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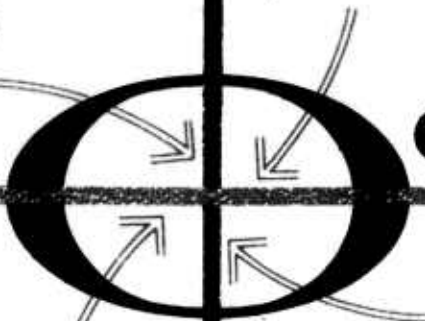
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Reviews in GEOPHYSICS

NO. 5

GREAT CIRCLE EQUIVALENT ROUTE
WINDS FOR MILITARY APPLICATIONS

at heights of 20,000, 30,000,
40,000 and 53,000 feet

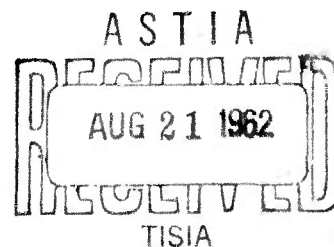
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JULY 1962

BOEING
TRANSPORT DIVISION

GREAT CIRCLE EQUIVALENT ROUTE WINDS
FOR MILITARY APPLICATIONS

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40,000 and 53,000 feet

REVIEWS IN GEOPHYSICS NO. 5

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D6-9175 replaces D6-5185

JULY 1962

THE BOEING COMPANY
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D6-9175

~~REF ID: A65500~~

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ABSTRACT

Equivalent headwinds or equivalent winds are computed using Sawyer's method for about 2000 routes over strategic air routes. The seasonal mean equivalent wind and its standard deviation and the annual 50-, 75- and 85-per cent reliability equivalent winds are tabulated. Route winds are computed for the 20,000-, 30,000-, 40,000- and 53,000-foot levels. An IBM 7090 program was used to compute the equivalent winds. Input data for the program consist, for each level, of a grid composed of the mean vector wind and the standard vector deviation at the intersection of each 5° of latitude with each 10° of longitude between 60°S and 60°N and at the intersection of each 5° of latitude with each 20° of longitude south and north of 60°S and 60°N respectively. In addition to the equivalent winds, great circle distances are computed and tabulated for each route.

FORWARD

Two years ago, The Boeing Company published three documents on equivalent route winds for domestic, International and military air routes for use in the airline industry. Since that time new and revised summaries of upper wind statistics were published. Boeing meteorologists incorporated these summaries into three new and completely revised and expanded documents on equivalent route winds. The new documents are "Equivalent Winds For North American Air Routes," D6-9176; "Equivalent Winds For World Air Routes," D6-9177; and "Great Circle Equivalent Route Winds For Military Application," D6-9175. These documents replace the three earlier "Wind Documents", "Winds For United States Air Routes," D6-5186; "Winds For World Air Route," D6-5187; and "Great Circle Route Equivalent Headwinds For Military Application," D6-5185.

The efforts of E. Lesford of the Engineering Computing and Analysis Staff for preparing the 7090 program used to compute the route winds is gratefully acknowledged. Thanks are also due to Alice Post for the industry and care shown in tabulating the wind data summaries.

GREAT CIRCLE EQUIVALENT ROUTE WINDS FOR MILITARY APPLICATIONS
at heights of 20,000, 30,000, 40,000 and 53,000 feet

I. INTRODUCTION

The development and introduction of high-performance jet aircraft for civil and military use established a requirement for route wind statistics with which to make long-term estimates of the economic and strategic capabilities of these aircraft when operated at new cruising heights and over new route systems. To meet this need for route-wind data, Boeing Meteorologists computed seasonal and annual equivalent winds for the principal strategic air routes.

II. DEFINITIONS

A. EQUIVALENT ROUTE WIND

The equivalent wind for an air route may be defined as a uniform wind, which, directed along the track at all points, results in the same average ground speed as that actually attained. Alternately, the equivalent route wind is the difference between the average airspeed and the average ground-speed throughout the flight.

B. RELIABILITY EQUIVALENT ROUTE WIND

The reliability equivalent wind is in the case of a headwind (tailwind), a route wind which is not exceeded (a route wind which can be relied upon) a given per cent of occasions or time during a given period.

III. COMPUTATIONS

A. EQUATIONS

1. Equivalent Route Wind

Sawyer's theory of equivalent headwinds has been applied extensively to the computation of equivalent route winds¹⁻⁹. This method involves use of the mean vector wind and the standard vector deviation: two parameters which completely define the circular normal distribution of winds generally found in the free atmosphere. Charts and tabulations of the mean vector wind and the standard vector deviation are available in many meteorological publications¹⁰⁻¹⁹.

The principal assumptions of Sawyer's theory are (1) the wind speed does not exceed the speed of the aircraft and (2) the distribution of winds in the free atmosphere during a given season can be approximated by the circular normal distribution. Based on these and other assumptions, the basic equation for the average equivalent headwind, $\bar{w}$, over a route and expressed in terms of the mean vector wind, $\bar{V}$, and the standard vector deviation, σ , at points along the route is

$$[\bar{w}] = -[\bar{u}] + \frac{1}{A} \left\{ \frac{(\bar{v})^2}{2} + \frac{[\sigma^2]}{4} \right\} \quad (1)$$

where:

- $\bar{u}$ = Mean wind parallel to the track
- $\bar{v}$ = Mean wind normal to the track
- σ = Standard vector deviation
- A = Airspeed.

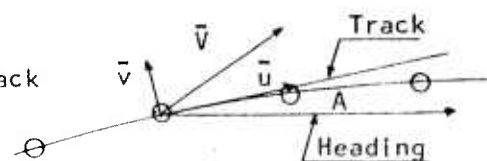


Fig. 1. Airspeed - Wind Vector Relationships

The bar denotes a mean value over a long period of time and the square brackets denote a mean value taken over a number of points along the route (Fig. 1).

Correlation studies and physical considerations reveal that vector winds at points along a route are related to one another^{1,2}. For this reason, the mean vector wind and the standard vector deviation at points along a route while sufficient to determine the average value of the route equivalent wind, are insufficient to determine its variability. For example, strong winds at points along a route may or may not occur simultaneously. If they do not occur together, there is a tendency for the headwind components to average out such that the average value of the extreme winds is less than the values of the extreme winds at individual points over the route. Sawyer¹ has shown this to be the case.

2. Route Standard Deviation

The route standard deviation provides a measure of the variability of the equivalent route wind. The relationship between the route standard deviation and the average value of the standard vector deviation at points along the route is

$$\sigma_t = s \left[\sigma^2 \right]^{1/2} \quad (2)$$

where:

- σ_t = Route standard deviation (tabulated value)
- s = Factor to convert the mean standard vector deviation of wind over a route, $\left[\sigma^2 \right]^{1/2}$, into the route standard deviation of the equivalent route wind. The value of s decreases with increasing route length and exhibits some variation with season, latitude and route orientation¹.

The values of s used in preparing Table 4 are those listed in Graystone⁶.

3. Great Circle Distance

Route lengths in nautical miles are computed over the great-circle course, i.e. the least distance on a sphere, between terminals. The expression used to compute great circle distances is

$$D = 60 \cos^{-1} \left\{ \sin \psi_1 \sin \psi_2 + \cos \psi_1 \cos \psi_2 \cos (\lambda_1 - \lambda_2) \right\} \quad (3)$$

where:

D = Great circle distance in nautical miles

ψ = Latitude

λ = Longitude

$\cos^{-1} \left\{ \right\}$ = Angle expressed in minutes.

South latitudes and east longitudes are considered negative and north latitudes and west longitudes are considered positive.

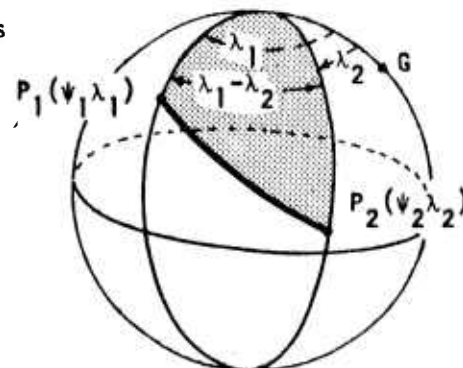


Fig. 2
Great Circle Distance

B. ANNUAL EQUIVALENT ROUTE WINDS

Annual equivalent route winds are computed from the mean seasonal values of equivalent route winds and their standard deviations. The technique involves an iterative procedure by which wind speeds are found such that 50, 75 and 85 per cent of the total area under the four seasonal wind distribution curves, lies to their right. With reference to Figure 3, the 50, 75 and 85 annual equivalent winds are estimated to be -5, -11 and -13 knots respectively.

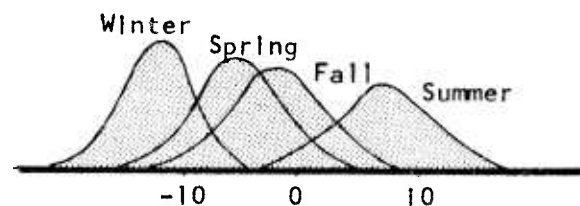


Fig. 3. Hypothetical Seasonal
Wind Distribution

C. INPUT DATA

The most recent and internally consistent summaries of statistical wind data available were used. Wind statistics were obtained from Tucker¹⁷ and Heastle and Stephenson¹⁸ for the southern hemisphere and from Crutcher¹⁵ for the northern hemisphere, while the airport coordinates were obtained from standard reference sources. The mean vector wind and the standard vector deviation together with the coordinates of each terminal form the input data for an IBM 7090 program. The wind parameters for the four seasons and for the 20,000- (500 mb), 30,000- (300 mb), 40,000- (200 mb) and 53,000- (100 mb) foot levels, were obtained by computing them at the intersection of each 5° of latitude with each 10° of longitude between 60°N and 60°S and at the intersection of each 5° of latitude with each 20° of longitude north of 60°N and south of 60°S.

D. METHOD

Equivalent route winds are computed by first dividing the route into an integral number of segments of 200 miles or less in length and then calculating the headwind at the mid-point of these segments. This is accomplished by weighing the four nearest wind values (at grid points) in proportion to their proximity to the point on the route and then averaging. The averaged values in turn are used to compute the equivalent wind for the entire route.

By convention a positive sign denotes a tailwind, a negative sign a headwind.

E. TABULATIONS

Equivalent winds for the 20,000-, 30,000-, 40,000- and 53,000-foot levels and for all combinations of routes between 65 airports are computed (Table 4). The route wind tabulations are organized

alphabetically by the terminals that identify each route. Included in the data are:

1. The direct and return seasonal mean equivalent route wind and its standard deviation and the annual 50-, 75- and 85-per cent reliability equivalent route wind in knots
2. The great circle distance in nautical miles.

An alphabetical listing of terminals with their airport names, geographical coordinates and length of the longest runway is provided (Table 3).

IV. USE OF TABLES

A. NORMAL CURVE

Brooks¹⁰ et al found that in any one season the distribution of equivalent route winds about the mean closely approximates the normal law of errors. According to this law, the mean and its standard deviation completely define the distribution of winds about the mean. In turn, this error distribution very nearly approximates the normal or Gaussian frequency distribution defined as

$$y = \frac{1}{\sigma \sqrt{2 \pi}} e^{-x^2/2\sigma^2} \quad (4)$$

where:

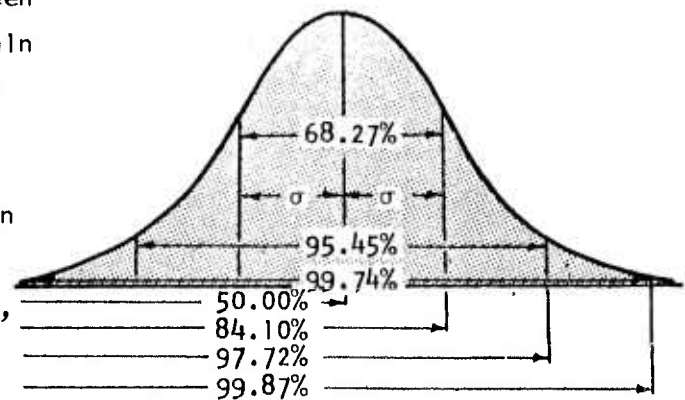
- y = The frequency ordinate at distance x from the mean
- σ = The standard deviation.

With reference to Figure 4 some of the more important properties of the normal curve to be noted in estimating reliability winds are:

1. The mean, median and mode are identical

2. Areas under the normal curve between abscissae $\pm \sigma$, $\pm 2\sigma$ and $\pm 3\sigma$ contain 68.27, 95.45 and 99.74 per cent of the whole sample

3. The value of the standard deviation equals the difference between the ordinate for 50 and 84.13 per cent, i.e. $50 + 68/2 = 84$ per cent.



B. ESTIMATING RELIABILITY EQUIVALENT ROUTE WINDS

Computation of reliability equivalent route winds deserves special attention since deviations of the relative frequency of extreme wind speeds from the assumed normal law of errors may be appreciable, particularly at levels and in regions affected by jet streams. The frequency of extreme values is probably higher than that predicted

from the assumed model. For this reason reliability equivalent winds for percentages less than 5 and greater than 95 are likely unreliable.

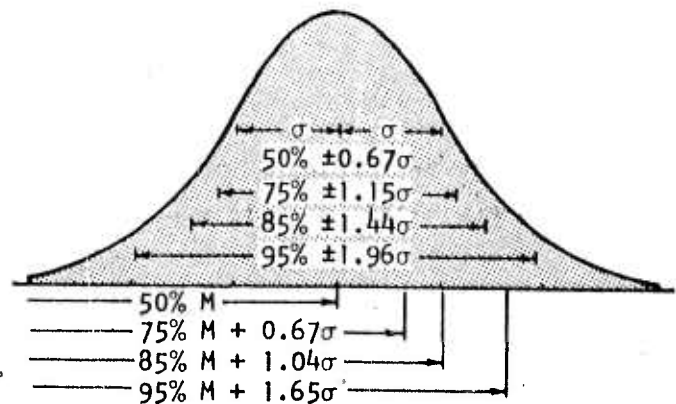


Fig. 4b. Normal Curve

Two methods for estimating equivalent winds for reliabilities other than for the tabulated mean values involve use of error factors and secondly use of arithmetic probability paper.

1. Error Factor Method

For a given route, reliability equivalent winds are computed by subtracting the product of k times the standard deviation from the mean equivalent wind, where k is a factor derivable from the error function.

Values of k are given in Table 1.

The error factors method is illustrated by computing the 85-per cent reliability equivalent route wind over the great circle Campbell AFB-to-McChord AFB route during winter at the 40,000-foot level. From Table 4 the Direct and Return equivalent winds are -54 and 51 knots respectively and the standard deviation, 19 knots. From Table 1, the error factor is 1.04.

Table 1. Error Factors

Per Cent	k
50	0.0
60	0.25
70	0.52
80	0.84
85	1.04
90	1.28
95	1.65

- a) The DIRECT 85-per cent reliability equivalent wind which should not be exceeded on 85 per cent of occasions is a headwind of -74 knots;

$$-54 - (1.04 \times 19) = -74 \text{ knots.}$$

- b) The RETURN 85-per cent reliability equivalent wind which can be relied on 85 per cent of occasions is a tailwind of 31 knots;

$$51 - (1.04 \times 19) = 31 \text{ knots.}$$

2. Arithmetic Probability Paper Method

As previously stated, in any one season the distribution of equivalent route winds about the mean closely approximates the normal law of errors and the normal or Gaussian frequency distribution defined in (4). Arithmetic probability paper is arranged with the per cent cumulative frequency scale printed on the ordinate such that the integral

$$Q(x) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^x e^{-x^2/2} dx \quad (5)$$

of the normal frequency curve plots as a straight line while the abscissa has a linear scale. The sign convention for equivalent wind speeds is + for a tailwind and - for a headwind.

Thus, to obtain a frequency distribution of the equivalent route winds for the great circle Campbell AFB-to-McChord AFB route at 40,000 feet during winter, look up the value of the 50 per cent direct (-54 knots) and return (51 knots) equivalent wind and the standard deviation (19 knots) in Table 4. Next plot -54 on the 50 per cent value of the ordinate scale and -73 (-54 - 19) knots on the 84 per cent ordinate value and draw a straight line through these points. Similarly for the McChord AFB-to-Campbell AFB route, plot 51 knots on the 50 per cent ordinate value and 32 (51 - 19) knots on the 84 per cent value of the ordinate scale and draw a straight line through these points. These two lines give the frequency distribution of equivalent winds over the route.

Use of these curves in Figure 6 is illustrated with three examples.

- a) The per cent of equivalent tailwinds that fall in the 35-45 knot range for the McChord AFB-to-Campbell AFB route is 17 per cent (80 - 63).
- b) Equivalent winds that should not be exceeded between 50 and 95 per cent of the time on the Campbell AFB-to-McChord AFB route range from -54 to -85 knots.
- c) For the McChord AFB-to-Campbell AFB route an equivalent tailwind of 31 knots can be relied on 85 per cent of the time.

C. VARIATION IN AIRSPEED

The tabulated equivalent wind data were computed for a 450-knot airspeed, but may be used for airspeeds between 300 and 550 knots because the small variation of equivalent wind with airspeed. For airspeeds outside this range, the tabulated values may be modified as follows. If D and R represent the DIRECT and RETURN equivalent wind for a 450 knot airspeed, the corresponding values, D' and R' for the new airspeed, A, are:

$$D' = 1/2 (D - R) + \frac{225}{A} (D + R) \quad (6)$$

$$R' = -1/2 (D - R) + \frac{225}{A} (D + R) \quad (7)$$

These expressions are derived from (1) by setting

$$\left[\bar{w} \right] = -\left[\bar{u} \right] + M \frac{1}{A}$$

where:

$$M = \left\{ \left[\frac{(\bar{v})^2}{2} + \left[\frac{\sigma}{4} \right]^2 \right\}.$$

Then for a 450 knot airspeed

$$D = -\left[\bar{u} \right] + \frac{M}{450} \quad (8)$$

$$R = \left[\bar{u} \right] + \frac{M}{450} \quad (9)$$

and for airspeed, A

$$D' = -\left[\bar{u} \right] + \frac{M}{A} \quad (10)$$

$$R' = \left[\bar{u} \right] + \frac{M}{A} \quad (11)$$

Substitute

$M = 225 (D + R)$, obtained from adding (8) and (9) and

$\left[\bar{u} \right] = -\frac{D - R}{2}$, obtained from subtracting (9) from (8) into (10) and (11), thus obtaining (6) and (7).

If D and R are of equal value and of opposite sign, the tabulated values are the same for any airspeed. If $D \neq R$, i.e., a cross wind component is present, D' and R' will differ slightly from D and R.

Per cent reliability equivalent headwinds computed for the new airspeed, A' , will differ by the same amount as the mean values, i.e. $D - D'$, because standard deviations are not sufficiently affected by changes in airspeed².

For example, to compute the direct and return mean equivalent wind for the December-February season over the Kindley-to-Tan San Nhut route for a 675-knot airspeed and at 40,000 feet, we have from Table 4,

$$D = 12 \text{ knots}$$

$$R = -16 \text{ knots}$$

Then,

$$\begin{aligned} D' &= 1/2 \left(12 - (-16) \right) + \frac{225}{675} \left(12 + (-16) \right) \\ &= 13 \text{ knots} \end{aligned}$$

$$\begin{aligned} R' &= -1/2 \left(12 - (-16) \right) + \frac{225}{675} \left(12 + (-16) \right) \\ &= -15 \text{ knots} \end{aligned}$$

D. GREAT CIRCLE ROUTE LENGTH

The route length in nautical miles is computed over the great-circle course, i.e. the least distance on a sphere, between terminals (Fig. 5). For completeness, a great circle may be defined as the intersection of the surface of a sphere and a plane which passes through the center of the sphere. A nautical mile is the length of one minute of arc along a great circle on the earth's surface, i.e. the earth's circumference is $360 \times 60 = 21,600$ n. mi. In terms of statute miles, 1 n. mi. = 1.1508 miles. A knot is one nautical mile per hour.

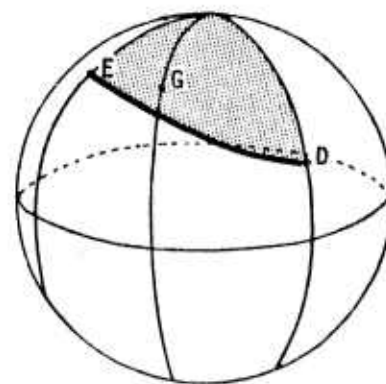


Fig. 5
Great Circle Route Length

For example the great circle distance between Ernst Harmon ($48^{\circ}32'$, $58^{\circ}33'$) and Dhahran ($26^{\circ}17'$, $-50^{\circ}10'$) may be computed from (3).

$$D = 60 \cos^{-1} \left\{ \sin \psi_1 \sin \psi_2 + \cos \psi_1 \cos \psi_2 \cos (\lambda_1 - \lambda_2) \right\} \quad (3)$$

With the aid of Table 2,

$$\begin{aligned} D &= 60 \cos^{-1} \left\{ \sin(48^\circ 32') \sin(26^\circ 17') + \cos 48^\circ 32' \cos 26^\circ 17' \cos 108^\circ 43' \right\} \\ &= 60 \cos^{-1} \left\{ .1412 \right\} \\ &= 4913 \text{ n. ml.} \end{aligned}$$

Table 2. Reference Trigonometric Relationships

$$\begin{aligned} \sin(90 + \psi) &= \cos \psi & \cos(90 + \psi) &= -\sin \psi \\ \sin(90 - \psi) &= \cos \psi & \cos(90 - \psi) &= \sin \psi \\ \sin(-\psi) &= -\sin \psi & \cos(-\psi) &= \cos \psi \end{aligned}$$

E. EQUIVALENT ROUTE LENGTH

$$\begin{array}{c|c} + \sin & + \sin \\ - \cos & + \cos \\ \hline - \sin & - \sin \\ - \cos & + \cos \end{array}$$

The equivalent route length, for a given reliability equivalent wind, is the distance that an aircraft would fly in still air on a flight having the same duration as that required to fly the route with given per cent equivalent wind. The equivalent route wind may be expressed as

$$L_x = \frac{DA}{A + W_x} \quad (11)$$

where:

L_x = Equivalent route length in knots for x per cent reliability equivalent wind W_x

D = Great circle distance in nautical miles

A = Airspeed in knots.

For example, the 85-per cent reliability route length over the great circle Campbell AFB-to-McChord AFB route at 40,000 feet in the December-February season for an airspeed of 450 knots is

$$\begin{aligned} \text{DIRECT: } L_{85} &= \frac{1667 \times 450}{450 + (-74)} \\ &= 1995 \text{ n. ml.} \end{aligned}$$

$$\begin{aligned} \text{RETURN: } L_{85} &= \frac{1667 \times 450}{450 + (31)} \\ &= 1560 \text{ n. ml.} \end{aligned}$$

V. OCCURRENCE OF HEADWINDS ON BOTH DIRECT AND RETURN FLIGHTS

Over routes characterized by prevailing light winds or by strong beam winds, the direct and return route winds can both appear as a headwind. This situation occurs when the contribution to the mean equivalent wind from the wind components at right angles to the track exceeds the contribution from the wind components along the track. The effect of beam winds on the ground speed becomes apparent when it is realized that an airplane could make no progress in a beam wind equal to its airspeed.

Reliability equivalent winds for some routes appear as headwinds for the direct and return flight. This situation can occur over routes where the mean equivalent wind is about the same magnitude as its standard deviation. For example, a route having a mean equivalent tailwind of 12 knots, and a standard deviation of 15 knots, has an 85 per cent reliability headwind of -3 knots. In this example a tailwind has not become a headwind, but rather a headwind of -3 knots is not likely to be exceeded on 85 per cent of occasions and a tailwind of 12 knots can be relied on 50 per cent of occasions.

VI. RELIABILITY OF RESULTS

The reliability of the tabulated equivalent headwinds in being representative of the actual route winds over great circle routes depends largely upon the assumption that wind distributions in the free atmosphere can be treated by the circular normal distribution. This distribution requires that the zonal and meridional components of wind be uncorrelated and that their standard deviation be equal. From physical considerations, however, some degree of ellipticity must be present, otherwise there would be no mean transport of energy in the atmosphere as is observed. For most conditions, the degree of ellipticity is small and the assumed circular normal distribution acceptable. Brooks¹⁰ pointed out that the assumption of circularity is likely to be weakest in frontal zones, in

the vicinity of jet streams and in areas characterized by distinct seasonal wind variation such as the boundary region between a monsoon circulation and the circulation above.

The tabulated values are intended as long term estimates of en route winds and as such the actual winds in any one season may differ appreciably from them. This condition particularly occurs where air routes closely parallel the mean position of the jet stream. Where air routes routinely traverse normal to the jet stream, however, only small differences between the tabulated and observed route winds should occur.

VII. CONCLUSION

The application of equivalent winds can aid agencies concerned with the problems of aircraft logistics to estimate the long term economic capabilities of carriers over new routes and at the elevated cruise levels of jet aircraft. Considerable effort is still needed to combine the element of temperature with that of wind into one reliability factor which would reflect the effect of the environment of aircraft performance. The solution of this problem involves not only combining and presenting the probabilities that equivalent headwinds and en route and surface temperatures occur but also weighing these factors according to their individual effect on aircraft performance.

While the circular normal distribution adequately describes the distribution of upper air winds, except in some regions as noted, the general bivariate normal distribution appears to provide the best description. Even this elliptical distribution, however, may not adequately describe the winds in some regions. At present, wind statistics based on the bivariate normal distribution are available only for the Northern Hemisphere.

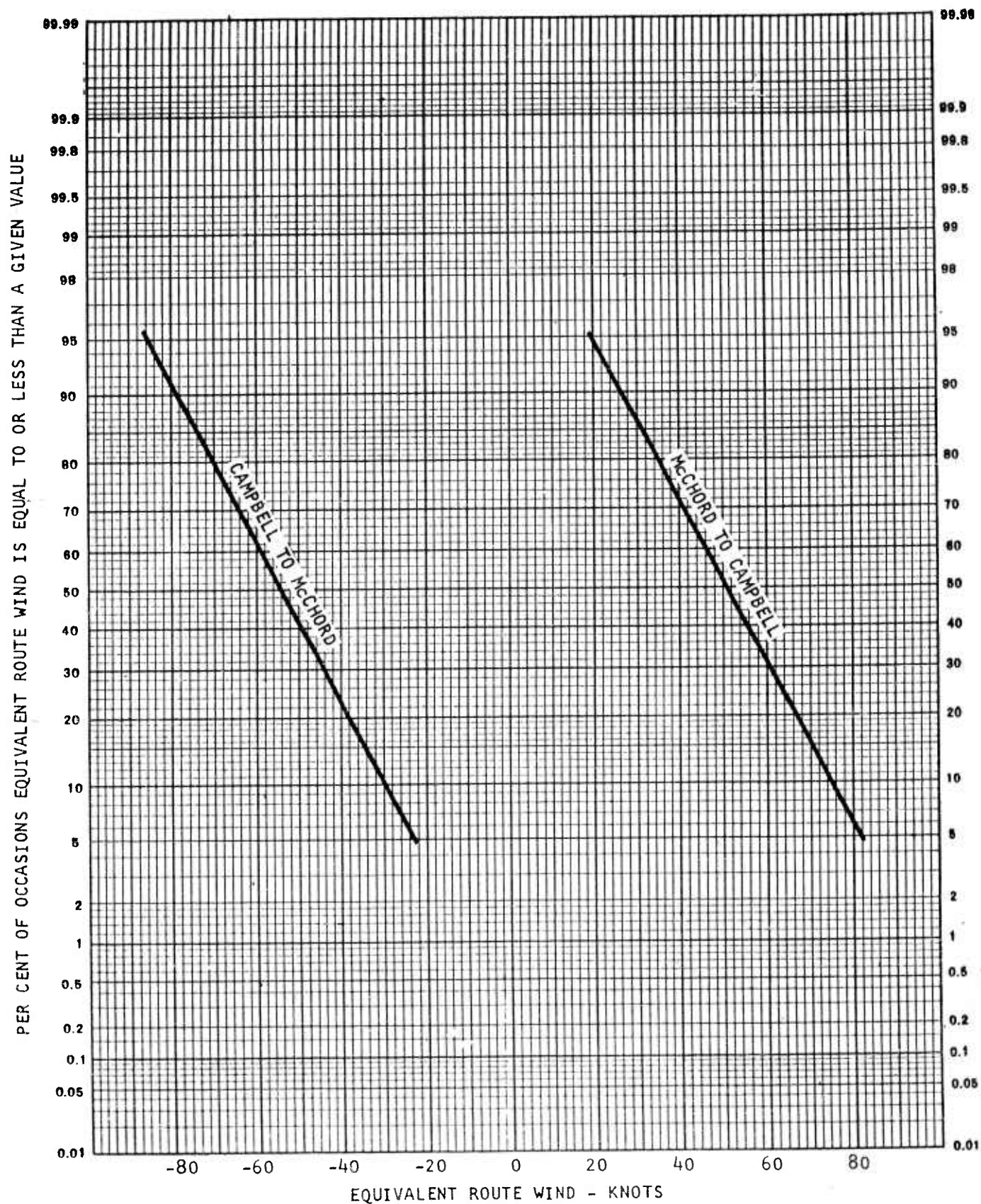
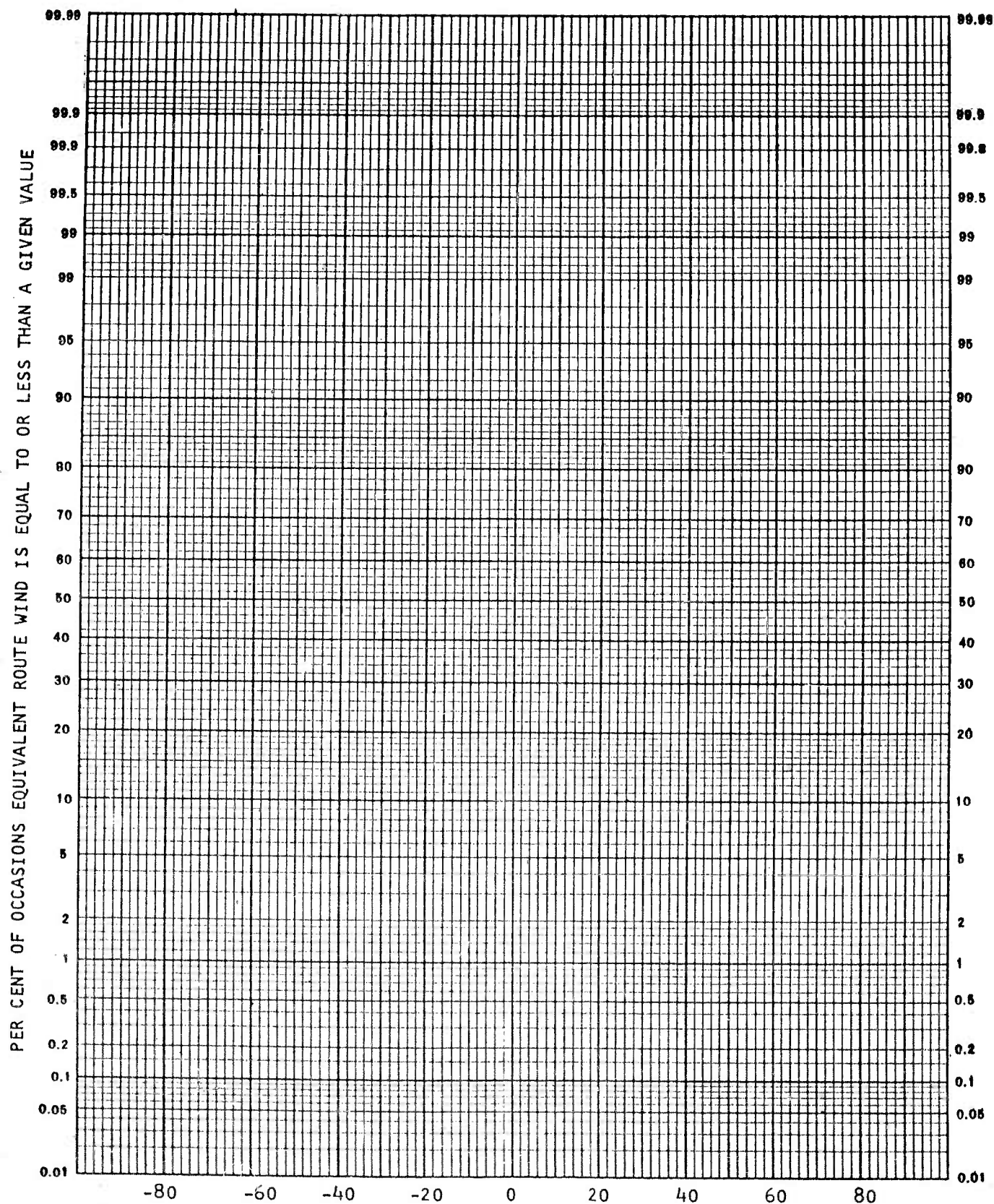


FIGURE 6. PROBABILITY PAPER



REFERENCES

1. Sawyer, J. S., "Equivalent headwinds: Application of upper-wind statistics to air-route planning," Met. Rep., London, 2, No. 6, M.O. 535a, Her Majesty's Stationery Office, 1950, 20 p.
2. "Equivalent headwinds on some of the principal air routes of the world," Met. Rep., London, 2, No. 2, M.O. 535b, Her Majesty's Stationery Office, 1950, 19 p.
3. Phillipot, H. R. and Reid, D. G., "Equivalent headwinds on Australian air routes," Bulletin No. 41, Commonwealth of Australia, May 1952, 24 p.
4. Cohen, S., "Sector equivalent headwinds on QANTAS world air routes," Rep. No. 1600, Issue A, QANTAS Empire Airways, 1956, 142 p.
5. Crossley, A. F., "Temperature-compensated equivalent headwinds for jet aircraft," Met. Rep., London, 8, No. 17, M.O. 621a, Her Majesty's Stationery Office, 1957.
6. Graystone, P., "Equivalent headwinds at heights of 30,000 feet and 40,000 feet along air routes," Met. Rep., London, 8, No. 20, M.O. 621d, Her Majesty's Stationery Office, 1958.
7. Evenson, A. A., Mancuso, R. L. and Wells, R. M., "Winds for United States air routes: Equivalent headwinds at heights of 20,000, 30,000 and 40,000 feet," D6-5186, The Boeing Company, 1960, 260 p.
8. _____, "Winds over World air routes: Equivalent headwinds at heights of 20,000, 30,000 and 40,000 feet with supplementary airport temperatures," D6-5187, The Boeing Company, 1960, 194 p.
9. _____, "Great circle route equivalent headwinds for military applications with supplementary airport temperatures," D6-5185, The Boeing Company, 1960, 176 p.
10. Brooks, C. E. P., Durst, C. S., Carruthers, N., Dewar, D. and Sawyer, J. S., "Upper winds over the world," Geophys. Mem., London, 10, No. 85, Her Majesty's Stationery Office, 1950, 150 p.

