 | -46 | -51 | -54 | -37 | -59 | -24 |
| 6.5 | 58 | -0 | 45 | -36 | 20 | -56 | -4 | -59 | -23 | -53 | -36 | -43 | -44 | -32 | -48 | -21 |
| 7.0 | 43 | -0 | 35 | -26 | 17 | -42 | -1 | -46 | -17 | -43 | -28 | -36 | -35 | -27 | -40 | -18 |
| 7.5 | 33 | -0 | 28 | -20 | 14 | -33 | -0 | -37 | -13 | -35 | -22 | -30 | -29 | -23 | -33 | -15 |
| 8.0 | 26 | -0 | 22 | -15 | 12 | -26 | 0 | -30 | -10 | -29 | -18 | -25 | -24 | -20 | -28 | -13 |
| 8.5 | 21 | -0 | 18 | -12 | 10 | -21 | 0 | -25 | -8 | -25 | -15 | -22 | -20 | -17 | -24 | -11 |
| 9.0 | 17 | -0 | 15 | -10 | 9 | -17 | 1 | -21 | -6 | -21 | -12 | -18 | -17 | -15 | -20 | -10 |
| 9.5 | 14 | -0 | 12 | -8 | 7 | -14 | 1 | -17 | -5 | -18 | -10 | -16 | -15 | -13 | -18 | -9 |
| 10.0 | 12 | -0 | 10 | -6 | 6 | -12 | 1 | -15 | -4 | -15 | -9 | -14 | -12 | -11 | -15 | -7 |

TABLE 8C

FCENT= 2.0 G1= 1.517 G2= 0.759 ALPHA= 2.0 FJ= 10000.0

DEGREE

| L | 0 BIGHZ | BIGHPI | 10 BIGHZ | BIGHPI | 20 BIGHZ | BIGHPI | 30 BIGHZ | BIGHPI | 40 BIGHZ | BIGHPI | 50 BIGHZ | BIGHPI | 60 BIGHZ | BIGHPI | 70 BIGHZ | BIGHPI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.0 | 31629 | -0 | 28733 | -16415 | 20395 | -30851 | 7623 | -41566 | -8042 | -47269 | -24711 | -47273 | -40372 | -41573 | -53138 | -30858 |
| 1.5 | 9089 | -0 | 8226 | -4844 | 5746 | -9117 | 1960 | -12304 | -2671 | -14015 | -7593 | -14028 | -12215 | -12338 | -15985 | -9158 |
| 2.0 | 3486 | -0 | 3130 | -2009 | 2109 | -3838 | 548 | -5227 | -1365 | -5971 | -3406 | -5970 | -5332 | -5243 | -6909 | -3888 |
| 2.5 | 1479 | -0 | 1314 | -1039 | 830 | -2037 | 82 | -2787 | -854 | -3154 | -1871 | -3121 | -2843 | -2727 | -3642 | -2016 |
| 3.0 | 694 | -0 | 618 | -673 | 374 | -1324 | -38 | -1756 | -568 | -1915 | -1152 | -1862 | -1711 | -1614 | -2171 | -1188 |
| 3.5 | 480 | -0 | 431 | -535 | 258 | -984 | -31 | -1209 | -383 | -1267 | -758 | -1213 | -1114 | -1043 | -1405 | -765 |
| 4.0 | 472 | -0 | 413 | -442 | 237 | -744 | -2 | -861 | -260 | -885 | -523 | -839 | -766 | -717 | -964 | -524 |
| 4.5 | 455 | -0 | 387 | -342 | 215 | -547 | 17 | -624 | -179 | -641 | -373 | -606 | -549 | -516 | -690 | -376 |
| 5.0 | 385 | -0 | 323 | -249 | 182 | -397 | 26 | -461 | -126 | -478 | -274 | -452 | -406 | -384 | -511 | -279 |
| 5.5 | 299 | -0 | 253 | -177 | 147 | -291 | 28 | -348 | -91 | -365 | -206 | -346 | -308 | -294 | -389 | -214 |
| 6.0 | 227 | -0 | 195 | -128 | 118 | -218 | 27 | -268 | -67 | -284 | -158 | -270 | -239 | -230 | -303 | -167 |
| 6.5 | 174 | -0 | 151 | -96 | 95 | -168 | 24 | -210 | -51 | -225 | -124 | -215 | -189 | -183 | -240 | -133 |
| 7.0 | 136 | -0 | 120 | -74 | 77 | -132 | 21 | -167 | -39 | -181 | -99 | -173 | -152 | -148 | -194 | -108 |
| 7.5 | 109 | -0 | 97 | -59 | 63 | -106 | 18 | -136 | -31 | -147 | -80 | -142 | -124 | -122 | -159 | -88 |
| 8.0 | 89 | -0 | 79 | -47 | 53 | -86 | 16 | -111 | -25 | -122 | -66 | -118 | -102 | -101 | -131 | -73 |
| 8.5 | 73 | -0 | 65 | -39 | 44 | -71 | 14 | -92 | -20 | -101 | -54 | -98 | -85 | -85 | -110 | -62 |
| 9.0 | 61 | -0 | 55 | -32 | 37 | -59 | 12 | -78 | -16 | -86 | -46 | -83 | -72 | -72 | -93 | -52 |
| 9.5 | 52 | -0 | 46 | -27 | 31 | -50 | 10 | -66 | -14 | -73 | -39 | -71 | -61 | -61 | -79 | -45 |
| 10.0 | 44 | -0 | 39 | -23 | 27 | -43 | 9 | -56 | -11 | -62 | -33 | -61 | -52 | -53 | -68 | -38 |

TABLE AD

FCENT= 2.0 G1= 1.517 G2= 0.759 ALPHA= 2.0 FJ= 10000.0

| L | DEGREE 0 BIGH | 10 BIGH | 20 BIGH | 30 BIGH | 40 BIGH | 50 BIGH | 60 BIGH | 70 BIGH |
|---|---|---|---|---|---|---|---|---|
| 1.0 | 31629 | 33091 | 36983 | 42260 | 47949 | 53342 | 57950 | 61448 |
| 1.5 | 9089 | 9546 | 10776 | 12459 | 14267 | 15951 | 17362 | 18423 |
| 2.0 | 3486 | 3720 | 4380 | 5256 | 6126 | 6873 | 7478 | 7928 |
| 2.5 | 1479 | 1675 | 2200 | 2788 | 3268 | 3639 | 3939 | 4163 |
| 3.0 | 694 | 914 | 1376 | 1756 | 1997 | 2190 | 2352 | 2475 |
| 3.5 | 480 | 687 | 1017 | 1209 | 1323 | 1431 | 1526 | 1600 |
| 4.0 | 472 | 605 | 781 | 861 | 922 | 989 | 1050 | 1097 |
| 4.5 | 455 | 517 | 588 | 624 | 666 | 712 | 753 | 786 |
| 5.0 | 385 | 408 | 436 | 462 | 494 | 529 | 559 | 583 |
| 5.5 | 299 | 309 | 326 | 349 | 376 | 403 | 426 | 444 |
| 6.0 | 227 | 233 | 249 | 269 | 292 | 313 | 332 | 346 |
| 6.5 | 174 | 180 | 193 | 211 | 230 | 248 | 263 | 275 |
| 7.0 | 136 | 141 | 153 | 169 | 185 | 200 | 213 | 222 |
| 7.5 | 109 | 113 | 124 | 137 | 151 | 163 | 174 | 182 |
| 8.0 | 89 | 92 | 101 | 112 | 124 | 135 | 144 | 151 |
| 8.5 | 73 | 76 | 84 | 93 | 104 | 113 | 120 | 126 |
| 9.0 | 61 | 64 | 70 | 79 | 87 | 95 | 102 | 107 |
| 9.5 | 52 | 54 | 59 | 67 | 74 | 81 | 87 | 91 |
| 10.0 | 44 | 46 | 51 | 57 | 63 | 69 | 74 | 78 |

TABLE 9A

FCENT= 2.0 G1= 1.917 G2= 0.759 ALPHA= 2.0 FJ= 5000.0

DEGREE

| | 0 | | 10 | | 20 | | 30 | | 40 | | 50 | | 60 | | 70 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L | BGMZ | BGMPI | BGMZ | BGMPI | BGMZ | BGMPI | BGMZ | BGMPI | BGMZ | BGMPI | BGMZ | BGMPI | BGMZ | BGMPI | BGMZ | BGMPI |
| 1.0 | -185 | -0 | -185 | 0 | -187 | 1 | -188 | 1 | -188 | 0 | -188 | -1 | -186 | -2 | -184 | -2 |
| 1.5 | -195 | -0 | -198 | 10 | -203 | 12 | -205 | 6 | -200 | -4 | -191 | -10 | -182 | -10 | -175 | -8 |
| 2.0 | -256 | -0 | -253 | 21 | -243 | 9 | -225 | -15 | -203 | -31 | -182 | -30 | -166 | -23 | -156 | -15 |
| 2.5 | -284 | -0 | -274 | 5 | -249 | -31 | -214 | -63 | -182 | -64 | -157 | -47 | -141 | -33 | -132 | -21 |
| 3.0 | -245 | -0 | -229 | -32 | -197 | -90 | -167 | -108 | -142 | -82 | -125 | -55 | -115 | -37 | -108 | -23 |
| 3.5 | -132 | -0 | -123 | -76 | -113 | -132 | -109 | -119 | -102 | -82 | -95 | -55 | -90 | -37 | -87 | -22 |
| 4.0 | -13 | -0 | -20 | -93 | -43 | -131 | -63 | -105 | -70 | -73 | -71 | -50 | -70 | -34 | -69 | -21 |
| 4.5 | 52 | -0 | 33 | -81 | -6 | -104 | -34 | -84 | -47 | -61 | -53 | -43 | -55 | -30 | -55 | -18 |
| 5.0 | 64 | -0 | 45 | -58 | 7 | -75 | -18 | -64 | -32 | -50 | -39 | -37 | -43 | -26 | -44 | -16 |
| 5.5 | 53 | -0 | 39 | -39 | 11 | -52 | -9 | -49 | -22 | -40 | -30 | -31 | -34 | -22 | -36 | -14 |
| 6.0 | 39 | -0 | 30 | -26 | 11 | -37 | -4 | -37 | -16 | -32 | -23 | -25 | -27 | -18 | -29 | -12 |
| 6.5 | 29 | -0 | 22 | -18 | 10 | -28 | -2 | -29 | -11 | -26 | -18 | -21 | -22 | -16 | -24 | -10 |
| 7.0 | 21 | -0 | 17 | -13 | 8 | -21 | -0 | -23 | -8 | -21 | -14 | -18 | -17 | -13 | -20 | -9 |
| 7.5 | 16 | -0 | 14 | -10 | 7 | -16 | -0 | -18 | -6 | -17 | -11 | -15 | -14 | -11 | -16 | -7 |
| 8.0 | 13 | -0 | 11 | -7 | 6 | -13 | 0 | -15 | -5 | -14 | -9 | -12 | -12 | -10 | -14 | -6 |
| 8.5 | 10 | -0 | 9 | -6 | 5 | -10 | 0 | -12 | -4 | -12 | -7 | -11 | -10 | -8 | -12 | -5 |
| 9.0 | 8 | -0 | 7 | -5 | 4 | -8 | 0 | -10 | -3 | -10 | -6 | -9 | -8 | -7 | -10 | -5 |
| 9.5 | 7 | -0 | 6 | -4 | 3 | -7 | 0 | -8 | -2 | -9 | -5 | -8 | -7 | -6 | -9 | -4 |
| 10.0 | 6 | -0 | 5 | -3 | 3 | -6 | 0 | -7 | -2 | -7 | -4 | -7 | -6 | -5 | -7 | -3 |