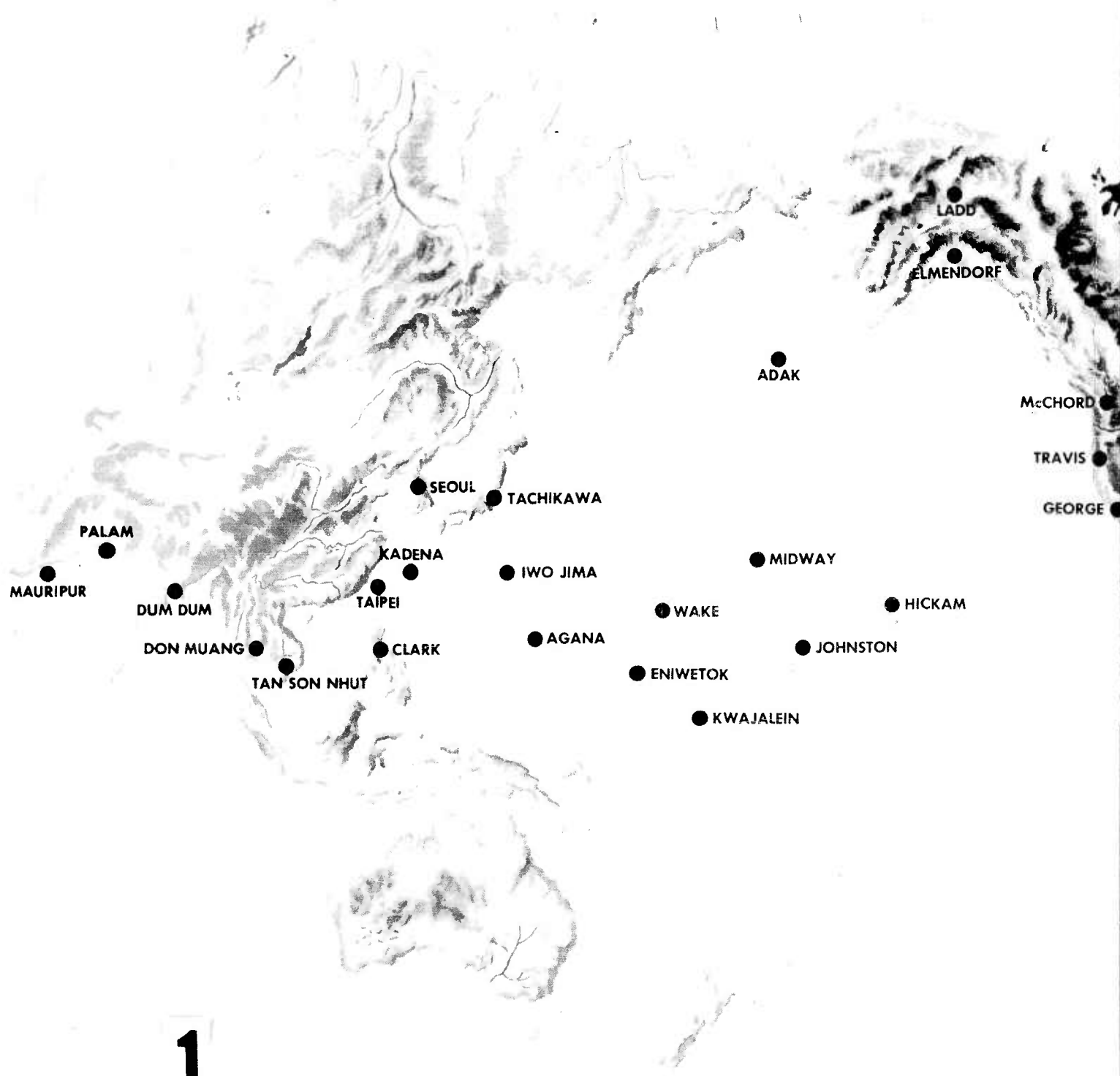
11. Henry, T. J. G., "Map of upper winds over Canada," Meteorological Branch, Department of Transport, 1957, 61 p.
12. Lahey, J. F., Bryson, R. H., Wahl, E. W., Horn, L. H. and Henderson, V. D., "Atlas of 500 mb wind characteristics for the Northern Hemisphere," University of Wisconsin Press, Madison, 1958.
13. U. S. Weather Bureau, "Upper wind distribution statistical parameter estimates," Tech. Paper No. 34, U. S. Department of Commerce, November 1958.
14. Ratner, B., "Upper-air climatology of the United States: Part 3 - Vector winds and shear," Tech. Paper No. 32, U. S. Weather Bureau, 1959, 67 p.
15. Crutcher, H. L., "Upper wind statistics charts of the Northern Hemisphere (850, 700 and 500 mb levels)," NAVAER 50-1C-535, Vols. I and II, Office of the Chief of Naval Operations, August 1959.
16. Lahey, J. F., Bryson, R. A. Corzine, H. A. and Hutchins, C. W., "Atlas of 300 mb wind characteristics for the Northern Hemisphere," University of Wisconsin Press, Madison, 1960.
17. Tucker, G. B., "Upper winds over the world: Part III, Standard vector deviation of wind up to the 100- millibar level over the world," Geophys. Mem., London, 13, No. 105, M.O. 631e, Her Majesty's Stationery Office, 1960, 101 p.
18. Heastle, H. and Stephenson, P. M., "Upper winds over the world," Parts I and II, Geophys. Mem., London, 13, No. 103, M.O. 631c, Her Majesty's Stationery Office, 1960, 217 p.
19. Crutcher, H. L., "Meridional cross-sections: Upper winds over the Northern Hemisphere," Tech. Paper No. 41, U. S. Weather Bureau, June 1961, 307 p.
20. Brooks, C. E. P. and Carruthers, N., Handbook of Statistical Methods in Meteorology, London, M.O. 538, Her Majesty's Stationery Office, 1953
21. Durst, C. S., "Variation of wind with time and distance," Geophys. Mem., London, 12, No. 93, 1954, 32 p.

TABLE 3. AIRPORTS

<u>AIRPORT</u>	<u>CITY - COUNTRY</u>	<u>CODE</u>	<u>LAT.</u> ° I	<u>LONG.</u> ° I	<u>ELEV.</u> ft.	<u>RUNWAY</u> ft.
Adak NAS	Adak, Alaska, U.S.A.	ADK	51.53N	176.39W	17	7900
Agana NAS	Guam, U.S.A.	GUM	13.29N	144.47E	280	10000
Albrook AFB	Balboa, Canal Zone U.S.A.		8.58N	79.33W	31	6800
Andrews AFB	Washington, D. C., U.S.A.		38.48N	76.53W	279	9700
Argentia NAS	Argentia, Newfoundland		47.18N	54.00W	51	7400
BW 8	Sondstrom, Greenland	SFJ	67.01N	50.42W	160	9200
Cairo Int'l	Cairo, Egypt	CAI	30.08N	31.24E	311	10827
Campbell AFB	Hopkinsville, Kentucky, U.S.A.		36.40N	87.29W	571	11800
Charleston AFB	Charleston, S.C., U.S.A.	CHS	32.54N	80.02W	45	9000
Chateauroux AB	Deols, France	FCX	46.51N	1.43E	532	8360
Churchill AP	Churchill, Canada	YYQ	58.45N	94.04W	100	11200
Clampino AP	Rome, Italy	ROM	41.48N	12.36E	423	7218
Clark AFB	Manila, Philippine Is.	UCL	15.11N	120.33E	475	10500
Dhahran AB	Saudi Arabia	DHA	26.17N	50.10E	78	10100
Don Muang	Bangkok, Thailand	BKK	13.54N	100.36E	12	9840
Dover AFB	Dover, Delaware, U.S.A.	DOV	39.08N	75.28W	28	8600
Dum Dum	Calcutta, India	CCU	22.38N	88.26E	8	7700
Elmendorf AFB	Anchorage, Alaska, U.S.A.	EDF	61.15N	149.48W	212	10000
Eniwetok AFB	Eniwetok Atoll, Marshall Is.	ENI	11.21N	162.20E	15	7700
Ernst Harmon AFB	Stephenville, Newfoundland	YJT	48.32N	58.33W	86	10000
Galeao	Rio de Janeiro, Brazil	RIO	22.49S	43.15W	10	10800
George AFB	Victorville, Calif., U.S.A.		34.35N	117.23W	2875	10000
Goose AB	Goose Bay, Labrador	YYR	53.19N	60.25W	150	11000
Heathrow	London, England	LON	51.28	0.27W	80	11000
Hickam AFB	Hawaiian Islands, U.S.A.	HIK	21.20N	157.56W	10	12300
Incirlik AB	Adana, Turkey		37.00N	35.26E	238	10000
Iwo Jima AB	Volcano Islands	IWO	24.47N	141.19E	353	9800
Johnston AFB	Johnston Island	JON	16.44N	169.31W	7	5900
Kadena AB	Okinawa	OKA	26.21N	127.46E	142	12100
Karachi	Karachi, Pakistan	KHI	24.54N	67.09E	75	10500
Keflavik AP	Keflavik, Iceland	KEF	63.59N	22.36W	169	10000
Kindley AFB	Bermuda	BDA	32.21N	64.41W	11	9710
Kwajalein NAS	Kwajalein Atoll	KWA	8.43N	167.44E	7	6750
Ladd AFB	Fairbanks, Alaska, U.S.A.	FBK	64.50N	147.38W	450	8400
Lajes AP	Terceira, Azores	LJZ	38.45N	27.05W	180	10400
Le Bourget AP	Paris, France	PAR	48.58N	2.27E	217	9842
Loring AFB	Limestone, Maine, U.S.A.		46.57N	67.53W		12100
McChord AFB	Tacoma, Washington, U.S.A.	TCM	47.09N	122.29W	320	10100
McGuire AFB	Wrightstown, N. J., U.S.A.	WRI	40.01N	74.35W	132	10000
Midway NAS	Sand Field	MDY	28.12N	177.23W	13	7900
Mildenhall AP	Mildenhall, England		52.22N	0.29E	30	9230
Minot AFB	Minot, N. Dak., U.S.A.		48.16N	101.17W	1723	13200
Myrtle Beach AFB	Myrtle Beach, S. C., U.S.A.		33.41N	78.56W	24	9500
Nouasseur AB	Casablanca, Morocco	NNR	33.23N	7.35W	655	12200
Orly AP	Paris, France	FOL	48.44N	2.23E	295	10892
Palam AP	New Delhi, India	NDH	28.34N	77.07E	761	7500
Patrick AFB	Cocoa Beach, Fla., U.S.A.		28.15N	80.36W	9	10000

<u>AIRPORT</u>	<u>CITY - COUNTRY</u>	<u>CODE</u>	<u>LAT.</u> °	<u>LONG.</u> °	<u>ELEV.</u> ft.	<u>RUNWAY</u> ft.
Piarco AP	Port of Spain, Trinidad	TND	10.36N	61.21W	44	9500
Pope AFB	Fort Bragg, N. C., U.S.A.		35.10N	79.01W	220	7500
Prestwick AB	Prestwick, Scotland	PIK	55.30N	4.35W	64	9800
Ramey AFB	Aguadilla, Puerto Rico	BQN	18.30N	67.08W	237	11700
Rhein/Main AB	Frankfurt, Germany	FRA	50.02N	8.34E	368	12795
Seoul AB	Seoul, Korea	SEL	37.31N	126.56E	34	5600
Sheremetievo	U.S.S.R.	MOW	55.58N	37.25E	623	11100
Stevenson Field	Winnipeg, Canada	YWG	49.54N	97.14W	785	8700
Sung Shan	Taipei, Formosa	TPE	25.04N	121.33E	21	7500
Tachikawa AB	Tokyo, Japan		35.42N	139.24E	316	5000
Tan San Nhut	Salgon, Vietnam	SGN	10.49N	106.39E	33	7900
Thule AB	Thule, Greenland	THU	76.32N	68.45W	251	10000
Torbay AP	St. Johns, Newfoundland	YYT	47.37N	52.45W	484	7000
Torrejon AFB	Madrid, Spain		40.29N	3.28W	1991	13400
Travis AFB	Fairfield, Calif., U.S.A.	SUU	38.16N	121.56W	58	11000
Wake AP	Wake Island	AWK	19.17N	166.39E	12	9500
Westover AFB	Chicopee Falls, Mass., USA		42.12N	72.33W	245	11600
Wheelus AP	Tripoli, Libya	AWF	32.54N	13.17E	36	11000

TERMINAL LOCATIONS



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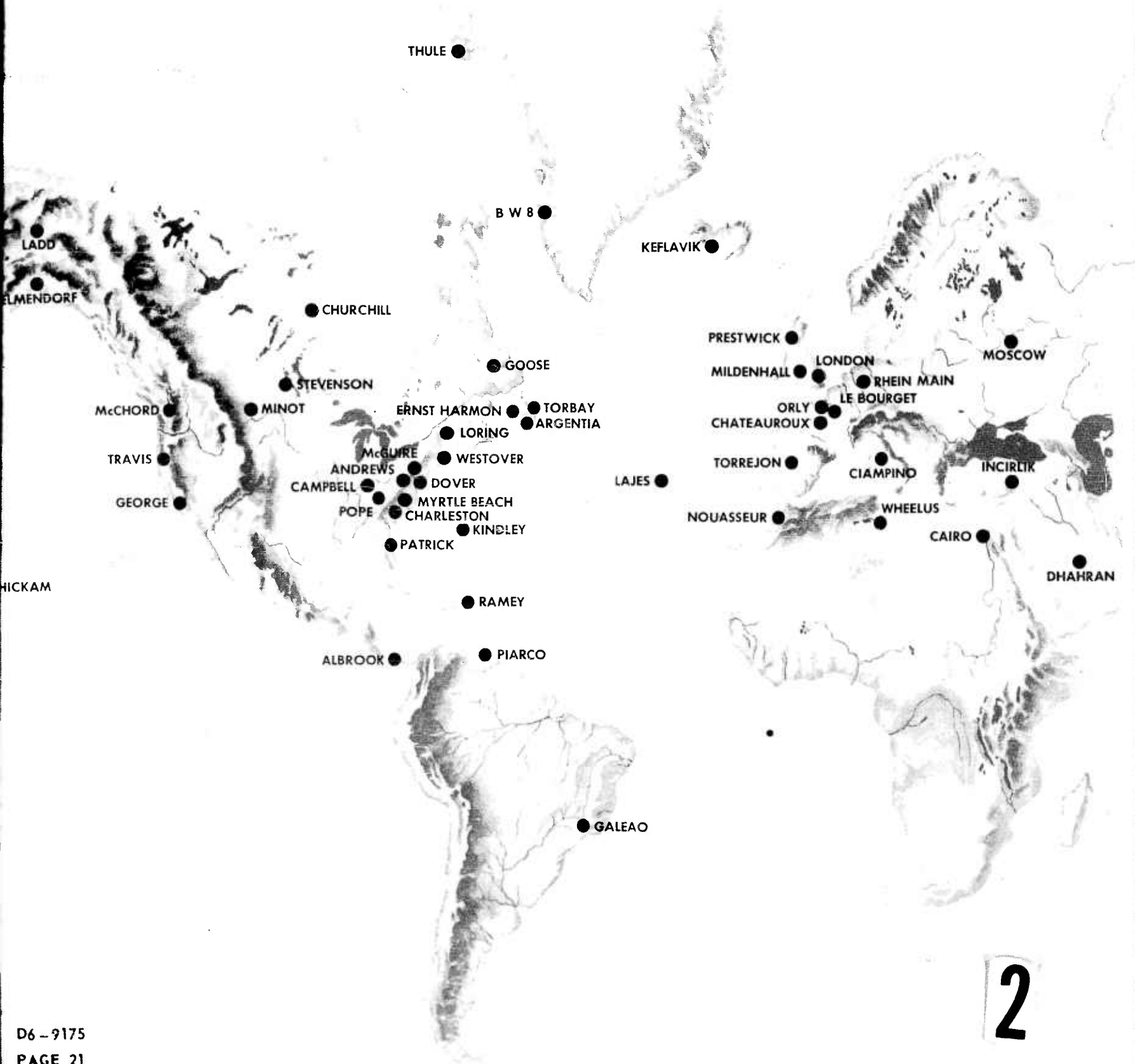


TABLE 4 EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	DIRECT							RETURN							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85				
A0AK NAS TO AGANA NAS																		
53,000	-37	-21	3	-12	-16	-28	-35	33	18	-4	10	13	2	-4	12	9	8	9
40,000	-50	-37	-8	-29	-32	-46	-52	43	31	6	24	26	12	6	13	13	12	14
30,000	-47	-31	-9	-28	-28	-41	-48	41	27	7	24	24	12	7	13	13	10	13
20,000	-31	-21	-10	-19	-19	-28	-32	28	19	9	18	18	11	7	10	9	7	9
ADAK NAS TO ALBROOK AFB																		
53,000	20	15	2	14	13	6	3	-22	-16	-3	-14	-14	-20	-23	8	6	5	6
40,000	30	27	15	24	24	16	12	-34	-30	-17	-26	-27	-35	-39	11	10	9	10
30,000	28	24	13	21	21	13	9	-31	-26	-14	-24	-23	-32	-37	11	11	8	10
20,000	18	14	7	13	12	7	4	-19	-15	-8	-14	-13	-19	-23	9	8	6	8
ADAK NAS TO ANDERSON AFB																		
53,000	-37	-21	3	-12	-16	-28	-35	33	18	-4	10	13	2	-4	12	9	8	9
40,000	-50	-37	-8	-29	-32	-46	-52	43	31	6	24	26	12	5	13	13	12	14
30,000	-47	-31	-9	-28	-28	-42	-48	41	27	7	24	24	12	7	13	13	10	13
20,000	-31	-21	-10	-19	-20	-28	-32	28	19	9	18	18	11	7	10	9	7	9
A0AK NAS TO ANDREWS AFB																		
53,000	26	14	9	20	16	10	8	-27	-14	-10	-21	-17	-24	-28	8	7	5	7
40,000	34	22	23	28	27	19	14	-37	-24	-25	-31	-29	-37	-42	11	10	11	12
30,000	34	22	21	27	26	17	12	-36	-25	-23	-30	-28	-37	-42	13	13	11	13
20,000	24	15	15	19	18	11	8	-25	-17	-16	-20	-19	-26	-30	10	9	8	9
ADAK NAS TO ARGENTIA NAS																		
53,000	19	9	6	14	11	6	3	-20	-9	-6	-14	-11	-18	-21	9	6	5	6
40,000	18	14	16	20	17	10	7	-21	-15	-18	-22	-19	-26	-29	10	9	9	10
30,000	16	14	16	19	16	9	5	-19	-16	-17	-22	-18	-26	-30	11	11	11	11
20,000	12	8	11	13	11	5	2	-13	-10	-12	-14	-12	-18	-21	9	9	7	8
A0AK NAS TO BW 8																		
53,000	15	7	3	11	8	3	0	-16	-7	-3	-11	-9	-15	-19	9	7	4	7
40,000	9	10	9	11	10	3	0	-10	-11	-10	-12	-11	-17	-20	10	9	9	9
30,000	6	10	9	10	9	1	-3	-8	-11	-11	-12	-10	-18	-22	12	11	11	11
20,000	2	6	6	6	5	-1	-5	-3	-6	-7	-7	-6	-12	-15	10	9	8	9
ADAK NAS TO CAIRO INTERNATIONAL																		
53,000	-6	-6	-7	-7	-6	-10	-12	4	5	6	6	5	2	0	8	5	4	6
40,000	-5	-9	-11	-11	-9	-15	-18	3	7	10	9	7	1	-2	9	8	8	8
30,000	-4	-7	-8	-8	-7	-13	-16	2	5	6	6	5	-1	-5	9	9	8	9
20,000	-4	-5	-6	-5	-5	-10	-12	2	4	5	4	4	-1	-4	8	7	6	7
A0AK NAS TO CAMPBELL AFB																		
53,000	25	15	9	21	17	11	8	-27	-16	-10	-21	-18	-25	-28	9	7	5	7
40,000	37	25	24	31	29	20	16	-40	-27	-26	-34	-31	-41	-45	12	11	11	13
30,000	35	24	22	30	27	18	13	-38	-26	-24	-32	-30	-40	-45	14	14	11	14
20,000	25	16	15	21	19	12	8	-26	-17	-15	-22	-20	-27	-31	11	10	8	10
ADAK NAS TO CHARLESTON AFB																		
53,000	26	15	9	20	17	11	8	-28	-16	-9	-21	-18	-25	-29	8	7	5	7
40,000	37	25	23	30	29	20	16	-41	-27	-25	-33	-31	-40	-45	12	11	11	12
30,000	36	24	21	28	27	18	13	-39	-27	-23	-31	-29	-39	-44	13	13	11	13
20,000	25	16	14	20	18	12	8	-26	-17	-15	-21	-19	-26	-30	10	9	7	9
A0AK NAS TO CHATEAUX ROUX AB																		
53,000	5	3	-1	2	2	-2	-4	-7	-4	1	-3	-3	-7	-10	8	6	4	5
40,000	5	2	0	1	2	-4	-7	-7	-3	-1	-3	-3	-9	-13	9	8	8	9
30,000	1	1	-1	-1	0	-7	-11	-4	-3	-1	-1	-2	-9	-13	11	11	10	10
20,000	0	2	0	-2	0	-5	-8	-2	-4	-1	1	-1	-7	-10	9	8	7	8
A0AK NAS TO CHURCHILL AP																		
53,000	25	11	6	19	14	7	4	-26	-11	-6	-19	-14	-23	-27	10	8	5	8
40,000	26	17	17	24	21	13	8	-27	-18	-18	-26	-22	-31	-35	12	11	12	12
30,000	24	18	16	22	20	11	6	-26	-19	-18	-24	-22	-31	-36	14	13	13	14
20,000	17	12	12	15	14	7	3	-18	-12	-13	-16	-15	-22	-25	12	10	9	10
A0AK NAS TO CAMPINO AP																		
53,000	-1	1	-2	-2	-1	-5	-7	-1	-2	2	1	0	-4	-6	8	5	4	5
40,000	2	-2	-4	-4	-2	-8	-11	-4	0	2	2	0	-6	-9	9	8	8	9
30,000	-1	-2	-5	-4	-3	-10	-14	-2	0	3	2	1	-6	-10	11	10	10	10
20,000	-1	0	-4	-4	-2	-8	-11	0	-1	3	3	1	-4	-7	9	8	7	8

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	D I R E C T							R E T U R N										
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
AOAK NAS TO CLARK AFB																		
53,000	-49	-29	2	-24	-26	-39	-47	46	26	-3	22	24	9	-1	11	9	3685 N.M.I.	
40,000	-56	-43	-19	-46	-43	-54	-60	51	39	17	42	39	26	18	12	12	12	13
30,000	-50	-38	-18	-40	-37	-48	-54	45	34	16	37	34	22	16	12	12	10	12
20,000	-31	-24	-11	-24	-23	-30	-34	29	22	10	23	21	13	10	9	9	7	8
AOAK NAS TO DARWIN																		
53,000	-21	-11	6	-4	-7	-16	-21	18	9	-7	3	6	-3	-7	8	7	4715 N.M.I.	
40,000	-31	-23	-2	-15	-18	-28	-32	26	20	0	12	15	5	0	8	9	8	9
30,000	-28	-19	-4	-16	-17	-25	-29	25	16	3	14	14	6	2	8	8	7	8
20,000	-17	-11	-5	-10	-11	-16	-18	15	10	5	10	10	5	3	7	6	5	6
ADAK NAS TO OAHARAN AB																		
53,000	-13	-12	-10	-14	-12	-16	-18	11	11	10	13	11	7	5	8	5	5505 N.M.I.	
40,000	-16	-17	-15	-20	-17	-23	-26	12	14	14	17	14	9	5	10	8	8	9
30,000	-12	-15	-12	-15	-13	-20	-23	9	13	10	13	11	5	2	10	10	8	9
20,000	-9	-9	-6	-10	-9	-14	-16	7	8	5	9	8	3	0	8	7	7	7
ADAK NAS TO DDN MUANG																		
53,000	-45	-28	4	-24	-26	-37	-43	42	27	-5	22	24	8	-3	10	8	4479 N.M.I.	
40,000	-46	-33	-15	-36	-34	-44	-49	41	30	13	34	30	20	14	11	10	10	11
30,000	-39	-29	-13	-27	-27	-37	-42	35	26	12	24	24	15	10	11	11	9	10
20,000	-22	-17	-9	-18	-16	-23	-26	20	16	8	17	15	9	6	8	8	6	7
ADAK NAS TO OOVER AFB																		
53,000	26	13	9	20	16	10	8	-27	-14	-10	-21	-17	-24	-28	8	7	3971 N.M.I.	
40,000	34	22	23	28	26	18	14	-36	-23	-24	-30	-28	-37	-41	11	10	11	12
30,000	33	22	21	27	25	17	12	-36	-24	-23	-29	-28	-37	-42	13	12	11	13
20,000	23	15	15	18	18	11	8	-25	-16	-16	-20	-19	-25	-29	10	9	8	9
ADAK NAS TO DUM DUM																		
53,000	-36	-25	-5	-28	-25	-33	-38	33	23	4	27	23	12	6	10	8	4516 N.M.I.	
40,000	-37	-29	-20	-32	-30	-38	-42	32	26	19	29	26	19	14	11	10	10	11
30,000	-26	-23	-15	-24	-22	-29	-33	22	20	14	22	19	12	8	11	11	9	10
20,000	-18	-14	-8	-14	-13	-19	-22	16	13	8	13	12	7	4	8	8	7	8
ADAK NAS TO ELMENDRFB AFB																		
53,000	20	11	5	17	12	4	-1	-21	-11	-5	-18	-13	-22	-28	17	12	8	12
40,000	27	20	19	24	22	10	3	-29	-21	-21	-25	-24	-37	-44	20	18	19	19
30,000	24	18	19	22	21	6	-1	-26	-20	-21	-24	-23	-37	-45	23	21	20	22
20,000	17	10	13	13	13	1	-5	-18	-11	-14	-14	-14	-26	-32	20	17	15	17
ADAK NAS TO ENIWETOK AFB																		
53,000	-20	-8	4	-3	-5	-15	-20	16	5	-5	1	3	-4	-8	12	10	8	9
40,000	-33	-24	-3	-14	-18	-31	-37	24	17	0	9	12	1	-4	14	14	12	14
30,000	-27	-20	-5	-14	-16	-26	-32	20	15	3	10	11	2	-2	14	13	10	13
20,000	-21	-11	-7	-11	-12	-19	-23	18	9	6	9	10	4	0	10	9	7	9
ADAK NAS TO ERNEST HARMON AFB																		
53,000	20	9	6	14	11	6	4	-22	-10	-6	-15	-12	-19	-22	9	6	5	6
40,000	20	15	17	21	18	11	8	-22	-16	-19	-24	-20	-27	-31	10	9	10	10
30,000	18	15	17	20	18	10	6	-20	-17	-19	-23	-20	-27	-31	11	11	11	11
20,000	13	9	12	14	12	6	3	-14	-10	-13	-15	-13	-19	-22	9	9	7	8
ADAK NAS TO GALEAD																		
53,000	16	13	4	12	11	6	4	-18	-14	-5	-13	-12	-17	-20	7	5	4	5
40,000	26	20	14	20	20	13	10	-29	-23	-15	-22	-22	-28	-32	9	8	7	8
30,000	23	18	12	18	17	11	8	-25	-20	-13	-19	-19	-25	-29	9	8	7	8
20,000	13	10	6	9	9	5	3	-14	-11	-6	-10	-10	-15	-17	7	6	5	6
ADAK NAS TO GEORGE AFB																		
53,000	22	16	8	18	16	9	6	-23	-17	-9	-19	-17	-24	-28	12	9	7	9
40,000	37	34	25	33	32	22	16	-40	-37	-27	-36	-35	-45	-51	16	15	13	15
30,000	35	32	21	31	29	18	13	-38	-35	-23	-34	-32	-44	-50	18	16	13	17
20,000	25	20	17	21	20	12	8	-27	-22	-17	-23	-22	-30	-35	14	13	10	12
ADAK NAS TO GOOSE AB																		
53,000	20	9	5	14	11	6	3	-21	-9	-6	-14	-11	-18	-22	9	6	5	7
40,000	19	14	15	20	17	10	7	-21	-15	-17	-22	-18	-25	-29	10	9	10	10
30,000	17	15	15	19	16	9	5	-19	-16	-17	-21	-18	-26	-30	11	11	11	11
20,000	11	9	11	13	11	5	2	-13	-10	-11	-14	-12	-18	-21	10	9	8	8

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION									
	D I R E C T							R E T U R N														
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT				
ADAK NAS TO HICKAM AFB																			2029 N.M.I.			
53,000	16	12	2	11	9	1	-3	-18	-13	-2	-12	-11	-20	-25	14	11	9	11				
40,000	15	19	12	21	17	6	0	-23	-25	-15	-27	-22	-33	-40	18	17	14	16				
30,000	12	17	7	20	14	3	-3	-18	-23	-9	-24	-18	-30	-36	18	16	12	16				
20,000	6	8	6	13	8	1	-4	-9	-11	-7	-15	-10	-18	-22	14	11	9	11				
ADAK NAS TO HILL AFB																			2655 N.M.I.			
53,000	23	15	9	20	16	9	6	-24	-15	-10	-20	-17	-24	-28	11	8	6	8				
40,000	37	30	25	34	31	21	16	-39	-32	-27	-36	-33	-44	-49	15	14	13	15				
30,000	36	28	23	32	29	18	12	-38	-31	-25	-35	-32	-43	-50	17	17	14	17				
20,000	25	17	17	21	20	11	7	-27	-19	-18	-23	-21	-30	-35	14	13	10	13				
ADAK NAS TO INCIRLIK AB																			5208 N.M.I.			
53,000	-6	-6	-6	-7	-6	-10	-12	4	5	6	6	5	2	-1	8	5	4	6				
40,000	-4	-9	-11	-11	-9	-15	-18	2	7	9	9	7	1	-2	9	8	8	8				
30,000	-3	-7	-8	-7	-6	-13	-16	1	6	6	6	5	-1	-5	9	9	9	9				
20,000	-3	-5	-6	-5	-5	-10	-13	2	4	5	4	4	-1	-4	8	8	7	8				
ADAK NAS TO IWO JIMA																			2505 N.M.I.			
53,000	-50	-34	-4	-28	-30	-43	-50	46	31	3	26	27	13	5	14	11	9	11				
40,000	-64	-49	-21	-52	-48	-63	-70	56	43	18	47	42	27	18	16	16	15	17				
30,000	-57	-44	-19	-47	-42	-57	-64	51	39	17	43	38	23	16	16	16	13	16				
20,000	-39	-27	-14	-29	-27	-37	-43	36	25	13	28	25	16	11	12	11	9	11				
ADAK NAS TO JOHNSTON AFB																			2136 N.M.I.			
53,000	8	8	1	7	5	-2	-6	-11	-10	-2	-8	-7	-15	-20	13	11	8	11				
40,000	1	9	7	12	7	-4	-9	-10	-16	-10	-17	-13	-24	-30	17	17	13	16				
30,000	1	6	3	9	5	-5	-11	-8	-12	-5	-14	-10	-20	-26	18	16	12	15				
20,000	0	2	2	6	3	-5	-9	-3	-4	-3	-8	-5	-12	-16	13	11	8	10				
ADAK NAS TO KADENA AB																			2914 N.M.I.			
53,000	-53	-34	-6	-34	-33	-45	-52	50	32	5	32	31	16	8	13	10	9	10				
40,000	-57	-46	-28	-54	-47	-59	-65	51	42	25	50	43	30	24	14	14	15	15				
30,000	-51	-41	-24	-46	-41	-53	-59	45	37	22	43	37	25	19	14	14	13	15				
20,000	-34	-26	-13	-28	-25	-34	-39	31	24	12	27	23	15	11	11	11	8	10				
ADAK NAS TO KEFLAVIK AP																			3743 N.M.I.			
53,000	10	5	0	7	5	0	-2	-11	-6	0	-7	-5	-11	-14	9	6	4	6				
40,000	3	5	5	5	5	-1	-4	-5	-7	-6	-6	-6	-12	-15	9	9	8	9				
30,000	1	5	5	3	4	-4	-8	-3	-6	-6	-5	-5	-13	-17	11	11	11	11				
20,000	-1	2	5	0	2	-5	-8	0	-3	-5	-1	-3	-9	-12	10	9	8	9				
ADAK NAS TO KINDLEY AFB																			4617 N.M.I.			
53,000	26	14	9	19	16	10	8	-28	-15	-9	-20	-17	-24	-28	8	6	5	6				
40,000	32	22	21	26	25	18	14	-36	-24	-23	-29	-28	-36	-40	11	10	10	11				
30,000	32	22	20	25	24	16	12	-35	-25	-21	-27	-27	-35	-40	12	12	10	12				
20,000	22	15	14	16	17	11	8	-24	-16	-15	-18	-18	-24	-28	10	9	7	9				
ADAK NAS TO KWAJALEIN NAS																			2701 N.M.I.			
53,000	-14	-4	3	0	-2	-10	-15	10	1	-4	-2	1	-6	-9	11	9	7	9				
40,000	-24	-18	-1	-8	-13	-24	-30	15	12	-1	3	7	-3	-8	13	14	12	14				
30,000	-19	-15	-3	-9	-11	-20	-25	12	10	2	4	7	-2	-6	14	12	9	12				
20,000	-15	-7	-5	-6	-8	-14	-18	12	5	5	4	6	0	-3	10	9	7	8				
ADAK NAS TO LADD AFB																			1181 N.M.I.			
53,000	19	10	4	16	11	3	-1	-20	-10	-4	-17	-12	-21	-27	16	11	8	11				
40,000	24	16	16	19	19	7	1	-26	-18	-18	-21	-20	-33	-39	19	17	17	18				
30,000	21	15	16	18	18	4	-3	-23	-17	-18	-21	-20	-33	-41	21	20	19	20				
20,000	14	9	11	11	11	0	-6	-15	-10	-12	-12	-12	-23	-29	19	16	14	16				
ADAK NAS TO LAJES AP																			5134 N.M.I.			
53,000	11	5	3	9	7	2	0	-13	-6	-4	-10	-7	-12	-15	8	6	4	6				
40,000	6	7	8	10	8	2	-2	-9	-8	-10	-12	-10	-16	-19	9	9	8	9				
30,000	4	7	9	9	7	0	-4	-7	-10	-11	-12	-10	-17	-21	11	11	10	11				
20,000	1	4	6	5	4	-1	-5	-3	-6	-7	-7	-6	-11	-14	9	9	7	8				
ADAK NAS TO LE BOURGET AP																			4749 N.M.I.			
53,000	5	4	-1	2	2	-2	-4	-6	-4	1	-3	-3	-7	-10	8	6	4	6				
40,000	5	2	0	0	1	-4	-8	-7	-3	-1	-2	-3	-9	-12	9	8	8	9				
30,000	1	1	-1	-2	0	-8	-11	-3	-3	-1	0	-2	-9	-13	11	11	11	10				
20,000	0	2	0	-2	0	-6	-9	-2	-3	-1	1	-1	-7	-10	9	9	7	8				

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*								STANDARD DEVIATION									
	DIRECT								RETURN									
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
ADAK NAS TO LONDON INTERNATIONAL																		
53,000	6	4	-1	3	2	-2	-4	-7	-4	1	-3	-3	-8	-10	8	6	4	6
40,000	4	2	0	1	2	-4	-7	-6	-4	-1	-3	-3	-9	-13	9	8	8	9
30,000	1	2	0	-1	0	-7	-11	-3	-4	-2	-1	-2	-10	-14	11	11	11	10
20,000	0	2	1	-2	0	-5	-9	-2	-3	-2	1	-1	-7	-10	9	9	7	8
ADAK NAS TO LORING AFB																		
53,000	24	11	8	17	14	8	6	-25	-11	-8	-18	-15	-22	-26	9	6	5	7
40,000	26	17	20	25	22	15	11	-28	-19	-21	-27	-24	-31	-35	11	10	10	11
30,000	25	18	20	24	22	13	9	-27	-20	-21	-26	-23	-31	-36	12	12	11	12
20,000	17	12	14	16	15	9	6	-19	-13	-15	-17	-16	-22	-25	10	9	7	9
ADAK NAS TO MAURIPUR AP																		
53,000	-22	-17	-11	-21	-18	-23	-27	20	16	11	20	16	11	8	9	6	5	7
40,000	-22	-21	-18	-23	-21	-27	-31	19	19	16	21	19	12	9	10	9	9	10
30,000	-16	-20	-13	-20	-17	-23	-27	13	17	12	18	15	8	5	10	10	8	9
20,000	-10	-11	-7	-13	-10	-15	-18	9	10	6	12	9	4	2	8	7	6	7
ADAK NAS TO MCCORD AFB																		
53,000	21	14	9	20	15	8	5	-22	-15	-10	-20	-16	-24	-28	13	9	7	9
40,000	36	30	26	34	31	20	15	-38	-32	-27	-36	-33	-44	-50	17	15	15	17
30,000	35	28	24	32	29	17	11	-37	-31	-26	-35	-32	-44	-51	19	18	16	19
20,000	24	17	17	22	20	10	5	-26	-19	-18	-23	-21	-31	-37	16	14	12	14
ADAK NAS TO MCGUIRE AFB																		
53,000	26	13	9	20	16	10	8	-27	-14	-9	-21	-17	-24	-28	8	7	5	7
40,000	33	21	22	28	26	18	14	-35	-23	-24	-30	-28	-36	-41	11	10	10	11
30,000	32	22	21	26	25	16	12	-35	-24	-23	-29	-27	-36	-41	13	12	11	13
20,000	22	15	15	18	17	11	8	-24	-16	-16	-19	-18	-25	-29	10	9	8	9
ADAK NAS TO MIDWAY NAS																		
53,000	-1	1	2	3	1	-7	-13	-3	-4	-2	-5	-4	-13	-18	17	13	10	14
40,000	-16	-6	3	5	-3	-18	-25	6	-2	-6	-12	-4	-17	-25	21	19	17	20
30,000	-14	-6	0	1	-4	-18	-25	5	-1	-2	-8	-2	-15	-21	22	20	15	20
20,000	-10	-5	-1	0	-3	-13	-18	6	2	-1	-3	0	-9	-14	17	14	11	14
ADAK NAS TO MILDENHALL AP																		
53,000	5	4	-1	2	2	-2	-4	-7	-4	1	-3	-3	-7	-10	8	6	4	6
40,000	4	2	0	1	2	-4	-7	-6	-3	-1	-2	-3	-9	-12	9	8	8	9
30,000	0	1	-1	-1	0	-7	-11	-3	-3	-1	-1	-2	-9	-13	11	11	11	10
20,000	0	2	1	-2	0	-5	-9	-1	-3	-2	1	-1	-7	-10	9	9	7	8
ADAK NAS TO MINOT AFB																		
53,000	24	13	9	21	16	9	6	-25	-13	-9	-21	-16	-24	-28	10	8	6	8
40,000	33	22	21	29	26	17	12	-35	-23	-22	-31	-27	-37	-42	13	12	13	14
30,000	33	22	20	28	25	15	10	-35	-24	-22	-31	-27	-38	-44	15	15	13	16
20,000	22	14	14	19	17	9	5	-24	-15	-14	-21	-18	-26	-30	12	11	10	11
ADAK NAS TO MOSCOW INTERNATIONAL																		
53,000	-4	-3	-4	-4	-4	-8	-10	3	3	4	4	3	0	-2	8	5	4	6
40,000	-2	-6	-7	-9	-6	-12	-15	0	5	6	7	5	-1	-5	9	8	8	9
30,000	-2	-6	-7	-7	-6	-12	-16	1	4	6	5	4	-3	-6	10	10	9	10
20,000	-2	-4	-6	-5	-4	-10	-13	1	3	6	4	3	-2	-5	8	8	7	8
ADAK NAS TO MYRTLE BEACH AFB																		
53,000	26	15	9	20	17	11	8	-28	-16	-9	-21	-18	-25	-29	8	7	5	7
40,000	37	24	23	30	28	20	16	-40	-27	-25	-32	-31	-40	-44	12	11	11	12
30,000	36	24	21	28	27	18	13	-39	-26	-23	-31	-29	-39	-44	13	13	11	13
20,000	25	16	14	20	18	12	8	-26	-17	-15	-21	-19	-26	-30	10	9	7	9
ADAK NAS TO NOUASSEUR AB																		
53,000	8	4	0	5	4	0	-2	-10	-5	0	-5	-5	-9	-12	7	6	4	5
40,000	6	4	3	3	4	-2	-5	-8	-6	-4	-5	-6	-11	-15	9	8	8	9
30,000	4	4	3	2	3	-4	-7	-6	-6	-5	-5	-6	-12	-16	11	10	10	10
20,000	1	2	3	0	1	-4	-7	-3	-3	-4	-1	-3	-8	-11	9	8	7	8
ADAK NAS TO ORLY AP																		
53,000	5	4	-1	2	2	-2	-4	-6	-4	1	-3	-3	-7	-10	8	6	4	6
40,000	5	2	0	0	1	-4	-8	-7	-3	-1	-2	-3	-9	-12	9	8	8	9
30,000	1	1	-1	-2	0	-7	-11	-3	-3	-1	-1	-2	-9	-13	11	11	11	10
20,000	0	2	0	-2	0	-6	-9	-2	-3	-1	1	-1	-7	-10	9	9	7	8

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HEIGHT IN FEET	EQUIVALENT								HEADWINDS*							STANDARD DEVIATION						
	DIRECT								RETURN							JAN	APR	JUL	OCT			
	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85								
AOAK NAS TO PALAM AP																			4621 N.MI.			
53,000	-25	-19	-11	-25	-20	-26	-30	23	18	10	23	18	12	9	10	7	6	7				
40,000	-25	-23	-21	-26	-24	-30	-34	21	21	19	23	21	15	11	10	9	9	10				
30,000	-17	-20	-16	-22	-19	-25	-29	14	17	15	20	17	10	6	10	11	8	10				
20,000	-12	-11	-9	-13	-11	-16	-19	10	10	8	12	10	5	2	8	8	7	7				
AOAK NAS TO PATRICK AFB																			4298 N.MI.			
53,000	26	17	8	20	17	11	8	-28	-18	-8	-20	-18	-25	-29	8	7	5	7				
40,000	38	27	22	31	29	21	17	-42	-30	-24	-34	-32	-41	-46	12	11	10	12				
30,000	35	25	20	29	27	18	13	-39	-28	-21	-31	-29	-39	-44	13	13	10	13				
20,000	24	16	13	19	18	11	8	-26	-18	-14	-21	-19	-26	-30	10	9	7	9				
AOAK NAS TO PIARCO AP																			5796 N.MI.			
53,000	24	17	5	16	16	9	6	-26	-18	-6	-17	-17	-23	-27	7	6	4	6				
40,000	35	25	17	25	25	18	14	-39	-28	-19	-28	-28	-36	-41	10	10	9	10				
30,000	33	24	15	23	23	15	12	-36	-26	-17	-25	-25	-34	-38	11	10	8	10				
20,000	20	14	9	14	14	8	6	-22	-16	-9	-15	-15	-21	-24	8	8	6	7				
ADAK NAS TO POPE AFB																			4037 N.MI.			
53,000	26	15	9	20	17	11	8	-28	-16	-10	-21	-18	-25	-29	8	7	5	7				
40,000	36	24	24	30	28	20	16	-39	-26	-25	-32	-30	-39	-44	12	11	11	12				
30,000	35	24	21	28	27	18	13	-39	-26	-23	-31	-29	-39	-44	13	13	11	13				
20,000	25	16	14	19	18	12	8	-26	-17	-15	-21	-19	-26	-30	10	9	8	9				
ADAK NAS TO PRESTWICK AB																			4345 N.MI.			
53,000	6	4	-1	3	3	-1	-3	-8	-5	1	-4	-3	-8	-11	8	6	4	6				
40,000	4	3	1	1	2	-3	-7	-6	-4	-2	-3	-4	-10	-13	9	8	8	9				
30,000	0	2	1	0	1	-6	-10	-2	-4	-3	-2	-3	-10	-14	11	11	11	10				
20,000	-1	2	2	-2	0	-5	-9	-1	-3	-3	1	-2	-7	-10	10	9	8	8				
AOAK NAS TO RAMEY AFB																			5214 N.MI.			
53,000	26	17	7	18	17	10	7	-28	-18	-7	-19	-18	-24	-28	8	7	5	6				
40,000	37	27	20	27	27	19	16	-41	-30	-21	-30	-30	-38	-43	11	10	9	11				
30,000	34	25	17	25	25	17	13	-38	-27	-19	-27	-27	-36	-41	11	11	9	11				
20,000	22	16	10	16	15	10	7	-24	-17	-11	-17	-17	-23	-27	9	8	6	8				
AOAK NAS TO RHEIN MAIN AB																			4679 N.MI.			
53,000	1	3	-2	-1	0	-4	-6	-2	-4	1	1	-1	-5	-7	8	6	4	6				
40,000	3	-1	-2	-3	-1	-7	-10	-5	-1	1	1	-1	-7	-10	9	8	8	9				
30,000	-1	-1	-3	-4	-2	-9	-13	-1	-1	1	1	0	-7	-11	11	11	10	10				
20,000	-1	1	-2	-3	-1	-7	-10	0	-2	1	2	0	-5	-8	9	8	7	8				
ADAK NAS TO SEOUL AB																			2485 N.MI.			
53,000	-41	-28	-12	-35	-29	-39	-45	38	27	11	34	27	17	12	14	10	8	10				
40,000	-41	-33	-28	-49	-38	-49	-55	37	31	26	46	35	24	18	14	14	15	15				
30,000	-32	-31	-22	-37	-30	-41	-47	29	28	20	35	28	17	12	15	15	14	15				
20,000	-24	-20	-12	-26	-20	-29	-34	22	19	11	24	18	10	6	13	12	10	12				
AOAK NAS TO STEVENSON FIELD																			2854 N.MI.			
53,000	25	12	8	21	16	9	6	-25	-13	-9	-21	-16	-24	-28	10	7	6	7				
40,000	32	20	20	28	25	16	11	-33	-21	-21	-29	-26	-35	-40	13	12	12	13				
30,000	31	20	19	27	24	14	9	-33	-22	-21	-29	-26	-36	-42	15	14	13	15				
20,000	22	13	13	18	16	9	5	-23	-14	-14	-19	-17	-25	-29	12	10	9	11				
ADAK NAS TO SUNG SHAN																			3198 N.MI.			
53,000	-53	-33	-5	-33	-33	-44	-51	49	31	5	31	30	15	7	12	10	8	10				
40,000	-53	-42	-26	-50	-44	-55	-60	47	39	24	46	39	28	22	13	13	14	14				
30,000	-47	-38	-22	-41	-37	-48	-54	42	34	20	38	33	23	17	13	13	12	14				
20,000	-31	-24	-12	-26	-23	-31	-36	29	22	11	24	21	13	10	11	10	8	10				
ADAK NAS TO TACHIKAWA AB																			2095 N.MI.			
53,000	-47	-33	-11	-37	-32	-44	-50	44	31	10	35	30	18	12	15	10	10	12				
40,000	-53	-43	-30	-60	-47	-60	-67	49	40	28	56	43	30	22	16	16	17	18				
30,000	-46	-40	-27	-50	-40	-54	-61	41	36	25	47	37	24	18	17	18	15	18				
20,000	-32	-26	-14	-32	-26	-36	-42	30	24	13	31	24	14	9	14	13	10	13				
ADAK NAS TO TAN SAN NHUT																			4399 N.MI.			
53,000	-46	-27	5	-22	-25	-36	-43	43	25	-6	21	23	7	-4	10	8	7	8				
40,000	-47	-35	-15	-38	-35	-45	-50	43	32	13	35	32	20	14	11	10	10	11				
30,000	-42	-31	-14	-31	-30	-39	-44	37	28	12	28	27	17	12	10	11	9	11				
20,000	-26	-19	-9	-19	-18	-25	-28	23	18	8	18	17	10	7	8	8	6	7				

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	DIRECT							RETURN							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85				
ADAK NAS TO THULE AB																		
53,000	15	7	2	10	8	2	0	-17	-8	-2	-11	-8	-15	-19	10	7	5	7
40,000	9	9	9	10	9	2	-1	-10	-10	-10	-12	-11	-17	-21	11	10	10	10
30,000	6	9	9	10	9	0	-4	-8	-10	-11	-11	-10	-19	-23	13	12	13	12
20,000	3	4	7	5	5	-2	-6	-4	-5	-8	-6	-6	-13	-16	11	10	9	9
ADAK NAS TO TORBAY AP																		
53,000	18	8	5	13	10	5	3	-20	-9	-6	-14	-11	-17	-21	9	6	5	6
40,000	18	13	16	19	16	10	6	-20	-15	-17	-22	-18	-25	-29	10	9	9	10
30,000	16	14	15	19	16	8	4	-18	-16	-17	-21	-18	-25	-29	11	11	11	11
20,000	11	8	10	12	10	5	2	-12	-9	-11	-13	-12	-17	-20	9	9	7	8
ADAK NAS TO TORREJON AFB																		
53,000	7	4	-1	4	3	-1	-3	-9	-5	0	-4	-4	-8	-11	8	6	4	5
40,000	6	3	1	2	3	-3	-6	-8	-5	-3	-4	-5	-11	-14	9	8	8	9
30,000	3	3	1	1	2	-5	-9	-5	-5	-3	-3	-4	-11	-15	11	10	10	10
20,000	1	2	2	-1	1	-5	-8	-2	-3	-3	0	-2	-7	-10	9	8	7	8
ADAK NAS TO TRAVIS AFB																		
53,000	21	16	9	19	16	9	5	-23	-17	-10	-20	-17	-24	-28	12	9	7	9
40,000	37	34	27	34	33	22	16	-40	-37	-28	-37	-35	-46	-52	17	15	14	16
30,000	36	32	23	33	30	19	13	-39	-35	-25	-36	-33	-46	-52	19	17	14	18
20,000	25	21	18	22	21	12	8	-27	-23	-19	-24	-23	-32	-37	15	13	11	13
ADAK NAS TO WAKE AP																		
53,000	-19	-9	3	-4	-6	-16	-22	14	6	-4	2	4	-4	-8	14	11	9	11
40,000	-36	-26	-4	-16	-20	-34	-42	25	18	1	10	13	1	-5	17	17	14	17
30,000	-32	-22	-7	-17	-19	-31	-38	24	16	5	11	13	3	-3	17	16	12	15
20,000	-23	-13	-9	-12	-14	-22	-26	19	10	8	10	11	4	0	13	11	9	10
ADAK NAS TO WESTOVER AFB																		
53,000	25	12	9	19	16	10	7	-26	-13	-9	-20	-16	-23	-27	8	6	5	7
40,000	31	20	22	27	25	17	13	-33	-22	-23	-29	-27	-35	-39	11	10	10	11
30,000	30	21	21	26	24	16	11	-33	-23	-22	-28	-26	-35	-40	12	12	11	13
20,000	21	14	15	17	17	10	7	-22	-15	-16	-19	-18	-24	-28	10	9	8	9
ADAK NAS TO WHEELUS AP																		
53,000	-1	0	-3	-2	-2	-5	-7	-1	-1	3	2	1	-3	-5	7	5	4	5
40,000	2	-2	-5	-5	-3	-8	-11	-4	1	3	2	1	-5	-9	9	8	8	9
30,000	0	-3	-6	-5	-3	-10	-14	-2	1	4	2	1	-5	-9	10	10	9	10
20,000	-1	-1	-4	-4	-2	-8	-10	-1	0	3	3	1	-4	-7	8	8	7	7
AGANA NAS TO ALBROOK AFB																		
53,000	21	17	-8	1	7	-4	-8	-22	-18	8	-1	-8	-20	-23	7	6	4	5
40,000	33	31	2	10	19	5	1	-35	-33	-2	-11	-20	-34	-38	9	8	6	7
30,000	26	21	1	6	12	3	0	-28	-22	-1	-7	-13	-25	-29	8	7	5	6
20,000	11	8	-3	0	3	-1	-4	-12	-9	3	-1	-4	-10	-13	6	5	3	4
AGANA NAS TO ANDREWS AFB																		
53,000	29	17	4	16	16	8	5	-32	-18	-4	-17	-17	-25	-30	8	6	5	6
40,000	42	30	18	29	29	21	16	-46	-34	-19	-32	-33	-42	-47	10	10	9	10
30,000	40	28	17	29	28	19	15	-44	-31	-19	-31	-31	-41	-46	11	10	8	10
20,000	28	19	14	20	20	14	12	-30	-21	-15	-22	-21	-28	-31	8	7	6	7
AGANA NAS TO ARGENTIA NAS																		
53,000	17	6	-1	7	7	1	-1	-20	-8	0	-9	-8	-15	-19	8	6	5	6
40,000	12	9	5	12	9	4	0	-17	-13	-7	-16	-13	-19	-23	8	8	8	9
30,000	10	8	6	11	9	3	-1	-15	-12	-7	-14	-12	-18	-22	9	9	8	9
20,000	8	6	5	8	7	2	-1	-10	-8	-6	-10	-8	-13	-16	8	7	6	7
AGANA NAS TO BW 8																		
53,000	10	2	-2	3	2	-2	-4	-13	-4	2	-5	-4	-10	-13	8	6	5	6
40,000	2	3	0	4	2	-3	-6	-7	-7	-1	-7	-6	-11	-14	8	8	8	8
30,000	1	2	0	3	1	-4	-7	-6	-5	-2	-5	-5	-10	-13	8	9	8	8
20,000	2	2	2	2	2	-2	-5	-4	-3	-3	-4	-4	-8	-11	7	7	6	7
AGANA NAS TO CAIRO INTERNATIONAL																		
53,000	-45	-34	-5	-26	-30	-40	-45	43	33	4	26	29	14	6	8	7	6	7
40,000	-55	-47	-18	-34	-40	-51	-56	52	45	17	33	38	24	18	10	9	8	9
30,000	-48	-40	-14	-25	-31	-44	-49	45	39	14	24	30	18	14	9	9	6	8
20,000	-26	-21	-6	-13	-17	-23	-27	25	21	6	13	16	9	6	6	5	5	5

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION						
	O I R E C T								R E T U R N				JAN	APR	JUL	OCT			
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50					A75	A85	
AGANA NAS TO CAMPBELL AFB																			
53,000	30	19	4	15	17	8	4	-32	-20	-4	-16	-18	-27	-31	8	7	5	6	6586 N.MI.
40,000	49	40	19	33	35	25	19	-53	-43	-21	-36	-38	-49	-54	10	10	9	11	
30,000	47	35	19	32	33	23	18	-50	-38	-20	-35	-36	-46	-52	11	11	8	11	
20,000	32	25	16	24	24	17	14	-34	-26	-16	-25	-25	-32	-36	9	8	6	8	
AGANA NAS TO CHARLESTON AFB																			
53,000	31	19	4	16	17	9	5	-33	-21	-4	-17	-19	-27	-32	8	7	5	6	7014 N.MI.
40,000	49	39	19	33	35	25	19	-53	-42	-21	-36	-38	-49	-54	10	10	9	11	
30,000	46	35	19	32	33	23	18	-50	-38	-20	-35	-35	-46	-51	11	10	8	11	
20,000	32	25	16	23	23	17	14	-34	-26	-16	-25	-25	-32	-35	9	8	6	8	
AGANA NAS TO CHATEAUX AFB																			
53,000	-19	-18	-8	-14	-15	-20	-23	15	16	7	13	13	8	6	8	6	5	6	6672 N.MI.
40,000	-26	-24	-15	-25	-23	-29	-33	21	21	14	23	20	13	10	10	9	8	9	
30,000	-22	-23	-12	-20	-19	-26	-30	18	21	11	17	17	10	6	10	10	9	10	
20,000	-15	-15	-8	-14	-13	-18	-21	13	14	7	13	12	7	4	8	7	6	7	
AGANA NAS TO CHURCHILL AP																			
53,000	28	13	0	14	13	5	1	-31	-15	-1	-15	-15	-24	-29	8	6	5	6	5612 N.MI.
40,000	31	21	9	22	21	13	8	-36	-25	-11	-26	-25	-34	-38	9	9	9	10	
30,000	30	19	10	22	20	12	8	-34	-22	-11	-24	-23	-31	-36	10	10	9	10	
20,000	21	13	9	15	14	9	6	-23	-15	-10	-16	-16	-22	-25	8	7	6	7	
AGANA NAS TO CIAMPINO AP																			
53,000	-27	-22	-11	-20	-20	-26	-29	23	21	10	19	18	12	10	8	7	5	6	6561 N.MI.
40,000	-31	-29	-20	-29	-27	-34	-37	27	27	18	27	25	18	15	9	9	9	9	
30,000	-29	-27	-13	-21	-23	-30	-34	25	25	12	19	20	13	9	10	10	8	9	
20,000	-19	-16	-9	-16	-15	-20	-23	17	15	8	15	14	9	6	7	7	6	7	
AGANA NAS TO CLARK AFB																			
53,000	4	4	31	17	13	4	-1	-6	-4	-32	-18	-14	-24	-31	10	10	10	8	1412 N.MI.
40,000	-3	-8	17	8	4	-6	-11	2	7	-18	-8	-4	-14	-19	9	11	9	10	
30,000	-4	-6	8	6	1	-6	-9	4	5	-8	-6	-2	-8	-12	8	10	7	8	
20,000	3	3	5	6	4	-1	-3	-3	-3	-5	-6	-4	-9	-12	7	7	7	7	
AGANA NAS TO DHAHRAN AB																			
53,000	-51	-35	15	-14	-24	-43	-49	49	34	-16	13	23	-2	-15	8	8	6	7	5287 N.MI.
40,000	-60	-48	4	-21	-34	-54	-60	58	46	-5	19	33	5	-3	9	9	6	9	
30,000	-51	-40	2	-17	-28	-46	-51	49	39	-2	16	27	6	-1	9	8	5	7	
20,000	-28	-20	2	-8	-14	-24	-28	27	20	-2	8	13	3	-1	6	5	4	5	
AGANA NAS TO DON MUANG																			
53,000	-2	4	38	22	14	1	-3	1	-4	-39	-23	-15	-30	-37	8	7	8	6	2572 N.MI.
40,000	-5	-10	24	6	2	-8	-12	4	9	-25	-7	-3	-16	-23	8	9	7	7	
30,000	-6	-7	12	4	1	-7	-10	5	6	-12	-5	-1	-9	-12	7	8	6	6	
20,000	1	1	4	5	3	-1	-3	-1	-1	-4	-5	-3	-7	-9	6	5	5	5	
AGANA NAS TO DOVER AFB																			
53,000	29	16	4	16	16	8	5	-32	-18	-4	-17	-17	-25	-30	8	6	5	6	6923 N.MI.
40,000	40	29	17	28	28	20	15	-45	-32	-19	-31	-32	-41	-46	10	9	9	10	
30,000	39	27	17	28	27	19	14	-43	-30	-18	-31	-30	-40	-45	10	10	8	10	
20,000	27	18	14	20	19	14	11	-29	-20	-14	-21	-20	-27	-30	8	7	6	7	
AGANA NAS TO DUM DUM																			
53,000	-30	-18	33	11	-2	-24	-30	29	17	-34	-12	2	-22	-32	8	8	7	7	3242 N.MI.
40,000	-40	-30	15	-4	-15	-35	-41	38	29	-16	3	15	-7	-14	9	10	7	8	
30,000	-35	-24	8	-4	-13	-30	-36	34	24	-9	4	12	-3	-8	8	9	5	7	
20,000	-14	-9	3	-2	-5	-12	-15	14	9	-4	2	5	-1	-4	6	6	5	5	
AGANA NAS TO ELMENDORF AFB																			
53,000	29	15	-2	12	13	4	-1	-32	-18	1	-13	-15	-25	-31	10	8	7	8	3989 N.MI.
40,000	37	26	8	23	24	13	7	-43	-31	-11	-27	-28	-39	-45	11	11	10	12	
30,000	35	23	10	23	22	12	8	-40	-27	-11	-26	-26	-36	-42	12	12	9	11	
20,000	24	15	9	16	16	9	6	-26	-17	-10	-17	-17	-24	-28	10	9	7	8	
AGANA NAS TO ENIWETOK AFB																			
53,000	-16	-4	-19	-11	-13	-21	-25	15	3	18	10	12	4	-1	11	12	11	9	1036 N.MI.
40,000	-6	7	-6	-6	-3	-11	-15	5	-8	5	5	2	-6	-11	9	12	12	12	
30,000	-5	4	-5	-6	-3	-9	-13	5	-4	5	5	3	-3	-7	9	9	8	8	
20,000	-12	-4	-9	-10	-8	-14	-17	12	3	9	9	8	3	0	9	7	7	8	

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION			
	D I R E C T							R E T U R N					JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85		
AGANA NAS TO ERNEST HARMON AFB																
53,000	20	8	0	9	8	2	0	-23	-10	-1	-10	-10	-17	-21	6877 N.MI.	
40,000	16	12	6	15	12	6	3	-21	-16	-8	-19	-16	-23	-26	8	6
30,000	15	11	8	14	12	5	2	-19	-14	-9	-17	-15	-21	-25	8	8
20,000	11	8	7	10	9	4	1	-13	-9	-8	-12	-10	-15	-18	9	8
AGANA NAS TO GALEAO																
53,000	15	20	28	25	22	17	14	-16	-21	-30	-26	-23	-29	-31	10078 N.MI.	
40,000	28	27	32	30	29	23	20	-30	-29	-35	-33	-32	-38	-41	5	6
30,000	25	25	27	26	26	20	16	-27	-27	-30	-29	-28	-34	-38	8	8
20,000	18	16	17	16	17	12	10	-19	-17	-18	-17	-18	-22	-25	9	9
AGANA NAS TO GEORGE AFB																
53,000	29	19	-1	7	12	3	-1	-30	-20	0	-8	-14	-25	-30	5320 N.MI.	
40,000	50	40	9	23	31	16	10	-52	-42	-11	-25	-33	-47	-53	9	8
30,000	43	33	9	21	26	14	9	-46	-35	-9	-22	-28	-40	-46	11	10
20,000	27	22	7	15	17	10	7	-29	-23	-8	-15	-18	-26	-30	11	9
AGANA NAS TO GOOSE AB																
53,000	19	7	0	8	8	2	-1	-23	-9	0	-10	-9	-17	-21	6588 N.MI.	
40,000	15	11	5	14	12	5	2	-20	-15	-7	-18	-15	-22	-25	8	6
30,000	13	10	7	13	11	5	1	-18	-14	-8	-16	-14	-20	-24	8	8
20,000	10	7	6	9	8	3	1	-12	-9	-7	-11	-9	-14	-17	9	9
AGANA NAS TO HICKAM AFB																
53,000	14	11	-11	-7	0	-9	-12	-15	-12	10	7	-1	-13	-18	3297 N.MI.	
40,000	26	33	4	6	16	5	0	-27	-34	-5	-7	-17	-31	-36	8	6
30,000	20	20	1	3	10	2	-2	-21	-21	-2	-3	-11	-21	-26	10	11
20,000	5	5	-4	-3	0	-5	-7	-6	-5	4	3	-1	-6	-9	9	10
AGANA NAS TO INCIRLIK AB																
53,000	-40	-31	-12	-28	-29	-36	-40	37	30	11	27	27	18	13	5803 N.MI.	
40,000	-47	-42	-22	-36	-38	-46	-50	44	40	21	35	36	26	21	8	7
30,000	-42	-37	-17	-24	-30	-40	-44	39	35	16	23	28	19	15	9	9
20,000	-23	-19	-8	-15	-16	-22	-25	22	19	7	14	16	10	7	9	8
AGANA NAS TO IWO JIMA																
53,000	6	-13	-2	-9	-4	-14	-19	-9	11	0	8	3	-7	-13	706 N.MI.	
40,000	6	-6	-4	-6	-2	-13	-19	-10	3	3	5	0	-11	-17	14	15
30,000	3	-9	-3	3	-1	-10	-15	-7	7	3	-4	0	-9	-14	14	14
20,000	13	3	4	4	6	-1	-5	-14	-4	-4	-5	-6	-14	-18	13	15
AGANA NAS TO JOHNSTON AFB																
53,000	7	7	-12	-11	-3	-11	-15	-8	-8	12	10	2	-8	-12	2649 N.MI.	
40,000	13	26	2	1	9	0	-4	-14	-27	-2	-2	-10	-21	-27	8	9
30,000	10	15	-1	-1	5	-2	-5	-10	-15	1	1	-5	-13	-18	9	11
20,000	-3	2	-6	-6	-4	-8	-10	3	-2	6	6	3	-2	-4	9	9
AGANA NAS TO KADENA AB																
53,000	-17	-19	12	-4	-7	-19	-24	14	18	-14	3	6	-6	-13	1229 N.MI.	
40,000	-21	-26	4	-9	-13	-25	-32	17	24	-5	8	11	-1	-6	12	13
30,000	-23	-23	2	-1	-10	-23	-30	20	21	-3	1	9	-2	-6	13	14
20,000	-5	-7	3	1	-2	-8	-12	4	6	-3	-1	1	-5	-8	12	13
AGANA NAS TO KEFLAVIK AP																
53,000	-5	-5	-4	-6	-5	-9	-11	1	3	3	4	3	-1	-3	6116 N.MI.	
40,000	-11	-8	-4	-9	-8	-13	-16	6	4	3	6	5	-1	-4	8	6
30,000	-11	-9	-3	-7	-7	-13	-17	6	6	2	4	4	-1	-4	8	7
20,000	-6	-5	-2	-5	-4	-9	-11	4	3	1	3	3	-2	-4	9	8
AGANA NAS TO KINDLEY AFB																
53,000	29	16	4	16	15	8	4	-31	-17	-4	-17	-17	-25	-30	7572 N.MI.	
40,000	37	26	15	26	26	18	13	-42	-30	-17	-29	-29	-38	-43	8	6
30,000	36	24	15	25	24	16	12	-40	-28	-17	-28	-27	-37	-42	10	5
20,000	24	17	12	17	17	12	9	-27	-18	-13	-18	-19	-25	-28	10	9
AGANA NAS TO KWAJALEIN NAS																
53,000	-20	-4	-17	-10	-13	-20	-24	19	3	16	9	12	4	0	1380 N.MI.	
40,000	-6	5	-4	-5	-3	-10	-14	6	-6	4	5	2	-5	-9	10	11
30,000	-8	2	-5	-6	-4	-10	-13	7	-2	5	6	4	-2	-5	8	10
20,000	-13	-5	-10	-11	-10	-15	-17	13	5	10	10	10	5	2	8	11

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION				
	DIRECT							RETURN							JAN	APR	JUL	OCT	
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85					
AGANA NAS TO LADD AFB																			4102 N.MI.
53,000	28	13	-2	12	12	3	-2	-31	-16	2	-13	-14	-24	-29	10	8	6	8	
40,000	32	22	6	20	20	10	5	-38	-27	-8	-24	-25	-35	-41	11	11	10	12	
30,000	30	19	7	20	19	9	5	-35	-23	-9	-23	-22	-33	-38	12	11	10	11	
20,000	21	13	8	14	13	7	4	-24	-15	-8	-15	-15	-22	-26	9	8	7	8	
AGANA NAS TO LAJES AP																			7633 N.MI.
53,000	-7	-6	-4	-6	-6	-10	-12	3	4	3	5	4	0	-2	7	6	4	6	
40,000	-13	-10	-6	-11	-10	-16	-19	8	6	4	8	6	1	-2	9	8	8	9	
30,000	-14	-11	-5	-10	-10	-16	-20	9	8	3	6	6	0	-3	9	9	8	9	
20,000	-9	-6	-3	-7	-6	-11	-14	6	4	2	5	4	0	-3	8	7	6	7	
AGANA NAS TO LE BOURGET AP																			6555 N.MI.
53,000	-19	-17	-8	-14	-14	-19	-22	15	16	7	13	12	8	5	8	6	5	6	
40,000	-25	-24	-15	-25	-22	-29	-32	21	21	13	22	19	13	9	10	9	8	9	
30,000	-22	-23	-12	-19	-19	-26	-30	18	20	10	17	16	9	6	10	10	9	10	
20,000	-15	-15	-8	-14	-13	-18	-21	13	14	7	13	12	7	4	8	7	6	7	
AGANA NAS TO LONDON INTERNATIONAL																			6503 N.MI.
53,000	-17	-15	-7	-13	-13	-18	-21	13	14	6	12	11	6	4	8	6	5	6	
40,000	-24	-21	-13	-23	-20	-27	-31	19	18	12	21	17	11	8	9	9	8	9	
30,000	-21	-22	-11	-19	-18	-25	-29	17	19	9	16	15	9	5	10	10	9	10	
20,000	-14	-14	-7	-13	-12	-17	-20	12	13	6	12	11	6	3	8	7	6	7	
AGANA NAS TO LORING AFB																			6771 N.MI.
53,000	26	12	2	13	12	5	2	-28	-13	-2	-14	-13	-22	-26	8	6	5	6	
40,000	27	18	11	21	19	12	8	-32	-22	-12	-24	-23	-30	-34	9	9	8	9	
30,000	25	17	12	21	18	11	8	-30	-20	-13	-23	-21	-29	-33	10	10	8	9	
20,000	18	12	10	14	13	8	6	-20	-13	-11	-15	-15	-20	-23	8	7	6	7	
AGANA NAS TO MAURIPUR AP																			4411 N.MI.
53,000	-47	-32	26	-3	-17	-39	-46	45	31	-27	2	16	-14	-25	8	8	7	8	
40,000	-55	-40	12	-12	-26	-48	-54	53	39	-12	11	25	-3	-11	9	9	6	9	
30,000	-46	-33	6	-11	-20	-39	-45	45	32	-6	10	20	1	-5	8	8	5	7	
20,000	-24	-16	3	-5	-10	-20	-24	24	15	-3	4	10	0	-3	6	5	5	5	
AGANA NAS TO MCCHORD AFB																			4919 N.MI.
53,000	30	19	1	12	15	6	1	-32	-20	-1	-13	-16	-26	-31	9	8	6	7	
40,000	50	42	15	32	36	22	16	-54	-46	-17	-34	-39	-51	-56	11	11	9	11	
30,000	48	38	16	32	33	22	17	-51	-41	-18	-34	-36	-48	-53	12	11	8	11	
20,000	32	27	15	23	24	17	14	-34	-28	-16	-25	-25	-33	-37	9	8	6	8	
AGANA NAS TO MCGUIRE AFB																			6912 N.MI.
53,000	29	16	4	16	16	8	4	-31	-17	-4	-17	-17	-25	-30	8	6	5	6	
40,000	49	27	16	27	27	19	14	-43	-31	-18	-30	-30	-40	-44	10	9	9	10	
30,000	38	25	16	27	26	18	14	-41	-29	-18	-30	-29	-38	-43	10	10	8	10	
20,000	26	18	13	19	18	13	10	-28	-19	-14	-20	-20	-26	-29	8	7	6	7	
AGANA NAS TO MIDWAY NAS																			2285 N.MI.
53,000	24	10	-15	-9	-1	-12	-17	-25	-11	15	9	0	-18	-24	10	10	7	8	
40,000	37	34	-3	2	17	0	-6	-39	-36	2	-3	-18	-37	-44	12	13	10	12	
30,000	52	23	-1	3	12	1	-4	-34	-24	1	-4	-13	-29	-35	11	11	7	9	
20,000	16	12	1	2	7	1	-2	-17	-13	-1	-3	-8	-15	-19	9	7	6	7	
AGANA NAS TO MILDENHALL AP																			6439 N.MI.
53,000	-17	-15	-7	-13	-13	-18	-21	13	14	6	12	11	6	4	8	6	5	6	
40,000	-24	-22	-13	-23	-21	-27	-31	19	18	11	21	17	11	8	9	9	8	9	
30,000	-22	-22	-10	-19	-18	-25	-29	17	19	9	16	15	9	5	10	10	9	10	
20,000	-14	-14	-7	-13	-12	-17	-20	12	13	6	12	11	6	3	8	7	6	7	
AGANA NAS TO MINOT AFB																			5705 N.MI.
53,000	29	17	2	15	16	7	3	-31	-19	-3	-16	-17	-25	-30	8	7	5	7	
40,000	44	35	16	30	31	21	16	-48	-38	-17	-33	-35	-45	-50	10	10	9	11	
30,000	42	31	17	31	30	20	16	-46	-34	-18	-33	-33	-43	-48	11	11	8	11	
20,000	29	22	14	22	21	15	12	-31	-23	-15	-23	-22	-29	-33	9	8	6	8	
AGANA NAS TO MOSCOW INTERNATIONAL																			5293 N.MI.
53,000	-26	-24	-9	-20	-20	-26	-30	22	22	9	18	18	11	8	8	7	6	6	
40,000	-33	-32	-17	-30	-28	-36	-39	29	29	16	28	26	18	14	10	9	9	9	
30,000	-30	-30	-11	-22	-23	-32	-36	26	27	10	20	21	13	9	10	10	8	10	
20,000	-20	-18	-8	-16	-15	-21	-24	18	17	7	15	14	8	5	8	7	6	7	

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION					
	D I R E C T							R E T U R N						JAN	APR	JUL	OCT	
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75					A85
AGANA NAS TO MYRTLE BEACH AFB																		
53,000	31	19	4	16	17	9	5	-33	-20	-5	-17	-18	-27	-32	8	7	5	6
40,000	48	38	19	33	35	24	19	-52	-41	-21	-36	-38	-48	-53	10	10	9	11
30,000	46	34	19	32	32	23	18	-49	-37	-20	-35	-35	-45	-51	11	10	8	11
20,000	31	24	16	23	23	17	14	-33	-25	-16	-24	-24	-31	-35	8	8	6	8
AGANA NAS TO NOUASSEUR AB																		
53,000	-19	-18	-9	-14	-15	-20	-23	16	17	9	13	13	9	7	8	6	5	6
40,000	-24	-24	-17	-26	-23	-29	-32	20	22	15	23	20	14	10	10	9	8	9
30,000	-21	-23	-14	-20	-19	-26	-30	17	20	12	17	17	10	7	10	10	8	10
20,000	-15	-15	-9	-14	-13	-18	-21	13	14	9	13	12	7	5	8	7	6	7
AGANA NAS TO ORLY AP																		
53,000	-19	-17	-8	-14	-14	-20	-22	15	16	7	13	12	8	5	8	6	5	6
40,000	-26	-24	-15	-25	-22	-29	-32	21	21	13	23	19	13	9	10	9	8	9
30,000	-22	-23	-12	-19	-19	-26	-30	18	20	10	17	16	9	6	10	10	9	10
20,000	-15	-15	-8	-14	-13	-18	-21	13	14	-	13	12	7	4	8	7	6	7
AGANA NAS TO PALAM AP																		
53,000	-47	-31	22	-5	-17	-39	-46	45	30	-23	4	16	-11	-21	9	9	7	8
40,000	-53	-41	8	-14	-28	-47	-53	50	40	-8	13	26	1	-7	10	10	7	10
30,000	-47	-35	4	-11	-22	-41	-47	45	34	-4	10	21	2	-3	9	9	5	7
20,000	-24	-17	3	-6	-11	-20	-24	24	16	-3	6	11	1	-3	6	6	5	5
AGANA NAS TO PATRICK AFB																		
53,000	32	21	3	14	17	8	3	-34	-23	-3	-15	-19	-28	-33	8	7	5	6
40,000	52	42	17	33	36	24	18	-56	-45	-19	-35	-39	-51	-56	11	10	8	10
30,000	47	38	16	31	33	21	17	-51	-40	-17	-33	-35	-47	-52	11	10	7	10
20,000	32	26	13	22	23	16	13	-33	-28	-14	-23	-24	-32	-35	8	7	5	7
AGANA NAS TO PIARCO AP																		
53,000	30	21	0	12	16	5	1	-31	-22	-1	-12	-17	-27	-31	7	7	5	6
40,000	48	40	12	28	33	19	13	-52	-43	-13	-30	-36	-48	-53	10	10	8	9
30,000	43	35	11	25	29	17	12	-46	-37	-12	-26	-31	-42	-47	10	9	6	9
20,000	27	23	8	16	18	11	8	-28	-24	-9	-17	-19	-26	-30	8	7	5	6
AGANA NAS TO POPE AFB																		
53,000	30	18	4	16	17	9	5	-32	-20	-5	-17	-18	-26	-31	8	6	5	6
40,000	46	37	19	32	34	24	19	-51	-40	-21	-35	-37	-47	-52	10	10	9	10
30,000	45	33	19	32	31	22	18	-48	-36	-20	-34	-34	-45	-50	11	10	8	11
20,000	31	23	15	23	22	16	13	-33	-24	-16	-24	-24	-31	-34	8	8	6	8
AGANA NAS TO PRESTWICK AB																		
53,000	-13	-13	-6	-11	-11	-15	-18	9	11	5	10	9	4	2	8	6	5	6
40,000	-21	-18	-11	-20	-17	-24	-27	16	15	9	17	14	8	5	9	8	8	9
30,000	-20	-20	-9	-17	-16	-23	-27	15	17	7	15	13	7	3	9	10	8	9
20,000	-13	-12	-5	-11	-10	-15	-18	11	11	5	10	9	4	1	8	7	6	7
AGANA NAS TO RAMEY AFB																		
53,000	31	21	2	14	17	7	3	-33	-23	-3	-15	-18	-28	-33	8	7	5	6
40,000	50	41	16	31	35	22	17	-54	-44	-18	-34	-38	-50	-55	10	10	8	10
30,000	45	37	15	29	31	20	16	-49	-39	-16	-31	-34	-45	-50	10	10	7	10
20,000	30	25	12	19	21	14	11	-31	-26	-12	-20	-22	-29	-33	8	7	5	7
AGANA NAS TO RHEIN MAIN AB																		
53,000	-21	-19	-8	-15	-16	-21	-24	17	17	8	14	14	9	6	8	6	5	6
40,000	-27	-26	-16	-26	-24	-31	-34	23	23	14	24	21	14	11	10	9	8	9
30,000	-24	-25	-12	-20	-20	-28	-32	20	22	11	18	18	11	7	10	10	9	10
20,000	-16	-16	-8	-15	-14	-19	-22	14	15	8	14	12	7	5	8	7	6	7
AGANA NAS TO SEOUL AB																		
53,000	-22	-27	-3	-13	-16	-26	-32	14	23	1	11	12	3	-2	13	13	11	11
40,000	-31	-31	-6	-24	-24	-36	-42	23	26	4	20	19	7	1	14	15	14	15
30,000	-32	-28	-3	-13	-19	-32	-38	25	24	2	10	15	4	-1	13	13	11	14
20,000	-15	-13	-1	-7	-9	-16	-20	12	12	0	6	7	0	-3	10	9	8	9
AGANA NAS TO STEVENSON FIELD																		
53,000	29	16	2	15	15	7	3	-31	-18	-3	-16	-17	-25	-30	8	7	5	6
40,000	41	30	14	28	29	19	14	-45	-34	-16	-31	-32	-42	-46	10	10	9	10
30,000	40	28	15	28	27	18	14	-43	-31	-17	-31	-30	-40	-45	11	10	9	11
20,000	27	19	13	20	19	13	11	-29	-20	-14	-21	-21	-27	-31	8	8	6	7