TABLE 98

FCENT= 2.0 G1= 1.517 G2= 0.759 ALPHA= 2.0 FJ= 5000.0

DEGREE

| L | 0 BIGHZ | BIGHPI | 10 BIGHZ | BIGHPI | 20 BIGHZ | BIGHPI | 30 BIGHZ | BIGHPI | 40 BIGHZ | BIGHPI | 50 BIGHZ | BIGHPI | 60 BIGHZ | BIGHPI | 70 BIGHZ | BIGHPI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.0 | 31814 | -0 | 28919 | -16416 | 20583 | -30852 | 7811 | -41568 | -7853 | -47270 | -24523 | -47271 | -40186 | -41571 | -52954 | -30855 |
| 1.5 | 5285 | -0 | 8424 | -4854 | 5950 | -9129 | 2165 | -12310 | -2471 | -14010 | -7401 | -14017 | -12033 | -12327 | -15810 | -9150 |
| 2.0 | 3743 | -0 | 3384 | -2031 | 2353 | -3847 | 774 | -5211 | -1161 | -5940 | -3224 | -5939 | -5166 | -5219 | -6752 | -3872 |
| 2.5 | 1763 | -0 | 1588 | -1045 | 1079 | -2005 | 297 | -2724 | -672 | -3090 | -1714 | -3073 | -2701 | -2693 | -3509 | -1995 |
| 3.0 | 939 | -0 | 848 | -640 | 571 | -1233 | 129 | -1647 | -426 | -1832 | -1026 | -1806 | -1596 | -1576 | -2063 | -1165 |
| 3.5 | 613 | -0 | 555 | -459 | 371 | -851 | 77 | -1089 | -281 | -1184 | -663 | -1158 | -1023 | -1006 | -1318 | -742 |
| 4.0 | 486 | -0 | 434 | -349 | 280 | -613 | 61 | -755 | -190 | -811 | -451 | -789 | -695 | -683 | -894 | -503 |
| 4.5 | 403 | -0 | 353 | -261 | 221 | -443 | 52 | -540 | -131 | -580 | -320 | -562 | -494 | -486 | -634 | -357 |
| 5.0 | 320 | -0 | 278 | -190 | 174 | -321 | 45 | -397 | -93 | -428 | -234 | -415 | -363 | -358 | -467 | -263 |
| 5.5 | 246 | -0 | 214 | -138 | 136 | -236 | 38 | -299 | -68 | -324 | -176 | -315 | -274 | -272 | -353 | -199 |
| 6.0 | 187 | -0 | 164 | -102 | 107 | -180 | 32 | -230 | -51 | -251 | -135 | -244 | -212 | -211 | -273 | -155 |
| 6.5 | 145 | -0 | 128 | -78 | 85 | -140 | 26 | -180 | -39 | -198 | -106 | -193 | -167 | -167 | -216 | -122 |
| 7.0 | 115 | -0 | 102 | -61 | 69 | -111 | 22 | -144 | -31 | -159 | -85 | -155 | -134 | -134 | -174 | -99 |
| 7.5 | 92 | -0 | 83 | -48 | 56 | -89 | 18 | -117 | -24 | -129 | -69 | -127 | -109 | -110 | -142 | -81 |
| 8.0 | 75 | -0 | 68 | -39 | 46 | -73 | 15 | -96 | -20 | -107 | -56 | -105 | -90 | -91 | -117 | -67 |
| 8.5 | 62 | -0 | 56 | -32 | 39 | -60 | 13 | -80 | -16 | -89 | -47 | -87 | -75 | -76 | -98 | -56 |
| 9.0 | 52 | -0 | 47 | -27 | 33 | -51 | 11 | -67 | -13 | -75 | -39 | -74 | -63 | -64 | -82 | -47 |
| 9.5 | 44 | -0 | 40 | -23 | 28 | -43 | 9 | -57 | -11 | -64 | -33 | -63 | -54 | -55 | -70 | -40 |
| 10.0 | 38 | -0 | 34 | -19 | 24 | -36 | 8 | -49 | -9 | -55 | -28 | -54 | -46 | -47 | -60 | -34 |

TABLE 9C

FCENT= 2.0 G1= 1.517 G2= 0.759 ALPHA= 2.0 FJ= 5000.0

| L | DEGREE 0 BIGH | 10 BIGH | 20 BIGH | 30 BIGH | 40 BIGH | 50 BIGH | 60 BIGH | 70 BIGH |
|---|---|---|---|---|---|---|---|---|
| 1.0 | 31814 | 33253 | 37088 | 42295 | 47918 | 53254 | 57819 | 61288 |
| 1.5 | 9285 | 9723 | 10897 | 12499 | 14226 | 15851 | 17227 | 18267 |
| 2.0 | 3743 | 3947 | 4510 | 5269 | 6052 | 6758 | 7344 | 7784 |
| 2.5 | 1763 | 1901 | 2278 | 2740 | 3162 | 3519 | 3815 | 4037 |
| 3.0 | 939 | 1063 | 1359 | 1652 | 1881 | 2078 | 2244 | 2369 |
| 3.5 | 613 | 720 | 929 | 1092 | 1217 | 1334 | 1435 | 1512 |
| 4.0 | 486 | 557 | 674 | 757 | 833 | 909 | 975 | 1026 |
| 4.5 | 403 | 439 | 495 | 542 | 595 | 647 | 693 | 728 |
| 5.0 | 320 | 337 | 366 | 399 | 438 | 476 | 510 | 536 |
| 5.5 | 246 | 254 | 274 | 301 | 331 | 361 | 386 | 406 |
| 6.0 | 187 | 194 | 210 | 232 | 256 | 279 | 299 | 314 |
| 6.5 | 145 | 150 | 164 | 182 | 202 | 221 | 236 | 249 |
| 7.0 | 115 | 119 | 131 | 146 | 162 | 177 | 190 | 200 |
| 7.5 | 92 | 96 | 106 | 118 | 132 | 144 | 155 | 163 |
| 8.0 | 75 | 78 | 87 | 97 | 109 | 119 | 128 | 135 |
| 8.5 | 62 | 65 | 72 | 81 | 90 | 99 | 107 | 113 |
| 9.0 | 52 | 54 | 60 | 68 | 76 | 84 | 90 | 95 |
| 9.5 | 44 | 46 | 51 | 58 | 65 | 71 | 77 | 81 |
| 10.0 | 38 | 39 | 44 | 49 | 55 | 61 | 66 | 69 |

TABLE 10A

FCENT= 2.0 G1= 1.517 G2= 0.759 ALPHA= 2.0 FJ= 2000.0

| | DEGREE | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | 10 | | 20 | | 30 | | 40 | | 50 | | 60 | | 70 | |
| L | BGHZ | BGHPI | BGHZ | BGHPI | BGHZ | BGHPI | BGHZ | BGHPI | BGHZ | BGHPI | BGHZ | BGHPI | BGHZ | BGHPI | BGHZ | BGHPI |
| 1.0 | -74 | -0 | -74 | 0 | -74 | 0 | -75 | 0 | -75 | 0 | -75 | -0 | -74 | -0 | -73 | -0 |
| 1.5 | -78 | -0 | -79 | 4 | -81 | 4 | -92 | 2 | -80 | -1 | -76 | -4 | -72 | -4 | -70 | -3 |
| 2.0 | -102 | -0 | -101 | 8 | -97 | 3 | -90 | -6 | -81 | -12 | -72 | -12 | -66 | -9 | -62 | -6 |
| 2.5 | -113 | -0 | -109 | 2 | -99 | -12 | -85 | -25 | -72 | -25 | -62 | -19 | -56 | -13 | -53 | -8 |
| 3.0 | -98 | -0 | -91 | -13 | -79 | -36 | 56 | -43 | -57 | -32 | -50 | -22 | -46 | -14 | -43 | -9 |
| 3.5 | -53 | -0 | -49 | -30 | -45 | -52 | -43 | -47 | -40 | -32 | -38 | -22 | -36 | -14 | -34 | -9 |
| 4.0 | -5 | -0 | -8 | -37 | -17 | -52 | 25 | -42 | -28 | -29 | -28 | -20 | -28 | -13 | -27 | -8 |
| 4.5 | 20 | -0 | 13 | -32 | -2 | -41 | 13 | -33 | -19 | -24 | -21 | -17 | -22 | -12 | -22 | -7 |
| 5.0 | 25 | -0 | 18 | -23 | 3 | -30 | -7 | -25 | -13 | -20 | -15 | -14 | -17 | -10 | -17 | -6 |
| 5.5 | 21 | -0 | 15 | -15 | 4 | -21 | -3 | -19 | -9 | -16 | -12 | -12 | -13 | -8 | -14 | -5 |
| 6.0 | 15 | -0 | 12 | -10 | 4 | -15 | -1 | -15 | -6 | -13 | -9 | -10 | -10 | -7 | -11 | -4 |
| 6.5 | 11 | -0 | 9 | -7 | 4 | -11 | -0 | -11 | -4 | -10 | -7 | -8 | -8 | -6 | -9 | -4 |
| 7.0 | 8 | -0 | 7 | -5 | 3 | -8 | -0 | -9 | -3 | -8 | -5 | -7 | -7 | -5 | -8 | -3 |
| 7.5 | 6 | -0 | 5 | -4 | 2 | -6 | -0 | -7 | -2 | -7 | -4 | -6 | -5 | -4 | -6 | -3 |
| 8.0 | 5 | -0 | 4 | -3 | 2 | -5 | 0 | -6 | -2 | -5 | -3 | -5 | -4 | -4 | -5 | -2 |
| 8.5 | 4 | -0 | 3 | -2 | 2 | -4 | 0 | -5 | -1 | -5 | -3 | -4 | -4 | -3 | -4 | -2 |
| 9.0 | 3 | -0 | 3 | -2 | 1 | -3 | 0 | -4 | -1 | -4 | -2 | -3 | -3 | -3 | -4 | -2 |
| 9.5 | 2 | -0 | 2 | -1 | 1 | -2 | 0 | -3 | -1 | -3 | -2 | -3 | -3 | -2 | -3 | -1 |
| 10.0 | 2 | -0 | 2 | -1 | 1 | -2 | 0 | -3 | -0 | -3 | -1 | -2 | -2 | -2 | -3 | -1 |

TABLE 10B

FCENT= 2.0 G1= 1.517 G2= 0.759 ALPHA= 2.0 FJ= 2000.0

| | DEGREE | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | 10 | | 20 | | 30 | | 40 | | 50 | | 60 | | 70 | |
| L | BIGHZ | BIGHPI | BIGHZ | BIGHPI | BIGHZ | BIGHPI | BIGHZ | BIGHPI | BIGHZ | BIGHPI | BIGHZ | BIGHPI | BIGHZ | BIGHPI | BIGHZ | BIGHPI |
| 1.0 | 31925 | -0 | 29030 | -16416 | 20695 | -30853 | 7924 | -41568 | -7740 | -47270 | -24410 | -47271 | -40074 | -41570 | -52843 | -30854 |
| 1.5 | 9403 | -0 | 8544 | -4860 | 6072 | -9136 | 2288 | -12314 | -2351 | -14007 | -7287 | -14010 | -11924 | -12321 | -15705 | -9145 |
| 2.0 | 3897 | -0 | 3536 | -2043 | 2498 | -3853 | 909 | -5202 | -1039 | -5921 | -3114 | -5921 | -5066 | -5205 | -6658 | -3863 |
| 2.5 | 1934 | -0 | 1753 | -1048 | 1229 | -1987 | 426 | -2685 | -563 | -3051 | -1620 | -3044 | -2616 | -2673 | -3430 | -1983 |
| 3.0 | 1086 | -0 | 986 | -621 | 690 | -1179 | 229 | -1582 | -340 | -1783 | -951 | -1773 | -1527 | -1554 | -1997 | -1151 |
| 3.5 | 693 | -0 | 629 | -413 | 439 | -772 | 142 | -1017 | -219 | -1135 | -605 | -1124 | -969 | -984 | -1265 | -728 |
| 4.0 | 494 | -0 | 446 | -293 | 307 | -534 | 99 | -691 | -147 | -767 | -408 | -758 | -653 | -663 | -852 | -490 |
| 4.5 | 372 | -0 | 332 | -212 | 225 | -380 | 73 | -489 | -103 | -543 | -288 | -536 | -461 | -468 | -601 | -346 |
| 5.0 | 281 | -0 | 251 | -154 | 169 | -276 | 56 | -358 | -74 | -398 | -210 | -393 | -337 | -342 | -440 | -253 |
| 5.5 | 213 | -0 | 190 | -114 | 129 | -206 | 44 | -269 | -55 | -300 | -158 | -296 | -254 | -258 | -331 | -191 |
| 6.0 | 164 | -0 | 146 | -86 | 100 | -158 | 35 | -207 | -41 | -231 | -121 | -229 | -196 | -200 | -256 | -147 |
| 6.5 | 128 | -0 | 115 | -67 | 79 | -123 | 28 | -163 | -32 | -182 | -95 | -180 | -154 | -157 | -201 | -116 |
| 7.0 | 102 | -0 | 91 | -53 | 64 | -98 | 22 | -130 | -25 | -146 | -76 | -145 | -123 | -126 | -161 | -93 |
| 7.5 | 82 | -0 | 74 | -42 | 52 | -79 | 18 | -106 | -20 | -119 | -62 | -118 | -100 | -103 | -131 | -76 |
| 8.0 | 67 | -0 | 61 | -35 | 43 | -65 | 15 | -87 | -17 | -98 | -51 | -97 | -83 | -85 | -108 | -62 |
| 8.5 | 56 | -0 | 51 | -29 | 35 | -54 | 13 | -72 | -14 | -81 | -42 | -81 | -69 | -71 | -90 | -52 |
| 9.0 | 47 | -0 | 42 | -24 | 30 | -45 | 11 | -61 | -11 | -69 | -35 | -68 | -58 | -60 | -76 | -44 |
| 9.5 | 40 | -0 | 36 | -20 | 25 | -38 | 9 | -52 | -9 | -58 | -30 | -58 | -49 | -51 | -65 | -37 |
| 10.0 | 34 | -0 | 31 | -17 | 22 | -33 | 8 | -44 | -8 | -50 | -26 | -50 | -42 | -43 | -55 | -32 |

TABLE 10C

FCENT= 2.0 G1= 1.517 G2= 0.759 ALPHA= 2.0 FJ= 2000.0

| L | DEGREE 0 BIGH | 10 BIGH | 20 BIGH | 30 BIGH | 40 BIGH | 50 BIGH | 60 BIGH | 70 BIGH |
|---|---|---|---|---|---|---|---|---|
| 1.0 | 31925 | 33351 | 37151 | 42317 | 47900 | 53201 | 57741 | 61192 |
| 1.5 | 9403 | 9829 | 10970 | 12525 | 14203 | 15792 | 17146 | 18174 |
| 2.0 | 3897 | 4084 | 4592 | 5281 | 6012 | 6690 | 7264 | 7698 |
| 2.5 | 1934 | 2042 | 2336 | 2719 | 3102 | 3448 | 3741 | 3962 |
| 3.0 | 1086 | 1165 | 1366 | 1599 | 1815 | 2012 | 2179 | 2306 |
| 3.5 | 693 | 753 | 888 | 1027 | 1156 | 1277 | 1381 | 1460 |
| 4.0 | 494 | 534 | 616 | 698 | 782 | 861 | 930 | 983 |
| 4.5 | 372 | 395 | 442 | 495 | 553 | 608 | 657 | 693 |
| 5.0 | 281 | 294 | 324 | 362 | 405 | 445 | 481 | 507 |
| 5.5 | 213 | 222 | 243 | 273 | 305 | 336 | 362 | 382 |
| 6.0 | 164 | 170 | 187 | 210 | 235 | 259 | 280 | 295 |
| 6.5 | 128 | 133 | 147 | 165 | 185 | 204 | 220 | 233 |
| 7.0 | 102 | 106 | 117 | 132 | 148 | 164 | 177 | 187 |
| 7.5 | 82 | 86 | 95 | 107 | 121 | 133 | 144 | 152 |
| 8.0 | 67 | 70 | 78 | 88 | 99 | 110 | 119 | 125 |
| 8.5 | 56 | 58 | 65 | 73 | 83 | 91 | 99 | 104 |
| 9.0 | 47 | 49 | 54 | 62 | 70 | 77 | 83 | 88 |
| 9.5 | 40 | 42 | 46 | 52 | 59 | 65 | 71 | 75 |
| 10.0 | 34 | 35 | 39 | 45 | 51 | 56 | 61 | 64 |

TABLE 11

FCENT= 3.0 G1= 1.517 G2= 0.759 ALPHA= 0.0 FJ= 1.0

| | DEGREE | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | 10 | | 20 | | 30 | | 40 | | 50 | | 60 | | 70 | |
| L | HZ | HPI | HZ | HPI | HZ | HPI | HZ | HPI | HZ | HPI | HZ | HPI | HZ | HPI | HZ | HPI |
| 1.0 | -0.119 | -0.000 | -0.119 | -0.000 | -0.119 | -0.000 | -0.119 | -0.001 | -0.118 | -0.001 | -0.118 | -0.000 | -0.118 | -0.000 | -0.118 | -0.000 |
| 1.5 | -0.120 | -0.000 | -0.120 | -0.000 | -0.120 | -0.001 | -0.120 | -0.001 | -0.120 | 0.002 | -0.122 | 0.002 | -0.120 | -0.001 | -0.117 | -0.002 |
| 2.0 | -0.122 | -0.000 | -0.122 | -0.000 | -0.123 | 0.001 | -0.126 | 0.008 | -0.127 | 0.008 | -0.129 | -0.008 | -0.119 | -0.009 | -0.112 | -0.007 |
| 2.5 | -0.138 | -0.000 | -0.139 | 0.005 | -0.142 | 0.014 | -0.139 | 0.011 | -0.132 | -0.013 | -0.122 | -0.024 | -0.109 | -0.018 | -0.101 | -0.011 |
| 3.0 | -0.169 | -0.000 | -0.165 | 0.009 | -0.152 | 0.005 | -0.135 | -0.018 | -0.120 | -0.044 | -0.105 | -0.035 | -0.094 | -0.024 | -0.087 | -0.015 |
| 3.5 | -0.154 | -0.000 | -0.147 | -0.006 | -0.128 | -0.025 | -0.109 | -0.057 | -0.096 | -0.058 | -0.085 | -0.039 | -0.077 | -0.026 | -0.073 | -0.016 |
| 4.0 | -0.104 | -0.000 | -0.097 | -0.027 | -0.082 | -0.060 | -0.074 | -0.078 | -0.071 | -0.058 | -0.066 | -0.039 | -0.063 | -0.026 | -0.060 | -0.016 |
| 4.5 | -0.037 | -0.000 | -0.035 | -0.044 | -0.036 | -0.077 | -0.045 | -0.074 | -0.050 | -0.052 | -0.051 | -0.036 | -0.050 | -0.024 | -0.049 | -0.015 |
| 5.0 | 0.016 | -0.000 | 0.010 | -0.048 | -0.008 | -0.072 | -0.026 | -0.062 | -0.035 | -0.045 | -0.039 | -0.032 | -0.040 | -0.022 | -0.041 | -0.014 |
| 5.5 | 0.038 | -0.000 | 0.028 | -0.041 | 0.005 | -0.056 | -0.015 | -0.049 | -0.025 | -0.037 | -0.030 | -0.027 | -0.032 | -0.019 | -0.033 | -0.012 |
| 6.0 | 0.039 | -0.000 | 0.029 | -0.031 | 0.008 | -0.042 | -0.008 | -0.038 | -0.018 | -0.031 | -0.023 | -0.023 | -0.026 | -0.017 | -0.028 | -0.011 |
| 6.5 | 0.032 | -0.000 | 0.024 | -0.022 | 0.008 | -0.031 | -0.005 | -0.030 | -0.013 | -0.026 | -0.018 | -0.020 | -0.021 | -0.014 | -0.023 | -0.009 |
| 7.0 | 0.024 | -0.000 | 0.019 | -0.016 | 0.008 | -0.023 | -0.002 | -0.024 | -0.010 | -0.021 | -0.015 | -0.017 | -0.018 | -0.013 | -0.019 | -0.008 |
| 7.5 | 0.018 | -0.000 | 0.015 | -0.011 | 0.007 | -0.018 | -0.001 | -0.019 | -0.007 | -0.018 | -0.012 | -0.014 | -0.015 | -0.011 | -0.016 | -0.007 |
| 8.0 | 0.014 | -0.000 | 0.012 | -0.009 | 0.006 | -0.014 | -0.000 | -0.016 | -0.006 | -0.015 | -0.010 | -0.012 | -0.012 | -0.009 | -0.014 | -0.006 |
| 8.5 | 0.012 | -0.000 | 0.010 | -0.007 | 0.005 | -0.011 | -0.000 | -0.013 | -0.004 | -0.012 | -0.008 | -0.011 | -0.010 | -0.008 | -0.012 | -0.006 |
| 9.0 | 0.009 | -0.000 | 0.008 | -0.005 | 0.004 | -0.009 | 0.000 | -0.011 | -0.004 | -0.011 | -0.007 | -0.009 | -0.009 | -0.007 | -0.010 | -0.005 |
| 9.5 | 0.008 | -0.000 | 0.007 | -0.004 | 0.004 | -0.008 | 0.000 | -0.009 | -0.003 | -0.009 | -0.006 | -0.008 | -0.007 | -0.006 | -0.009 | -0.004 |
| 10.0 | 0.006 | -0.000 | 0.006 | -0.004 | 0.003 | -0.006 | 0.000 | -0.008 | -0.002 | -0.008 | -0.005 | -0.007 | -0.006 | -0.006 | -0.008 | -0.004 |