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HEIGHT IN FEET	EQUIVALENT HEADWINDS*								STANDARD DEVIATION							
	DIRECT				RETURN				JAN APR JUL OCT				JAN APR JUL OCT			
	JAN	APR	JUL	OCT	**A50	A75	A85		JAN	APR	JUL	OCT	A50	A75	A85	
AGANA NAS TO SUNG SHAN																
53,000	-20	-17	19	-1	-6	-18	-24	17	16	-20	0	5	-10	-18		1485 N.MI.
40,000	-25	-27	7	-8	-14	-26	-32	22	26	-7	7	12	-1	-7		11 11 10 9
30,000	-27	-24	4	-1	-11	-25	-31	25	23	-4	1	10	-2	-7		11 13 11 12
20,000	-7	-6	3	1	-2	-9	-12	7	6	-3	-1	2	-4	-7		10 12 8 10
AGANA NAS TO TACHIKAWA AB																
53,000	-1	-15	-6	-9	-8	-17	-22	-8	10	5	8	4	-6	-11		1364 N.MI.
40,000	-10	-14	-6	-12	-10	-22	-28	-2	5	5	7	4	-8	-14		14 14 12 12
30,000	-10	-14	-4	-3	-7	-17	-23	-1	7	3	-1	2	-8	-13		16 17 15 17
20,000	1	-3	3	1	0	-6	-10	-5	0	-3	-2	-3	-9	-13		14 15 12 15
AGANA NAS TO TAN SAN NHUT																
53,000	6	8	36	25	18	7	3	-7	-8	-37	-25	-19	-30	-36		2240 N.MI.
40,000	-1	-3	25	9	6	-3	-6	0	2	-25	-10	-7	-18	-24		8 8 8 7
30,000	-2	-5	12	6	3	-4	-7	2	5	-13	-6	-3	-10	-13		8 9 8 8
20,000	2	3	5	6	4	0	-2	-2	-3	-5	-7	-4	-8	-10		6 8 6 6
AGANA NAS TO THULE AB																
53,000	13	3	-2	4	3	-2	-4	-17	-5	2	-6	-5	-12	-16		5269 N.MI.
40,000	5	5	0	6	4	-2	-5	-11	-9	-2	-10	-8	-14	-18		8 6 5 6
30,000	4	3	1	5	3	-2	-6	-9	-7	-3	-8	-7	-13	-16		8 8 8 8
20,000	5	3	3	4	4	-1	-3	-7	-5	-4	-6	-5	-10	-13		9 9 8 9
AGANA NAS TO TORBAY AP																
53,000	15	5	-1	7	6	1	-2	-19	-7	0	-8	-7	-14	-18		7016 N.MI.
40,000	10	8	4	11	8	2	-1	-15	-12	-6	-14	-12	-18	-21		8 6 5 6
30,000	8	7	5	9	7	1	-2	-13	-11	-6	-12	-11	-17	-20		8 8 8 9
20,000	7	5	5	7	6	1	-1	-9	-7	-6	-9	-7	-12	-15		9 9 8 9
AGANA NAS TO TORREJON AFB																
53,000	-19	-18	-8	-14	-14	-20	-23	15	16	8	13	13	8	6		7112 N.MI.
40,000	-25	-24	-16	-25	-22	-29	-32	20	21	14	23	19	13	10		8 6 5 6
30,000	-21	-23	-13	-19	-19	-26	-30	18	20	12	17	16	10	6		10 9 8 9
20,000	-15	-15	-9	-14	-13	-18	-21	13	14	8	13	12	7	4		10 10 9 10
AGANA NAS TO TRAVIS AFB																
53,000	30	19	0	9	13	4	0	-31	-21	0	-9	-14	-26	-31		5053 N.MI.
40,000	52	42	10	26	33	17	11	-55	-44	-11	-28	-35	-49	-56		9 8 6 7
30,000	47	36	10	24	29	16	11	-49	-38	-11	-26	-31	-44	-50		11 11 9 10
20,000	30	26	10	18	20	13	9	-31	-27	-10	-19	-21	-29	-33		11 10 7 10
AGANA NAS TO WAKE AP																
53,000	9	1	-19	-14	-7	-17	-21	-10	-2	18	14	7	-6	-12		1305 N.MI.
40,000	10	22	-5	-4	5	-5	-11	-10	-23	4	3	-6	-17	-23		11 12 9 8
30,000	10	12	-4	-3	3	-5	-8	-11	-12	4	3	-3	-12	-17		11 13 12 12
20,000	-3	4	-4	-3	-2	-7	-10	3	-5	3	3	1	-5	-8		10 11 8 9
AGANA NAS TO WESTOVER AFB																
53,000	28	14	3	15	15	7	4	-31	-16	-4	-16	-16	-24	-29		6876 N.MI.
40,000	35	24	14	25	25	17	12	-39	-28	-16	-29	-28	-36	-41		8 6 5 6
30,000	34	23	15	25	23	16	12	-38	-26	-16	-27	-26	-35	-40		9 9 9 10
20,000	23	16	12	17	17	11	9	-25	-17	-13	-18	-18	-24	-27		10 10 8 10
AGANA NAS TO WHEELUS AP																
53,000	-34	-27	-14	-25	-25	-32	-35	31	26	13	24	24	17	14		6869 N.MI.
40,000	-38	-36	-23	-33	-33	-40	-43	35	34	22	31	31	24	20		8 7 6 6
30,000	-35	-33	-16	-22	-26	-35	-39	32	31	15	21	24	17	13		9 8 9 9
20,000	-21	-18	-9	-16	-16	-21	-24	20	17	8	15	15	10	7		9 9 7 9
ALBROOK AFB TO ANDREWS AFB																
53,000	1	-3	-3	-2	-2	-8	-11	-4	1	2	0	0	-7	-10		1796 N.MI.
40,000	3	1	-5	3	0	-9	-14	-10	-7	4	-6	-4	-15	-20		11 11 7 10
30,000	1	-2	-2	3	0	-8	-12	-6	-2	1	-5	-2	-10	-15		15 15 11 14
20,000	-1	-1	2	4	1	-5	-8	-1	0	-2	-5	-2	-8	-11		13 13 9 12
ALBROOK AFB TO ARGENTIA NAS																
53,000	13	8	-2	5	5	-2	-5	-16	-10	1	-6	-7	-15	-19		2642 N.MI.
40,000	23	19	4	14	15	5	0	-28	-24	-6	-17	-18	-29	-35		10 10 6 9
30,000	17	15	5	13	12	4	0	-22	-19	-6	-15	-15	-24	-29		14 14 10 13
20,000	8	10	5	9	8	2	0	-11	-11	-6	-10	-9	-15	-18		14 12 8 11

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION						
	D I R E C T							R E T U R N						JAN	APR	JUL	OCT		
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75					A85	
ALBROOK AFB TO BW 8																			
53,000	11	3	0	6	5	-1	-3	-14	-5	-1	-7	-6	-13	-16	9	3674 N.MI.	5	7	
40,000	16	9	2	13	10	2	-3	-22	-13	-5	-17	-14	-23	-28	12	8	10	12	
30,000	13	7	4	12	9	1	-3	-18	-11	-6	-15	-12	-20	-25	12	11	9	11	
20,000	8	5	4	8	6	1	-2	-10	-6	-5	-10	-7	-13	-16	9	12	9	11	
															9	9	6	8	
ALBROOK AFB TO CAIRO INTERNATIONAL																			
53,000	23	24	4	10	15	7	4	-24	-24	-5	-10	-15	-24	-28	7	6188 N.MI.	5	5	
40,000	36	36	17	19	26	17	14	-38	-38	-17	-21	-27	-38	-43	10	6	7	9	
30,000	25	29	12	15	19	13	10	-27	-30	-13	-16	-20	-29	-33	9	9	6	7	
20,000	12	15	6	8	10	6	4	-12	-15	-7	-8	-10	-15	-18	7	8	5	5	
ALBROOK AFB TO CAMPBELL AFB																			
53,000	-8	-10	0	-5	-5	-12	-16	4	8	0	4	3	-3	-6	11	1717 N.MI.	7	9	
40,000	-8	-12	-5	-5	-7	-17	-22	1	7	4	2	4	-6	-11	15	11	11	14	
30,000	-8	-11	-2	-3	-5	-14	-18	3	7	2	1	3	-4	-9	13	15	8	12	
20,000	-5	-6	1	0	-2	-8	-11	3	4	-1	-1	1	-5	-7	10	12	6	8	
															10	9	6	8	
ALBROOK AFB TO CHARLESTON AFB																			
53,000	-2	-5	-1	-3	-3	-9	-13	-1	3	1	2	1	-5	-9	12	1436 N.MI.	7	10	
40,000	1	-3	-5	1	-2	-11	-16	-7	-3	4	-3	-1	-11	-17	15	12	11	15	
30,000	-1	-5	-2	1	-2	-9	-13	-2	2	2	-2	0	-7	-12	13	15	9	11	
20,000	-4	-3	2	2	0	-6	-9	2	2	-3	-3	-1	-6	-9	10	12	6	8	
															10	9	6	8	
ALBROOK AFB TO CHATEAUX ROUX AB																			
53,000	17	14	3	6	9	4	1	-18	-15	-3	-7	-10	-17	-21	8	4651 N.MI.	7	7	
40,000	27	25	12	17	20	12	8	-30	-28	-13	-19	-22	-31	-36	11	7	8	11	
30,000	22	20	10	15	16	10	6	-24	-22	-11	-17	-18	-26	-30	11	11	7	10	
20,000	12	12	8	11	10	6	3	-13	-13	-9	-11	-11	-16	-19	9	10	5	7	
ALBROOK AFB TO CHURCHILL AP																			
53,000	-10	-8	-4	-7	-7	-12	-15	7	6	3	5	5	0	-2	9	3060 N.MI.	6	7	
40,000	-12	-11	-11	-10	-11	-19	-23	5	6	9	6	6	-1	-6	12	8	10	12	
30,000	-13	-11	-8	-9	-10	-18	-22	7	8	7	6	7	0	-4	12	12	9	12	
20,000	-9	-8	-4	-5	-6	-12	-15	7	6	3	3	5	-1	-3	9	9	6	8	
															9	9	6	8	
ALBROOK AFB TO CIAMPINO AP																			
53,000	16	16	4	6	10	5	2	-18	-17	-5	-7	-11	-18	-21	8	5138 N.MI.	5	6	
40,000	26	27	13	16	20	12	9	-29	-29	-14	-18	-22	-30	-35	11	7	8	10	
30,000	19	21	12	14	16	10	7	-21	-22	-12	-15	-17	-24	-28	10	10	7	9	
20,000	9	11	8	9	9	5	2	-10	-12	-8	-10	-10	-14	-17	8	9	5	6	
ALBROOK AFB TO CLARK AFB																			
53,000	-34	-23	-1	-19	-20	-28	-33	32	21	0	18	19	8	1	8	8922 N.MI.	5	6	
40,000	-46	-39	-18	-36	-36	-45	-49	42	35	17	33	33	23	17	10	6	8	10	
30,000	-42	-34	-16	-32	-31	-40	-45	38	31	15	30	29	19	15	10	9	8	10	
20,000	-26	-20	-10	-19	-19	-25	-28	24	19	9	18	17	11	9	8	10	5	7	
ALBROOK AFB TO DHAHRAN AB																			
53,000	25	23	5	10	15	8	5	-26	-24	-6	-11	-16	-25	-28	7	7188 N.MI.	5	5	
40,000	35	35	16	21	26	18	14	-37	-37	-17	-23	-28	-38	-42	10	6	7	9	
30,000	26	28	14	17	20	14	11	-28	-30	-15	-18	-22	-30	-34	10	9	6	8	
20,000	14	16	9	10	12	7	5	-15	-16	-9	-10	-12	-17	-19	7	6	4	5	
ALBROOK AFB TO DON MUANG																			
53,000	-3	-3	0	-1	-2	-5	-7	-1	1	0	0	0	-4	-5	7	9427 N.MI.	4	5	
40,000	-2	0	-4	0	-1	-6	-9	-4	-4	2	-2	-2	-7	-10	8	5	7	8	
30,000	0	0	-3	0	-1	-6	-9	-4	-3	2	-2	-2	-7	-10	8	7	7	7	
20,000	1	0	-2	0	0	-4	-6	-3	-1	1	-2	-1	-5	-7	6	8	5	6	
ALBROOK AFB TO DOVER AFB																			
53,000	2	-2	-3	-1	-1	-8	-11	-5	0	2	0	0	-7	-11	11	1823 N.MI.	7	9	
40,000	5	2	-4	4	1	-8	-13	-12	-8	3	-7	-5	-16	-22	15	11	11	14	
30,000	2	-1	-2	4	1	-7	-11	-7	-3	1	-6	-3	-11	-16	13	15	9	12	
20,000	-1	-1	2	4	1	-4	-8	-1	-1	-2	-5	-2	-8	-11	10	13	6	8	
ALBROOK AFB TO DUM DUM																			
53,000	20	9	2	12	10	4	2	-22	-11	-3	-13	-12	-19	-22	7	8776 N.MI.	4	6	
40,000	21	17	10	18	16	10	7	-25	-20	-11	-20	-19	-26	-30	9	6	7	9	
30,000	19	16	10	16	15	9	5	-22	-19	-11	-18	-18	-24	-28	10	9	8	9	
20,000	11	11	5	11	9	5	2	-13	-12	-6	-12	-11	-16	-18	7	9	5	7	

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HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION					
	D I R E C T							R E T U R N										
	JAN	APR	JUL	DCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
ALBROOK AFB TO ELMENDORF AFB																		
53,000	-21	-13	-3	-13	-12	-19	-22	19	12	2	13	11	5	2	4363 N.MI.			
40,000	-28	-20	-12	-19	-19	-28	-32	24	17	10	17	16	9	5	8	7	5	6
30,000	-25	-18	-10	-18	-17	-25	-30	22	15	8	15	15	7	3	11	10	9	10
20,000	-16	-10	-4	-11	-10	-16	-19	14	9	4	10	9	3	1	11	11	8	11
ALBROOK AFB TO ENIWETOK AFB																		
53,000	-16	-17	7	0	-6	-17	-20	15	16	-7	0	5	-4	-7	6912 N.MI.			
40,000	-26	-31	-3	-8	-16	-29	-33	25	30	2	7	15	4	1	6	6	4	4
30,000	-18	-15	-2	-3	-8	-16	-20	16	15	1	2	8	2	-1	8	8	6	7
20,000	-1	-2	6	3	2	-2	-4	0	1	-6	-4	-2	-6	-7	7	6	5	5
ALBROOK AFB TO ERNEST HARMON AFB																		
53,000	12	5	-2	5	4	-2	-5	-15	-8	1	-6	-6	-14	-18	2600 N.MI.			
40,000	20	15	3	14	13	3	-2	-26	-21	-5	-17	-17	-27	-33	10	10	6	9
30,000	15	12	4	12	10	2	-2	-20	-16	-6	-14	-13	-22	-27	14	14	10	13
20,000	7	7	5	9	7	1	-2	-10	-9	-5	-10	-8	-14	-18	14	13	9	11
ALBROOK AFB TO GALEAO																		
53,000	2	5	4	6	4	0	-3	-2	-6	-4	-6	-5	-9	-11	2861 N.MI.			
40,000	10	9	10	8	9	3	0	-12	-10	-11	-9	-10	-16	-19	8	6	7	5
30,000	5	8	7	8	7	2	-1	-5	-9	-7	-8	-8	-13	-15	10	9	8	7
20,000	-4	-2	-1	-3	-2	-6	-8	3	1	0	2	2	-2	-4	8	7	7	7
ALBROOK AFB TO GEORGE AFB																		
53,000	-20	-18	8	-6	-10	-19	-24	18	17	-8	6	9	-2	-7	2583 N.MI.			
40,000	-30	-29	-1	-14	-18	-31	-36	27	26	0	12	16	5	0	9	9	6	7
30,000	-25	-22	2	-9	-13	-24	-29	22	20	-2	8	11	1	-3	13	12	9	11
20,000	-10	-10	6	-2	-3	-11	-14	9	9	-6	1	3	-4	-7	12	10	7	9
ALBROOK AFB TO GOOSE AB																		
53,000	10	4	-1	5	4	-2	-5	-14	-6	0	-7	-6	-13	-17	2818 N.MI.			
40,000	17	11	3	13	11	2	-3	-24	-17	-5	-17	-15	-25	-31	10	9	6	8
30,000	13	8	4	11	9	1	-3	-19	-13	-5	-14	-12	-21	-26	14	13	11	13
20,000	7	5	4	9	6	1	-2	-10	-7	-5	-10	-8	-14	-17	14	13	9	12
ALBROOK AFB TO HICKAM AFB																		
53,000	-20	-19	9	-4	-9	-20	-23	19	18	-9	3	8	-3	-8	4560 N.MI.			
40,000	-29	-30	0	-8	-16	-29	-34	27	29	-1	7	15	3	-2	8	7	4	5
30,000	-21	-15	-1	-4	-9	-17	-22	20	14	0	3	8	1	-2	10	9	7	8
20,000	-3	-4	6	2	1	-4	-6	3	3	-6	-2	-1	-5	-7	9	7	5	6
ALBROOK AFB TO INCIRLIK AB																		
53,000	19	18	7	8	12	7	5	-20	-19	-7	-9	-13	-20	-23	6231 N.MI.			
40,000	28	28	17	19	23	16	12	-30	-30	-18	-20	-24	-32	-36	7	6	5	6
30,000	21	22	15	16	18	12	9	-23	-24	-16	-17	-20	-26	-30	10	10	7	9
20,000	11	12	10	10	11	7	4	-12	-13	-10	-11	-12	-16	-18	10	9	7	9
ALBROOK AFB TO IWO JIMA																		
53,000	-36	-28	-2	-18	-22	-32	-36	34	27	1	17	21	8	3	7668 N.MI.			
40,000	-55	-47	-15	-36	-40	-52	-57	52	44	14	34	38	23	15	8	7	5	7
30,000	-50	-41	-13	-31	-35	-46	-51	47	39	12	30	33	20	13	10	10	8	10
20,000	-32	-26	-9	-19	-22	-29	-33	30	25	9	19	21	13	9	11	9	7	9
ALBROOK AFB TO JOHNSTON AFB																		
53,000	-19	-19	8	-2	-8	-19	-22	18	18	-8	2	8	-3	-7	5244 N.MI.			
40,000	-29	-32	-1	-8	-17	-30	-35	27	31	0	8	15	4	0	7	6	4	4
30,000	-20	-15	-2	-4	-9	-17	-22	19	14	1	3	8	2	-1	9	9	7	7
20,000	-2	-2	6	2	2	-2	-4	1	1	-6	-3	-2	-6	-7	8	7	5	6
ALBROOK AFB TO KAOENA AB																		
53,000	-32	-21	-4	-21	-20	-28	-31	29	19	3	20	19	10	5	8150 N.MI.			
40,000	-40	-33	-19	-34	-32	-40	-44	35	29	17	31	28	20	16	8	6	5	6
30,000	-36	-29	-17	-29	-28	-36	-40	32	26	15	26	25	17	13	10	9	9	10
20,000	-23	-17	-9	-18	-16	-22	-26	21	15	8	16	15	9	6	10	10	8	10
ALBROOK AFB TO KEFLAVIK AP																		
53,000	18	9	3	10	9	3	1	-21	-10	-3	-11	-11	-18	-22	4073 N.MI.			
40,000	28	20	10	21	19	11	6	-33	-24	-12	-24	-23	-32	-37	9	8	5	7
30,000	24	18	10	19	17	9	5	-29	-21	-12	-22	-20	-29	-34	12	12	9	12
20,000	14	12	8	13	11	6	3	-16	-13	-8	-14	-13	-19	-22	13	12	9	11

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HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	D I R E C T							R E T U R N							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85				
ALBROOK AFB TO KINDLEY AFB																		1629 N.MI.
53,000	8	5	-6	-1	1	-6	-10	-10	-7	5	0	-2	-11	-16	12	12	7	9
40,000	18	16	-1	5	8	-2	-7	-22	-20	1	-6	-11	-23	-30	15	15	10	14
30,000	10	10	-1	3	5	-3	-7	-12	-13	0	-4	-6	-15	-20	14	12	8	10
20,000	-1	3	0	3	1	-4	-7	0	-4	0	-3	-2	-7	-10	10	9	6	7
ALBROOK AFB TO KWAJALEIN NAS																		6642 N.MI.
53,000	-14	-16	6	0	-5	-15	-18	13	16	-6	0	5	-3	-6	6	6	4	4
40,000	-24	-30	-1	-6	-14	-27	-31	22	29	0	6	13	3	0	8	8	6	6
30,000	-15	-13	-2	-1	-7	-14	-18	15	13	1	1	6	1	-1	7	6	4	5
20,000	2	1	8	4	4	1	-1	-3	-1	-8	-4	-4	-7	-9	5	4	3	3
ALBROOK AFB TO LAO AFB																		4360 N.MI.
53,000	-20	-13	-3	-13	-12	-18	-22	18	11	3	12	11	5	2	8	7	5	6
40,000	-25	-18	-11	-17	-18	-25	-29	21	14	10	15	14	8	4	10	10	9	10
30,000	-24	-16	-9	-16	-16	-24	-28	20	13	8	14	13	6	3	11	10	8	10
20,000	-16	-10	-5	-10	-10	-15	-19	14	9	5	9	9	4	1	8	7	5	7
ALBROOK AFB TO LAJES AP																		3328 N.MI.
53,000	15	16	-2	4	7	0	-3	-16	-17	1	-4	-8	-17	-21	9	9	6	7
40,000	28	29	6	10	17	7	3	-31	-32	-7	-11	-19	-32	-38	12	12	8	11
30,000	19	21	6	8	12	5	2	-21	-23	-6	-9	-13	-23	-28	11	10	7	9
20,000	5	10	2	4	5	0	-2	-6	-10	-2	-5	-5	-11	-14	8	8	5	6
ALBROOK AFB TO LE BOURGET AP																		4680 N.MI.
53,000	17	13	3	7	10	4	1	-19	-15	-4	-8	-10	-17	-21	8	7	5	7
40,000	29	25	13	18	20	12	9	-32	-27	-14	-20	-23	-31	-36	11	11	8	11
30,000	23	21	11	17	18	10	7	-26	-23	-12	-18	-19	-27	-32	11	11	8	10
20,000	14	13	9	12	12	7	4	-15	-14	-10	-13	-13	-18	-21	9	8	6	7
ALBROOK AFB TO LONDON INTERNATIONAL																		4573 N.MI.
53,000	18	13	4	8	10	4	2	-20	-14	-4	-9	-11	-18	-22	8	7	5	7
40,000	30	25	13	19	21	13	9	-34	-27	-15	-21	-24	-33	-38	12	11	9	11
30,000	26	21	12	18	19	11	8	-29	-24	-13	-20	-21	-29	-34	12	11	8	10
20,000	16	14	10	13	13	8	5	-18	-15	-11	-14	-14	-20	-23	9	8	6	7
ALBROOK AFB TO LORING AFB																		2356 N.MI.
53,000	7	1	-3	3	2	-4	-8	-11	-4	2	-4	-3	-10	-15	10	10	6	9
40,000	12	8	0	9	7	-3	-7	-20	-14	-1	-13	-11	-22	-28	14	14	11	14
30,000	9	5	1	8	5	-3	-7	-15	-9	-2	-10	-8	-18	-22	14	13	9	12
20,000	4	3	3	7	4	-1	-4	-7	-5	-4	-8	-6	-12	-15	10	10	6	9
ALBROOK AFB TO MAURIPUR AP																		7977 N.MI.
53,000	23	17	5	11	14	8	5	-25	-18	-6	-12	-15	-22	-25	7	6	5	6
40,000	33	27	15	21	24	16	13	-36	-30	-17	-24	-26	-35	-39	10	9	7	9
30,000	27	23	15	19	20	14	11	-30	-25	-16	-21	-22	-29	-34	10	9	7	9
20,000	16	14	11	12	13	9	6	-17	-15	-11	-13	-14	-18	-21	8	7	5	6
ALBROOK AFB TO MCCHORO AFB																		3162 N.MI.
53,000	-21	-16	1	-11	-12	-20	-24	19	15	-1	10	11	3	-1	9	8	6	7
40,000	-30	-26	-9	-19	-21	-31	-36	25	22	8	17	18	9	4	13	12	10	11
30,000	-26	-22	-7	-16	-17	-26	-32	23	19	6	14	15	6	3	13	11	8	11
20,000	-14	-11	-1	-8	-8	-15	-18	13	10	0	7	7	1	-2	9	8	5	8
ALBROOK AFB TO MCGUIRE AFB																		1882 N.MI.
53,000	3	-2	-3	-1	-1	-7	-11	-6	-1	3	0	-1	-8	-11	11	11	7	9
40,000	6	3	-4	5	2	-8	-12	-13	-9	3	-8	-6	-17	-22	15	15	11	14
30,000	2	0	-1	4	1	-7	-11	-8	-4	1	-6	-4	-12	-17	13	13	9	12
20,000	0	0	2	5	2	-4	-7	-2	-1	-2	-5	-3	-8	-12	10	10	6	8
ALBROOK AFB TO MIDWAY NAS																		5555 N.MI.
53,000	-24	-22	4	-7	-13	-23	-27	23	21	-4	7	12	1	-3	8	7	5	6
40,000	-38	-33	-5	-17	-24	-35	-41	36	31	4	16	22	9	4	10	9	7	8
30,000	-30	-25	-3	-12	-17	-27	-32	28	23	2	11	15	6	2	10	8	6	7
20,000	-14	-11	3	-3	-6	-13	-16	13	11	-3	3	6	0	-3	7	6	4	5
ALBROOK AFB TO MILDENHALL AP																		4610 N.MI.
53,000	18	13	4	8	10	4	2	-20	-14	-4	-9	-11	-18	-22	8	7	5	7
40,000	31	25	14	20	22	13	9	-34	-27	-15	-22	-24	-33	-38	12	11	9	11
30,000	27	22	13	18	19	12	8	-30	-24	-14	-20	-21	-30	-35	12	11	8	11
20,000	17	14	11	14	13	8	6	-18	-15	-11	-15	-14	-20	-23	9	9	6	8

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.

MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION							
	O I R E C T							R E T U R N						JAN	APR	JUL	OCT			
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75					A85		
ALBROOK AFB TO MINOT AFB																	2601 N.MI.			
53,000	-15	-13	-2	-9	-9	-16	-20	11	11	1	8	7	1	-2	9	9	6	8		
40,000	-20	-19	-10	-14	-16	-24	-29	13	14	9	11	11	3	-1	14	13	10	13		
30,000	-18	-16	-7	-11	-12	-21	-26	13	12	6	9	9	2	-2	13	12	8	12		
20,000	-11	-10	-3	-6	-7	-13	-17	9	8	2	5	6	0	-2	10	9	6	8		
ALBROOK AFB TO MOSCOW INTERNATIONAL																	5831 N.MI.			
53,000	21	12	5	12	12	6	4	-23	-13	-5	-13	-13	-19	-23	8	7	5	6		
40,000	30	23	15	23	22	15	11	-34	-26	-16	-25	-25	-33	-38	11	10	9	11		
30,000	28	22	15	21	21	13	9	-32	-25	-17	-23	-24	-32	-37	12	11	9	11		
20,000	18	15	11	15	14	9	6	-20	-16	-12	-16	-16	-22	-25	9	9	6	8		
ALBROOK AFB TO MYRTLE BEACH AFB																	1483 N.MI.			
53,000	-1	-5	-2	-3	-2	-9	-13	-2	2	1	2	1	-6	-9	12	12	7	10		
40,000	2	-1	-5	1	-1	-10	-15	-8	-4	4	-3	-2	-12	-18	15	15	11	14		
30,000	-1	-4	-2	1	-1	-9	-13	-3	1	2	-3	0	-8	-12	13	12	9	11		
20,000	-3	-2	2	3	0	-5	-9	2	1	-2	-3	-1	-6	-9	10	9	6	8		
ALBROOK AFB TO NOUASSEUR AB																	4203 N.MI.			
53,000	17	20	-1	5	9	2	-1	-18	-20	0	-6	-10	-19	-23	8	7	5	6		
40,000	32	33	11	12	21	11	8	-34	-35	-12	-13	-22	-34	-40	11	10	7	9		
30,000	19	23	8	8	14	7	4	-21	-25	-8	-9	-15	-23	-28	9	9	6	7		
20,000	4	9	3	3	5	0	-2	-5	-10	-3	-3	-5	-10	-12	7	6	5	5		
ALBROOK AFB TO ORLY AP																	4678 N.MI.			
53,000	17	13	3	7	9	4	1	-19	-15	-4	-8	-10	-17	-21	8	7	5	7		
40,000	29	25	13	18	20	12	8	-32	-27	-14	-20	-23	-31	-36	11	11	8	11		
30,000	23	21	11	17	17	10	7	-26	-23	-12	-18	-19	-27	-32	11	10	8	10		
20,000	14	12	9	12	12	7	4	-15	-13	-10	-13	-12	-18	-21	9	8	6	7		
ALBROOK AFB TO PALAM AP																	8173 N.MI.			
53,000	22	12	6	15	13	7	5	-25	-14	-6	-16	-15	-21	-25	8	6	5	6		
40,000	27	21	16	22	24	14	11	-31	-23	-17	-25	-24	-31	-35	10	9	8	10		
30,000	25	20	16	21	20	13	10	-29	-23	-17	-23	-22	-30	-34	11	10	8	10		
20,000	16	13	10	14	13	8	6	-18	-15	-10	-15	-14	-20	-22	8	8	6	7		
ALBROOK AFB TO PATRICK AFB																	1159 N.MI.			
53,000	-2	-5	0	-3	-2	-10	-14	0	4	0	3	1	-6	-9	13	13	7	10		
40,000	2	-3	-4	1	-1	-11	-16	-6	-1	3	-2	-1	-11	-17	16	15	11	15		
30,000	-1	-4	-2	1	-1	-9	-13	-1	2	1	-2	0	-7	-11	13	12	9	10		
20,000	-4	-3	3	3	0	-6	-9	3	2	-3	-3	0	-6	-9	10	9	6	8		
ALBROOK AFB TO PIARCO AP																	1080 N.MI.			
53,000	4	12	-10	-5	-1	-9	-13	-5	-13	10	4	1	-9	-15	13	11	8	8		
40,000	25	16	-9	2	8	-4	-9	-26	-17	8	-3	-8	-22	-29	14	13	10	10		
30,000	18	7	-6	4	2	-6	-9	-18	-7	5	4	-2	-13	-19	11	10	8	8		
20,000	-5	-4	-13	-8	-8	-13	-15	5	4	13	8	8	2	-1	8	8	6	6		
ALBROOK AFB TO POPE AFB																	1572 N.MI.			
53,000	-1	-5	-2	-3	-2	-9	-13	-2	2	1	2	1	-6	-9	11	12	7	10		
40,000	2	-2	-5	1	-1	-11	-16	-8	-4	4	-4	-2	-12	-18	15	15	11	14		
30,000	-1	-4	-2	1	-1	-9	-13	-3	1	2	-3	-1	-8	-13	13	12	9	11		
20,000	-3	-2	2	3	0	-5	-9	1	1	-2	-3	-1	-6	-9	10	9	6	8		
ALBROOK AFB TO PRESTWICK AB																	4447 N.MI.			
53,000	19	12	4	9	10	5	2	-21	-14	-4	-10	-11	-18	-22	9	7	5	7		
40,000	32	25	14	21	22	14	10	-35	-28	-16	-24	-25	-34	-40	12	11	9	12		
30,000	29	22	14	20	21	13	9	-32	-25	-16	-22	-23	-32	-37	13	11	9	11		
20,000	18	15	11	15	14	9	6	-20	-16	-11	-16	-15	-21	-25	10	9	6	8		
ALBROOK AFB TO RAMEY AFB																	922 N.MI.			
53,000	6	8	-10	-4	-2	-9	-13	-6	-9	9	4	1	-9	-15	13	13	8	9		
40,000	26	19	-1	3	10	-1	-6	-28	-21	0	-4	-11	-25	-32	16	15	11	13		
30,000	16	11	1	1	6	-2	-5	-17	-12	-1	-1	-6	-16	-21	13	12	8	9		
20,000	-5	-3	-7	-5	-5	-10	-13	5	2	7	4	5	-1	-4	9	9	6	7		
ALBROOK AFB TO RHEIN MAIN AB																	4916 N.MI.			
53,000	18	13	4	8	10	4	2	-19	-14	-4	-8	-11	-18	-21	8	7	5	6		
40,000	29	24	14	19	21	13	9	-32	-27	-15	-21	-23	-32	-37	11	11	9	11		
30,000	24	21	13	18	18	11	8	-27	-23	-14	-20	-20	-28	-33	12	11	8	10		
20,000	15	13	10	13	13	8	5	-16	-14	-11	-14	-14	-19	-22	9	8	6	7		

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEADWINDS*							STANDARD DEVIATION						
	DIRECT								RETURN													
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT				
ALBROOK AFB TO SEOUL AB																			7640 N.MI.			
53,000	-22	-13	-4	-17	-14	-20	-23	20	11	3	16	12	6	3	7	6	4	6				
40,000	-24	-17	-13	-20	-18	-25	-28	20	15	11	17	15	9	6	9	8	8	9				
30,000	-20	-15	-11	-16	-16	-22	-26	17	13	9	14	13	7	4	9	9	8	9				
20,000	-13	-9	-5	-10	-9	-14	-17	11	7	5	9	8	3	1	7	7	5	7				
ALBROOK AFB TO STEVENSON FIELD																			2610 N.MI.			
53,000	-13	-11	-3	-8	-8	-14	-18	9	9	2	7	6	1	-2	9	9	6	8				
40,000	-17	-16	-10	-12	-14	-22	-27	9	11	9	8	9	1	-3	13	13	10	13				
30,000	-16	-14	-7	-10	-11	-19	-24	10	11	6	7	8	1	-3	13	12	9	12				
20,000	-10	-9	-3	-6	-6	-13	-16	8	7	2	4	5	0	-3	10	9	6	9				
ALBROOK AFB TO SUNG SHAN																			8414 N.MI.			
53,000	-28	-17	-3	-19	-17	-24	-28	25	15	2	18	16	7	3	7	6	5	6				
40,000	-31	-24	-15	-25	-24	-31	-35	26	21	13	22	21	14	10	9	9	8	9				
30,000	-28	-20	-13	-21	-20	-27	-31	23	17	11	18	17	11	7	10	9	8	9				
20,000	-17	-12	-6	-13	-12	-17	-20	15	10	6	11	10	5	3	8	7	5	7				
ALBROOK AFB TO TACHIKAWA AB																			7332 N.MI.			
53,000	-28	-20	-5	-20	-19	-26	-29	27	19	4	20	18	10	6	8	6	5	6				
40,000	-38	-32	-20	-35	-32	-40	-44	35	29	18	32	29	21	16	10	10	9	10				
30,000	-34	-29	-17	-30	-28	-36	-40	31	26	16	28	25	17	13	11	10	8	10				
20,000	-22	-17	-9	-19	-16	-23	-26	20	16	8	17	15	9	7	8	8	6	7				
ALBROOK AFB TO TAN SAN NHUT																			9557 N.MI.			
53,000	-20	-10	0	-11	-10	-16	-20	17	9	-1	9	8	2	0	7	6	4	5				
40,000	-17	-12	-9	-12	-13	-18	-21	12	8	8	10	9	4	1	8	8	7	8				
30,000	-16	-11	-9	-10	-11	-17	-20	12	8	8	8	9	4	1	8	8	7	8				
20,000	-8	-6	-6	-6	-7	-10	-13	6	5	5	5	6	2	0	6	6	5	6				
ALBROOK AFB TO THULE AB																			4069 N.MI.			
53,000	3	-2	-2	1	0	-5	-7	-6	0	1	-2	-1	-6	-9	8	7	5	6				
40,000	4	0	-4	2	0	-7	-10	-10	-4	2	-6	-4	-11	-15	10	10	9	10				
30,000	2	-2	-2	2	0	-7	-10	-7	-2	0	-5	-3	-10	-14	11	10	8	10				
20,000	1	-1	0	3	1	-4	-7	-4	-1	-1	-4	-2	-7	-10	8	8	6	8				
ALBROOK AFB TO TORBAY AP																			2689 N.MI.			
53,000	13	8	-2	5	5	-1	-4	-16	-10	1	-6	-7	-15	-20	10	10	6	9				
40,000	23	20	5	14	15	5	0	-29	-24	-6	-17	-19	-30	-35	14	14	10	13				
30,000	18	16	6	13	12	5	0	-22	-19	-7	-15	-15	-24	-29	14	12	8	11				
20,000	9	10	5	10	8	3	0	-11	-11	-6	-11	-9	-15	-19	10	9	6	8				
ALBROOK AFB TO TORREJON AFB																			4418 N.MI.			
53,000	16	17	2	5	9	3	0	-17	-18	-2	-6	-10	-18	-21	8	7	5	6				
40,000	27	28	11	13	19	11	7	-30	-30	-11	-15	-21	-31	-36	11	11	8	10				
30,000	19	21	9	11	14	8	5	-21	-22	-10	-12	-15	-23	-27	10	10	7	8				
20,000	7	10	5	7	7	3	0	-8	-11	-5	-7	-8	-12	-15	8	7	5	6				
ALBROOK AFB TO TRAVIS AFB																			2879 N.MI.			
53,000	-21	-18	6	-8	-11	-20	-24	19	17	-6	7	10	0	-5	9	8	6	7				
40,000	-32	-30	-5	-16	-20	-32	-38	28	27	3	15	18	7	3	13	12	9	11				
30,000	-26	-23	-2	-12	-15	-26	-31	24	21	1	10	13	4	0	13	10	7	9				
20,000	-12	-11	4	-4	-5	-13	-16	11	10	-4	3	4	-2	-5	9	8	5	7				
ALBROOK AFB TO WAKE AP																			6537 N.MI.			
53,000	-21	-20	6	-3	-9	-20	-24	20	19	-7	2	9	-3	-6	7	6	4	5				
40,000	-35	-33	-4	-12	-20	-34	-39	33	31	3	11	19	6	2	9	9	7	7				
30,000	-26	-21	-2	-6	-12	-23	-28	25	20	2	6	12	4	1	9	7	5	6				
20,000	-10	-7	4	1	-2	-8	-11	9	6	-4	-1	2	-3	-5	6	5	4	4				
ALBROOK AFB TO WESTOVER AFB																			2028 N.MI.			
53,000	4	-1	-3	0	0	-6	-10	-8	-2	3	-2	-1	-9	-12	11	11	7	9				
40,000	7	5	-3	6	3	-6	-11	-15	-11	2	-9	-8	-18	-24	15	15	11	14				
30,000	4	2	-1	5	2	-5	-10	-10	-6	0	-7	-5	-14	-19	14	13	9	12				
20,000	1	1	2	5	2	-3	-6	-4	-3	-3	-6	-4	-9	-13	10	10	6	9				
ALBROOK AFB TO WHEELUS AP																			5250 N.MI.			
53,000	20	22	3	8	12	5	2	-21	-23	-3	-8	-13	-22	-26	7	7	5	5				
40,000	33	35	14	16	23	15	11	-36	-36	-15	-17	-25	-36	-41	10	9	7	9				
30,000	22	26	11	12	17	10	7	-24	-28	-11	-13	-18	-26	-30	9	8	6	7				
20,000	9	12	5	6	7	3	1	-9	-13	-5	-6	-8	-13	-15	7	6	5	5				

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MINUS SIGNS DENOTE HEADWINDS.