TABLE 12

FCENT= 3.0 G1= 1.517 G2= 0.759 ALPHA= 1.0 FJ= 1.0

| | DEGREE | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | 10 | | 20 | | 30 | | 40 | | 50 | | 60 | | 70 | |
| L | HZ | MPI | HZ | MPI | HZ | MPI | HZ | MPI | HZ | MPI | HZ | MPI | HZ | MPI | HZ | MPI |
| 1.0 | -0.089 | -0.000 | -0.089 | -0.000 | -0.089 | -0.000 | -0.089 | -0.000 | -0.089 | -0.000 | -0.089 | -0.000 | -0.089 | -0.000 | -0.089 | -0.000 |
| 1.5 | -0.089 | -0.000 | -0.089 | 0.000 | -0.090 | 0.000 | -0.090 | 0.000 | -0.090 | 0.001 | -0.091 | 0.000 | -0.089 | -0.001 | -0.088 | -0.001 |
| 2.0 | -0.090 | -0.000 | -0.090 | 0.001 | -0.093 | 0.003 | -0.096 | 0.006 | -0.096 | 0.005 | -0.094 | -0.005 | -0.089 | -0.005 | -0.085 | -0.004 |
| 2.5 | -0.106 | -0.000 | -0.108 | 0.008 | -0.113 | 0.016 | -0.110 | 0.007 | -0.103 | -0.009 | -0.092 | -0.014 | -0.083 | -0.011 | -0.078 | -0.008 |
| 3.0 | -0.148 | -0.000 | -0.144 | 0.014 | -0.130 | 0.007 | -0.113 | -0.015 | -0.097 | -0.030 | -0.083 | -0.023 | -0.074 | -0.016 | -0.068 | -0.010 |
| 3.5 | -0.147 | -0.000 | -0.138 | -0.000 | -0.117 | -0.022 | -0.097 | -0.046 | -0.080 | -0.042 | -0.069 | -0.028 | -0.062 | -0.019 | -0.058 | -0.012 |
| 4.0 | -0.108 | -0.000 | -0.098 | -0.022 | -0.080 | -0.054 | -0.069 | -0.063 | -0.061 | -0.045 | -0.056 | -0.029 | -0.052 | -0.019 | -0.049 | -0.012 |
| 4.5 | -0.044 | -0.000 | -0.040 | -0.041 | -0.039 | -0.070 | -0.044 | -0.062 | -0.045 | -0.042 | -0.044 | -0.028 | -0.042 | -0.019 | -0.041 | -0.011 |
| 5.0 | 0.010 | -0.000 | 0.005 | -0.047 | -0.012 | -0.066 | -0.026 | -0.053 | -0.032 | -0.037 | -0.034 | -0.026 | -0.034 | -0.017 | -0.034 | -0.011 |
| 5.5 | 0.034 | -0.000 | 0.024 | -0.040 | 0.001 | -0.052 | -0.015 | -0.042 | -0.023 | -0.031 | -0.026 | -0.023 | -0.028 | -0.015 | -0.028 | -0.010 |
| 6.0 | 0.036 | -0.000 | 0.026 | -0.030 | 0.006 | -0.038 | -0.009 | -0.034 | -0.017 | -0.026 | -0.021 | -0.020 | -0.022 | -0.014 | -0.023 | -0.009 |
| 6.5 | 0.029 | -0.000 | 0.022 | -0.021 | 0.007 | -0.028 | -0.005 | -0.027 | -0.012 | -0.022 | -0.016 | -0.017 | -0.018 | -0.012 | -0.020 | -0.008 |
| 7.0 | 0.022 | -0.000 | 0.017 | -0.015 | 0.006 | -0.021 | -0.003 | -0.021 | -0.009 | -0.018 | -0.013 | -0.014 | -0.015 | -0.010 | -0.016 | -0.007 |
| 7.5 | 0.017 | -0.000 | 0.013 | -0.011 | 0.006 | -0.016 | -0.001 | -0.017 | -0.007 | -0.015 | -0.010 | -0.012 | -0.013 | -0.009 | -0.014 | -0.006 |
| 8.0 | 0.013 | -0.000 | 0.011 | -0.008 | 0.005 | -0.013 | -0.001 | -0.014 | -0.005 | -0.013 | -0.009 | -0.011 | -0.011 | -0.008 | -0.012 | -0.005 |
| 8.5 | 0.010 | -0.000 | 0.009 | -0.006 | 0.004 | -0.010 | -0.000 | -0.012 | -0.004 | -0.011 | -0.007 | -0.009 | -0.009 | -0.007 | -0.010 | -0.005 |
| 9.0 | 0.008 | -0.000 | 0.007 | -0.005 | 0.004 | -0.008 | 0.000 | -0.010 | -0.003 | -0.009 | -0.006 | -0.008 | -0.008 | -0.006 | -0.009 | -0.004 |
| 9.5 | 0.007 | -0.000 | 0.006 | -0.004 | 0.003 | -0.007 | 0.000 | -0.008 | -0.003 | -0.008 | -0.005 | -0.007 | -0.007 | -0.005 | -0.008 | -0.004 |
| 10.0 | 0.006 | -0.000 | 0.005 | -0.003 | 0.003 | -0.006 | 0.000 | -0.007 | -0.002 | -0.007 | -0.004 | -0.006 | -0.006 | -0.005 | -0.007 | -0.003 |

TABLE 13

FCENT= 3.0 G1= 1.517 G2= 0.759 ALPHA= 3.0 FJ= 1.0

| L | DEGREE 0 HZ | 0 HPI | 10 HZ | 10 HPI | 20 HZ | 20 HPI | 30 HZ | 30 HPI | 40 HZ | 40 HPI | 50 HZ | 50 HPI | 60 HZ | 60 HPI | 70 HZ | 70 HPI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.0 | -0.061 | -0.000 | -0.061 | 0.000 | -0.061 | 0.000 | -0.061 | 0.000 | -0.061 | 0.000 | -0.061 | 0.000 | -0.061 | -0.000 | -0.061 | -0.000 |
| 1.5 | -0.060 | -0.000 | -0.060 | 0.001 | -0.061 | 0.001 | -0.062 | 0.001 | -0.062 | 0.001 | -0.062 | -0.000 | -0.062 | -0.001 | -0.061 | -0.001 |
| 2.0 | -0.058 | -0.000 | -0.060 | 0.004 | -0.064 | 0.005 | -0.067 | 0.004 | -0.066 | 0.000 | -0.064 | -0.002 | -0.061 | -0.003 | -0.059 | -0.002 |
| 2.5 | -0.073 | -0.000 | -0.077 | 0.012 | -0.082 | 0.015 | -0.079 | 0.003 | -0.071 | -0.006 | -0.064 | -0.008 | -0.058 | -0.006 | -0.055 | -0.005 |
| 3.0 | -0.123 | -0.000 | -0.117 | 0.019 | -0.103 | 0.004 | -0.085 | -0.013 | -0.070 | -0.017 | -0.059 | -0.014 | -0.053 | -0.010 | -0.049 | -0.006 |
| 3.5 | -0.134 | -0.000 | -0.123 | 0.002 | -0.099 | -0.022 | -0.077 | -0.033 | -0.061 | -0.026 | -0.051 | -0.018 | -0.046 | -0.012 | -0.043 | -0.008 |
| 4.0 | -0.107 | -0.000 | -0.094 | -0.022 | -0.074 | -0.049 | -0.059 | -0.046 | -0.049 | -0.030 | -0.043 | -0.020 | -0.039 | -0.013 | -0.037 | -0.008 |
| 4.5 | -0.049 | -0.000 | -0.043 | -0.041 | -0.040 | -0.062 | -0.040 | -0.047 | -0.037 | -0.030 | -0.034 | -0.020 | -0.032 | -0.013 | -0.031 | -0.008 |
| 5.0 | 0.004 | -0.000 | -0.001 | -0.046 | -0.016 | -0.057 | 0.025 | -0.041 | -0.027 | -0.028 | -0.027 | -0.019 | -0.027 | -0.012 | -0.026 | -0.008 |
| 5.5 | 0.030 | -0.000 | 0.018 | -0.039 | -0.003 | -0.045 | -0.015 | -0.034 | -0.020 | -0.024 | -0.021 | -0.017 | -0.022 | -0.011 | -0.022 | -0.007 |
| 6.0 | 0.032 | -0.000 | 0.022 | -0.028 | 0.003 | -0.034 | -0.009 | -0.028 | -0.015 | -0.021 | -0.017 | -0.015 | -0.018 | -0.010 | -0.018 | -0.006 |
| 6.5 | 0.026 | -0.000 | 0.018 | -0.019 | 0.004 | -0.025 | 0.005 | -0.022 | -0.011 | -0.017 | -0.013 | -0.013 | -0.015 | -0.009 | -0.015 | -0.006 |
| 7.0 | 0.020 | -0.000 | 0.015 | -0.013 | 0.005 | -0.019 | -0.003 | -0.018 | -0.008 | -0.015 | -0.011 | -0.011 | -0.012 | -0.008 | -0.013 | -0.005 |
| 7.5 | 0.015 | -0.000 | 0.011 | -0.010 | 0.004 | -0.014 | -0.002 | -0.014 | -0.006 | -0.012 | -0.009 | -0.010 | -0.010 | -0.007 | -0.011 | -0.005 |
| 8.0 | 0.011 | -0.000 | 0.009 | -0.007 | 0.004 | -0.011 | -0.001 | -0.012 | -0.005 | -0.010 | -0.007 | -0.008 | -0.009 | -0.006 | -0.010 | -0.004 |
| 8.5 | 0.009 | -0.000 | 0.007 | -0.006 | 0.004 | -0.009 | -0.000 | -0.010 | -0.004 | -0.009 | -0.006 | -0.007 | -0.007 | -0.006 | -0.008 | -0.004 |
| 9.0 | 0.007 | -0.000 | 0.006 | -0.004 | 0.003 | -0.007 | -0.000 | -0.008 | -0.003 | -0.008 | -0.005 | -0.006 | -0.006 | -0.005 | -0.007 | -0.003 |
| 9.5 | 0.006 | -0.000 | 0.005 | -0.004 | 0.003 | -0.006 | 0.000 | -0.007 | -0.002 | -0.007 | -0.004 | -0.006 | -0.005 | -0.004 | -0.006 | -0.003 |
| 10.0 | 0.005 | -0.000 | 0.004 | -0.003 | 0.002 | -0.005 | 0.000 | -0.006 | -0.002 | -0.006 | -0.004 | -0.005 | -0.005 | -0.004 | -0.005 | -0.003 |

TABLE 14A

FCENT= 6.0 G1= 1.517 G2= 1.517 ALPHA=-0.5 FJ= 1.0

| | DEGREE | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | 10 | | 20 | | 30 | | 40 | | 50 | | 60 | | 70 | |
| L | HZ | HPI | HZ | HPI | HZ | HPI | HZ | HPI | HZ | HPI | HZ | HPI | HZ | HPI | HZ | HPI |
| 1.0 | -0.291 | -0.000 | -0.291 | -0.000 | -0.291 | -0.001 | -0.290 | -0.001 | -0.290 | -0.001 | -0.290 | -0.001 | -0.289 | -0.001 | -0.289 | -0.000 |
| 1.5 | -0.292 | -0.000 | -0.292 | -0.001 | -0.291 | -0.001 | -0.291 | -0.002 | -0.289 | -0.002 | -0.288 | -0.002 | -0.288 | -0.001 | -0.288 | -0.000 |
| 2.0 | -0.293 | -0.000 | -0.293 | -0.001 | -0.293 | -0.002 | -0.292 | -0.003 | -0.289 | -0.005 | -0.283 | -0.003 | -0.286 | 0.001 | -0.288 | 0.000 |
| 2.5 | -0.295 | -0.000 | -0.295 | -0.001 | -0.294 | -0.002 | -0.293 | -0.004 | -0.294 | -0.006 | -0.278 | 0.034 | -0.294 | 0.005 | -0.290 | -0.002 |
| 3.0 | -0.296 | -0.000 | -0.296 | -0.002 | -0.295 | -0.003 | -0.294 | -0.003 | -0.295 | 0.009 | -0.343 | -0.005 | -0.306 | -0.010 | -0.288 | -0.010 |
| 3.5 | -0.298 | -0.000 | -0.297 | -0.003 | -0.295 | -0.004 | -0.293 | -0.003 | -0.292 | 0.141 | -0.334 | -0.038 | -0.298 | -0.030 | -0.276 | -0.021 |
| 4.0 | -0.301 | -0.000 | -0.299 | -0.004 | -0.296 | -0.006 | -0.309 | 0.044 | -0.361 | -0.006 | -0.316 | -0.066 | -0.279 | -0.047 | -0.257 | -0.030 |
| 4.5 | -0.305 | -0.000 | -0.304 | -0.005 | -0.314 | 0.011 | -0.389 | 0.224 | -0.347 | -0.127 | -0.287 | -0.088 | -0.253 | -0.059 | -0.233 | -0.037 |
| 5.0 | -0.332 | -0.000 | -0.348 | 0.011 | -0.449 | 0.153 | -0.399 | -0.017 | -0.298 | -0.156 | -0.252 | -0.102 | -0.225 | -0.067 | -0.209 | -0.041 |
| 5.5 | -0.508 | -0.000 | -0.567 | 0.102 | -0.556 | 0.190 | -0.295 | -0.258 | -0.245 | -0.168 | -0.215 | -0.108 | -0.196 | -0.070 | -0.185 | -0.042 |
| 6.0 | -0.758 | -0.000 | -0.675 | 0.112 | -0.295 | -0.199 | -0.204 | -0.265 | -0.195 | -0.165 | -0.181 | -0.108 | -0.170 | -0.070 | -0.162 | -0.042 |
| 6.5 | -0.394 | -0.000 | -0.212 | -0.139 | -0.076 | -0.339 | -0.138 | -0.236 | -0.152 | -0.155 | -0.151 | -0.103 | -0.146 | -0.067 | -0.142 | -0.041 |
| 7.0 | 0.142 | -0.000 | 0.125 | -0.243 | -0.008 | -0.278 | -0.091 | -0.203 | -0.118 | -0.140 | -0.125 | -0.096 | -0.126 | -0.064 | -0.124 | -0.039 |
| 7.5 | 0.239 | -0.000 | 0.154 | -0.187 | 0.016 | -0.213 | -0.060 | -0.171 | -0.092 | -0.124 | -0.104 | -0.088 | -0.108 | -0.059 | -0.109 | -0.037 |
| 8.0 | 0.186 | -0.000 | 0.126 | -0.131 | 0.026 | -0.165 | -0.039 | -0.143 | -0.072 | -0.109 | -0.087 | -0.079 | -0.093 | -0.055 | -0.095 | -0.034 |
| 8.5 | 0.140 | -0.000 | 0.101 | -0.095 | 0.029 | -0.130 | -0.026 | -0.120 | -0.057 | -0.095 | -0.072 | -0.071 | -0.080 | -0.050 | -0.084 | -0.031 |
| 9.0 | 0.109 | -0.000 | 0.082 | -0.072 | 0.029 | -0.103 | -0.017 | -0.100 | -0.045 | -0.083 | -0.061 | -0.064 | -0.069 | -0.045 | -0.074 | -0.029 |
| 9.5 | 0.087 | -0.000 | 0.067 | -0.056 | 0.027 | -0.084 | -0.011 | -0.085 | -0.036 | -0.073 | -0.052 | -0.057 | -0.060 | -0.041 | -0.065 | -0.026 |
| 10.0 | 0.070 | -0.000 | 0.056 | -0.044 | 0.025 | -0.069 | -0.007 | -0.072 | -0.029 | -0.064 | -0.044 | -0.051 | -0.053 | -0.037 | -0.057 | -0.024 |

TABLE 14B

FCENT= 6.0 G1= 1.517 G2= 1.517 ALPHA=-0.5 FJ= 150.0

| | DEGREE | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | 10 | | 20 | | 30 | | 40 | | 50 | | 60 | | 70 | |
| L | BGHZ | BGHPI | BGHZ | BGHPI | BGHZ | BGHPI | BGHZ | BGHPI | BGHZ | BGHPI | BGHZ | BGHPI | BGHZ | BGHPI | BGHZ | BGHPI |
| 1.0 | -43 | -0 | -43 | -0 | -43 | -0 | -43 | -0 | -43 | -0 | -43 | -0 | -43 | -0 | -43 | -0 |
| 1.5 | -43 | -0 | -43 | -0 | -43 | -0 | -43 | -0 | -43 | -0 | -43 | -0 | -43 | -0 | -43 | -0 |
| 2.0 | -44 | -0 | -43 | -0 | -43 | -0 | -43 | -0 | -43 | -0 | -42 | -0 | -42 | 0 | -43 | 0 |
| 2.5 | -44 | -0 | -44 | -0 | -44 | -0 | -44 | -0 | -44 | -0 | -41 | 5 | -44 | 0 | -43 | -0 |
| 3.0 | -44 | -0 | -44 | -0 | -44 | -0 | -44 | -0 | -44 | 1 | -51 | -0 | -45 | -1 | -43 | -1 |
| 3.5 | -44 | -0 | -44 | -0 | -46 | -0 | -43 | -0 | -43 | 21 | -50 | -5 | -44 | -4 | -41 | -3 |
| 4.0 | -45 | -0 | -44 | -0 | -44 | -0 | -46 | 6 | -54 | -0 | -47 | -9 | -41 | -7 | -38 | -4 |
| 4.5 | -45 | -0 | -45 | -0 | -47 | 1 | -58 | 33 | -52 | -19 | -43 | -13 | -37 | -8 | -34 | -5 |
| 5.0 | -49 | -0 | -52 | 1 | -67 | 22 | -59 | -2 | -44 | -23 | -37 | -15 | -33 | -10 | -31 | -6 |
| 5.5 | -76 | -0 | -85 | 15 | -83 | 28 | -44 | -38 | -36 | -25 | -32 | -16 | -29 | -10 | -27 | -6 |
| 6.0 | -113 | -0 | -101 | 16 | -44 | -29 | -30 | -39 | -29 | -24 | -27 | -16 | -25 | -10 | -24 | -6 |
| 6.5 | -59 | -0 | -31 | -20 | -11 | -50 | -20 | -35 | -22 | -23 | -22 | -15 | -21 | -10 | -21 | -6 |
| 7.0 | 21 | -0 | 18 | -36 | -1 | -41 | -13 | -30 | -17 | -21 | -18 | -14 | -18 | -9 | -18 | -5 |
| 7.5 | 35 | -0 | 23 | -27 | 2 | -31 | -9 | -25 | -13 | -18 | -15 | -13 | -16 | -8 | -16 | -5 |
| 8.0 | 27 | -0 | 18 | -19 | 3 | -24 | -5 | -21 | -10 | -16 | -12 | -11 | -13 | -8 | -14 | -5 |
| 8.5 | 21 | -0 | 15 | -14 | 4 | -19 | -3 | -17 | -8 | -14 | -10 | -10 | -12 | -7 | -12 | -4 |
| 9.0 | 16 | -0 | 12 | -10 | 4 | -15 | -2 | -15 | -6 | -12 | -9 | -9 | -10 | -6 | -11 | -4 |
| 9.5 | 12 | -0 | 10 | -8 | 4 | -12 | -1 | -12 | -5 | -10 | -7 | -8 | -9 | -6 | -9 | -3 |
| 10.0 | 10 | -0 | 8 | -6 | 3 | -10 | -0 | -10 | -4 | -9 | -6 | -7 | -7 | -5 | -8 | -3 |

TABLE 14C

FCENT= 6.0 G1= 1.517 G2= 1.517 ALPHA=-0.5 FJ= 150.0

| | DEGREE 0 | | 10 | | 20 | | 30 | | 40 | | 50 | | 60 | | 70 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L | BIGHZ | BIGHPI | BIGHZ | BIGHPI | BIGHZ | BIGHPI | BIGHZ | BIGHPI | BIGHZ | BIGHPI | BIGHZ | BIGHPI | BIGHZ | BIGHPI | BIGHZ | BIGHPI |
| 1.0 | 31956 | -0 | 29061 | -16417 | 20726 | -30853 | 7956 | -41569 | -7708 | -47270 | -24378 | -47270 | -40043 | -41569 | -52813 | -30853 |
| 1.5 | 9437 | -0 | 8579 | -4864 | 6110 | -9142 | 2326 | -12317 | -2314 | -14006 | -7253 | -14006 | -11895 | -12316 | -15678 | -9141 |
| 2.0 | 3955 | -0 | 3594 | -2052 | 2552 | -3857 | 956 | -5196 | -1001 | -5909 | -3084 | -5909 | -5042 | -5196 | -6639 | -3856 |
| 2.5 | 2003 | -0 | 1818 | -1050 | 1285 | -1974 | 467 | -2660 | -534 | -3026 | -1599 | -3020 | -2604 | -2659 | -3420 | -1974 |
| 3.0 | 1140 | -0 | 1033 | -608 | 725 | -1143 | 252 | -1540 | -328 | -1749 | -952 | -1751 | -1527 | -1541 | -1997 | -1144 |
| 3.5 | 701 | -0 | 634 | -383 | 440 | -720 | 142 | -969 | -222 | -1081 | -617 | -1108 | -977 | -974 | -1272 | -722 |
| 4.0 | 454 | -0 | 409 | -257 | 280 | -482 | 78 | -642 | -173 | -739 | -427 | -748 | -666 | -656 | -863 | -486 |
| 4.5 | 305 | -0 | 273 | -180 | 180 | -336 | 29 | -422 | -136 | -537 | -310 | -531 | -476 | -465 | -614 | -344 |
| 5.0 | 206 | -0 | 180 | -129 | 98 | -223 | 4 | -335 | -106 | -401 | -232 | -393 | -353 | -342 | -453 | -252 |
| 5.5 | 116 | -0 | 89 | -83 | 41 | -157 | 3 | -288 | -82 | -309 | -178 | -300 | -269 | -260 | -344 | -191 |
| 6.0 | 34 | -0 | 33 | -59 | 51 | -172 | 6 | -232 | -64 | -243 | -139 | -234 | -210 | -202 | -268 | -149 |
| 6.5 | 57 | -0 | 74 | -80 | 64 | -163 | 8 | -186 | -50 | -195 | -111 | -187 | -167 | -161 | -213 | -118 |
| 7.0 | 114 | -0 | 103 | -84 | 59 | -131 | 9 | -151 | -40 | -158 | -89 | -152 | -135 | -130 | -172 | -95 |
| 7.5 | 111 | -0 | 92 | -66 | 51 | -105 | 9 | -124 | -31 | -130 | -73 | -125 | -111 | -107 | -141 | -78 |
| 8.0 | 90 | -0 | 75 | -51 | 44 | -85 | 9 | -102 | -25 | -108 | -60 | -104 | -92 | -89 | -117 | -65 |
| 8.5 | 73 | -0 | 62 | -41 | 38 | -69 | 9 | -85 | -20 | -91 | -50 | -87 | -77 | -75 | -98 | -54 |
| 9.0 | 60 | -0 | 52 | -33 | 32 | -57 | 8 | -72 | -17 | -77 | -42 | -74 | -65 | -63 | -83 | -46 |
| 9.5 | 50 | -0 | 44 | -27 | 28 | -48 | 7 | -61 | -14 | -66 | -36 | -63 | -55 | -54 | -71 | -39 |
| 10.0 | 42 | -0 | 37 | -23 | 24 | -41 | 7 | -52 | -12 | -56 | -30 | -54 | -47 | -47 | -61 | -34 |

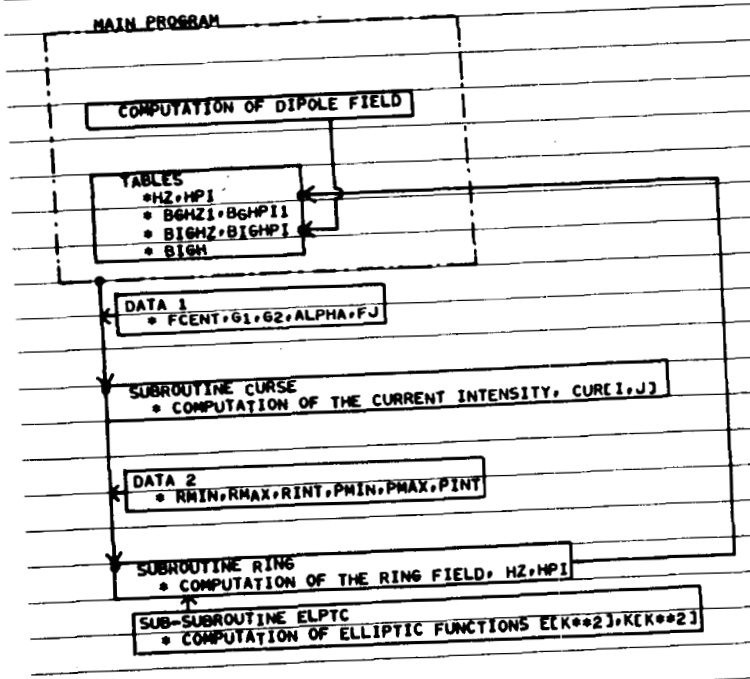
TABLE 14D

FCENT= 6.0 G1= 1.517 G2= 1.517 ALPHA=-0.5 FJ= 150.0

| | DEGREE | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 |
| L | BIGH | BIGH | BIGH | BIGH | BIGH | BIGH | BIGH | BIGH |
| 1.0 | 31956 | 33378 | 37169 | 42323 | 47895 | 53186 | 57718 | 61165 |
| 1.5 | 9037 | 9862 | 10996 | 12534 | 14196 | 15773 | 17123 | 18149 |
| 2.0 | 3955 | 4138 | 4625 | 5283 | 5993 | 6665 | 7240 | 7678 |
| 2.5 | 2003 | 2100 | 2356 | 2701 | 3073 | 3417 | 3722 | 3949 |
| 3.0 | 1140 | 1199 | 1353 | 1560 | 1779 | 1993 | 2169 | 2302 |
| 3.5 | 701 | 741 | 844 | 980 | 1104 | 1268 | 1380 | 1463 |
| 4.0 | 454 | 483 | 558 | 647 | 759 | 862 | 935 | 990 |
| 4.5 | 305 | 328 | 382 | 423 | 554 | 615 | 666 | 703 |
| 5.0 | 206 | 222 | 244 | 335 | 415 | 457 | 492 | 519 |
| 5.5 | 116 | 122 | 162 | 288 | 320 | 349 | 374 | 394 |
| 6.0 | 34 | 67 | 180 | 232 | 252 | 273 | 292 | 307 |
| 6.5 | 57 | 109 | 175 | 186 | 201 | 218 | 232 | 244 |
| 7.0 | 114 | 133 | 144 | 151 | 163 | 176 | 188 | 197 |
| 7.5 | 111 | 113 | 117 | 124 | 134 | 145 | 154 | 161 |
| 8.0 | 90 | 91 | 95 | 103 | 111 | 120 | 128 | 134 |
| 8.5 | 73 | 74 | 79 | 86 | 93 | 101 | 107 | 112 |
| 9.0 | 60 | 61 | 66 | 72 | 79 | 85 | 91 | 95 |
| 9.5 | 50 | 51 | 56 | 61 | 67 | 73 | 78 | 81 |
| 10.0 | 42 | 44 | 47 | 52 | 58 | 62 | 67 | 70 |