THE BOEING COMPANY
TRANSPORT DIVISION

NO. D6-9175

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEADWINDS*								STANDARD DEVIATION			
	DIRECT								RETURN											
	JAN	APR	JUL	OCT	**A50	A75	A85		JAN	APR	JUL	OCT	A50	A75	A85		JAN	APR	JUL	OCT
ANDERSON AFB TO CLARK AFB																				
53,000	4	4	31	17	13	4	-1		-5	-4	-32	-18	-14	-24	-31		10	10	10	8
40,000	-3	-8	17	8	4	-6	-11		2	7	-18	-8	-4	-14	-19		9	11	9	10
30,000	-4	-6	8	6	1	-6	-10		4	5	-8	-6	-2	-8	-11		8	10	7	8
20,000	3	3	5	6	4	-1	-3		-3	-3	-5	-6	-4	-9	-12		7	7	7	7
ANDERSON AFB TO DARWIN																				
53,000	3	3	10	8	6	0	-4		-4	-4	-12	-8	-7	-13	-17		9	8	9	9
40,000	-2	-2	7	7	2	-4	-7		1	1	-7	-8	-3	-9	-12		7	9	8	8
30,000	0	0	4	3	2	-3	-5		-1	0	-5	-3	-2	-6	-9		6	6	7	7
20,000	5	3	2	3	3	-1	-3		-5	-3	-3	-3	-4	-7	-9		6	5	6	5
ANDERSON AFB TO ELMENDORF AFB																				
53,000	29	15	-2	12	13	4	-1		-32	-18	1	-13	-15	-25	-31		10	8	7	8
40,000	37	26	8	23	24	13	7		-43	-31	-11	-27	-28	-39	-45		12	11	10	12
30,000	35	23	10	23	22	12	8		-40	-27	-11	-26	-26	-36	-42		12	12	9	11
20,000	24	15	10	16	16	9	6		-26	-17	-10	-17	-17	-24	-28		10	9	7	8
ANDERSON AFB TO HICKAM AFB																				
53,000	14	11	-11	-7	0	-9	-12		-15	-12	10	7	-1	-13	-18		8	8	6	6
40,000	26	33	4	6	16	5	0		-27	-35	-5	-7	-17	-31	-37		10	11	9	10
30,000	20	21	1	3	10	2	-2		-21	-21	-2	-3	-11	-21	-26		10	9	6	7
20,000	5	5	-4	-3	0	-5	-7		-6	-5	4	3	-1	-6	-9		7	6	5	5
ANDERSON AFB TO HILL AFB																				
53,000	30	19	1	12	15	6	2		-32	-21	-2	-13	-16	-26	-31		9	7	6	7
40,000	52	42	15	31	35	22	16		-55	-45	-17	-33	-38	-51	-56		11	11	9	11
30,000	48	38	15	29	33	21	16		-51	-41	-16	-32	-35	-47	-53		12	11	8	10
20,000	32	27	14	22	23	16	13		-34	-28	-14	-23	-24	-32	-36		9	8	6	8
ANDERSON AFB TO TACHIKAWA AB																				
53,000	-1	-15	-6	-10	-8	-17	-22		-7	11	5	8	4	-5	-11		14	14	12	12
40,000	-11	-14	-6	-12	-11	-22	-28		-2	5	5	7	4	-7	-13		16	17	15	17
30,000	-10	-14	-4	-3	-7	-17	-23		-1	8	3	-1	2	-7	-13		14	15	12	15
20,000	1	-3	3	1	0	-7	-10		-5	0	-3	-2	-2	-9	-13		11	10	9	10
ANDREWS AFB TO ARGENTIA NAS																				
53,000	40	22	11	28	24	13	8		-41	-23	-12	-29	-25	-37	-44		16	13	10	13
40,000	59	40	35	51	46	29	21		-63	-43	-37	-54	-49	-66	-75		24	22	20	24
30,000	57	38	33	45	42	26	18		-61	-42	-35	-48	-45	-63	-72		27	25	18	24
20,000	41	26	22	31	29	17	11		-43	-28	-22	-32	-30	-43	-51		20	19	12	18
ANDREWS AFB TO BW 8																				
53,000	19	7	4	13	10	3	-1		-22	-8	-5	-14	-11	-20	-25		12	10	8	10
40,000	24	12	8	21	16	5	-1		-29	-15	-11	-25	-20	-32	-38		16	15	15	16
30,000	22	11	9	19	15	3	-4		-28	-14	-12	-23	-19	-32	-38		19	18	15	18
20,000	15	7	6	11	10	1	-4		-18	-9	-8	-13	-12	-21	-26		14	14	10	14
ANDREWS AFB TO CAIRO INTERNATIONAL																				
53,000	30	19	13	20	20	14	12		-31	-20	-14	-20	-21	-27	-31		8	7	6	6
40,000	43	30	31	39	35	27	23		-46	-32	-33	-41	-38	-47	-51		12	11	10	12
30,000	42	29	29	36	33	25	20		-45	-32	-30	-38	-36	-45	-50		14	13	10	12
20,000	29	20	21	24	23	17	14		-31	-21	-22	-25	-25	-31	-35		11	9	7	9
ANDREWS AFB TO CAMPBELL AFB																				
53,000	-51	-34	-6	-27	-29	-45	-53		50	33	6	27	28	12	5		17	16	11	15
40,000	-78	-54	-26	-51	-51	-73	-86		75	51	25	49	49	28	18		27	27	21	26
30,000	-71	-48	-21	-44	-44	-67	-79		68	46	20	42	42	22	13		25	27	17	27
20,000	-48	-32	-16	-28	-29	-46	-55		47	30	16	27	28	14	8		21	21	12	20
ANDREWS AFB TO CHARLESTON AFB																				
53,000	-25	-15	3	-12	-11	-25	-32		19	11	-3	10	9	-3	-9		17	17	11	16
40,000	-37	-26	-4	-30	-23	-44	-54		24	18	1	24	16	-2	-12		27	28	21	27
30,000	-33	-22	-6	-25	-20	-39	-49		22	16	4	20	15	-1	-10		24	27	17	27
20,000	-25	-14	-6	-15	-14	-27	-36		21	11	5	13	11	0	-6		21	20	11	20
ANDREWS AFB TO CHATEAUX ROUX AB																				
53,000	31	17	14	23	20	14	11		-32	-18	-15	-23	-21	-28	-33		10	8	6	8
40,000	47	29	34	44	38	28	22		-50	-31	-36	-47	-41	-52	-58		15	14	13	15
30,000	48	29	32	41	37	26	20		-51	-32	-34	-44	-40	-52	-58		17	16	13	16
20,000	34	21	23	29	26	18	14		-36	-22	-23	-30	-27	-36	-41		13	12	9	12

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEADWINDS*							STANDARD DEVIATION			
	DIRECT								RETURN							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85					
ANDREWS AFB TO CHURCHILL AP																		1368 N.MI.	
53,000	-20	-12	-10	-13	-13	-21	-25	17	11	10	12	12	5	1	13	10	9	11	
40,000	-30	-19	-25	-24	-25	-37	-44	23	16	21	20	20	8	1	18	17	17	20	
30,000	-31	-21	-23	-24	-25	-38	-45	24	18	20	20	20	8	0	20	20	16	20	
20,000	-21	-16	-16	-15	-17	-26	-32	18	14	15	13	15	5	0	16	15	11	15	
ANDREWS AFB TO CIAMPINO AP																		3899 N.MI.	
53,000	29	17	14	21	20	14	11	-30	-18	-15	-22	-20	-27	-31	9	7	6	7	
40,000	44	28	33	42	36	27	22	-47	-30	-35	-44	-39	-49	-54	14	13	12	14	
30,000	44	28	30	39	35	25	20	-47	-31	-32	-42	-38	-48	-54	16	14	12	15	
20,000	32	20	22	27	25	17	13	-34	-21	-23	-28	-26	-34	-38	12	11	8	11	
ANDREWS AFB TO CLARK AFB																		7416 N.MI.	
53,000	-23	-10	-2	-12	-11	-17	-22	19	8	1	10	9	3	1	7	6	5	6	
40,000	-18	-13	-13	-16	-15	-20	-24	14	10	11	13	12	6	3	8	8	8	8	
30,000	-16	-13	-13	-14	-14	-20	-23	12	10	11	11	11	5	2	8	9	8	8	
20,000	-9	-8	-9	-8	-9	-13	-15	7	6	8	7	7	3	1	7	6	5	6	
ANDREWS AFB TO OHAHRAN AB																		5896 N.MI.	
53,000	30	16	10	18	17	11	9	-31	-17	-10	-19	-18	-26	-30	8	6	5	6	
40,000	40	27	24	33	30	22	18	-43	-29	-26	-36	-33	-42	-47	11	10	9	11	
30,000	38	25	24	30	29	20	16	-42	-28	-26	-33	-32	-41	-46	13	12	10	12	
20,000	26	17	17	20	19	13	10	-28	-19	-18	-21	-21	-27	-31	10	9	7	9	
ANDREWS AFB TO OON MUANG																		7634 N.MI.	
53,000	1	0	1	2	1	-3	-5	-4	-2	-2	-3	-2	-6	-8	7	5	4	5	
40,000	2	4	-1	3	2	-4	-6	-6	-7	-1	-5	-5	-10	-13	8	7	7	8	
30,000	4	4	-2	3	2	-3	-6	-8	-7	0	-5	-5	-11	-14	9	9	7	8	
20,000	4	3	0	2	2	-2	-5	-6	-4	0	-3	-3	-8	-10	7	7	5	6	
ANDREWS AFB TO OOVER AFB																		69 N.MI.	
53,000	49	30	7	28	28	12	5	-50	-31	-8	-29	-28	-45	-54	19	18	13	17	
40,000	71	49	29	50	49	27	16	-75	-52	-31	-52	-51	-75	-87	31	31	25	30	
30,000	67	46	26	43	43	23	13	-70	-48	-27	-46	-46	-69	-83	31	32	20	31	
20,000	48	31	19	29	29	15	8	-49	-33	-19	-30	-31	-48	-58	24	24	14	23	
ANDREWS AFB TO DUM DUM																		7022 N.MI.	
53,000	14	8	2	10	8	3	1	-17	-10	-2	-11	-10	-15	-19	7	6	4	6	
40,000	12	10	6	13	10	4	1	-17	-13	-8	-15	-13	-19	-22	9	8	7	9	
30,000	13	11	7	12	11	4	1	-16	-14	-9	-15	-13	-20	-23	10	9	8	9	
20,000	8	8	3	7	7	2	-1	-10	-9	-4	-9	-8	-13	-15	7	7	6	7	
ANDREWS AFB TO ELMENDORF AFB																		2924 N.MI.	
53,000	-29	-14	-10	-20	-17	-25	-29	27	13	10	20	16	10	7	9	7	6	7	
40,000	-36	-21	-23	-29	-27	-36	-41	33	19	21	26	25	16	11	12	11	12	13	
30,000	-36	-23	-21	-28	-27	-37	-42	33	21	19	25	24	15	10	14	14	12	14	
20,000	-25	-17	-15	-19	-19	-26	-30	23	15	14	18	17	11	7	11	10	8	10	
ANDREWS AFB TO ENIWETOK AFB																		6332 N.MI.	
53,000	-26	-17	-7	-14	-15	-22	-26	24	16	6	13	14	8	5	8	7	5	6	
40,000	-46	-35	-20	-31	-33	-42	-47	43	32	19	28	30	21	17	10	10	9	10	
30,000	-41	-33	-18	-28	-29	-39	-44	38	30	17	25	27	18	15	11	10	8	10	
20,000	-29	-22	-13	-20	-20	-27	-31	27	21	12	19	19	13	10	9	7	5	7	
ANDREWS AFB TO ERNEST HARMON AFB																		983 N.MI.	
53,000	37	20	10	26	22	11	6	-39	-21	-10	-27	-23	-35	-42	16	13	10	13	
40,000	55	35	31	47	41	25	16	-60	-39	-34	-50	-45	-63	-72	25	23	21	24	
30,000	52	34	29	41	38	21	13	-57	-37	-32	-45	-42	-60	-69	28	26	19	25	
20,000	37	22	19	28	26	14	8	-40	-25	-20	-30	-28	-41	-48	20	19	12	19	
ANDREWS AFB TO GALEAO																		4152 N.MI.	
53,000	9	10	1	5	6	1	-1	-11	-11	-1	-6	-7	-12	-15	7	7	5	6	
40,000	14	11	5	7	9	3	-1	-17	-14	-6	-9	-11	-18	-22	9	10	7	8	
30,000	13	11	3	6	8	2	-1	-15	-13	-4	-7	-9	-16	-19	9	8	6	7	
20,000	4	4	-1	-1	1	-3	-5	-5	-5	1	0	-2	-6	-9	6	6	5	5	
ANDREWS AFB TO GEORGE AFB																		1949 N.MI.	
53,000	-42	-32	-9	-25	-27	-38	-43	41	31	9	24	26	15	9	12	11	8	10	
40,000	-66	-49	-33	-44	-47	-62	-72	66	47	32	42	45	32	25	19	18	15	18	
30,000	-59	-43	-25	-37	-59	-55	-64	56	41	24	35	37	24	18	20	18	12	18	
20,000	-39	-28	-16	-23	-25	-36	-42	37	27	16	22	24	15	11	14	14	8	13	

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	DIRECT							RETURN										
	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
ANDREWS AFB TO GOOSE AB																		
53,000	28	13	8	21	17	7	2	-30	-15	-8	-22	-18	-29	-35	15	13	10	1104 N.MI.
40,000	41	22	21	36	29	14	6	-47	-26	-25	-41	-34	-51	-59	23	21	20	12
30,000	38	21	20	32	27	11	3	-45	-26	-23	-37	-32	-49	-58	26	25	19	23
20,000	27	14	14	21	18	7	1	-30	-16	-15	-23	-20	-33	-39	19	18	12	24
ANDREWS AFB TO HICKAM AFB																		
53,000	-29	-25	-11	-19	-21	-28	-32	28	24	10	18	20	13	10	9	8	6	4204 N.MI.
40,000	-50	-38	-30	-35	-37	-47	-52	47	36	29	33	35	27	22	13	12	10	7
30,000	-42	-32	-22	-28	-30	-39	-45	39	30	21	26	28	20	16	13	12	8	12
20,000	-26	-19	-11	-16	-17	-24	-28	24	18	11	15	16	10	8	10	9	6	11
ANDREWS AFB TO INCIRLIK AB																		
53,000	29	16	13	20	18	13	10	-30	-17	-13	-20	-19	-26	-30	8	6	5	4915 N.MI.
40,000	40	26	29	37	33	24	20	-43	-28	-32	-39	-35	-44	-49	12	11	10	7
30,000	39	25	28	34	31	22	17	-43	-28	-30	-37	-34	-44	-49	15	13	11	13
20,000	28	17	19	23	21	15	11	-30	-19	-20	-24	-23	-30	-34	11	10	8	14
ANDREWS AFB TO IWO JIMA																		
53,000	-33	-18	-6	-21	-19	-27	-32	30	16	5	20	18	10	6	8	6	5	6424 N.MI.
40,000	-39	-26	-19	-33	-29	-38	-42	34	23	16	29	25	17	14	10	9	9	6
30,000	-36	-25	-18	-30	-27	-36	-40	32	22	16	27	24	16	12	10	10	9	10
20,000	-25	-17	-12	-19	-18	-24	-28	22	15	11	18	16	11	8	8	8	6	11
ANDREWS AFB TO JOHNSTON AFB																		
53,000	-26	-23	-11	-17	-19	-26	-29	25	22	10	16	18	12	9	8	7	5	4896 N.MI.
40,000	-47	-37	-28	-33	-36	-45	-50	44	35	27	31	34	25	21	12	11	9	7
30,000	-40	-31	-21	-27	-29	-38	-43	37	29	20	25	27	19	15	13	11	8	11
20,000	-24	-18	-10	-15	-16	-22	-26	23	17	9	14	15	9	7	9	8	5	7
ANDREWS AFB TO KADENA AB																		
53,000	-25	-11	-5	-16	-13	-20	-25	22	9	4	14	11	6	3	8	6	5	6654 N.MI.
40,000	-21	-15	-16	-20	-18	-24	-27	16	12	14	16	15	9	6	9	8	8	6
30,000	-19	-15	-15	-17	-17	-23	-26	15	12	13	14	14	8	4	9	9	8	9
20,000	-12	-9	-10	-11	-10	-15	-18	10	8	9	9	9	4	2	7	7	6	9
ANDREWS AFB TO KEFLAVIK AP																		
53,000	29	13	9	21	17	9	6	-31	-14	-9	-22	-18	-27	-32	11	9	7	2418 N.MI.
40,000	39	22	20	34	28	17	11	-43	-25	-23	-37	-31	-43	-50	16	15	13	9
30,000	36	22	19	31	27	14	8	-41	-25	-22	-34	-30	-43	-50	18	18	15	16
20,000	24	14	12	19	17	8	3	-26	-16	-13	-20	-18	-28	-33	14	14	10	18
ANDREWS AFB TO KINDLEY AFB																		
53,000	41	31	7	21	24	10	4	-43	-33	-7	-22	-25	-41	-48	17	17	10	710 N.MI.
40,000	55	44	18	31	36	18	9	-60	-48	-20	-35	-39	-59	-71	26	26	19	15
30,000	50	39	15	26	30	14	6	-54	-43	-16	-29	-33	-54	-64	26	25	15	24
20,000	34	27	11	15	20	8	3	-37	-29	-11	-16	-21	-36	-44	19	18	10	24
ANDREWS AFB TO KWAJALEIN NAS																		
53,000	-24	-18	-8	-13	-15	-22	-25	22	17	8	12	14	9	6	8	7	5	6216 N.MI.
40,000	-43	-33	-21	-29	-31	-40	-45	41	30	19	27	29	21	16	11	10	9	6
30,000	-37	-30	-17	-25	-26	-35	-40	34	28	16	23	24	17	13	11	10	7	10
20,000	-24	-18	-9	-15	-16	-22	-26	22	17	9	14	15	9	7	8	7	5	7
ANDREWS AFB TO LADD AFB																		
53,000	-28	-13	-9	-19	-16	-24	-28	27	12	9	18	15	9	7	9	7	6	2846 N.MI.
40,000	-33	-19	-22	-27	-25	-34	-39	30	17	20	24	23	14	10	12	11	11	7
30,000	-33	-21	-20	-26	-25	-35	-40	30	19	19	23	23	13	9	13	13	12	13
20,000	-23	-16	-15	-18	-18	-24	-28	21	15	15	16	16	10	7	11	10	8	14
ANDREWS AFB TO LAJES AP																		
53,000	35	24	12	23	23	14	10	-37	-25	-12	-24	-24	-33	-39	12	10	8	2299 N.MI.
40,000	50	39	29	42	40	27	21	-52	-41	-31	-44	-42	-54	-61	18	17	14	10
30,000	48	39	26	37	37	25	19	-50	-41	-28	-39	-39	-52	-59	19	18	12	17
20,000	37	27	20	26	26	18	14	-38	-28	-21	-27	-27	-37	-43	15	14	9	17
ANDREWS AFB TO LE BOURGET AP																		
53,000	31	17	14	23	20	14	11	-32	-17	-14	-24	-21	-28	-33	10	8	6	3325 N.MI.
40,000	47	28	33	44	38	27	22	-50	-31	-35	-46	-40	-51	-57	15	14	13	8
30,000	47	29	31	41	36	25	19	-51	-32	-33	-44	-39	-52	-58	18	16	13	15
20,000	34	20	22	28	25	17	13	-36	-22	-23	-29	-27	-36	-41	14	13	9	16

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HEIGHT IN FEET	EQUIVALENT							HEADWINDS*						STANDARD DEVIATION				
	O I R E C T							R E T U R N						JAN	APR	JUL	OCT	
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85				
ANDREWS AFB TO LONDON INTERNATIONAL																		
53,000	31	16	13	23	20	13	10	-33	-17	-14	-24	-21	-29	-33	10	8	7	8
40,000	47	29	33	44	38	27	21	-50	-31	-35	-46	-40	-52	-58	15	14	13	16
30,000	48	29	31	40	36	25	19	-51	-32	-33	-43	-39	-52	-59	18	17	14	17
20,000	34	20	21	27	25	16	12	-36	-22	-22	-29	-27	-36	-41	14	13	9	12
ANDREWS AFB TO LORING AFB																		
53,000	31	15	6	21	17	6	1	-34	-17	-6	-23	-19	-32	-39	17	15	11	14
40,000	44	27	21	37	32	14	4	-53	-32	-25	-42	-38	-57	-67	27	26	23	27
30,000	42	25	21	33	29	11	2	-50	-30	-24	-37	-34	-54	-65	31	29	20	27
20,000	31	17	14	23	20	7	1	-35	-19	-16	-25	-23	-37	-45	22	21	13	21
ANDREWS AFB TO MAURIPUR AP																		
53,000	27	12	5	18	15	8	5	-29	-13	-6	-20	-16	-24	-29	8	6	5	6
40,000	31	19	15	25	22	14	11	-35	-22	-18	-28	-25	-34	-38	11	10	9	10
30,000	28	19	16	22	21	13	9	-32	-22	-18	-25	-24	-32	-37	12	11	9	11
20,000	19	13	9	15	13	8	5	-21	-14	-10	-16	-15	-21	-25	9	8	6	8
ANDREWS AFB TO MCCHORD AFB																		
53,000	-35	-22	-14	-25	-23	-32	-37	34	22	14	24	23	15	12	11	9	7	9
40,000	-54	-36	-38	-42	-42	-54	-61	52	34	37	39	40	28	22	17	16	15	18
30,000	-53	-35	-33	-39	-39	-52	-60	50	33	32	37	37	25	19	19	18	14	19
20,000	-36	-24	-21	-27	-26	-36	-41	35	23	21	26	25	17	13	14	13	9	13
ANDREWS AFB TO MCGUIRE AFB																		
53,000	43	25	6	26	24	9	3	-45	-26	-6	-27	-25	-41	-49	19	18	13	17
40,000	60	41	25	46	42	21	10	-66	-45	-27	-49	-46	-68	-80	31	30	25	30
30,000	57	38	23	40	38	18	8	-63	-42	-25	-43	-41	-64	-76	31	31	20	31
20,000	42	25	17	27	26	12	5	-45	-28	-18	-28	-28	-44	-54	24	24	14	23
ANDREWS AFB TO MIDWAY NAS																		
53,000	-28	-21	-12	-21	-20	-27	-30	27	20	12	20	19	13	10	9	7	6	7
40,000	-52	-38	-27	-40	-39	-49	-55	49	35	26	37	36	27	22	12	11	10	12
30,000	-49	-38	-24	-36	-36	-47	-53	46	35	23	34	33	24	19	13	12	9	13
20,000	-34	-27	-17	-26	-25	-33	-37	32	25	16	25	24	17	14	10	9	6	9
ANDREWS AFB TO MILDENHALL AP																		
53,000	31	16	13	23	20	13	10	-32	-17	-13	-24	-21	-29	-33	10	8	7	8
40,000	47	28	32	43	37	26	21	-50	-31	-34	-46	-40	-51	-57	15	14	13	16
30,000	47	28	31	40	36	24	18	-51	-32	-33	-43	-39	-52	-58	18	17	14	17
20,000	33	20	20	27	25	16	12	-35	-22	-21	-28	-26	-35	-40	14	13	9	12
ANDREWS AFB TO MINOT AFB																		
53,000	-36	-23	-14	-24	-23	-33	-39	34	22	14	23	22	14	9	14	12	9	11
40,000	-57	-37	-40	-42	-44	-59	-67	53	35	38	39	41	27	19	21	20	18	22
30,000	-55	-37	-33	-38	-40	-56	-64	51	34	32	35	37	23	15	23	22	16	23
20,000	-38	-26	-22	-26	-27	-38	-45	36	24	21	25	26	15	10	17	17	11	17
ANDREWS AFB TO MOSCOW INTERNATIONAL																		
53,000	29	13	7	20	16	9	6	-30	-14	-7	-21	-17	-25	-30	9	7	5	7
40,000	34	22	17	28	25	16	12	-37	-24	-20	-31	-27	-37	-42	12	11	10	12
30,000	32	23	16	24	24	14	9	-36	-26	-19	-28	-27	-37	-42	15	14	12	14
20,000	21	15	10	16	15	8	4	-23	-17	-11	-18	-17	-24	-29	11	11	8	10
ANDREWS AFB TO MYRTLE BEACH AFB																		
53,000	-21	-11	3	-10	-9	-22	-29	15	8	-4	8	6	-5	-11	17	18	11	16
40,000	-30	-22	-2	-27	-19	-39	-50	17	13	0	20	12	-6	-16	27	29	22	28
30,000	-27	-19	-5	-22	-17	-35	-46	16	12	3	17	11	-5	-14	25	28	17	27
20,000	-22	-11	-5	-14	-12	-25	-33	17	8	4	11	9	-3	-9	21	21	12	20
ANDREWS AFB TO NOUASSEUR AB																		
53,000	32	23	12	20	21	14	11	-33	-23	-13	-21	-22	-29	-34	10	8	6	8
40,000	43	36	27	38	36	26	21	-46	-38	-29	-40	-37	-48	-53	15	14	11	14
30,000	41	34	24	34	32	23	18	-43	-36	-25	-35	-34	-45	-51	15	14	10	14
20,000	31	23	18	23	23	16	13	-32	-24	-19	-24	-24	-32	-37	12	11	7	10
ANDREWS AFB TO ORLY AP																		
53,000	31	17	14	23	20	14	11	-32	-17	-14	-24	-21	-28	-33	10	8	6	8
40,000	47	29	33	44	38	27	22	-50	-31	-36	-46	-40	-51	-58	15	14	13	15
30,000	47	29	31	41	37	25	19	-51	-32	-34	-44	-39	-52	-58	18	16	13	16
20,000	34	20	22	28	25	17	13	-36	-22	-23	-30	-27	-36	-41	14	12	9	12

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEADWINDS*							STANDARD DEVIATION			
	DIRECT								RETURN										
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT	
ANDREWS AFB TO PALAM AP																		6504 N.MI.	
53,000	22	10	4	15	12	6	4	-24	-11	-5	-17	-14	-21	-24	8	6	5	6	
40,000	20	14	11	20	16	10	6	-24	-17	-13	-23	-19	-25	-29	9	9	8	9	
30,000	18	15	11	18	15	9	5	-22	-18	-13	-21	-18	-25	-29	11	10	9	10	
20,000	12	10	6	11	10	5	2	-14	-12	-7	-13	-11	-17	-19	8	8	6	8	
ANDREWS AFB TO PATRICK AFB																		660 N.MI.	
53,000	-18	-9	3	-8	-7	-19	-25	12	5	-4	6	4	-6	-11	15	16	10	16	
40,000	-26	-21	1	-21	-16	-34	-43	14	12	-3	15	9	-7	-15	24	25	18	24	
30,000	-22	-14	-2	-17	-13	-28	-37	13	7	1	13	8	-6	-13	21	23	15	23	
20,000	-17	-10	-4	-11	-9	-21	-27	13	7	4	9	7	-2	-8	18	18	10	16	
ANDREWS AFB TO PIARCO AP																		1886 N.MI.	
53,000	17	17	0	7	9	1	-2	-20	-18	0	-8	-11	-20	-26	11	11	7	9	
40,000	24	19	4	10	13	3	-3	-30	-24	-4	-13	-17	-30	-37	15	16	11	15	
30,000	21	17	3	7	11	2	-2	-25	-21	-3	-9	-13	-25	-31	14	13	8	12	
20,000	11	9	-2	-1	3	-3	-6	-12	-11	2	0	-4	-12	-17	11	10	6	8	
ANDREWS AFB TO POPE AFB																		241 N.MI.	
53,000	-27	-15	2	-14	-13	-27	-34	22	12	-3	12	10	-2	-8	18	18	12	17	
40,000	-39	-27	-6	-32	-25	-46	-57	26	20	4	26	18	-1	-11	28	29	23	28	
30,000	-35	-24	-8	-27	-22	-42	-53	25	18	6	22	17	0	-9	26	29	18	28	
20,000	-27	-14	-7	-17	-15	-29	-38	22	11	6	15	12	0	-7	22	22	12	21	
ANDREWS AFB TO PRESTWICK AB																		2965 N.MI.	
53,000	31	16	12	24	20	13	9	-33	-16	-13	-24	-20	-29	-34	11	8	7	9	
40,000	47	28	31	42	36	25	20	-50	-30	-33	-45	-39	-51	-57	16	14	13	16	
30,000	46	28	30	39	35	23	17	-51	-32	-32	-42	-38	-51	-59	19	17	14	18	
20,000	32	20	19	26	24	15	10	-35	-21	-20	-27	-25	-35	-40	14	13	10	13	
ANDREWS AFB TO RAMEY AFB																		1320 N.MI.	
53,000	17	17	2	7	10	1	-3	-21	-19	-3	-9	-12	-22	-28	13	13	8	12	
40,000	24	20	7	10	14	2	-4	-32	-27	-8	-14	-19	-33	-41	19	20	13	18	
30,000	21	18	5	7	12	1	-4	-27	-22	-6	-10	-15	-27	-35	18	17	11	16	
20,000	11	10	-1	-1	4	-4	-8	-14	-12	1	0	-5	-14	-20	13	13	7	11	
ANDREWS AFB TO RHEIN MAIN AB																		3520 N.MI.	
53,000	31	16	13	22	19	13	10	-32	-17	-13	-23	-20	-28	-32	10	7	6	8	
40,000	45	27	32	42	36	26	20	-48	-29	-34	-45	-38	-50	-55	15	13	12	15	
30,000	45	27	30	39	35	24	18	-49	-30	-32	-42	-38	-50	-56	17	16	13	16	
20,000	32	19	20	26	24	16	11	-34	-21	-21	-28	-25	-34	-39	13	12	9	12	
ANDREWS AFB TO SEOUL AB																		6036 N.MI.	
53,000	-19	-9	-6	-12	-10	-16	-19	16	7	5	11	9	5	3	8	5	4	6	
40,000	-14	-11	-14	-16	-14	-19	-22	11	9	12	13	11	5	3	8	8	8	8	
30,000	-13	-12	-14	-13	-13	-19	-22	10	9	12	11	11	5	1	9	9	8	9	
20,000	-7	-7	-10	-9	-8	-13	-15	6	6	9	7	7	2	0	7	7	6	7	
ANDREWS AFB TO STEVENSON FIELD																		1092 N.MI.	
53,000	-33	-20	-13	-22	-21	-31	-36	31	19	13	21	20	11	7	14	12	10	12	
40,000	-52	-34	-37	-38	-40	-55	-63	47	31	35	34	37	22	15	21	20	19	23	
30,000	-51	-34	-31	-35	-37	-53	-61	45	31	29	32	34	19	11	23	23	17	23	
20,000	-35	-24	-21	-24	-25	-37	-43	32	23	20	22	24	13	8	18	17	11	17	
ANDREWS AFB TO SUNG SHAN																		6831 N.MI.	
53,000	-21	-9	-4	-12	-10	-17	-20	17	7	3	10	9	4	2	8	6	4	6	
40,000	-15	-11	-14	-14	-13	-19	-22	10	8	12	11	10	5	2	8	8	8	8	
30,000	-13	-11	-13	-12	-13	-18	-21	9	8	12	10	10	4	1	9	9	8	9	
20,000	-7	-7	-9	-8	-8	-12	-15	5	5	8	6	6	2	-1	7	7	6	7	
ANDREWS AFB TO TACHIKAWA AB																		5899 N.MI.	
53,000	-27	-13	-6	-19	-15	-23	-27	25	12	6	18	14	8	5	8	6	5	6	
40,000	-26	-18	-17	-26	-22	-29	-32	23	16	15	23	19	12	9	9	9	9	9	
30,000	-24	-18	-17	-22	-20	-27	-31	21	15	15	20	18	11	7	10	10	9	10	
20,000	-17	-12	-11	-15	-13	-19	-22	14	11	10	13	12	7	4	8	8	6	8	
ANDREWS AFB TO TAN SAN NHUT																		7816 N.MI.	
53,000	-8	-4	0	-3	-3	-7	-10	4	2	-1	1	1	-2	-4	7	5	4	5	
40,000	-4	-1	-5	-3	-3	-8	-11	-1	-2	3	0	0	-5	-8	8	7	7	8	
30,000	-2	-1	-5	-3	-3	-8	-11	-2	-2	3	1	0	-5	-8	8	9	7	8	
20,000	1	-1	-4	-1	-1	-6	-8	-3	0	3	0	0	-4	-7	7	6	5	6	