APPENDIX 1

COMPUTATION OF RING CURRENT FIELD



```
$IBFTC MAIN
C MAGNETIC FIELD OF ASYMMETRIC RING CURRENT BELT
C MENDRICKS,KAUNS
C     XEQ
C MAIN FORTRAN IV PROGRAM, IBM SYSTEM 7044
C THIS PROGRAM GENERATES SETS OF TABLES DEPEND UPON THE VALUES OF
C FJ'S( UP TO 4 DIFFERENT FJ'S WITH ONE FJ FIXED AT 1.0 , IF LESSER
C FJ'S ARE USED, ENTER 0.0 INTO UNUSED FJ FIELDS ON DATA CARD ) WITH
C FIXED FCENT,G1,G2 AND ALPHA.
      DIMENSION CUR(100,100),TAB(19,16),IA(19,16,3),IB(19,16,3),
     1IC(19,8,3),FJ(3)
      COMMON CUR,A,W,X
      COMMON/END/MM,NN
      NN=-1
      ASSIGN 7000 TO MM
      W=6.990E-6
      C=-9.60E4
      D=3.20E4
      KK=2
      JJ=1
      II=1
      LL=1
      CALL TRAPS(-1,-1)
    1 READ(5,2) FCENT,G1,G2,ALPHA,FJ(1),FJ(2),FJ(3)
    2 FORMAT(7F10.4)
    3 READ(5,4) RMIN,RMAX,RINT,PMIN,PMAX,PIN
      IF(RMIN) 5,1,5
    4 FORMAT(6F10.2)
    5 CALL CURSE(FCENT,G1,G2,ALPHA)
      PHI=PMIN
   20 PHIR=PHI/57.2957795
      COSP=COS(PHIR)
      COS2P=COSP*COSP
      COS3P=COSP*COS2P
      COS5P=COS2P*COS3P
      COS6P=COS3P*COS3P
      SINP=SIN(PHIR)
      SIN2P=SINP*SINP
      R=RMIN
   22 F=R/COS2P
      CALL RING(F,PHI,HPI,HZ,H)
      DPHPI=C/F**3*SINP/COS5P
      DPHZ=D/F**3*(1.0-3.0*SIN2P)/COS6P
      TAB(II,JJ)=HZ
      TAB(II,KK)=HPI
      BGHZ1=FJ(1)*HZ
      BGHPI1=FJ(1)*HPI
      BIGHZ1=BGHZ1+DPHZ
      BIGHPI=BGHPI1+DPHPI
      IA(II,JJ,1)=BGHZ1
      IA(II,KK,1)=BGHPI1
      IB(II,JJ,1)=BIGHZ1
      IB(II,KK,1)=BIGHPI
      IC(II,LL,1)=SQRT(BIGHPI*BIGHPI+BIGHZ1*BIGHZ1)
      IF(FJ(2).EQ.0.) GO TO 5000
      BGHZ2=FJ(2)*HZ
      BGHPI2=FJ(2)*HPI
      BIGHZ2=BGHZ2+DPHZ
      BIGHP2=BGHPI2+DPHPI
```

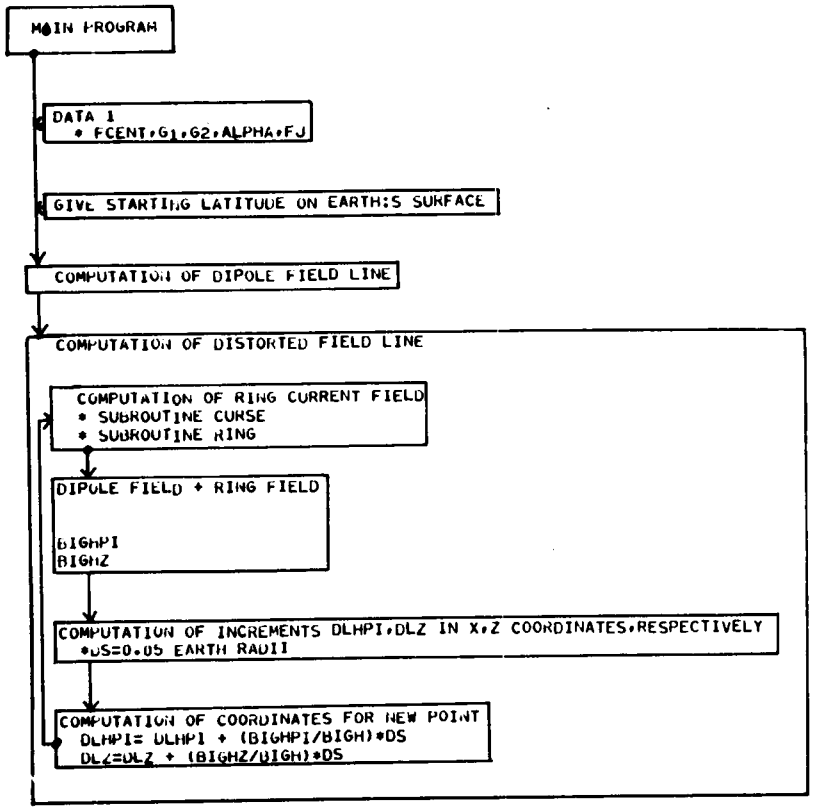
```
      IA(II,JJ,2)=BGHZ2
      IA(II,KK,2)=BGHPI2
      IB(II,JJ,2)=BIGHZ2
      IB(II,KK,2)=BIGHP2
      IC(II,LL,2)=SQRT(BIGHP2*BIGHP2+BIGHZ2*BIGHZ2)
      IF(FJ(3).EQ.0.) GO TO 5000
      BGHZ3=FJ(3)*HZ
      BGHPI3=FJ(3)*HPI
      BIGHZ3=BGHZ3+DPHZ
      BIGHP3=BGHPI3+DPHPI
      IA(II,JJ,3)=BGHZ3
      IA(II,KK,3)=BGHPI3
      IB(II,JJ,3)=BIGHZ3
      IB(II,KK,3)=BIGHP3
      IC(II,LL,3)=SQRT(BIGHP3*BIGHP3+BIGHZ3*BIGHZ3)
 5000 II=II+1
      R=R+RINT
      IF(R-RMAX) 22,22,88
   88 PHI=PHI+PIN
      KK=KK+2
      JJ=JJ+2
      II=1
      LL=LL+1
      IF(PMAX-PHI) 2000,20,20
 2000 WRITE(6,3000) FCENT,G1,G2,ALPHA
 3000 FORMAT(1H1,14H        FCENT=,F4.1,9H      G1=,F6.3,9H      G2=,
     1F6.3,12H      ALPHA=,F4.1,17H      FJ=     1.0)
 3001 FORMAT(1H0,63H
     1     DEGREE)
      WRITE(6,3001)
 3002 FORMAT(1H ,125H           0              10              20
     1        30              40              50              60
     2       70)
      WRITE(6,3002)
 3003 FORMAT(1H ,129H  L      HZ     HPI       HZ     HPI       HZ     HPI
     1     HZ     HPI       HZ     HPI       HZ     HPI       HZ     HPI
     2   HZ     HPI)
      WRITE(6,3003)
 3004 FORMAT(/F5.1,F7.3,F7.3,7(F9.3,F7.3))
      DO 4000 I=1,19
      HALF=I
      RADI=HALF/2.+0.5
      WRITE(6,3004) RADI,(TAB(I,J),J=1,16,1)
 4000 CONTINUE
      III=3
      IF(FJ(3).EQ.0.) III=2
      IF(FJ(2).EQ.0.) III=1
      DO 6000 IJK=1,III
      WRITE(6,3005) FCENT,G1,G2,ALPHA,FJ(IJK)
 3005 FORMAT(1H1,14H        FCENT=,F4.1,9H      G1=,F6.3,9H      G2=,
     1F6.3,12H      ALPHA=,F4.1,9H      FJ=,F8.1)
      WRITE(6,3001)
      WRITE(6,3002)
 3006 FORMAT(1H ,130H  L    BGHZ  BGHPI     BGHZ  BGHPI     BGHZ  BGHPI
     1    BGHZ  BGHPI     BGHZ  BGHPI     BGHZ  BGHPI     BGHZ  BGHPI
     2  BGHZ  BGHPI)
      WRITE(6,3006)
 3007 FORMAT(/F5.1,I7,I7,7(I9,I7))
      DO 4001 I=1,19
      HALF=I
      RADI=HALF/2.+0.5
      WRITE(6,3007) RADI,(IA(I,J,IJK),J=1,16,1)
 4001 CONTINUE
      WRITE(6,3005) FCENT,G1,G2,ALPHA,FJ(IJK)
      WRITE(6,3001)
      WRITE(6,3002)
```

```
3008 FORMAT(1H ,130H  L    BIGHZ BIGHPI    BIGHZ BIGHPI    BIGHZ BIGHPI
     1   9IGHZ BIGHPI    BIGHZ BIGHPI    BIGHZ BIGHPI    BIGHZ BIGHPI
     2 BIGHZ BIGHPI)
      WRITE(6,3008)
      DO 4002 I=1,19
      HALF=I
      RADI=HALF/2.+0.5
      WRITE(6,3007) RADI,(IB(I,J,IJK),J=1,16,1)
4002 CONTINUE
      WRITE(6,3005) FCENT,G1,G2,ALPHA,FJ(IJK)
      WRITE(6,3001)
      WRITE(6,3002)
3009 FORMAT(1H ,126H  L       BIGH          BIGH          BIGH
     1       BIGH          BIGH
     2       BIGH)
      WRITE(6,3009)
3010 FORMAT(/F5.1,5X,I6,7(10X,I6))
      DO 4003 I=1,19
      HALF=I
      RADI=HALF/2.+0.5
      WRITE(6,3010) RADI,(IC(I,J,IJK),J=1,8,1)
4003 CONTINUE
6000 CONTINUE
      KK=2
      JJ=1
      II=1
      LL=1
      GO TO 1
7000 CALL EXIT
      END
$IBFTC CURSE
C     SUBROUTINE CURSE
      SUBROUTINE CURSE(FCENT,G1,G2,ALPHA)
C     CARDS COLUMN
      DIMENSION CUR(100,100)
      COMMON CUR,A,W,X
      BALPHA=(ALPHA+2.0)/(4.0*(ALPHA+3.0))
      X=3.0*FCENT*FCENT*(1.0-6.0*BALPHA)
      A=-X*W
      DO 33 I=1,25
      PR=(2.*FLOAT(I)-1.)/57.2957795
      SINP=SIN(PR)
      SIN2P=SINP*SINP
      COSP=COS(PR)
      D=3.0*(1.0-6.0*BALPHA)*(1.0 +SIN2P)*COSP**(5.0+3.0*ALPHA)/
     1(1.0 +3.0*SIN2P)**(2.0+ALPHA/4.0)
      DPK=6.*ALPHA*BALPHA*SIN2P*(3.+5.*SIN2P)*COSP**(3.+ALPHA+3.)/
     1(1.+3.*SIN2P)**(4.+ALPHA/2.)
      F=2.0*BALPHA*COSP**(3.0*ALPHA+3.0)/(1.0 +3.0*SIN2P)**(ALPHA/4.0)
      DO 44 J=1,100
      Z=1.0+0.1*FLOAT(J)-FCENT
      ZZ=Z*Z
      F2=Z+FCENT
      A2=F2*F2
      A3=A2*F2
      IF(Z) 55,66,66
   55 G=G1
      GO TO 77
   66 G=G2
      GO TO 77
   77 B=EXP(-G*G*ZZ)
      E=2.0*(G**2)*Z*A3*B
      C=A2*B
      CUR(I,J)=(C*(D+DPK)+E*F)/X
   44 CONTINUE
   33 CONTINUE
```

```
      RETURN
      END
$IBFTC RING
C     SUBROUTINE RING
C     CARDS COLUMN
      SUBROUTINE RING(F,PHI,HPI,HZ,H)
      DIMENSION CUR(100,100)
      COMMON CUR,A,W,X
      PHIR=PHI/57.2957795
      COSP=COS(PHIR)
      COS2P=COSP*COSP
      COS3P=COSP*COS2P
      FTM=F*COS2P*SIN(PHIR)
      FL=F*COS3P
      HPI=0.
      HZ=0.
      H=0.
      DO 5 I=1,25
      DO 6  J=1,100
      P=2.0*FLOAT(I)-1.0
      F2=1.1+0.1*FLOAT(J)
   34 IF(INT(F*10.0+0.5-F2*10.0)) 2,42,2
   42 IF(INT(PHI-P)) 2,8,2
    2 PR=P/57.2957795
      CSP=COS(PR)
      CS2P=CSP*CSP
      FM=FTM-F2*CS2P*SIN(PR)
      FN=F2*CS2P*CSP
      D1=(FN+FL)*(FN+FL)+FM*FM
      D2=(FN-FL)*(FN-FL)+FM*FM
      FA=SQRT(4.0*FN*FL/D1)
      CALL ELPTC(FA,FK,FE)
      DR=SQRT(D1)
      B=FE/D2
      G=F2*CS2P*CS2P
      HPI=HPI+A/FL*CUR(I,J)/DR*FM*(-FK+(FN*FN+FL*FL+FM*FM)*B)*G
      HZ=HZ+A/DR*CUR(I,J)*(FK+(FN*FN-FL*FL-FM*FM)*B)*G
    8 IF(P) 6,6,10
   10 P=-P
      GO TO 34
    6 CONTINUE
    5 CONTINUE
      H=SQRT(HPI*HPI+HZ*HZ)
   12 RETURN
      END
$IBFTC ELPTC
      SUBROUTINE ELPTC(FA,FK,FE)
      IF(FA+1.0) 99,99,99
    2 IF(FA-1.0) 4,99,99
    4 ETA=1.0-FA*FA
      B=ALOG(1.0/ETA)
      ETA2=ETA*ETA
      FK=1.3862944+0.1119723*ETA+0.0725296*ETA2
     1+(0.5+0.1213478*ETA+0.0288729*ETA2)*B
      FE=1.0+0.4630151*ETA+0.1077812*ETA2+(0.2452727*ETA
     1+0.0412496*ETA2)*B
   99 RETURN
      END
$ENTRY
      6.0       1.517     1.517     -0.5      150.0     0.0       0.0
        1.0     10.0        0.5       0.0       70.0      10.0
$END OF DATA
```

APPENDIX II

COMPUTATION OF DISTORTED FIELD LINES



```
$IBFTC MAIN
C TRACING OF DISTORTED LINES OF FORCE
C MENDRICKS,KAUNG
C XEQ
C MAIN FORTRAN IV PROGRAM. IBM SYSTEM 7044
C THIS PROGRAM GENERATES SETS OF X AND -Y (SOUTHERN HEMISPHERE) OF THE
C DISTORTED FIELD AND ITS DIPOLE FIELD (X AND Y) AT  THE GIVEN DEGREE.
      DIMENSION CUR(100,100)
      COMMON CUR,A,W,X
      W=6.990E-6
      C=-9.60E4
      D=3.20E4
      CALL TRAPS(-1,-1)
    1 READ(5,2) FCENT,G1,G2,ALPHA,FJ
      WRITE(3,3) FCENT,G1,G2,ALPHA,FJ
      WRITE(6,2000) FCENT,G1,G2,ALPHA,FJ
    2 FORMAT(5F12.6)
    3 FORMAT(5F12.4)
 2000 FORMAT(1H ,5F12.4)
      CALL CURSE(FCENT,G1,G2,ALPHA)
      DS=0.05
      DO 20 NPHI=10,70,10
      F=FLOAT(NPHI)
      PHIR=F/57.2957795
      COSP=COS(PHIR)
      COS2P=COSP*COSP
      EQR=1.0/COS2P
      GO TO 70
   30 PHIR=F/57.2957795
      COSP=COS(PHIR)
      COS2P=COSP*COSP
   70 SMR=EQR*COS2P
      X1=SMR*COSP
      Y1=SMR*SIN(PHIR)
      IJK=0
      WRITE(3,31) X1,Y1,IJK
   31 FORMAT(2F12.4,I6)
   63 FORMAT(1H ,2F12.4)
      WRITE(6,63) X1,Y1
      IF(F.EQ.0.) GO TO 35
      F=F-2.
      GO TO 30
   35 IJK=999999
      X1=0
      Y1=0
      WRITE(3,31) X1,Y1,IJK
      F=FLOAT(NPHI)
      PHIR=-F/57.2957795
      R=1.0
      DLZ=R*SIN(PHIR)
      PHI=-NPHI
      DLPHI=1.0*COS(PHIR)
   33 COSP=COS(PHIR)
      COS2P=COSP*COSP
      COS3P=COS2P*COSP
      COS5P=COS2P*COS3P
      COS6P=COS3P*COS3P
      SINP=SIN(PHIR)
      SIN2P=SINP*SINP
```

```
      F=R/COS2P
      FM3=F**(-3)
      DPHPI=C/COS5P*SINP*FM3
      DPHZ=D/COS6P*(1.-3.*SIN2P)*FM3
      CALL RING(F,PHI,HPI,HZ,H)
      BIGHPI=FJ*HPI+DPHPI
      BIGHZ=FJ*HZ+DPHZ
      BIGH=SQRT(BIGHPI*BIGHPI+BIGHZ*BIGHZ)
      DLPHI=DLPHI+(BIGHPI/BIGH)*DS
      DLZ=DLZ+(BIGHZ/BIGH)*DS
      XX=R*COSP
      YY=R*SINP
      PHI=PHIR*57.2957795
      WRITE(6,64) PHI,R,BIGHPI,BIGHZ,BIGH,XX,YY
   64 FORMAT(1H ,7F12.4)
      IJK=0
      WRITE(3,65) XX,YY,IJK
   65 FORMAT(2F12.4,I6)
      PHIR=ATAN(DLZ/DLPHI)
      R=SQRT(DLPHI**2+DLZ**2)
      IF(PHIR) 33,21,21
   21 IJK=999999
      XX=0
      YY=0
      WRITE(3,65) XX,YY,IJK
   20 CONTINUE
      CALL EXIT
      END
$ENTRY
      3.0          1.517        0.759        2.0        4500.0
```