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HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION							
	DIRECT							RETURN							JAN	APR	JUL	OCT				
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85								
ANDREWS AFB TO THULE AB																			2274 N.MI.			
53,000	5	0	-1	3	1	-4	-7	-7	-1	1	-5	-3	-9	-12	10	8	6	8				
40,000	5	0	-2	2	1	-8	-12	-10	-3	0	-6	-5	-14	-19	13	12	12	14				
30,000	4	0	-2	2	1	-9	-14	-9	-3	-1	-6	-4	-14	-20	15	15	13	15				
20,000	4	0	-1	2	1	-7	-11	-6	-2	-1	-4	-3	-11	-15	12	12	9	12				
ANDREWS AFB TO TORBAY AP																			1174 N.MI.			
53,000	39	22	11	28	24	13	8	-41	-23	-12	-29	-25	-37	-44	15	13	10	13				
40,000	59	40	35	51	46	29	21	-63	-43	-37	-54	-49	-65	-75	24	22	20	23				
30,000	56	38	33	45	42	26	18	-61	-41	-35	-48	-45	-62	-72	26	24	18	23				
20,000	41	26	22	31	29	17	11	-43	-28	-23	-32	-30	-43	-50	19	19	12	18				
ANDREWS AFB TO TORREJON AFB																			3290 N.MI.			
53,000	31	19	14	21	21	14	11	-32	-20	-15	-22	-21	-28	-33	10	8	6	8				
40,000	45	32	32	42	38	28	22	-48	-34	-34	-44	-40	-50	-56	15	14	12	15				
30,000	45	31	30	39	35	25	20	-48	-34	-31	-41	-38	-49	-54	16	15	12	15				
20,000	33	22	22	28	26	18	14	-35	-23	-23	-29	-27	-35	-40	13	12	8	11				
ANDREWS AFB TO TRAVIS AFB																			2093 N.MI.			
53,000	-39	-28	-13	-25	-25	-35	-41	38	28	12	24	25	16	11	11	10	7	9				
40,000	-64	-44	-38	-44	-46	-60	-67	61	42	37	41	44	32	26	18	17	15	18				
30,000	-56	-40	-29	-38	-39	-53	-62	53	38	28	35	37	25	19	19	18	12	18				
20,000	-37	-26	-19	-24	-25	-35	-41	35	25	18	23	24	16	12	14	13	8	13				
ANDREWS AFB TO WAKE AP																			5817 N.MI.			
53,000	-28	-19	-8	-17	-17	-24	-28	26	18	8	16	16	10	7	8	7	5	7				
40,000	-51	-38	-23	-35	-36	-47	-52	47	35	21	32	34	24	19	11	11	9	11				
30,000	-47	-36	-21	-33	-34	-44	-50	44	34	20	30	31	22	18	12	11	8	11				
20,000	-33	-26	-16	-24	-24	-31	-35	32	24	15	23	23	16	13	9	8	6	8				
ANDREWS AFB TO WESTOVER AFB																			284 N.MI.			
53,000	35	19	5	23	19	7	0	-38	-21	-5	-24	-21	-36	-43	19	17	12	16				
40,000	49	33	21	40	35	15	5	-57	-38	-25	-45	-40	-62	-73	30	29	25	29				
30,000	46	31	21	35	32	13	3	-55	-36	-23	-39	-36	-58	-69	31	31	21	30				
20,000	35	20	15	24	22	9	2	-39	-23	-16	-26	-24	-40	-49	24	23	13	22				
ANDREWS AFB TO WHEELUS AP																			4213 N.MI.			
53,000	30	20	14	20	20	15	12	-31	-21	-14	-21	-21	-28	-32	9	7	6	7				
40,000	43	32	30	39	36	27	22	-46	-34	-32	-41	-38	-47	-52	13	12	11	13				
30,000	41	31	28	36	33	24	20	-43	-33	-29	-38	-35	-45	-50	14	13	10	13				
20,000	31	21	21	25	24	17	14	-32	-22	-21	-26	-25	-32	-36	11	10	7	9				
ARGENTIA NAS TO BW 8																			1187 N.MI.			
53,000	14	5	3	7	7	-2	-6	-16	-6	-4	-8	-8	-17	-22	15	12	10	12				
40,000	19	9	3	10	10	-3	-10	-23	-12	-7	-16	-14	-27	-35	19	19	17	20				
30,000	16	8	5	11	10	-6	-14	-21	-11	-8	-16	-14	-30	-38	24	23	21	23				
20,000	11	7	3	6	7	-5	-11	-14	-9	-5	-8	-9	-20	-27	19	18	14	18				
ARGENTIA NAS TO CAIRO INTERNATIONAL																			3925 N.MI.			
53,000	27	19	14	17	19	13	11	-28	-19	-15	-18	-19	-26	-29	9	7	6	7				
40,000	39	27	31	35	33	24	19	-41	-29	-32	-38	-35	-44	-49	13	12	11	13				
30,000	38	27	27	33	31	22	17	-41	-29	-29	-35	-33	-43	-48	15	14	11	14				
20,000	26	18	21	22	22	15	12	-28	-20	-22	-23	-23	-30	-34	12	10	8	10				
ARGENTIA NAS TO CAMPBELL AFB																			1608 N.MI.			
53,000	-42	-25	-11	-28	-26	-37	-44	41	24	11	27	25	14	10	13	11	9	11				
40,000	-67	-44	-36	-53	-49	-65	-73	63	41	33	50	46	31	24	21	19	17	20				
30,000	-63	-42	-33	-47	-45	-61	-70	59	39	31	44	42	27	20	22	21	15	21				
20,000	-43	-27	-22	-31	-29	-41	-49	41	25	21	30	28	18	13	17	16	10	16				
ARGENTIA NAS TO CHARLESTON AFB																			1463 N.MI.			
53,000	-40	-23	-7	-25	-23	-35	-41	37	21	6	24	21	10	5	14	12	9	12				
40,000	-59	-43	-27	-48	-44	-60	-69	53	39	25	45	40	25	17	21	21	17	21				
30,000	-56	-40	-26	-42	-40	-56	-65	50	36	24	39	36	22	15	22	22	15	21				
20,000	-40	-27	-18	-28	-27	-39	-46	38	25	17	26	25	15	10	17	16	10	15				
ARGENTIA NAS TO CHATEAUX ROUX AB																			2227 N.MI.			
53,000	27	15	16	20	19	12	9	-28	-15	-16	-21	-19	-26	-31	12	9	8	10				
40,000	41	24	34	41	35	23	16	-44	-26	-36	-43	-37	-49	-56	18	16	15	18				
30,000	44	25	31	39	35	21	14	-47	-28	-33	-42	-37	-51	-59	21	19	16	20				
20,000	31	18	23	28	25	15	10	-33	-20	-24	-29	-26	-36	-42	17	15	11	14				

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HEIGHT IN FEET	EQUIVALENT							HEAD WINDS*							STANDARD DEVIATION							
	DIRECT							RETURN							JAN	APR	JUL	OCT				
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85								
ARGENTIA NAS TO CHURCHILL AP																			1570 N.MI.			
53,000	-23	-12	-12	-19	-16	-24	-28	22	11	12	18	15	8	4	13	10	8	10				
40,000	-31	-20	-32	-35	-29	-41	-48	28	18	30	32	27	15	9	17	15	16	18				
30,000	-30	-21	-31	-33	-29	-41	-48	26	19	29	29	26	13	6	18	19	17	19				
20,000	-22	-12	-20	-22	-19	-28	-34	20	11	19	21	18	8	3	15	14	11	14				
ARGENTIA NAS TO CIAMPINO AP																			2779 N.MI.			
53,000	25	15	16	18	18	12	9	-26	-16	-16	-19	-19	-25	-29	10	8	7	8				
40,000	38	23	32	38	33	22	17	-40	-25	-34	-40	-35	-46	-52	16	14	13	16				
30,000	39	24	29	37	32	20	14	-42	-26	-31	-39	-34	-46	-53	18	17	14	17				
20,000	28	17	22	25	23	15	10	-30	-18	-23	-27	-24	-33	-38	14	13	9	12				
ARGENTIA NAS TO CLARK AFB																			7040 N.MI.			
53,000	3	3	3	4	4	0	-2	-7	-5	-4	-6	-5	-9	-11	7	6	4	6				
40,000	10	8	1	9	7	1	-2	-14	-11	-3	-12	-10	-16	-19	8	7	7	8				
30,000	9	8	1	8	7	0	-3	-13	-11	-2	-10	-9	-16	-19	9	9	8	9				
20,000	8	6	1	6	5	1	-2	-10	-8	-2	-7	-6	-11	-14	7	7	6	7				
ARGENTIA NAS TO OHAHRAN AB																			4790 N.MI.			
53,000	28	16	11	17	17	11	9	-30	-18	-11	-18	-18	-25	-29	8	6	6	7				
40,000	38	26	25	32	30	22	17	-41	-29	-27	-34	-32	-41	-46	12	11	10	12				
30,000	36	25	25	29	28	19	15	-39	-28	-27	-31	-31	-40	-45	14	13	11	13				
20,000	25	17	18	19	19	13	10	-27	-19	-19	-20	-21	-27	-31	11	10	7	9				
ARGENTIA NAS TO OON MUANG																			6882 N.MI.			
53,000	19	11	4	11	10	5	3	-22	-12	-5	-12	-12	-18	-22	8	6	5	6				
40,000	18	17	9	16	15	9	5	-22	-20	-11	-18	-18	-24	-28	9	8	8	9				
30,000	19	18	8	16	15	8	5	-23	-21	-10	-18	-18	-25	-29	10	10	8	9				
20,000	13	12	4	10	10	4	2	-15	-13	-5	-11	-11	-16	-19	8	7	6	7				
ARGENTIA NAS TO OOVER AFB																			1054 N.MI.			
53,000	-41	-23	-12	-29	-25	-37	-44	39	22	11	28	24	13	8	16	13	10	13				
40,000	-63	-43	-37	-54	-49	-66	-75	59	40	35	51	45	29	20	24	23	21	24				
30,000	-60	-42	-35	-48	-45	-63	-72	56	38	33	45	42	26	17	27	25	18	24				
20,000	-43	-28	-23	-32	-30	-43	-51	41	26	22	31	29	17	11	20	19	12	18				
ARGENTIA NAS TO OUM OUM																			6139 N.MI.			
53,000	25	12	5	16	14	8	5	-27	-14	-6	-18	-16	-23	-27	8	7	5	6				
40,000	24	19	15	22	20	13	10	-28	-22	-17	-24	-22	-30	-33	10	9	8	10				
30,000	24	20	15	20	19	12	8	-27	-23	-16	-22	-22	-30	-34	11	11	9	11				
20,000	15	13	7	13	12	6	4	-17	-15	-8	-14	-13	-19	-22	8	8	7	8				
ARGENTIA NAS TO ELMENDORF AFB																			3139 N.MI.			
53,000	-22	-9	-7	-15	-12	-19	-23	20	9	7	14	12	6	4	9	7	5	7				
40,000	-21	-15	-19	-25	-20	-27	-32	19	14	17	23	18	10	7	11	10	10	12				
30,000	-20	-17	-18	-24	-20	-28	-32	17	15	16	21	17	9	4	12	13	12	12				
20,000	-14	-10	-13	-16	-13	-19	-23	12	9	12	15	12	6	2	10	9	8	9				
ARGENTIA NAS TO ENIWETOK AFB																			6781 N.MI.			
53,000	-21	-10	-3	-11	-10	-17	-21	19	9	3	10	9	4	1	8	6	5	6				
40,000	-30	-23	-14	-22	-22	-29	-33	25	20	13	19	19	12	9	9	9	8	9				
30,000	-26	-21	-15	-22	-21	-28	-31	22	18	13	19	18	11	8	10	10	8	10				
20,000	-19	-13	-12	-15	-14	-20	-22	17	12	11	14	13	8	6	8	7	6	7				
ARGENTIA NAS TO ERNEST HARMON AFB																			197 N.MI.			
53,000	-29	-18	-15	-26	-21	-34	-41	27	17	15	24	20	8	2	21	16	14	18				
40,000	-46	-31	-43	-51	-43	-63	-74	41	28	41	47	39	19	9	30	28	27	31				
30,000	-45	-31	-38	-46	-40	-62	-73	39	27	36	42	36	15	3	35	33	27	32				
20,000	-33	-18	-24	-30	-26	-42	-51	30	16	23	28	24	9	0	26	25	18	24				
ARGENTIA NAS TO GALEAO																			4247 N.MI.			
53,000	2	3	0	3	2	-3	-5	-3	-4	0	-4	-3	-7	-10	8	7	5	6				
40,000	1	-1	1	3	1	-5	-8	-4	-2	-3	-6	-4	-10	-13	10	10	8	9				
30,000	4	2	0	2	2	-4	-7	-6	-5	-1	-3	-4	-9	-12	9	9	7	8				
20,000	1	0	-1	2	1	-3	-5	-3	-1	0	-2	-2	-6	-8	7	6	5	5				
ARGENTIA NAS TO GEORGE AFB																			2889 N.MI.			
53,000	-33	-22	-14	-24	-23	-30	-35	32	22	14	23	22	15	12	10	8	7	8				
40,000	-53	-36	-41	-43	-43	-54	-59	50	34	39	40	41	30	25	15	14	13	15				
30,000	-49	-34	-35	-38	-38	-49	-56	46	31	33	35	36	26	20	17	16	12	16				
20,000	-32	-22	-22	-25	-25	-33	-37	31	20	22	24	24	16	12	12	12	8	11				

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	D I R E C T							R E T U R N										
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
ARGENTIA NAS TO GOOSE AB																		
53,000	-10	-7	-8	-12	-9	-20	-26	7	6	7	10	7	-3	-9	19	15	13	16
40,000	-17	-12	-26	-25	-20	-38	-48	9	9	22	18	14	-4	-14	28	25	24	28
30,000	-17	-12	-21	-22	-18	-38	-49	9	8	17	15	12	-8	-19	32	31	26	30
20,000	-13	-4	-13	-15	-12	-26	-34	9	2	11	12	9	-6	-14	24	23	17	22
ARGENTIA NAS TO HICKAM AFB																		
53,000	-21	-16	-14	-19	-17	-22	-25	19	15	13	18	16	12	9	8	7	5	7
40,000	-36	-26	-29	-33	-31	-39	-43	33	24	27	30	28	21	17	11	10	10	11
30,000	-34	-25	-25	-30	-28	-36	-41	31	23	24	27	26	18	14	12	12	9	12
20,000	-23	-16	-15	-19	-18	-24	-27	21	15	14	18	17	11	8	9	8	6	8
ARGENTIA NAS TO INCIRLIK AB																		
53,000	27	16	14	18	18	12	10	-28	-16	-15	-18	-18	-24	-28	9	7	6	7
40,000	37	24	30	34	31	22	17	-39	-26	-32	-37	-33	-42	-47	13	12	11	14
30,000	36	24	28	32	30	20	14	-39	-26	-30	-35	-32	-43	-48	16	15	12	15
20,000	26	16	20	22	21	14	10	-27	-18	-21	-23	-22	-30	-34	12	11	8	11
ARGENTIA NAS TO IWO JIMA																		
53,000	-14	-6	-1	-8	-7	-12	-15	11	4	0	6	5	0	-2	8	6	5	6
40,000	-9	-9	-6	-11	-9	-14	-17	3	5	4	7	5	-1	-4	8	8	8	9
30,000	-6	-8	-6	-9	-7	-13	-17	1	4	4	5	4	-2	-6	9	9	9	9
20,000	-3	-4	-4	-6	-4	-9	-12	0	3	4	4	3	-2	-5	8	7	6	7
ARGENTIA NAS TO JOHNSTON AFB																		
53,000	-19	-15	-12	-17	-15	-20	-23	17	14	12	16	14	10	8	8	6	5	6
40,000	-35	-26	-23	-32	-29	-36	-40	31	23	22	29	26	19	15	11	10	9	11
30,000	-32	-26	-22	-29	-27	-35	-39	28	23	20	27	24	17	13	12	11	9	11
20,000	-22	-16	-13	-19	-17	-23	-26	20	15	12	18	16	11	8	9	8	6	8
ARGENTIA NAS TO KADENA AB																		
53,000	-1	0	2	-1	0	-4	-6	-2	-2	-2	-1	-2	-6	-8	8	6	4	6
40,000	8	2	-1	4	3	-3	-6	-12	-5	0	-7	-6	-12	-15	8	8	7	8
30,000	7	3	-1	4	3	-3	-6	-11	-6	-1	-7	-6	-12	-16	9	9	9	9
20,000	7	4	0	3	3	-1	-4	-9	-5	-1	-5	-5	-10	-13	7	7	6	7
ARGENTIA NAS TO KEFLAVIK AP																		
53,000	28	12	11	19	16	8	3	-30	-13	-11	-20	-17	-27	-33	15	11	10	12
40,000	39	24	21	32	28	15	8	-42	-26	-24	-35	-31	-45	-53	20	19	17	21
30,000	39	23	20	30	28	12	3	-43	-27	-23	-34	-31	-48	-57	25	23	20	23
20,000	26	17	12	18	18	6	0	-28	-18	-13	-20	-20	-32	-39	19	18	14	18
ARGENTIA NAS TO KINDLEY AFB																		
53,000	-22	-13	-3	-13	-12	-23	-29	18	11	2	11	10	0	-5	17	15	10	15
40,000	-36	-29	-14	-29	-26	-43	-52	29	24	11	24	21	6	-2	25	23	18	23
30,000	-33	-28	-15	-27	-25	-41	-49	26	23	12	23	20	6	-2	25	23	16	21
20,000	-23	-20	-12	-18	-18	-30	-36	19	18	11	16	15	5	-1	19	18	11	16
ARGENTIA NAS TO KWAJALEIN NAS																		
53,000	-19	-10	-5	-12	-11	-16	-20	17	9	4	11	10	5	3	8	6	5	6
40,000	-30	-24	-15	-24	-23	-30	-34	26	21	13	21	20	13	10	9	9	8	10
30,000	-27	-22	-15	-23	-21	-28	-32	23	19	14	20	19	12	9	10	10	8	10
20,000	-19	-15	-11	-16	-15	-20	-23	17	13	10	14	13	9	6	8	7	6	7
ARGENTIA NAS TO LADD AFB																		
53,000	-20	-9	-7	-14	-11	-18	-22	19	8	6	13	11	5	3	9	7	5	7
40,000	-19	-14	-18	-23	-18	-26	-30	16	13	16	21	16	9	5	11	10	10	11
30,000	-17	-16	-17	-22	-18	-26	-31	15	14	15	20	16	8	3	12	13	12	12
20,000	-12	-9	-12	-15	-12	-18	-22	11	8	11	13	11	5	1	10	10	8	9
ARGENTIA NAS TO LAJES AP																		
53,000	23	16	15	21	18	10	5	-25	-17	-15	-22	-19	-28	-34	15	12	10	13
40,000	34	26	31	39	32	18	11	-37	-29	-33	-41	-35	-49	-57	22	21	18	22
30,000	32	26	27	35	30	15	7	-36	-29	-29	-38	-33	-48	-56	24	23	18	23
20,000	26	17	20	25	22	11	5	-29	-19	-21	-27	-23	-35	-41	19	18	12	16
ARGENTIA NAS TO LE BOURGET AP																		
53,000	27	15	15	20	19	12	9	-28	-15	-16	-21	-19	-27	-31	12	9	8	10
40,000	42	24	34	41	35	23	16	-44	-26	-35	-43	-37	-50	-56	18	16	15	18
30,000	44	25	31	39	35	21	14	-47	-28	-34	-42	-37	-51	-59	21	20	17	20
20,000	32	19	23	28	25	15	10	-34	-20	-24	-29	-26	-37	-43	17	15	11	15

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEADWINDS*								STANDARD DEVIATION			
	DIRECT								RETURN								JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85						
ARGENTIA NAS TO LONDON INTERNATIONAL																				
53,000	28	15	15	21	19	12	8	-29	-15	-15	-22	-19	-27	-32	12	2059 N.MI.				
40,000	43	25	34	41	36	23	16	-45	-27	-35	-44	-38	-51	-58	18	9	8	10		
30,000	45	26	32	39	35	21	14	-49	-29	-34	-42	-38	-53	-61	22	17	16	19		
20,000	33	19	22	28	25	15	9	-35	-21	-23	-29	-27	-37	-44	22	21	18	21		
ARGENTIA NAS TO LORING AFB																				
53,000	-37	-21	-16	-30	-25	-37	-44	36	20	16	29	24	13	8	19	566 N.MI.				
40,000	-58	-38	-45	-56	-49	-67	-78	55	36	43	54	47	28	19	28	15	12	15		
30,000	-55	-38	-41	-51	-46	-65	-76	52	35	40	49	44	25	15	31	25	24	28		
20,000	-39	-23	-26	-34	-30	-44	-52	37	22	26	32	29	15	8	23	29	23	28		
ARGENTIA NAS TO MAURIPUR AP																				
53,000	28	14	8	19	16	10	7	-30	-15	-8	-20	-17	-25	-29	9	5423 N.MI.				
40,000	35	22	20	28	25	17	13	-38	-24	-22	-31	-28	-37	-42	11	6	5	6		
30,000	32	21	21	26	25	16	12	-36	-24	-23	-28	-27	-36	-41	13	10	9	11		
20,000	23	15	13	17	16	10	7	-24	-16	-14	-19	-18	-24	-28	10	12	10	12		
ARGENTIA NAS TO MCCORD AFB																				
53,000	-27	-16	-15	-23	-20	-26	-30	26	15	15	23	19	13	10	10	2696 N.MI.				
40,000	-39	-25	-35	-38	-34	-44	-49	36	23	34	36	32	22	17	14	7	6	8		
30,000	-39	-26	-33	-37	-34	-44	-50	36	24	32	34	32	21	16	15	13	13	15		
20,000	-27	-17	-22	-25	-23	-30	-35	26	15	21	24	22	14	10	12	15	13	16		
ARGENTIA NAS TO MCGUIRE AFB																				
53,000	-41	-23	-12	-29	-25	-37	-44	39	22	12	28	24	13	8	16	991 N.MI.				
40,000	-63	-43	-38	-54	-49	-66	-76	59	40	36	51	46	29	21	25	13	10	13		
30,000	-61	-42	-36	-48	-46	-63	-73	56	38	34	46	43	26	18	28	23	21	25		
20,000	-42	-28	-23	-33	-30	-44	-51	41	26	22	31	29	17	11	20	26	19	24		
ARGENTIA NAS TO MIDWAY NAS																				
53,000	-21	-13	-8	-17	-14	-20	-23	19	12	8	16	13	8	6	8	5337 N.MI.				
40,000	-34	-25	-20	-32	-28	-35	-39	30	22	18	29	25	17	13	10	6	5	7		
30,000	-33	-26	-20	-30	-27	-35	-40	29	23	19	27	24	16	12	12	10	9	11		
20,000	-24	-19	-15	-22	-19	-25	-29	22	17	14	20	18	12	9	9	11	10	11		
ARGENTIA NAS TO MILOENHALL AP																				
53,000	28	15	14	21	19	12	8	-29	-15	-15	-22	-19	-27	-32	12	2079 N.MI.				
40,000	43	25	33	41	35	23	16	-45	-27	-35	-43	-37	-50	-57	18	9	8	10		
30,000	45	26	32	39	35	21	13	-49	-29	-34	-42	-38	-53	-61	22	16	16	19		
20,000	33	19	22	27	25	14	9	-35	-21	-23	-29	-26	-37	-44	22	21	18	21		
ARGENTIA NAS TO MINOT AFB																				
53,000	-31	-18	-16	-25	-22	-30	-34	30	17	16	25	21	14	10	11	1877 N.MI.				
40,000	-47	-28	-41	-44	-40	-52	-58	44	27	39	41	38	26	19	17	9	8	10		
30,000	-45	-30	-37	-41	-38	-51	-58	42	28	36	38	36	23	17	19	15	15	18		
20,000	-32	-18	-25	-28	-26	-35	-40	30	17	25	26	25	15	10	14	19	15	19		
ARGENTIA NAS TO MOSCOW INTERNATIONAL																				
53,000	28	13	10	20	17	10	7	-30	-14	-10	-21	-17	-25	-30	11	3202 N.MI.				
40,000	36	24	22	31	28	18	13	-38	-25	-24	-33	-30	-40	-45	14	8	6	8		
30,000	36	25	22	27	27	16	10	-39	-28	-24	-30	-30	-42	-48	18	13	12	15		
20,000	25	18	14	19	18	10	6	-27	-19	-15	-21	-20	-29	-33	13	17	15	17		
ARGENTIA NAS TO MYRTLE BEACH AFB																				
53,000	-40	-23	-7	-25	-23	-35	-42	37	21	7	24	21	10	5	14	1391 N.MI.				
40,000	-59	-42	-28	-49	-44	-60	-69	54	39	26	45	40	25	17	22	13	9	12		
30,000	-56	-40	-27	-43	-40	-56	-66	51	37	25	40	37	22	15	23	21	18	21		
20,000	-40	-27	-18	-28	-27	-39	-47	38	25	17	27	26	15	10	17	22	15	21		
ARGENTIA NAS TO NOUASSEUR AB																				
53,000	23	17	15	18	18	12	8	-24	-18	-16	-18	-19	-25	-29	11	2242 N.MI.				
40,000	33	26	28	35	30	20	14	-36	-28	-29	-37	-32	-43	-49	17	9	8	9		
30,000	32	25	24	31	28	17	11	-35	-27	-25	-34	-30	-41	-47	18	16	14	16		
20,000	24	16	18	23	20	12	7	-26	-18	-19	-24	-21	-30	-34	14	17	13	17		
ARGENTIA NAS TO ORLY AP																				
53,000	27	15	15	20	19	12	9	-28	-15	-16	-21	-19	-27	-31	12	2212 N.MI.				
40,000	42	24	34	41	35	23	16	-44	-26	-35	-43	-37	-50	-56	18	9	8	10		
30,000	44	25	31	39	35	21	14	-47	-28	-33	-42	-37	-51	-59	21	16	15	18		
20,000	32	19	23	28	25	15	10	-34	-20	-24	-29	-26	-36	-43	17	20	17	20		

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	D I R E C T							R E T U R N							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85				
ARGENTIA NAS TO PALAM AP																		
53,000	26	13	8	20	16	9	7	-28	-14	-9	-21	-17	-25	-29	5538 N.MI.			
40,000	28	19	19	25	23	16	12	-31	-21	-21	-28	-25	-33	-37	9	6	5	6
30,000	27	21	18	23	22	14	10	-30	-23	-20	-25	-25	-33	-37	11	10	9	11
20,000	18	14	10	16	14	8	5	-20	-15	-11	-17	-15	-22	-25	12	12	10	12
ARGENTIA NAS TO PATRICK AFB																		
53,000	-36	-21	-4	-21	-20	-32	-38	33	19	4	20	18	7	3	1687 N.MI.			
40,000	-53	-41	-20	-42	-38	-53	-62	46	36	17	38	34	19	12	13	12	8	12
30,000	-48	-36	-19	-36	-34	-49	-57	43	32	17	33	30	17	11	20	19	16	19
20,000	-34	-25	-15	-24	-23	-34	-40	32	23	14	23	22	12	8	20	19	13	18
ARGENTIA NAS TO PIARCO AP																		
53,000	-2	-1	1	1	0	-6	-10	-1	-2	-1	-2	-1	-8	-11	2234 N.MI.			
40,000	-11	-14	-4	-3	-7	-17	-23	4	8	2	0	3	-6	-11	12	10	7	9
30,000	-7	-8	-4	-5	-6	-14	-19	2	4	3	2	3	-6	-10	16	15	11	14
20,000	-2	-5	-4	-4	-4	-10	-13	0	3	3	3	3	-4	-7	15	14	9	12
ARGENTIA NAS TO POPE AFB																		
53,000	-41	-23	-9	-26	-24	-36	-43	38	22	8	25	22	11	7	1334 N.MI.			
40,000	-61	-43	-31	-51	-46	-62	-71	56	39	29	47	42	27	19	15	13	9	12
30,000	-58	-41	-29	-45	-42	-59	-68	53	37	27	42	39	24	16	22	21	18	22
20,000	-42	-28	-20	-30	-28	-41	-48	39	26	19	28	27	16	10	24	23	16	22
ARGENTIA NAS TO PRESTWICK AB																		
53,000	29	14	14	22	19	11	8	-30	-15	-15	-23	-20	-28	-33	1871 N.MI.			
40,000	44	27	33	41	36	23	16	-47	-28	-34	-44	-38	-51	-59	13	10	8	11
30,000	47	28	32	39	36	21	13	-50	-30	-34	-42	-39	-54	-63	19	17	16	20
20,000	33	20	21	26	25	14	8	-35	-22	-22	-28	-26	-38	-45	24	22	19	23
ARGENTIA NAS TO RAMEY AFB																		
53,000	-11	-6	1	-5	-4	-13	-17	7	3	-1	3	3	-5	-8	1844 N.MI.			
40,000	-21	-21	-6	-13	-14	-27	-33	14	15	4	9	10	-1	-7	13	12	8	11
30,000	-17	-17	-6	-13	-12	-23	-29	11	12	5	10	9	-1	-6	18	18	13	17
20,000	-9	-12	-7	-10	-9	-17	-21	6	10	6	9	8	1	-3	18	16	11	15
ARGENTIA NAS TO RHEIN MAIN AB																		
53,000	27	14	14	20	18	12	9	-28	-15	-15	-21	-19	-26	-31	2411 N.MI.			
40,000	41	24	32	39	34	22	16	-43	-26	-34	-42	-36	-48	-54	11	8	7	9
30,000	43	25	31	38	34	20	13	-46	-27	-33	-41	-36	-50	-58	17	15	15	18
20,000	31	18	21	26	24	14	9	-33	-20	-22	-28	-25	-35	-41	21	19	16	20
ARGENTIA NAS TO SEOUL AB																		
53,000	2	1	1	0	1	-3	-5	-4	-2	-1	-2	-2	-6	-8	5711 N.MI.			
40,000	10	4	0	5	4	-1	-4	-13	-5	-2	-8	-7	-13	-16	8	5	4	6
30,000	9	4	0	5	5	-2	-5	-11	-6	-2	-8	-7	-13	-17	8	8	7	8
20,000	8	4	1	4	4	-1	-4	-9	-5	-2	-5	-5	-11	-13	9	9	9	9
ARGENTIA NAS TO STEVENSON FIELD																		
53,000	-31	-17	-16	-25	-22	-30	-35	30	16	16	25	21	13	10	1699 N.MI.			
40,000	-46	-27	-40	-44	-39	-52	-59	43	26	39	41	37	25	18	12	9	8	10
30,000	-44	-30	-37	-41	-38	-51	-58	41	28	36	38	35	23	16	17	16	16	19
20,000	-32	-18	-25	-28	-26	-35	-40	30	17	25	26	24	15	10	20	20	16	20
ARGENTIA NAS TO SUNG SHAN																		
53,000	3	3	3	3	3	-1	-3	-7	-5	-3	-5	-5	-9	-11	6451 N.MI.			
40,000	11	7	0	9	7	1	-2	-16	-10	-2	-12	-10	-16	-20	8	6	4	6
30,000	10	8	1	8	7	0	-3	-14	-10	-2	-10	-9	-16	-20	9	8	7	8
20,000	9	7	1	6	5	1	-2	-11	-8	-2	-7	-7	-12	-15	9	9	8	9
ARGENTIA NAS TO TACHIKAWA AB																		
53,000	-8	-4	-2	-6	-4	-9	-11	6	3	1	5	3	-1	-3	5768 N.MI.			
40,000	0	-4	-5	-6	-4	-10	-13	-3	2	3	3	1	-4	-7	8	5	4	6
30,000	0	-4	-4	-3	-3	-9	-12	-4	1	2	1	0	-6	-10	8	8	8	8
20,000	2	-1	-3	-3	-1	-6	-9	-4	0	2	1	0	-5	-8	9	9	9	9
ARGENTIA NAS TO TAN SAN NHUT																		
53,000	14	11	4	9	9	4	2	-17	-12	-5	-10	-11	-16	-19	7163 N.MI.			
40,000	15	16	6	14	13	6	3	-19	-19	-8	-16	-15	-22	-25	8	6	5	6
30,000	16	17	5	14	13	6	2	-20	-19	-7	-16	-15	-22	-26	9	8	7	9
20,000	12	11	3	9	9	3	1	-13	-12	-4	-10	-10	-15	-18	10	9	8	9

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.

MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION					
	DIRECT							RETURN							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85				
ARGENTIA NAS TO THULE AB																		
53,000	5	1	0	1	2	-5	-8	-8	-2	0	-3	-3	-9	-13	12	10	7	10
40,000	10	2	-1	2	3	-7	-12	-13	-4	-1	-6	-6	-16	-22	15	14	13	15
30,000	9	2	0	4	3	-8	-15	-13	-4	-3	-7	-7	-19	-25	18	17	16	18
20,000	7	3	1	2	3	-6	-11	-9	-5	-3	-4	-5	-14	-19	15	14	11	14
ARGENTIA NAS TO TORBAY AP																		
53,000	34	19	17	27	23	11	4	-35	-20	-17	-26	-24	-38	-45	23	17	15	19
40,000	54	36	41	53	46	25	14	-56	-38	-43	-56	-48	-69	-81	32	30	27	33
30,000	55	34	37	50	43	21	9	-58	-37	-40	-53	-46	-70	-82	37	34	28	33
20,000	38	23	24	32	29	13	4	-40	-24	-25	-34	-30	-47	-57	28	27	19	25
ARGENTIA NAS TO TORREJON AFB																		
53,000	25	16	16	19	18	12	9	-26	-16	-17	-19	-19	-26	-30	11	9	8	10
40,000	37	25	31	38	33	21	15	-39	-27	-33	-41	-35	-46	-53	17	16	15	17
30,000	37	25	29	36	31	19	13	-40	-27	-30	-39	-34	-46	-53	19	18	15	18
20,000	28	17	22	26	23	14	9	-30	-19	-22	-27	-24	-34	-39	16	14	10	13
ARGENTIA NAS TO TRAVIS AFB																		
53,000	-31	-19	-16	-24	-22	-28	-32	29	19	15	23	21	15	12	9	8	6	8
40,000	-46	-31	-41	-41	-40	-50	-55	43	29	39	39	38	28	22	14	13	13	15
30,000	-44	-31	-36	-37	-37	-47	-53	41	28	34	34	34	24	18	16	15	12	16
20,000	-30	-19	-23	-25	-24	-32	-36	28	18	23	24	23	16	12	12	11	8	11
ARGENTIA NAS TO WAKE AP																		
53,000	-22	-11	-4	-13	-11	-18	-22	19	10	4	12	10	5	3	8	6	5	6
40,000	-31	-24	-16	-24	-24	-31	-35	26	21	14	21	20	13	10	10	9	9	10
30,000	-29	-23	-16	-24	-23	-30	-34	25	20	15	21	20	13	9	10	10	9	10
20,000	-20	-14	-13	-16	-16	-21	-24	18	13	12	15	14	9	7	8	7	6	7
ARGENTIA NAS TO WESTOVER AFB																		
53,000	-40	-23	-14	-29	-25	-37	-44	39	22	13	29	24	14	9	17	14	11	14
40,000	-63	-42	-41	-56	-50	-68	-78	60	40	39	53	48	30	21	26	24	22	26
30,000	-61	-41	-39	-50	-47	-65	-76	57	39	37	48	44	27	18	30	27	20	26
20,000	-42	-27	-25	-34	-31	-45	-53	40	26	24	32	30	17	10	21	21	14	19
ARGENTIA NAS TO WHEELUS AP																		
53,000	26	18	15	18	18	13	10	-27	-19	-15	-18	-19	-25	-29	10	8	7	8
40,000	37	26	29	35	31	22	17	-39	-28	-31	-37	-33	-43	-48	15	13	12	14
30,000	35	25	26	33	29	20	15	-37	-27	-28	-35	-32	-42	-47	16	14	12	15
20,000	26	17	20	23	21	14	10	-28	-19	-21	-24	-22	-30	-34	13	11	8	10
BW 8 TO CAIRO INTERNATIONAL																		
53,000	23	12	4	12	11	5	2	-25	-13	-4	-13	-13	-20	-25	10	8	6	7
40,000	24	18	13	18	18	10	5	-27	-21	-15	-21	-21	-29	-34	13	12	10	13
30,000	23	18	12	15	17	7	2	-26	-21	-14	-18	-20	-30	-35	15	14	12	14
20,000	14	13	9	10	11	4	1	-16	-14	-10	-11	-13	-20	-24	12	11	8	10
BW 8 TO CAMPBELL AFB																		
53,000	-21	-9	-5	-14	-11	-19	-24	19	8	4	12	10	3	0	11	9	7	9
40,000	-29	-16	-12	-22	-19	-30	-36	23	13	9	19	16	5	0	15	14	13	15
30,000	-27	-15	-12	-20	-18	-30	-36	22	12	9	16	14	4	-2	17	16	14	16
20,000	-17	-10	-8	-13	-12	-20	-25	14	8	7	11	10	2	-3	13	13	9	13
BW 8 TO CHARLESTON AFB																		
53,000	-22	-9	-3	-14	-11	-19	-24	19	8	3	12	10	3	-1	11	9	7	9
40,000	-29	-16	-10	-25	-20	-31	-37	23	12	7	21	15	5	-1	15	15	13	15
30,000	-28	-15	-11	-23	-19	-30	-37	21	11	8	19	14	3	-2	17	17	13	17
20,000	-18	-10	-7	-13	-12	-20	-25	15	7	6	11	10	2	-3	13	13	9	13
BW 8 TO CHATEAUX AB																		
53,000	20	10	4	12	10	4	0	-22	-10	-4	-13	-11	-19	-24	12	9	7	9
40,000	22	15	13	17	16	6	0	-25	-17	-14	-20	-19	-30	-36	17	15	14	17
30,000	20	15	13	16	16	3	-4	-24	-18	-15	-19	-19	-32	-39	21	19	17	20
20,000	12	11	7	9	9	0	-5	-15	-12	-8	-11	-11	-21	-26	16	15	12	15
BW 8 TO CHURCHILL AP																		
53,000	-19	-7	-4	-12	-9	-17	-22	18	6	4	11	9	2	-1	13	10	7	10
40,000	-17	-13	-11	-16	-14	-24	-29	16	12	10	14	13	3	-2	15	14	14	16
30,000	-16	-15	-11	-16	-14	-26	-32	14	14	10	14	13	1	-5	17	17	17	17
20,000	-10	-10	-6	-11	-9	-18	-23	9	9	6	10	8	-1	-5	14	14	12	14

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEADWINDS*								STANDARD DEVIATION			
	D I R E C T								R E T U R N								JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85						
BW 8 TO CIAMPINO AP																	2513 N.MI.			
53,000	21	10	5	12	11	5	2	-22	-11	-5	-13	-12	-19	-24	11	8	6	8		
40,000	24	16	13	18	17	8	3	-26	-17	-15	-21	-19	-29	-35	15	14	12	15		
30,000	22	16	12	16	16	5	-2	-25	-18	-14	-20	-19	-31	-38	18	17	15	18		
20,000	14	11	7	9	10	2	-3	-16	-13	-8	-11	-12	-20	-25	14	13	10	13		
BW 8 TO CLARK AFB																	5853 N.MI.			
53,000	0	2	3	3	2	-2	-4	-4	-4	-4	-5	-4	-8	-10	7	6	4	6		
40,000	7	7	0	8	5	0	-3	-11	-10	-1	-10	-8	-14	-17	8	7	7	8		
30,000	7	7	0	6	5	-1	-4	-11	-10	-1	-8	-8	-14	-17	8	9	8	8		
20,000	7	6	1	5	4	0	-2	-9	-7	-1	-6	-6	-10	-13	7	7	6	6		
BW 8 TO DHAHRAN AB																	4202 N.MI.			
53,000	23	10	2	13	11	4	1	-25	-12	-2	-14	-12	-20	-25	9	7	5	7		
40,000	23	17	6	16	15	7	3	-26	-20	-8	-18	-18	-26	-31	11	10	9	11		
30,000	20	17	8	12	14	6	1	-24	-20	-10	-15	-17	-26	-31	13	12	11	12		
20,000	13	12	5	8	9	3	0	-14	-13	-6	-10	-11	-17	-21	10	9	7	9		
BW 8 TO DON MUANG																	5782 N.MI.			
53,000	10	5	2	6	5	1	-1	-13	-7	-3	-8	-7	-12	-15	8	6	5	6		
40,000	8	12	3	9	8	2	-1	-12	-15	-5	-11	-11	-17	-20	9	8	7	8		
30,000	11	13	3	11	9	3	-1	-14	-15	-4	-12	-11	-18	-22	9	9	8	8		
20,000	8	9	2	6	6	1	-1	-9	-10	-2	-7	-7	-12	-15	7	7	6	6		
BW 8 TO DOVER AFB																	1867 N.MI.			
53,000	-22	-8	-5	-14	-11	-20	-25	19	7	4	13	10	3	-1	12	10	8	10		
40,000	-29	-15	-11	-25	-20	-32	-38	24	11	8	21	16	4	-2	16	15	15	17		
30,000	-27	-14	-12	-23	-19	-32	-39	22	11	9	19	15	3	-4	19	18	15	18		
20,000	-18	-9	-8	-13	-12	-21	-26	15	7	6	11	10	1	-4	15	14	10	14		
BW 8 TO DUM DUM																	5118 N.MI.			
53,000	16	12	2	10	10	4	1	-19	-14	-2	-12	-12	-18	-21	8	7	5	6		
40,000	12	12	7	13	11	5	2	-16	-14	-9	-15	-13	-19	-23	9	8	7	9		
30,000	12	13	8	12	11	5	1	-15	-15	-9	-14	-13	-20	-23	10	9	8	9		
20,000	8	10	3	8	7	2	-1	-9	-11	-3	-9	-8	-13	-16	8	7	6	7		
BW 8 TO ELMENDORF AFB																	2338 N.MI.			
53,000	-17	-7	-3	-12	-9	-16	-20	15	6	3	12	8	3	0	10	8	5	8		
40,000	-8	-11	-9	-15	-11	-18	-22	7	11	8	14	10	3	-1	11	10	10	10		
30,000	-6	-13	-10	-15	-11	-20	-24	4	12	8	14	10	1	-4	13	12	12	12		
20,000	-3	-8	-6	-8	-7	-13	-17	2	7	5	8	6	-1	-5	11	10	9	9		
BW 8 TO ENIWETOK AFB																	5882 N.MI.			
53,000	-16	-6	1	-6	-6	-12	-16	13	5	-1	5	5	0	-3	8	6	4	6		
40,000	-17	-13	-3	-10	-11	-17	-21	12	9	2	7	7	1	-2	9	8	8	9		
30,000	-13	-11	-5	-10	-10	-16	-19	9	8	4	7	7	1	-3	9	9	8	9		
20,000	-9	-6	-5	-7	-7	-12	-14	7	5	5	6	5	1	-2	8	7	6	7		
BW 8 TO ERNEST HARMON AFB																	1135 N.MI.			
53,000	-19	-7	-5	-11	-10	-19	-24	17	6	4	10	8	0	-4	15	12	9	12		
40,000	-25	-13	-9	-20	-16	-30	-37	22	10	6	15	13	0	-7	19	18	17	20		
30,000	-23	-12	-10	-19	-16	-31	-40	19	9	7	15	12	-3	-11	23	23	20	23		
20,000	-14	-9	-6	-10	-10	-21	-28	12	8	5	8	8	-3	-9	18	18	14	18		
BW 8 TO GALEAO																	5400 N.MI.			
53,000	-3	0	-1	0	-1	-5	-7	1	-1	1	-1	0	-4	-7	7	6	5	6		
40,000	-6	-4	-1	0	-3	-9	-12	2	1	-1	-3	0	-6	-9	10	9	8	9		
30,000	-2	-1	-2	-2	-2	-8	-11	-1	-1	0	-1	-1	-6	-9	10	9	7	8		
20,000	-3	-2	-1	0	-1	-6	-8	1	0	0	-1	0	-4	-7	7	7	6	6		
BW 8 TO GEORGE AFB																	2968 N.MI.			
53,000	-15	-9	-8	-11	-10	-16	-19	13	8	7	10	9	5	2	9	7	5	7		
40,000	-19	-15	-20	-18	-18	-26	-30	15	13	18	15	15	7	3	12	11	11	13		
30,000	-18	-15	-17	-16	-16	-25	-30	14	13	15	13	14	5	0	14	13	11	14		
20,000	-10	-9	-10	-10	-10	-16	-20	8	8	9	9	8	2	-1	10	10	8	10		
BW 8 TO GOOSE AB																	869 N.MI.			
53,000	-20	-8	-5	-12	-10	-20	-26	18	7	4	11	9	1	-4	16	13	10	13		
40,000	-24	-13	-9	-21	-16	-30	-37	22	11	7	18	14	1	-6	19	19	17	20		
30,000	-23	-13	-11	-19	-16	-32	-40	20	10	9	16	14	-2	-10	24	23	21	23		
20,000	-14	-9	-6	-11	-10	-22	-29	13	8	6	9	8	-3	-10	19	18	15	18		

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

••A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.THE BOEING COMPANY
TRANSPORT DIVISION

NO. D6-9175

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEAD WINDS*							STANDARD DEVIATION			
	DIRECT								RETURN										
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT	
BW 8 TO HICKAM AFB																			
53,000	-11	-8	-6	-10	-9	-13	-16	9	7	6	9	8	3	1	8	7	5	7	
40,000	-17	-16	-10	-20	-15	-23	-26	13	13	8	17	13	6	2	10	10	9	10	
30,000	-15	-17	-9	-19	-15	-23	-27	11	15	8	16	12	5	1	11	11	9	11	
20,000	-10	-12	-6	-12	-10	-16	-19	8	11	5	11	9	3	0	9	8	7	8	
4612 N.M.I.																			
BW 8 TO INCIRLIK AB																			
53,000	24	11	4	13	12	5	3	-25	-12	-5	-14	-13	-21	-25	10	8	5	7	
40,000	23	18	10	18	17	8	4	-26	-20	-12	-20	-19	-28	-33	13	12	11	13	
30,000	22	18	11	14	16	6	1	-24	-20	-13	-17	-19	-29	-34	15	14	13	15	
20,000	13	12	7	10	10	3	-1	-15	-14	-8	-11	-12	-19	-23	12	11	9	11	
3294 N.M.I.																			
BW 8 TO IWO JIMA																			
53,000	-10	-4	1	-5	-4	-9	-12	6	1	-1	3	2	-2	-5	8	6	5	6	
40,000	-2	-5	-2	-5	-4	-9	-12	-3	1	0	2	0	-6	-9	8	8	8	8	
30,000	-1	-4	-2	-3	-2	-8	-12	-3	0	0	0	-1	-7	-10	9	9	9	9	
20,000	1	-1	-2	-2	-1	-6	-8	-4	0	1	0	-1	-6	-8	8	7	6	7	
5265 N.M.I.																			
BW 8 TO JOHNSTON AFB																			
53,000	-11	-7	-5	-9	-8	-13	-15	9	6	4	8	7	2	0	8	7	5	6	
40,000	-17	-16	-8	-19	-15	-22	-25	13	12	7	16	12	5	2	10	9	8	9	
30,000	-15	-17	-10	-18	-15	-22	-26	11	13	8	15	12	5	1	11	10	9	10	
20,000	-10	-12	-6	-11	-10	-15	-18	8	10	5	9	8	3	1	9	7	6	7	
5108 N.M.I.																			
BW 8 TO KADENA AB																			
53,000	-2	1	2	0	0	-4	-6	-2	-3	-2	-1	-2	-6	-8	8	6	4	6	
40,000	8	3	-1	6	4	-2	-5	-12	-6	0	-8	-7	-13	-16	9	8	7	8	
30,000	7	4	-1	5	4	-3	-6	-11	-7	0	-7	-6	-13	-16	9	9	9	9	
20,000	7	4	1	4	4	-1	-3	-9	-6	-1	-5	-5	-10	-13	7	7	6	7	
5198 N.M.I.																			
BW 8 TO KEFLAVIK AP																			
53,000	21	9	2	13	10	1	-4	-22	-10	-2	-14	-11	-22	-28	17	14	9	13	
40,000	16	16	8	17	14	1	-5	-18	-18	-9	-18	-16	-28	-35	20	19	16	19	
30,000	13	16	8	13	13	-4	-12	-16	-18	-9	-15	-15	-31	-40	26	24	22	25	
20,000	7	12	4	7	7	-6	-12	-9	-13	-5	-8	-8	-21	-28	21	20	15	19	
716 N.M.I.																			
BW 8 TO KINDLEY AFB																			
53,000	-16	-6	-3	-10	-8	-16	-20	12	4	2	8	6	-1	-4	12	10	7	10	
40,000	-24	-14	-8	-20	-16	-28	-34	18	10	5	15	11	1	-5	17	16	14	16	
30,000	-21	-14	-9	-19	-15	-27	-34	15	9	6	14	11	-1	-7	19	18	14	17	
20,000	-14	-10	-6	-11	-10	-19	-24	10	8	5	9	8	-1	-5	14	14	10	13	
2138 N.M.I.																			
BW 8 TO KWAJALEIN NAS																			
53,000	-15	-6	0	-6	-6	-12	-15	13	4	0	5	5	0	-2	8	6	4	6	
40,000	-17	-15	-6	-10	-12	-18	-22	12	11	5	8	9	3	0	9	8	8	9	
30,000	-13	-13	-8	-11	-11	-17	-21	9	10	6	8	8	2	-1	10	9	8	9	
20,000	-9	-7	-7	-7	-7	-12	-14	7	6	6	5	6	1	-1	8	7	6	7	
5962 N.M.I.																			
BW 8 TO LADO AFB																			
53,000	-17	-7	-3	-12	-9	-16	-20	15	6	3	11	8	3	0	10	8	5	8	
40,000	-7	-11	-9	-14	-10	-17	-21	6	10	8	13	9	2	-2	11	10	10	10	
30,000	-4	-12	-10	-14	-10	-19	-23	3	11	8	12	9	0	-5	13	12	13	12	
20,000	-2	-8	-6	-8	-6	-12	-16	0	7	5	7	5	-2	-6	11	10	9	10	
2136 N.M.I.																			
BW 8 TO LAJES AP																			
53,000	3	2	5	5	4	-3	-7	-5	-3	-5	-7	-5	-12	-16	13	10	8	11	
40,000	0	1	7	7	4	-7	-14	-5	-4	-10	-12	-8	-19	-25	17	16	15	18	
30,000	0	3	6	6	4	-9	-16	-5	-6	-9	-11	-8	-21	-28	21	19	16	20	
20,000	-2	2	5	4	2	-8	-13	-1	-4	-6	-6	-5	-15	-20	17	16	12	15	
1873 N.M.I.																			
BW 8 TO LE BOURGET AP																			
53,000	21	10	4	12	10	4	0	-23	-11	-4	-13	-11	-20	-25	12	10	7	9	
40,000	23	16	12	17	17	6	0	-26	-17	-14	-20	-19	-30	-36	17	15	14	17	
30,000	20	16	13	16	16	3	-5	-24	-19	-15	-19	-19	-33	-40	21	20	18	21	
20,000	12	11	7	9	9	0	-5	-15	-13	-8	-11	-11	-21	-27	17	16	12	15	
1919 N.M.I.																			
BW 8 TO LONDON INTERNATIONAL																			
53,000	21	10	3	12	10	3	0	-23	-11	-3	-13	-11	-20	-25	13	10	7	10	
40,000	23	16	12	17	17	6	0	-25	-18	-14	-20	-19	-30	-37	18	16	14	18	
30,000	20	16	12	15	16	2	-6	-24	-19	-15	-19	-19	-33	-41	22	20	18	22	
20,000	12	12	7	9	9	-1	-6	-14	-13	-8	-11	-11	-22	-28	17	16	12	16	
1732 N.M.I.																			

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.

MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	D I R E C T							R E T U R N										
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
BW 8 TO LORING AFB																		
53,000	-21	-8	-6	-14	-11	-20	-25	19	7	5	13	10	2	-2	14	11	9	11
40,000	-27	-13	-10	-24	-18	-31	-38	24	11	8	20	15	3	-3	18	17	16	18
30,000	-25	-13	-12	-22	-18	-32	-40	22	11	9	18	15	1	-6	21	21	18	21
20,000	-16	-9	-7	-12	-11	-21	-27	14	8	6	10	9	-1	-7	17	16	13	16
BW 8 TO MAURIPUR AP																		
53,000	20	8	1	14	10	3	1	-23	-10	-2	-15	-12	-20	-24	9	7	5	7
40,000	18	12	8	15	13	6	3	-22	-15	-10	-18	-16	-23	-27	10	9	8	10
30,000	15	13	9	13	12	5	1	-18	-15	-11	-15	-15	-22	-26	12	11	9	11
20,000	10	10	5	9	8	3	0	-12	-12	-5	-11	-10	-15	-18	9	8	7	8
BW 8 TO MCCORD AFB																		
53,000	-15	-8	-6	-13	-10	-16	-19	13	7	5	12	9	4	1	10	8	6	7
40,000	-14	-13	-11	-17	-14	-22	-26	12	12	10	15	12	4	0	12	11	11	13
30,000	-15	-15	-12	-17	-15	-24	-29	12	13	11	15	13	3	-2	14	14	13	14
20,000	-9	-10	-8	-11	-9	-16	-20	7	9	7	10	8	1	-2	11	10	9	10
BW 8 TO MCGUIRE AFB																		
53,000	-22	-8	-5	-14	-11	-20	-25	19	7	4	13	10	3	-1	12	10	8	10
40,000	-29	-14	-11	-25	-20	-32	-38	24	11	8	21	16	4	-2	17	16	15	17
30,000	-27	-14	-12	-23	-19	-32	-39	22	11	9	19	15	2	-4	19	19	16	18
20,000	-18	-9	-8	-13	-12	-21	-27	15	8	6	11	10	1	-4	15	14	11	14
BW 8 TO MIDWAY NAS																		
53,000	-14	-7	-3	-11	-8	-14	-17	12	6	3	9	7	2	0	9	7	5	7
40,000	-18	-16	-10	-15	-15	-21	-25	14	13	8	12	12	5	2	10	9	9	10
30,000	-16	-16	-11	-16	-15	-22	-26	12	13	9	13	12	5	1	11	10	10	11
20,000	-11	-12	-8	-10	-10	-15	-18	9	10	7	8	8	3	0	9	8	7	8
BW 8 TO MILDENHALL AP																		
53,000	22	10	3	13	11	3	0	-23	-11	-3	-14	-11	-21	-26	13	10	7	10
40,000	23	17	12	17	17	6	0	-25	-18	-13	-20	-19	-30	-37	18	16	14	18
30,000	20	17	12	15	16	2	-6	-24	-20	-14	-18	-19	-33	-41	22	20	18	22
20,000	12	12	6	9	9	-1	-6	-14	-14	-7	-11	-11	-22	-28	17	16	12	16
BW 8 TO MINOT AFB																		
53,000	-17	-7	-6	-12	-10	-16	-20	15	6	5	11	9	3	0	11	8	6	8
40,000	-19	-13	-15	-16	-16	-25	-30	17	12	13	14	14	5	0	13	12	13	15
30,000	-17	-15	-14	-16	-15	-26	-31	15	13	12	13	13	3	-3	15	15	14	16
20,000	-11	-9	-8	-11	-10	-18	-22	9	8	7	9	8	1	-3	12	12	10	12
BW 8 TO MOSCOW INTERNATIONAL																		
53,000	25	11	2	16	13	5	1	-27	-12	-3	-17	-13	-23	-28	12	9	5	8
40,000	23	18	9	18	17	8	3	-25	-20	-10	-20	-18	-28	-33	13	12	11	13
30,000	20	19	8	14	15	4	-2	-22	-21	-10	-17	-17	-29	-35	17	16	15	17
20,000	13	14	4	10	10	2	-3	-14	-16	-5	-11	-11	-20	-24	13	13	10	12
BW 8 TO MYRTLE BEACH AFB																		
53,000	-22	-9	-4	-14	-11	-19	-24	19	7	3	12	10	3	-1	11	9	7	9
40,000	-29	-16	-10	-25	-20	-31	-37	23	12	7	21	15	5	-1	15	15	14	16
30,000	-27	-15	-11	-23	-19	-31	-37	21	11	8	19	14	3	-3	17	17	14	17
20,000	-18	-10	-7	-13	-12	-21	-25	15	7	6	11	10	1	-3	13	13	9	13
BW 8 TO NOUASSEUR AB																		
53,000	12	7	5	9	8	2	0	-14	-8	-6	-10	-9	-15	-18	10	8	6	8
40,000	15	10	9	13	11	2	-3	-19	-12	-11	-16	-14	-24	-29	15	14	12	15
30,000	14	11	9	12	11	1	-5	-18	-14	-12	-15	-14	-25	-31	17	16	14	16
20,000	8	7	6	7	7	-1	-5	-11	-9	-7	-9	-9	-17	-21	14	13	10	12
BW 8 TO ORLY AP																		
53,000	21	10	4	12	10	4	0	-23	-11	-4	-13	-11	-20	-25	12	10	7	9
40,000	23	15	12	17	17	6	0	-26	-17	-14	-20	-19	-30	-36	17	15	14	17
30,000	20	16	13	16	16	3	-4	-24	-19	-15	-19	-19	-33	-40	21	20	18	21
20,000	12	11	7	9	9	0	-5	-15	-13	-8	-11	-11	-21	-27	17	16	12	15
BW 8 TO PALAM AP																		
53,000	19	12	3	14	12	5	3	-21	-13	-4	-16	-13	-20	-23	8	7	5	6
40,000	14	12	9	16	13	6	3	-17	-14	-11	-18	-15	-21	-25	10	9	8	9
30,000	13	13	10	14	13	6	2	-15	-16	-12	-17	-15	-22	-26	11	10	9	10
20,000	8	10	5	9	8	3	0	-9	-11	-6	-10	-9	-14	-17	8	8	7	8

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.THE BOEING COMPANY
TRANSPORT DIVISION

NO. D6-9175

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION							
	DIRECT							RETURN														
	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT				
8W 8 TO PATRICK AFB																			2567 N.MI.			
53,000	-21	-9	-3	-13	-10	-19	-23	18	7	2	11	9	2	-1	10	9	7	9				
40,000	-29	-17	-8	-24	-19	-30	-36	22	12	5	19	14	4	-1	14	14	12	15				
30,000	-27	-15	-9	-21	-17	-29	-34	20	10	7	17	13	3	-2	16	16	12	15				
20,000	-18	-10	-7	-13	-11	-19	-24	15	7	6	11	9	2	-2	12	12	8	12				
8W 8 TO PIARCO AP																			3413 N.MI.			
53,000	-6	-1	-1	-3	-2	-8	-11	3	0	0	1	1	-4	-7	10	8	6	8				
40,000	-14	-11	-5	-8	-9	-18	-22	8	7	2	4	5	-3	-7	13	12	10	12				
30,000	-10	-8	-5	-9	-8	-16	-20	5	4	3	5	4	-3	-8	13	13	10	12				
20,000	-5	-6	-4	-6	-5	-11	-14	3	4	3	4	4	-2	-5	10	10	7	9				
8W 8 TO POPE AFB																			2147 N.MI.			
53,000	-22	-9	-4	-14	-11	-20	-24	19	7	3	13	10	3	-1	11	9	7	9				
40,000	-29	-16	-11	-25	-20	-32	-37	23	12	7	21	16	5	-1	16	15	14	16				
30,000	-28	-15	-11	-23	-19	-31	-38	22	11	9	19	15	3	-3	17	17	14	17				
20,000	-18	-9	-7	-14	-12	-21	-26	15	7	6	11	10	1	-3	14	13	10	13				
8W 8 TO PRESTWICK AB																			1453 N.MI.			
53,000	22	10	3	13	10	3	-1	-23	-11	-3	-14	-11	-21	-26	14	11	7	11				
40,000	21	17	11	17	16	5	-2	-24	-18	-13	-19	-18	-30	-37	18	17	15	18				
30,000	18	17	12	14	15	1	-7	-22	-20	-14	-17	-18	-33	-41	23	21	19	23				
20,000	10	12	6	8	9	-2	-8	-13	-14	-7	-10	-11	-22	-28	18	17	13	17				
8W 8 TO RAMEY AFB																			2980 N.MI.			
53,000	-11	-3	-1	-7	-5	-11	-15	8	1	0	5	3	-3	-5	10	9	6	9				
40,000	-18	-12	-5	-14	-12	-22	-27	12	7	3	10	8	-1	-6	14	13	11	14				
30,000	-15	-11	-6	-13	-11	-20	-25	9	6	4	10	7	-2	-7	15	14	11	13				
20,000	-9	-8	-6	-9	-8	-14	-18	6	6	5	8	6	-1	-4	11	11	7	10				
8W 8 TO RHEIN MAIN AB																			2011 N.MI.			
53,000	23	10	3	13	11	4	1	-25	-11	-4	-14	-12	-21	-26	12	9	6	9				
40,000	24	17	12	18	18	7	2	-27	-19	-14	-21	-20	-31	-36	16	15	13	17				
30,000	22	17	11	16	16	4	-4	-26	-20	-14	-19	-19	-33	-40	20	19	17	20				
20,000	14	12	6	10	10	1	-4	-16	-14	-7	-11	-12	-22	-27	16	15	11	15				
8W 8 TO SEOUL AB																			4527 N.MI.			
53,000	1	1	1	0	1	-3	-5	-4	-2	-1	-2	-2	-6	-8	8	6	4	6				
40,000	10	4	0	6	5	-1	-4	-12	-6	-1	-8	-7	-13	-16	9	8	7	8				
30,000	8	4	0	5	5	-2	-5	-10	-6	-2	-7	-6	-13	-16	9	9	9	9				
20,000	8	4	1	5	4	-1	-3	-9	-5	-2	-6	-5	-11	-14	8	8	7	7				
8W 8 TO STEVENSON FIELD																			1721 N.MI.			
53,000	-18	-7	-5	-12	-10	-17	-21	16	6	5	11	9	3	0	12	9	7	9				
40,000	-20	-13	-14	-16	-16	-25	-30	18	12	12	14	14	4	0	14	13	13	15				
30,000	-17	-15	-13	-16	-15	-26	-32	15	13	11	13	13	2	-3	16	16	15	16				
20,000	-12	-9	-8	-11	-10	-18	-23	10	8	7	10	9	0	-4	13	12	10	13				
8W 8 TO SUNG SHAN																			5264 N.MI.			
53,000	1	2	2	2	2	-2	-4	-5	-4	-3	-4	-4	-8	-10	8	6	4	6				
40,000	9	7	-1	9	6	0	-3	-14	-10	-1	-11	-9	-15	-18	9	8	7	8				
30,000	9	7	0	7	6	-1	-4	-12	-10	-1	-9	-8	-15	-18	9	9	8	9				
20,000	8	6	1	6	5	0	-2	-10	-8	-2	-7	-6	-11	-14	7	7	6	7				
8W 8 TO TACHIKAWA AB																			4620 N.MI.			
53,000	-5	-2	0	-5	-3	-7	-10	3	1	0	3	1	-3	-5	8	6	4	6				
40,000	3	-2	-2	-3	-1	-7	-10	-6	0	0	0	-1	-7	-10	8	8	8	8				
30,000	3	-1	-1	0	0	-6	-9	-6	-1	0	-3	-2	-9	-12	9	9	9	9				
20,000	5	0	-1	1	1	-4	-7	-6	-2	0	-2	-2	-8	-11	8	8	7	8				
8W 8 TO TAN SAN NHUT																			6026 N.MI.			
53,000	6	4	2	5	4	0	-2	-9	-5	-4	-7	-6	-10	-13	7	6	5	6				
40,000	7	11	2	9	7	1	-1	-11	-14	-3	-11	-10	-16	-19	8	7	7	8				
30,000	9	12	1	9	8	2	-2	-13	-15	-2	-10	-10	-16	-20	9	9	7	8				
20,000	7	8	1	6	5	1	-2	-9	-10	-2	-6	-7	-11	-14	7	7	6	6				
8W 8 TO THULE AB																			658 N.MI.			
53,000	-1	-1	0	-3	-1	-9	-13	-1	0	0	2	0	-7	-11	15	13	7	11				
40,000	8	-1	1	0	2	-8	-14	-9	0	-1	-1	-3	-13	-19	17	15	14	16				
30,000	7	-1	-1	3	2	-12	-19	-9	0	0	-4	-3	-17	-24	21	18	19	21				
20,000	9	1	1	4	4	-7	-13	-10	-2	-2	-5	-4	-16	-22	18	17	13	17				

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION							
	D I R E C T							R E T U R N							JAN	APR	JUL	OCT				
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85								
BW 8 TO TORBAY AP																			1166 N.MI.			
53,000	-16	-6	-4	-8	-7	-16	-22	13	5	3	6	6	-2	-7	16	12	10	13				
40,000	-23	-11	-6	-15	-13	-27	-34	18	9	3	9	10	-4	-11	20	19	17	21				
30,000	-20	-11	-7	-15	-13	-29	-38	15	7	4	10	9	-6	-15	24	23	21	23				
20,000	-14	-9	-4	-7	-8	-20	-27	11	7	3	5	6	-5	-11	19	18	14	18				
BW 8 TO TORREJON AFB																			2216 N.MI.			
53,000	16	8	5	10	9	3	0	-18	-9	-5	-11	-10	-17	-21	11	9	7	9				
40,000	19	12	11	15	14	4	-2	-22	-14	-14	-18	-17	-27	-33	16	15	13	16				
30,000	17	12	11	15	14	2	-5	-21	-15	-14	-18	-17	-29	-36	19	18	15	19				
20,000	10	9	7	8	8	0	-5	-13	-11	-8	-10	-10	-19	-25	16	14	11	14				
BW 8 TO TRAVIS AFB																			2882 N.MI.			
53,000	-15	-9	-8	-12	-10	-16	-18	13	8	7	11	9	5	2	9	7	5	7				
40,000	-17	-14	-17	-17	-16	-24	-28	14	12	15	14	14	6	2	12	11	11	13				
30,000	-17	-14	-15	-16	-16	-24	-29	13	12	14	13	13	4	-1	14	13	12	14				
20,000	-9	-10	-9	-11	-10	-16	-20	7	8	9	9	8	2	-2	10	10	8	10				
BW 8 TO WAKE AP																			5362 N.MI.			
53,000	-16	-7	0	-8	-7	-13	-17	13	6	0	6	6	0	-2	8	6	5	6				
40,000	-18	-14	-5	-12	-12	-19	-23	13	10	4	9	9	2	-1	9	9	8	9				
30,000	-15	-13	-7	-12	-12	-18	-22	10	10	5	9	8	2	-2	10	10	9	10				
20,000	-9	-7	-6	-8	-8	-13	-15	7	6	5	6	6	1	-1	8	8	6	7				
BW 8 TO WESTOVER AFB																			1651 N.MI.			
53,000	-21	-8	-5	-14	-11	-20	-25	19	7	5	13	10	3	-1	13	10	8	10				
40,000	-29	-14	-11	-25	-19	-32	-38	24	11	8	21	16	4	-2	17	16	15	17				
30,000	-27	-14	-12	-23	-19	-32	-39	22	11	9	19	15	2	-5	20	19	17	19				
20,000	-17	-9	-8	-13	-11	-21	-27	15	8	6	11	10	0	-5	15	15	11	15				
BW 8 TO WHEELUS AP																			2995 N.MI.			
53,000	20	11	4	11	11	5	2	-21	-12	-5	-12	-12	-18	-22	10	8	6	7				
40,000	24	15	13	17	17	8	3	-27	-17	-15	-20	-19	-29	-34	14	13	11	14				
30,000	21	15	11	16	15	5	0	-24	-18	-14	-19	-18	-29	-35	17	15	13	16				
20,000	13	10	8	9	10	2	-2	-16	-12	-9	-11	-11	-19	-23	13	12	9	11				
CAIRO INTERNATIONAL TO CAMPBELL AFB																			5521 N.MI.			
53,000	-31	-19	-13	-21	-20	-27	-31	30	19	12	20	19	14	11	8	6	5	6				
40,000	-46	-31	-32	-40	-37	-46	-51	43	28	30	38	34	26	22	12	11	10	12				
30,000	-45	-30	-29	-37	-35	-44	-49	41	28	27	35	32	23	19	14	12	10	12				
20,000	30	-20	-21	-24	-23	-30	-34	28	18	20	23	22	16	13	10	9	7	9				
CAIRO INTERNATIONAL TO CHARLESTON AFB																			5375 N.MI.			
53,000	-32	-22	-13	-20	-21	-28	-32	31	21	12	19	20	14	11	8	7	5	6				
40,000	-46	-35	-30	-40	-37	-46	-51	43	32	28	37	35	27	22	12	11	10	12				
30,000	-44	-34	-27	-36	-35	-44	-49	41	31	26	34	32	24	20	13	12	9	12				
20,000	-31	-23	-20	-24	-24	-31	-34	30	22	20	23	23	17	14	10	9	6	8				
CAIRO INTERNATIONAL TO CHATEAUX AFB																			1701 N.MI.			
53,000	-29	-23	-12	-15	-19	-28	-33	28	22	11	14	18	10	6	12	10	9	9				
40,000	-37	-31	-27	-29	-31	-43	-49	34	29	25	27	28	17	11	19	17	14	17				
30,000	-33	-30	-23	-26	-27	-39	-46	30	27	22	24	25	14	8	20	17	13	17				
20,000	-21	-19	-18	-16	-18	-26	-31	19	18	18	15	17	9	5	15	13	10	11				
CAIRO INTERNATIONAL TO CHURCHILL AP																			4817 N.MI.			
53,000	-23	-11	-4	-12	-11	-18	-22	21	10	3	11	10	5	2	8	6	5	6				
40,000	-24	-18	-13	-18	-18	-25	-29	21	16	11	16	16	9	5	10	10	9	10				
30,000	-22	-19	-13	-17	-17	-26	-30	19	17	11	14	15	7	3	12	11	10	12				
20,000	-13	-13	-9	-11	-11	-17	-21	12	11	8	9	10	4	1	10	9	7	9				
CAIRO INTERNATIONAL TO CIAMPINO AP																			1146 N.MI.			
53,000	-34	-27	-10	-16	-21	-32	-38	32	26	9	15	20	10	5	15	13	11	11				
40,000	-43	-38	-28	-30	-34	-48	-55	39	35	26	28	31	18	12	22	20	16	18				
30,000	-37	-36	-24	-25	-29	-43	-51	33	33	22	23	27	15	8	24	20	14	18				
20,000	-23	-22	-19	-16	-20	-29	-34	21	21	18	15	19	10	5	16	14	11	12				
CAIRO INTERNATIONAL TO CLARK AFB																			4904 N.MI.			
53,000	50	34	-9	15	24	2	-8	-52	-35	8	-16	-25	-43	-50	8	8	6	7				
40,000	59	47	4	24	35	13	6	-62	-49	-5	-26	-37	-55	-62	11	10	7	9				
30,000	49	40	5	22	30	13	7	-51	-41	-6	-23	-31	-46	-52	10	9	5	7				
20,000	29	23	2	11	16	7	3	-30	-23	-3	-12	-17	-26	-30	7	6	5	5				

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANOARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEADWINDS*							STANDARD DEVIATION						
	O I R E C T								R E T U R N													
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT				
CAIRO INTERNATIONAL TO DHAMRAN AB																			1018 N.M.I.			
53,000	48	34	-4	16	24	6	-3	-49	-36	3	-17	-25	-42	-50	13	13	12	12				
40,000	59	51	9	36	38	18	10	-61	-52	-10	-38	-40	-60	-70	21	21	12	18				
30,000	51	45	9	27	31	14	8	-53	-46	-9	-28	-32	-51	-60	22	18	11	15				
20,000	31	28	9	12	18	9	5	-32	-28	-9	-13	-19	-31	-37	15	13	9	10				
CAIRO INTERNATIONAL TO DON MUANG																			3914 N.M.I.			
53,000	46	33	-22	11	21	-4	-20	-47	-34	21	-12	-23	-41	-47	8	8	7	7				
40,000	57	46	-6	22	33	6	-5	-61	-48	6	-24	-35	-54	-61	12	11	7	9				
30,000	46	37	-1	21	27	8	1	-48	-38	0	-21	-28	-43	-49	11	10	5	7				
20,000	28	21	2	9	14	6	2	-29	-22	-2	-10	-15	-25	-29	7	7	5	5				
CAIRO INTERNATIONAL TO DOVER AFB																			4979 N.M.I.			
53,000	-31	-20	-14	-20	-21	-27	-31	30	19	13	20	20	14	12	8	7	6	7				
40,000	-46	-32	-33	-41	-38	-46	-51	43	30	32	38	35	27	23	12	11	10	12				
30,000	-45	-32	-30	-38	-36	-45	-50	41	29	29	35	33	25	20	14	13	10	12				
20,000	-31	-22	-22	-25	-24	-31	-35	29	20	21	24	23	17	14	11	9	7	9				
CAIRO INTERNATIONAL TO DUM DUM																			3068 N.M.I.			
53,000	57	42	-6	24	33	7	-4	-58	-43	6	-25	-34	-51	-57	10	10	8	9				
40,000	71	55	5	32	43	16	7	-74	-57	-6	-34	-44	-65	-74	14	13	8	12				
30,000	56	46	6	28	35	15	8	-58	-47	-7	-29	-36	-52	-59	13	11	6	9				
20,000	35	27	4	13	19	9	5	-35	-28	-5	-14	-19	-31	-36	9	8	5	6				
CAIRO INTERNATIONAL TO ELMENOORF AFB																			5317 N.M.I.			
53,000	-4	-3	2	-2	-1	-6	-8	2	2	-2	1	0	-3	-5	8	6	4	5				
40,000	-2	-2	3	-2	-1	-7	-10	0	0	-4	0	-1	-7	-10	9	8	7	8				
30,000	0	-3	1	-1	-1	-7	-11	-2	1	-2	-1	-1	-8	-11	10	10	9	9				
20,000	0	-2	-1	0	-1	-6	-9	-1	1	0	-1	0	-5	-8	8	8	6	7				
CAIRO INTERNATIONAL TO ENIWETOK AFB																			7031 N.M.I.			
53,000	36	32	14	28	28	20	15	-39	-33	-15	-29	-30	-37	-41	8	7	6	6				
40,000	46	41	26	38	38	30	26	-49	-44	-28	-40	-40	-48	-52	9	9	9	9				
30,000	41	36	20	27	30	22	18	-44	-38	-21	-28	-32	-42	-46	9	9	7	8				
20,000	22	21	8	16	17	11	9	-23	-22	-9	-17	-18	-23	-26	6	6	5	5				
CAIRO INTERNATIONAL TO ERNEST HARMON AFB																			4072 N.M.I.			
53,000	-29	-19	-14	-19	-19	-25	-29	27	18	13	18	18	13	10	9	7	6	7				
40,000	-41	-28	-32	-38	-35	-44	-48	39	26	30	35	32	24	19	13	12	11	13				
30,000	-41	-28	-29	-35	-33	-43	-48	38	26	27	33	31	21	16	15	14	11	14				
20,000	-28	-19	-21	-23	-23	-29	-33	26	18	20	22	21	15	11	12	10	8	10				
CAIRO INTERNATIONAL TO GALEAO																			5343 N.M.I.			
53,000	-15	-12	2	-4	-7	-14	-17	14	12	-3	4	6	0	-3	6	6	5	5				
40,000	-26	-22	-4	-16	-18	-25	-29	25	21	3	15	16	8	4	9	8	7	7				
30,000	-17	-16	-3	-13	-13	-18	-21	16	15	3	12	12	6	3	7	6	6	6				
20,000	-5	-4	3	-2	-2	-6	-8	4	4	-3	1	2	-2	-4	5	5	5	4				
CAIRO INTERNATIONAL TO GEORGE AFB																			6534 N.M.I.			
53,000	-21	-11	-6	-12	-12	-17	-21	19	10	6	11	11	6	4	7	6	4	6				
40,000	-24	-18	-17	-19	-19	-26	-29	20	16	15	17	17	11	7	10	9	8	10				
30,000	-22	-19	-16	-17	-18	-26	-30	19	16	13	14	15	8	4	12	11	9	11				
20,000	-13	-12	-10	-11	-11	-17	-20	11	11	9	9	10	5	2	9	8	6	8				
CAIRO INTERNATIONAL TO GOOSE AB																			4036 N.M.I.			
53,000	-28	-17	-12	-17	-18	-24	-28	27	16	11	17	17	11	9	9	7	6	7				
40,000	-38	-25	-28	-34	-31	-40	-45	35	23	26	31	29	20	15	13	12	11	13				
30,000	-38	-26	-26	-32	-30	-40	-46	34	23	24	29	27	18	13	15	14	12	14				
20,000	-25	-17	-18	-20	-20	-27	-31	23	16	17	19	18	11	8	12	10	8	10				
CAIRO INTERNATIONAL TO HICKAM AFB																			7665 N.M.I.			
53,000	4	3	3	4	3	0	-2	-6	-4	-3	-5	-4	-8	-10	8	5	4	5				
40,000	1	5	6	5	5	-1	-4	-5	-8	-8	-8	-7	-13	-16	9	8	7	8				
30,000	2	3	3	4	3	-3	-6	-5	-6	-5	-7	-6	-12	-15	10	9	8	9				
20,000	1	1	3	3	2	-3	-5	-3	-3	-4	-5	-3	-8	-10	8	7	6	7				
CAIRO INTERNATIONAL TO INCIRLIK AB																			459 N.M.I.			
53,000	13	17	16	16	16	6	0	-18	-20	-17	-18	-18	-28	-34	17	15	13	14				
40,000	21	19	22	19	20	5	-3	-29	-26	-25	-23	-26	-41	-49	26	24	18	22				
30,000	16	12	14	15	14	0	-8	-23	-18	-16	-18	-18	-33	-41	28	23	16	20				
20,000	12	8	-1	9	6	-4	-10	-14	-10	0	-11	-8	-19	-25	19	16	12	14				