# DISTORTED FIELD

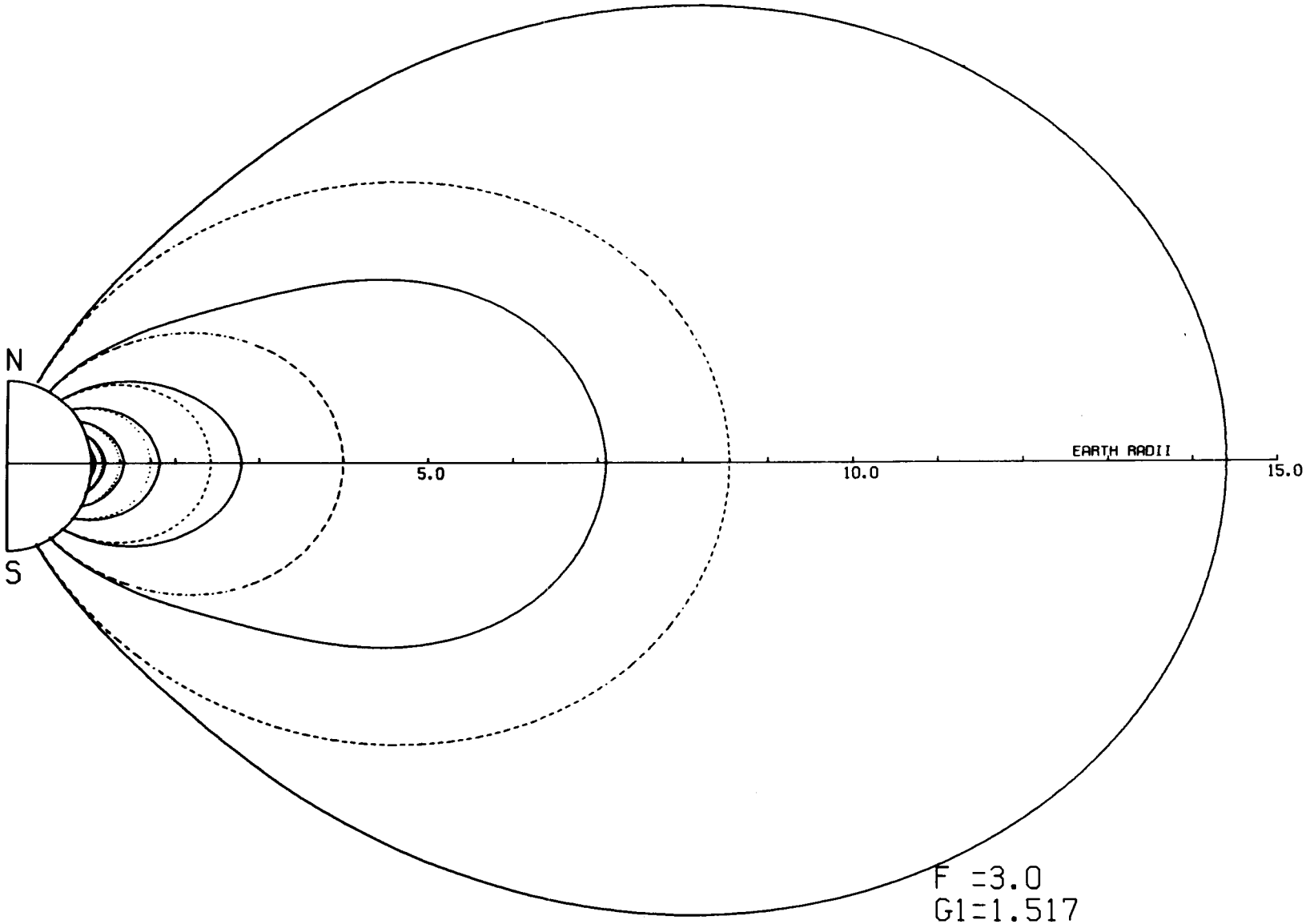
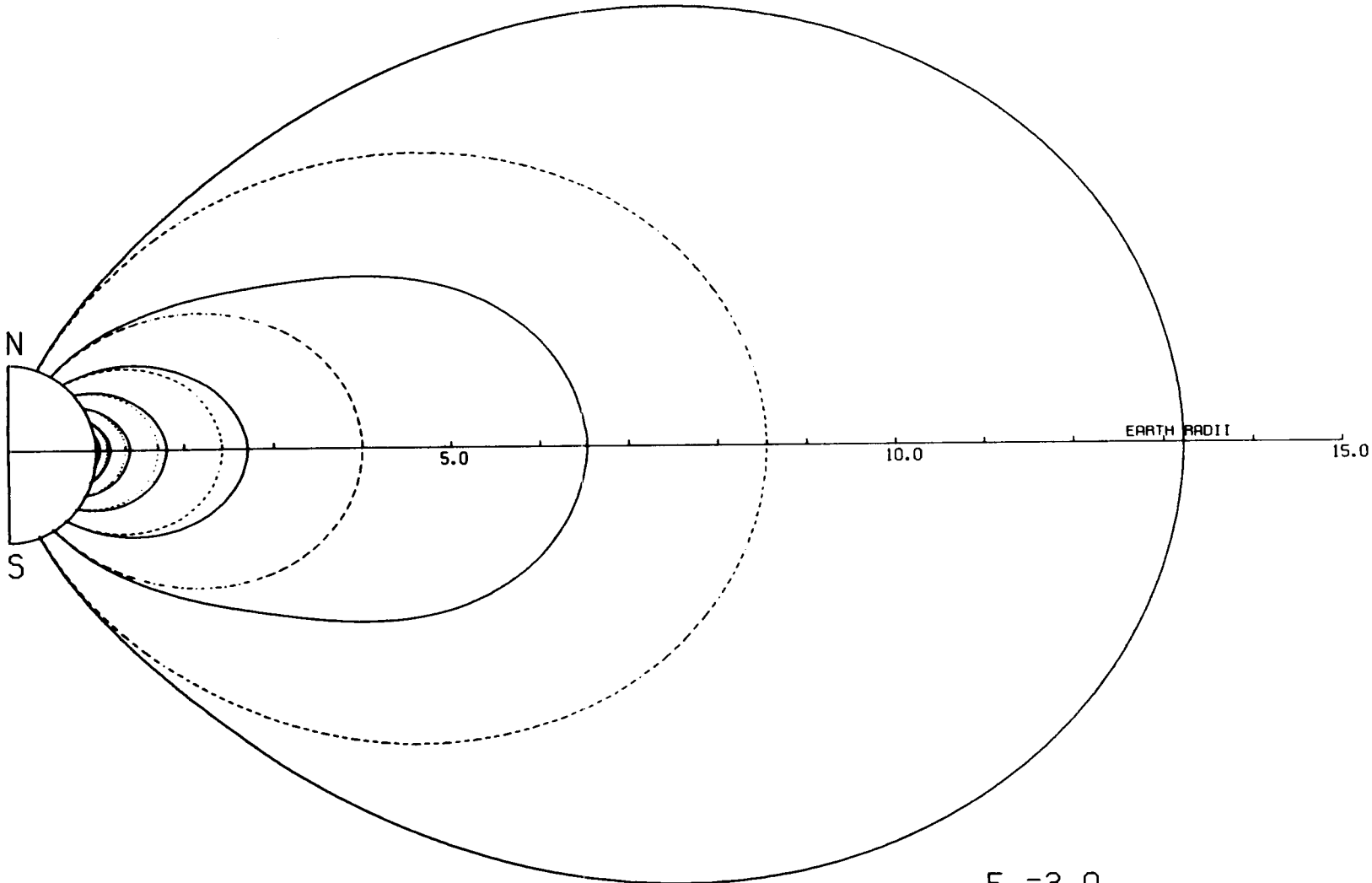



Figure 1

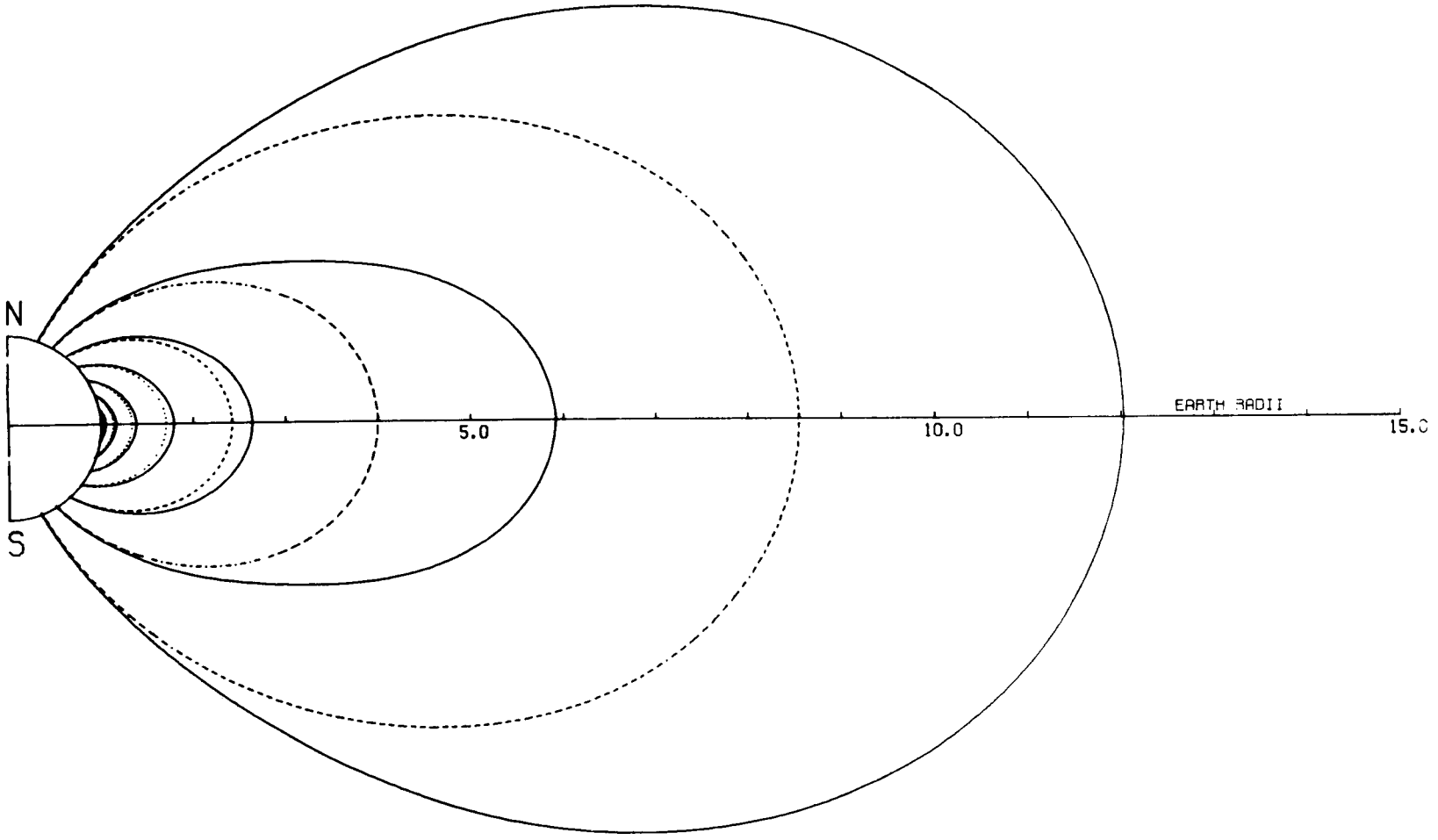
# DISTORTED FIELD




F =3.0
G1=1.517
G2=.759
ALPHA=2.0
FJ=3500.0

Figure 2

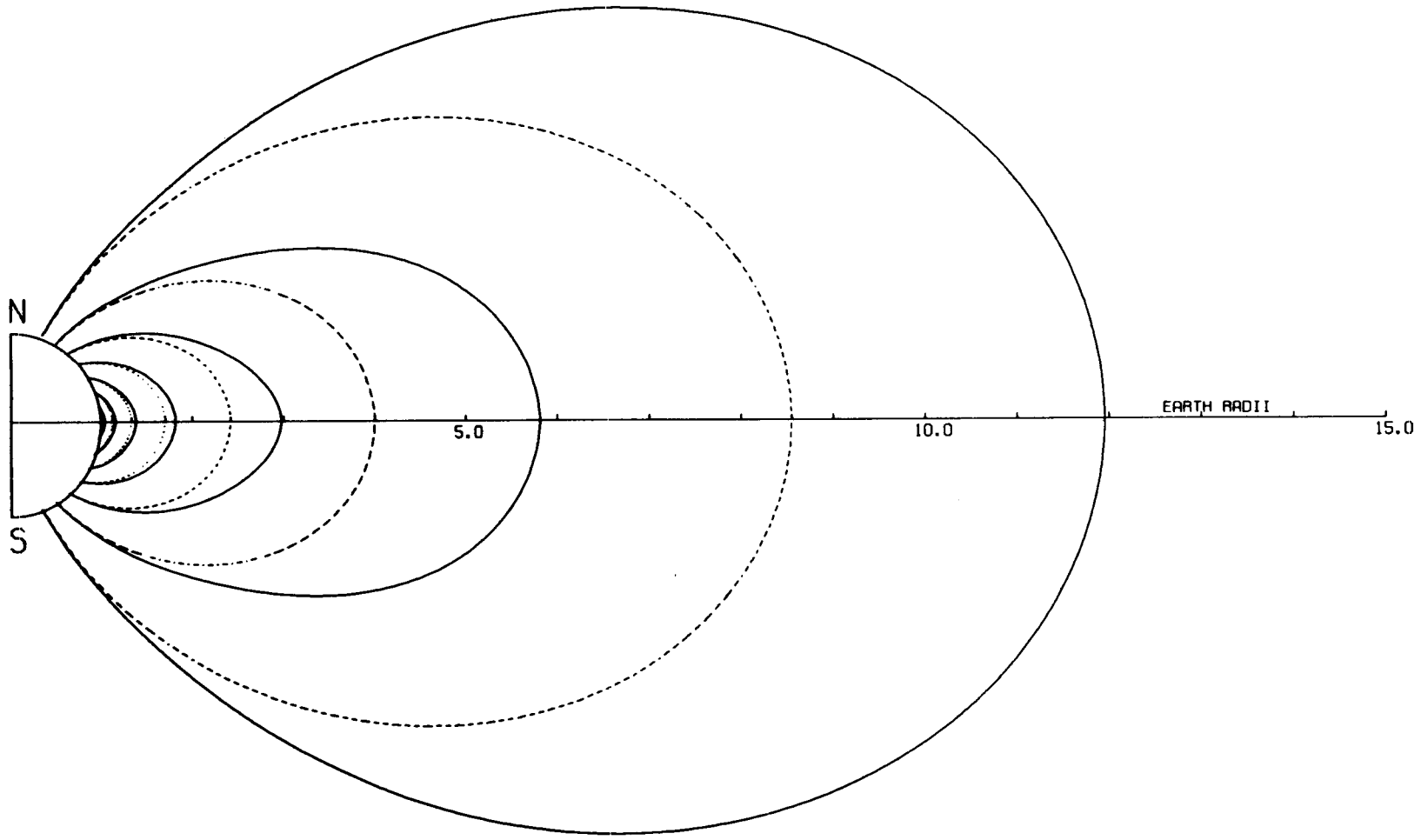
# DISTORTED FIELD




F =3.0
G1=1.517
G2=.759
ALPHA=2.0
FJ=2500.0

**Figure 3**

# DISTORTED FIELD




F =2.0
G1=1.517
G2=.759
ALPHA=2.0
FJ=10000.0

**Figure 4**