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	DIRECT							RETURN							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85				
CAIRO INTERNATIONAL TO TWO JIMA																		
53,000	45	37	18	35	35	25	19	-48	-38	-18	-36	-36	-44	-49	9	7	6	7
40,000	56	48	30	45	45	35	30	-59	-50	-32	-47	-47	-56	-61	11	9	9	10
30,000	49	41	23	31	36	26	22	-51	-43	-24	-33	-37	-48	-53	10	10	8	9
20,000	30	24	11	20	21	15	11	-31	-25	-11	-21	-22	-29	-32	7	6	5	6
CAIRO INTERNATIONAL TO JOHNSTON AFB																		
53,000	11	12	8	11	11	7	5	-14	-13	-9	-13	-12	-16	-18	8	5	4	6
40,000	13	15	16	18	15	10	7	-17	-19	-17	-21	-18	-24	-27	9	9	8	9
30,000	10	14	10	14	12	6	3	-14	-16	-12	-16	-15	-21	-24	10	9	8	9
20,000	7	9	6	8	8	3	1	-9	-10	-7	-10	-9	-14	-16	8	7	6	7
CAIRO INTERNATIONAL TO KADENA AB																		
53,000	49	37	14	34	35	23	15	-51	-38	-14	-35	-36	-46	-50	9	8	7	8
40,000	60	50	26	43	45	33	27	-62	-52	-27	-44	-47	-58	-63	11	10	9	10
30,000	51	43	20	31	36	25	20	-53	-45	-21	-32	-37	-49	-55	11	10	7	9
20,000	30	25	9	18	20	13	10	-31	-25	-10	-18	-21	-28	-32	7	6	5	5
CAIRO INTERNATIONAL TO KEFLAVIK AP																		
53,000	-26	-14	-6	-12	-13	-21	-26	24	13	5	11	12	6	3	10	8	6	8
40,000	-31	-22	-18	-22	-23	-33	-38	27	19	15	19	20	11	6	15	13	12	14
30,000	-29	-22	-17	-20	-22	-33	-39	26	19	15	17	19	8	3	17	16	13	16
20,000	-18	-15	-12	-13	-14	-22	-26	16	13	11	11	13	5	1	13	12	9	11
CAIRO INTERNATIONAL TO KINDLEY AFB																		
53,000	-30	-24	-12	-16	-20	-27	-31	29	23	12	15	19	13	10	8	7	6	7
40,000	-40	-36	-24	-32	-32	-41	-46	37	33	23	30	31	22	18	12	11	9	11
30,000	-35	-33	-21	-29	-29	-38	-42	33	31	20	27	27	19	16	13	11	8	11
20,000	-26	-22	-18	-19	-21	-27	-30	24	21	17	19	20	15	12	10	9	6	8
CAIRO INTERNATIONAL TO KHAJALEIN NAS																		
53,000	34	30	14	26	26	19	15	-36	-32	-15	-27	-28	-35	-38	8	7	6	6
40,000	43	39	27	37	37	29	25	-46	-41	-28	-39	-39	-46	-50	9	9	9	9
30,000	39	34	19	26	29	22	18	-42	-36	-20	-27	-31	-40	-44	9	9	7	8
20,000	20	20	8	16	16	11	8	-21	-21	-8	-17	-17	-23	-25	6	6	5	5
CAIRO INTERNATIONAL TO LADO AFB																		
53,000	-5	-4	2	-3	-2	-7	-9	3	3	-2	2	1	-3	-5	8	6	4	5
40,000	-3	-3	2	-2	-1	-7	-10	0	1	-4	0	-1	-7	-10	9	8	7	8
30,000	-1	-4	0	-1	-1	-8	-11	-2	1	-2	-1	-1	-8	-11	10	10	9	9
20,000	0	-3	-2	0	-1	-6	-9	-1	1	1	-1	0	-5	-8	8	8	7	7
CAIRO INTERNATIONAL TO LAJES AP																		
53,000	-30	-26	-15	-16	-21	-28	-33	29	26	14	16	20	14	11	9	8	7	7
40,000	-38	-36	-28	-32	-33	-42	-47	36	34	27	30	31	23	18	15	13	10	13
30,000	-33	-33	-23	-28	-29	-38	-42	30	31	22	26	27	18	14	15	13	10	12
20,000	-22	-21	-17	-18	-19	-26	-29	21	20	17	17	19	13	9	11	10	7	9
CAIRO INTERNATIONAL TO LE BOURGET AP																		
53,000	-28	-21	-10	-13	-17	-26	-31	26	20	9	13	16	8	5	12	10	9	9
40,000	-35	-29	-26	-28	-29	-40	-47	32	26	23	25	26	15	9	19	17	14	17
30,000	-32	-27	-22	-25	-26	-38	-45	28	25	21	22	24	12	6	21	18	14	17
20,000	-20	-17	-18	-15	-17	-26	-30	19	16	17	14	16	8	4	15	13	10	12
CAIRO INTERNATIONAL TO LONDON INTERNATIONAL																		
53,000	-27	-19	-10	-13	-16	-25	-29	25	18	9	12	15	8	4	12	10	8	9
40,000	-34	-26	-24	-27	-28	-39	-45	31	23	22	24	25	14	8	18	16	14	17
30,000	-31	-26	-22	-24	-25	-37	-44	28	23	20	22	23	11	5	20	17	14	17
20,000	-20	-16	-17	-15	-17	-25	-29	18	15	16	14	16	8	3	14	13	10	12
CAIRO INTERNATIONAL TO LORING AFB																		
53,000	-29	-18	-14	-19	-19	-26	-29	28	17	13	19	18	13	11	9	7	6	7
40,000	-42	-28	-32	-39	-35	-44	-49	39	26	30	36	33	24	19	13	11	10	13
30,000	-41	-28	-29	-36	-33	-43	-48	38	26	27	34	31	22	17	15	13	11	13
20,000	-28	-19	-21	-23	-22	-29	-33	26	17	20	22	21	15	11	11	10	8	10
CAIRO INTERNATIONAL TO MAURIPUR AP																		
53,000	52	37	-5	21	29	8	-3	-53	-38	4	-22	-30	-45	-53	11	11	10	11
40,000	70	57	4	37	44	17	7	-72	-59	-5	-39	-46	-66	-75	17	17	9	15
30,000	58	48	6	29	35	15	7	-60	-49	-6	-30	-37	-54	-63	17	15	8	12
20,000	35	29	7	14	19	10	6	-35	-29	-7	-14	-20	-32	-38	12	10	7	8

*HEADWINDS—COMPUTED FOR A 450-KT AIRSPEED.

**A—DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT O I R E C T							H E A D W I N D S * R E T U R N							S T A N D A R D D E V I A T I O N			
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
CAIRO INTERNATIONAL TO MCCHORD AFB																		
53,000	-16	-8	-2	-10	-8	-14	-17	14	7	1	9	7	2	0	7	6	4	5
40,000	-14	-13	-7	-13	-12	-18	-21	12	11	5	10	9	3	0	9	8	8	9
30,000	-14	-14	-8	-12	-12	-19	-23	11	11	6	9	9	2	-1	11	10	9	10
20,000	-8	-9	-6	-7	-7	-13	-15	6	8	5	5	6	1	-2	8	8	6	8
CAIRO INTERNATIONAL TO MCGUIRE AFB																		
53,000	-31	-20	-14	-20	-20	-27	-31	30	19	14	20	20	14	12	8	7	6	7
40,000	-45	-32	-34	-41	-38	-46	-51	43	29	32	38	35	27	23	13	11	10	12
30,000	-45	-32	-30	-38	-36	-45	-50	41	29	29	35	33	24	20	14	13	10	13
20,000	-31	-21	-22	-25	-24	-31	-35	29	20	21	24	23	17	14	11	10	7	9
CAIRO INTERNATIONAL TO MIDWAY NAS																		
53,000	12	13	10	13	12	8	6	-15	-14	-10	-14	-13	-17	-20	8	5	5	6
40,000	15	16	17	19	17	11	8	-19	-19	-19	-22	-20	-26	-29	10	9	8	9
30,000	11	15	12	16	13	7	4	-15	-18	-14	-18	-16	-22	-26	10	9	8	9
20,000	9	10	7	10	9	4	1	-11	-12	-7	-11	-10	-15	-18	8	7	6	7
CAIRO INTERNATIONAL TO MILDENHALL AP																		
53,000	-27	-19	-9	-12	-16	-24	-29	25	17	8	12	15	7	4	12	10	8	9
40,000	-33	-25	-23	-26	-27	-38	-44	30	22	21	23	24	13	7	18	16	14	17
30,000	-31	-25	-21	-23	-25	-36	-43	27	22	19	21	22	11	4	20	18	14	17
20,000	-19	-16	-16	-14	-16	-25	-29	18	14	16	13	15	7	3	14	13	10	12
CAIRO INTERNATIONAL TO MINOT AFB																		
53,000	-23	-12	-6	-13	-12	-19	-23	22	11	6	12	12	7	4	8	6	5	6
40,000	-27	-19	-17	-21	-21	-28	-32	24	17	15	19	19	12	8	10	9	9	10
30,000	-25	-20	-16	-20	-20	-28	-33	22	18	14	17	17	10	6	12	11	10	12
20,000	-16	-13	-11	-13	-13	-19	-22	14	12	10	11	12	6	3	9	9	7	8
CAIRO INTERNATIONAL TO MOSCOW INTERNATIONAL																		
53,000	-3	3	7	4	4	-4	-9	-1	-5	-8	-5	-5	-13	-17	14	11	9	10
40,000	-2	2	11	2	4	-8	-14	-3	-7	-14	-6	-8	-19	-25	18	17	15	17
30,000	-3	-1	2	1	0	-12	-18	-2	-3	-5	-4	-4	-15	-21	20	18	15	17
20,000	0	0	-1	0	0	-9	-13	-2	-2	0	-2	-1	-10	-14	15	13	10	13
CAIRO INTERNATIONAL TO MYRTLE BEACH AFB																		
53,000	-32	-22	-13	-20	-21	-28	-32	31	21	12	19	20	14	11	8	7	5	7
40,000	-46	-35	-30	-40	-37	-46	-51	43	32	29	37	35	27	22	12	11	10	12
30,000	-44	-34	-27	-36	-35	-44	-49	41	31	26	34	32	24	20	13	12	9	12
20,000	-31	-23	-21	-24	-24	-31	-34	30	22	20	23	23	17	14	10	9	6	8
CAIRO INTERNATIONAL TO NOUASSEUR AB																		
53,000	-39	-35	-13	-20	-26	-37	-43	38	34	12	20	25	16	11	11	10	8	8
40,000	-52	-50	-27	-37	-40	-53	-61	50	48	26	35	39	27	22	18	15	11	14
30,000	-45	-45	-21	-30	-34	-47	-55	42	44	20	29	32	21	16	18	15	10	13
20,000	-28	-27	-12	-17	-20	-29	-34	27	26	12	17	20	12	8	12	10	8	9
CAIRO INTERNATIONAL TO ONLY AP																		
53,000	-28	-21	-11	-14	-17	-26	-31	26	20	10	13	16	9	5	12	10	9	9
40,000	-36	-29	-26	-28	-29	-41	-47	32	26	23	25	26	15	10	19	17	14	17
30,000	-32	-28	-22	-25	-26	-38	-45	29	25	21	22	24	12	6	20	18	13	17
20,000	-20	-17	-18	-15	-17	-26	-30	19	16	17	14	16	8	4	15	13	10	12
CAIRO INTERNATIONAL TO PALAM AP																		
53,000	56	41	5	31	36	17	7	-57	-42	-5	-32	-37	-50	-56	11	10	9	10
40,000	71	57	14	39	46	25	16	-74	-59	-15	-40	-48	-66	-75	16	15	10	13
30,000	57	49	13	33	38	22	14	-59	-50	-14	-34	-39	-55	-62	16	13	8	11
20,000	34	29	7	16	21	11	7	-35	-29	-8	-17	-21	-32	-37	10	9	6	7
CAIRO INTERNATIONAL TO PATRICK AFB																		
53,000	-32	-23	-11	-18	-20	-28	-32	31	22	11	17	19	13	10	8	7	5	7
40,000	-44	-37	-25	-36	-35	-44	-49	41	34	24	34	33	24	20	12	11	9	11
30,000	-40	-34	-23	-32	-32	-41	-46	38	32	22	30	30	22	18	12	11	8	11
20,000	-29	-23	-18	-22	-22	-29	-32	27	22	18	21	21	16	13	9	9	6	8
CAIRO INTERNATIONAL TO PIARCO AP																		
53,000	-29	-28	-3	-13	-18	-29	-32	28	28	2	12	18	7	3	7	6	5	5
40,000	-45	-45	-17	-23	-31	-45	-50	42	43	17	22	30	19	15	10	9	7	9
30,000	-33	-35	-12	-16	-22	-34	-39	31	34	12	15	21	13	10	10	9	5	7
20,000	-15	-16	-3	-8	-10	-16	-19	14	15	2	7	9	4	2	7	6	5	5

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	O I R E C T							R E T U R N										
	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
CAIRO INTERNATIONAL TO POPE AFB																		
53,000	-32	-21	-13	-20	-21	-28	-32	31	21	13	19	20	14	11	8	7	5	6
40,000	-46	-34	-32	-40	-38	-46	-51	43	32	30	38	35	27	23	12	11	10	12
30,000	-45	-33	-29	-37	-35	-44	-50	42	31	27	35	33	25	20	13	12	9	12
20,000	-32	-23	-21	-25	-24	-31	-35	30	21	20	24	23	17	14	10	9	6	9
CAIRO INTERNATIONAL TO PRESTWICK AB																		
53,000	-26	-17	-8	-12	-15	-23	-28	25	16	7	11	14	7	4	11	9	8	8
40,000	-33	-24	-22	-26	-26	-37	-43	29	21	20	23	23	13	7	17	15	13	16
30,000	-30	-23	-21	-24	-24	-36	-42	27	21	18	21	21	10	4	19	17	14	17
20,000	-20	-15	-16	-15	-16	-24	-29	18	14	15	13	15	7	2	14	12	10	12
CAIRO INTERNATIONAL TO RAMEY AFB																		
53,000	-28	-27	-8	-13	-18	-27	-31	26	26	7	12	17	10	6	7	7	5	6
40,000	-39	-40	-20	-24	-30	-40	-45	36	38	19	22	28	20	16	11	10	7	9
30,000	-29	-33	-15	-19	-23	-32	-36	26	31	15	18	22	15	11	11	10	6	9
20,000	-16	-19	-10	-12	-14	-19	-22	15	18	9	11	13	8	6	8	7	5	6
CAIRO INTERNATIONAL TO RHEIN MAIN AB																		
53,000	-26	-19	-8	-12	-15	-24	-29	24	17	7	11	14	6	2	13	11	9	10
40,000	-32	-26	-22	-24	-26	-38	-44	29	23	19	21	23	11	5	19	17	15	18
30,000	-29	-25	-20	-21	-24	-36	-43	26	22	18	19	21	9	3	21	18	14	18
20,000	-18	-15	-16	-13	-16	-24	-29	16	14	16	12	15	6	1	15	13	10	12
CAIRO INTERNATIONAL TO SEOUL AB																		
53,000	39	32	24	35	32	26	23	-41	-33	-24	-36	-33	-40	-44	9	7	6	7
40,000	47	40	36	44	42	34	30	-49	-41	-38	-46	-43	-51	-55	11	10	10	11
30,000	39	36	27	30	33	25	22	-41	-38	-29	-31	-34	-42	-46	11	11	9	10
20,000	26	21	12	22	20	14	11	-27	-22	-13	-22	-21	-27	-30	8	7	6	7
CAIRO INTERNATIONAL TO STEVENSON FIELD																		
53,000	-24	-12	-6	-14	-13	-20	-24	23	11	6	13	12	7	5	8	6	5	6
40,000	-28	-20	-18	-23	-22	-29	-33	25	18	15	20	19	12	9	10	10	9	11
30,000	-26	-21	-17	-21	-21	-29	-34	23	18	15	18	18	10	6	12	12	10	12
20,000	-17	-13	-11	-13	-13	-19	-23	15	12	10	12	12	6	3	10	9	7	9
CAIRO INTERNATIONAL TO SUNG SHAN																		
53,000	52	38	7	31	34	19	9	-54	-39	-8	-32	-35	-47	-53	9	8	7	8
40,000	62	51	21	37	43	29	22	-65	-53	-23	-39	-45	-59	-65	12	10	9	11
30,000	52	44	17	30	35	23	18	-55	-45	-18	-31	-37	-50	-56	11	10	7	9
20,000	30	25	7	16	20	12	8	-31	-26	-8	-17	-20	-28	-32	7	6	5	5
CAIRO INTERNATIONAL TO TACHIKAWA AB																		
53,000	37	31	22	32	30	24	21	-40	-32	-23	-33	-32	-38	-42	9	7	6	7
40,000	45	37	33	41	39	32	28	-47	-39	-35	-43	-41	-48	-52	11	9	10	10
30,000	38	34	25	30	31	24	20	-40	-36	-26	-32	-33	-41	-45	11	11	9	10
20,000	26	21	12	23	21	14	11	-27	-22	-13	-23	-21	-27	-30	8	7	6	7
CAIRO INTERNATIONAL TO TAN SAN NHUT																		
53,000	41	29	-24	7	18	-7	-22	-43	-30	22	-8	-19	-36	-42	8	8	7	7
40,000	51	42	-9	19	30	3	-7	-54	-44	8	-20	-31	-49	-55	11	10	6	9
30,000	42	34	-2	18	24	7	-1	-44	-35	2	-19	-25	-39	-45	10	9	5	7
20,000	25	19	2	8	13	5	2	-26	-20	-2	-8	-13	-23	-27	7	6	5	5
CAIRO INTERNATIONAL TO THULE AB																		
53,000	-18	-9	-1	-10	-8	-15	-19	16	8	0	9	7	1	-1	9	7	5	7
40,000	-17	-14	-6	-12	-12	-20	-24	14	12	3	10	10	2	-2	11	10	9	11
30,000	-17	-14	-8	-11	-12	-21	-26	13	12	6	8	9	1	-4	14	12	11	13
20,000	-9	-10	-6	-6	-7	-14	-17	7	9	5	4	6	0	-3	11	10	8	9
CAIRO INTERNATIONAL TO TORBAY AP																		
53,000	-28	-19	-15	-18	-19	-25	-29	27	19	14	17	19	13	11	9	7	6	7
40,000	-41	-29	-32	-37	-35	-44	-48	38	27	30	35	32	24	19	14	12	11	13
30,000	-40	-29	-29	-35	-33	-43	-48	37	27	27	33	31	21	17	15	14	11	14
20,000	-28	-20	-22	-23	-23	-30	-33	26	18	21	22	22	15	11	12	10	8	10
CAIRO INTERNATIONAL TO TORREJON AFB																		
53,000	-34	-29	-14	-18	-23	-32	-38	33	28	14	18	22	14	10	12	10	9	9
40,000	-44	-40	-30	-33	-36	-48	-54	41	38	29	31	34	23	18	19	16	13	15
30,000	-37	-37	-25	-29	-31	-43	-49	34	35	24	27	29	19	13	19	16	12	15
20,000	-24	-23	-19	-17	-21	-28	-33	23	23	18	17	20	12	9	14	12	9	10

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*								STANDARD DEVIATION							
	D I R E C T								R E T U R N							
	JAN	APR	JUL	OCT	**A50	A75	A85		JAN	APR	JUL	OCT	A50	A75	A85	
CAIRO INTERNATIONAL TO TRAVIS AFB																
53,000	-17	-9	-4	-11	-10	-15	-18		15	8	3	10	9	4	2	6433 N.MI.
40,000	-18	-15	-12	-16	-15	-21	-25		15	13	10	13	12	6	3	7 6 4 5
30,000	-17	-16	-12	-14	-14	-22	-26		14	13	9	11	12	5	1	9 9 8 10
20,000	-10	-11	-8	-9	-9	-14	-17		8	9	7	7	8	3	0	11 10 9 11
CAIRO INTERNATIONAL TO WAKE AP																
53,000	33	28	16	24	25	19	15		-37	-29	-16	-25	-27	-34	-37	6867 N.MI.
40,000	44	37	26	34	35	27	23		-48	-40	-28	-37	-38	-46	-50	8 7 6 6
30,000	37	32	19	27	29	21	17		-41	-35	-21	-29	-31	-39	-44	10 9 9 10
20,000	25	21	10	19	19	12	9		-26	-22	-10	-20	-20	-26	-29	10 10 8 9
CAIRO INTERNATIONAL TO WESTOVER AFB																
53,000	-30	-19	-14	-20	-20	-26	-30		29	19	14	19	19	14	11	4768 N.MI.
40,000	-45	-31	-34	-41	-37	-46	-51		42	28	32	38	35	26	22	8 7 6 7
30,000	-44	-31	-31	-38	-35	-45	-50		41	28	29	35	33	24	19	13 11 10 12
20,000	-30	-21	-22	-25	-24	-31	-35		28	19	21	24	23	17	13	14 13 10 13
CAIRO INTERNATIONAL TO WHEELUS AP																
53,000	-45	-39	-9	-21	-28	-42	-49		44	38	9	21	27	14	8	940 N.MI.
40,000	-62	-56	-28	-40	-45	-62	-72		60	55	27	39	43	28	20	14 13 12 11
30,000	-56	-51	-20	-31	-36	-56	-66		53	49	19	30	35	20	14	24 21 15 19
20,000	-32	-30	-10	-18	-21	-33	-39		30	29	10	17	21	11	6	25 21 12 17
CAMPBELL AFB TO CHARLESTON AFB																
53,000	43	31	5	21	24	9	3		-46	-33	-5	-22	-25	-42	-49	431 N.MI.
40,000	60	47	18	38	40	20	10		-66	-51	-19	-41	-44	-65	-77	17 17 11 16
30,000	53	40	12	30	32	14	5		-58	-44	-13	-34	-36	-58	-69	26 28 21 26
20,000	33	27	9	18	20	7	2		-36	-29	-9	-19	-21	-37	-45	24 26 16 27
CAMPBELL AFB TO CHATEAUX ROUX AB																
53,000	31	17	13	23	20	14	11		-33	-18	-14	-23	-21	-28	-33	3821 N.MI.
40,000	48	28	32	43	37	27	22		-51	-31	-34	-46	-40	-51	-56	9 7 6 8
30,000	47	28	30	40	36	25	19		-51	-31	-32	-43	-38	-50	-56	14 13 12 14
20,000	33	19	21	27	24	17	13		-35	-21	-22	-28	-26	-34	-39	16 15 12 15
CAMPBELL AFB TO CHURCHILL AP																
53,000	-14	-6	-7	-9	-8	-16	-20		10	5	6	7	7	0	-4	1350 N.MI.
40,000	-17	-11	-15	-16	-15	-27	-34		9	6	11	11	10	-3	-9	13 10 8 10
30,000	-18	-12	-14	-16	-15	-28	-35		10	8	11	12	10	-2	-10	18 17 17 20
20,000	-13	-10	-10	-11	-11	-20	-25		10	8	8	9	9	-1	-6	20 20 16 21
CAMPBELL AFB TO CIAMPINO AP																
53,000	30	17	13	21	20	14	11		-31	-18	-14	-22	-20	-27	-31	4377 N.MI.
40,000	45	27	31	41	36	26	21		-48	-30	-33	-44	-38	-48	-54	9 7 6 7
30,000	44	27	29	38	34	24	19		-48	-30	-31	-41	-37	-48	-53	13 12 11 13
20,000	31	18	20	26	23	16	12		-33	-20	-21	-27	-25	-33	-37	15 14 11 14
CAMPBELL AFB TO CLARK AFB																
53,000	-31	-14	-2	-18	-16	-24	-29		28	13	1	17	14	6	2	4377 N.MI.
40,000	-30	-20	-15	-24	-22	-29	-33		26	17	13	21	19	12	9	9 7 6 7
30,000	-28	-19	-13	-20	-20	-27	-31		23	15	12	18	17	10	7	8 8 7 8
20,000	-18	-12	-8	-14	-13	-18	-21		16	10	8	12	11	6	4	9 9 8 10
CAMPBELL AFB TO DHAHRAN AB																
53,000	28	14	7	17	16	10	7		-30	-15	-8	-18	-17	-24	-29	7308 N.MI.
40,000	36	23	18	28	26	18	14		-39	-26	-20	-31	-29	-37	-42	8 6 5 6
30,000	33	22	19	25	24	16	12		-37	-25	-21	-28	-27	-36	-41	11 10 9 11
20,000	22	15	13	16	16	10	7		-24	-16	-14	-17	-17	-24	-27	13 12 10 12
CAMPBELL AFB TO DON MUANG																
53,000	-14	-7	-2	-7	-7	-12	-15		11	5	1	5	5	1	-1	7731 N.MI.
40,000	-12	-5	-9	-9	-9	-14	-17		7	2	7	7	6	1	-2	7 5 4 5
30,000	-8	-5	-8	-8	-8	-13	-16		4	2	7	6	5	-1	-4	8 7 7 8
20,000	-5	-4	-7	-5	-5	-9	-11		3	3	6	4	4	0	-3	8 9 7 8
CAMPBELL AFB TO DOVER AFB																
53,000	49	32	6	27	28	13	6		-50	-33	-6	-28	-29	-45	-53	587 N.MI.
40,000	74	51	25	49	49	28	19		-77	-53	-27	-52	-51	-73	-85	17 16 11 15
30,000	68	46	21	42	42	23	14		-71	-48	-22	-45	-44	-67	-79	26 26 21 26
20,000	47	31	16	27	28	15	9		-48	-32	-16	-28	-29	-45	-55	25 27 17 27

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION							
	DIRECT							RETURN														
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT				
CAMPBELL AFB TO DUM DUM																			7234 N.MI.			
53,000	2	0	-1	2	0	-3	-5	-5	-2	1	-3	-2	-6	-8	7	5	4	5				
40,000	1	2	0	2	1	-4	-7	-6	-5	-2	-5	-4	-10	-12	8	7	7	8				
30,000	2	3	-1	2	2	-4	-7	-6	-6	-1	-5	-4	-10	-14	9	9	8	8				
20,000	1	2	0	1	1	-3	-6	-3	-3	-1	-2	-2	-7	-9	7	7	6	6				
CAMPBELL AFB TO ELMENDORF AFB																			2721 N.MI.			
53,000	-28	-14	-9	-20	-17	-25	-29	27	13	8	19	16	9	6	9	8	6	7				
40,000	-37	-20	-21	-28	-26	-36	-41	33	18	19	25	24	14	9	13	12	12	14				
30,000	-35	-21	-19	-27	-25	-36	-42	32	19	17	24	22	12	7	15	15	12	15				
20,000	-25	-15	-12	-19	-17	-25	-29	23	13	11	18	16	9	5	11	10	8	10				
CAMPBELL AFB TO ENIWETOK AFB																			5931 N.MI.			
53,000	-26	-19	-6	-12	-15	-23	-27	24	18	5	11	14	7	4	8	7	5	7				
40,000	-46	-35	-17	-28	-31	-42	-47	43	33	16	26	29	19	15	11	10	9	10				
30,000	-38	-31	-14	-23	-26	-36	-41	35	29	13	22	24	15	11	11	10	7	10				
20,000	-25	-19	-8	-15	-16	-23	-26	23	18	7	14	15	9	6	9	7	5	7				
CAMPBELL AFB TO ERNEST HARMON AFB																			1450 N.MI.			
53,000	39	23	10	26	24	13	8	-41	-24	-10	-27	-25	-36	-43	13	12	9	11				
40,000	60	38	31	47	43	28	20	-64	-41	-33	-50	-46	-63	-71	21	20	18	21				
30,000	56	35	29	42	39	24	17	-60	-39	-30	-45	-42	-59	-68	23	22	16	22				
20,000	39	23	20	28	26	16	10	-41	-25	-20	-29	-28	-40	-47	17	17	11	16				
CAMPBELL AFB TO GALEAO																			4360 N.MI.			
53,000	9	11	0	6	6	2	-1	-11	-12	-1	-6	-7	-13	-15	7	6	5	5				
40,000	16	15	6	9	11	5	2	-19	-17	-7	-11	-13	-20	-24	9	9	7	8				
30,000	13	13	4	7	9	4	1	-15	-14	-5	-9	-10	-16	-19	8	8	6	7				
20,000	4	4	-2	0	1	-2	-4	-5	-5	1	0	-2	-6	-8	6	5	5	5				
CAMPBELL AFB TO GEORGE AFB																			1458 N.MI.			
53,000	-42	-33	-7	-23	-26	-38	-44	41	32	7	23	25	13	7	13	12	9	11				
40,000	-67	-50	-29	-43	-46	-63	-72	64	48	28	41	44	29	22	21	20	16	19				
30,000	-56	-44	-21	-35	-37	-54	-63	53	42	20	33	35	21	14	23	20	13	19				
20,000	-36	-28	-13	-20	-23	-35	-41	35	27	13	19	22	12	7	16	15	9	14				
CAMPBELL AFB TO GOOSE AB																			1507 N.MI.			
53,000	31	17	9	22	19	10	6	-33	-19	-9	-23	-20	-30	-36	13	11	9	11				
40,000	46	27	23	38	33	19	12	-52	-31	-26	-42	-37	-52	-60	20	19	17	20				
30,000	43	25	22	34	30	16	9	-49	-29	-25	-38	-34	-50	-58	22	21	16	21				
20,000	30	15	16	22	20	10	5	-33	-18	-17	-24	-22	-33	-39	16	16	11	16				
CAMPBELL AFB TO HICKAM AFB																			3729 N.MI.			
53,000	-29	-26	-8	-18	-20	-28	-32	27	25	8	17	19	11	8	9	8	6	8				
40,000	-48	-39	-27	-33	-36	-46	-52	45	37	26	31	34	25	20	14	13	10	12				
30,000	-38	-32	-18	-25	-27	-37	-43	36	30	17	24	26	17	13	14	12	8	11				
20,000	-23	-18	-8	-13	-14	-22	-26	22	17	8	12	14	8	5	10	9	6	8				
CAMPBELL AFB TO INCIRLIK AB																			5361 N.MI.			
53,000	29	15	11	19	17	12	9	-30	-16	-11	-20	-18	-25	-29	8	6	5	6				
40,000	38	24	24	33	29	21	17	-42	-26	-27	-36	-32	-41	-46	12	11	10	12				
30,000	37	23	24	31	28	19	14	-40	-26	-26	-34	-31	-41	-46	14	13	11	13				
20,000	25	15	16	20	19	12	9	-27	-17	-17	-21	-20	-27	-31	10	10	7	10				
CAMPBELL AFB TO IWO JIMA																			6196 N.MI.			
53,000	-36	-23	-7	-24	-23	-31	-35	34	21	6	23	21	12	8	8	7	5	7				
40,000	-50	-36	-24	-41	-38	-47	-52	45	32	21	38	34	25	20	11	10	10	11				
30,000	-46	-33	-22	-38	-35	-45	-50	42	30	20	35	31	22	17	12	11	9	12				
20,000	-32	-21	-15	-25	-23	-30	-34	29	19	14	24	21	15	12	9	8	7	8				
CAMPBELL AFB TO JOHNSON AFB																			4430 N.MI.			
53,000	-26	-25	-8	-16	-18	-26	-30	24	24	8	15	17	10	7	9	8	6	7				
40,000	-46	-39	-25	-32	-35	-44	-50	43	36	24	30	33	24	20	13	12	9	11				
30,000	-37	-31	-17	-24	-26	-36	-41	34	29	16	22	24	17	13	13	11	8	10				
20,000	-21	-16	-7	-11	-13	-20	-24	20	15	6	11	12	7	4	9	8	5	7				
CAMPBELL AFB TO KADENA AB																			6527 N.MI.			
53,000	-31	-15	-5	-21	-18	-26	-31	28	14	4	20	16	8	5	8	6	5	6				
40,000	-31	-21	-18	-27	-24	-31	-35	26	18	15	24	21	14	10	9	9	9	10				
30,000	-28	-20	-15	-23	-21	-29	-33	24	16	14	20	18	11	7	10	10	9	10				
20,000	-19	-12	-9	-15	-14	-19	-22	16	11	9	14	12	7	4	8	8	6	7				

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION				
	D I R E C T							R E T U R N							JAN	APR	JUL	OCT	
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85					
CAMPBELL AFB TO KEFLAVIK AP																			2801 N.MI.
53,000	27	13	8	19	16	8	5	-29	-14	-8	-20	-17	-25	-30	10	8	7	8	
40,000	35	21	17	30	25	15	10	-39	-23	-19	-33	-28	-39	-45	14	13	12	14	
30,000	33	19	16	27	23	12	7	-37	-23	-18	-30	-27	-38	-45	16	16	13	16	
20,000	21	12	10	16	15	7	3	-24	-14	-11	-18	-16	-25	-30	13	12	9	12	
CAMPBELL AFB TO KINDLEY AFB																			1154 N.MI.
53,000	49	35	4	24	28	11	5	-50	-36	-5	-25	-29	-45	-52	14	14	9	13	
40,000	68	53	18	41	45	25	16	-71	-56	-19	-44	-47	-67	-78	22	23	16	21	
30,000	60	46	14	34	37	19	11	-63	-49	-15	-36	-39	-59	-69	21	21	13	21	
20,000	40	32	11	20	24	12	7	-42	-33	-11	-21	-25	-40	-47	16	16	9	15	
CAMPBELL AFB TO KWAJALEIN NAS																			5785 N.MI.
53,000	-23	-20	-7	-11	-15	-22	-26	22	19	6	11	14	8	5	8	7	5	6	
40,000	-42	-34	-19	-27	-30	-40	-45	40	32	17	25	28	19	15	11	10	9	10	
30,000	-33	-29	-13	-21	-23	-32	-37	31	27	13	19	21	14	10	11	10	7	9	
20,000	-19	-15	-5	-11	-12	-18	-22	18	14	5	10	11	6	3	8	7	5	6	
CAMPBELL AFB TO LADD AFB																			2685 N.MI.
53,000	-28	-13	-8	-19	-16	-24	-28	27	12	8	18	15	9	6	9	8	6	7	
40,000	-33	-18	-19	-25	-24	-33	-38	30	16	17	22	21	12	7	13	12	12	14	
30,000	-33	-19	-17	-24	-23	-33	-39	29	17	15	21	20	11	6	14	14	12	15	
20,000	-23	-14	-12	-18	-16	-24	-28	21	13	11	17	15	8	5	11	10	8	10	
CAMPBELL AFB TO LAJES AP																			2816 N.MI.
53,000	38	25	11	24	24	15	11	-39	-26	-12	-25	-25	-34	-40	11	9	7	9	
40,000	54	41	29	44	41	30	24	-57	-43	-31	-46	-44	-56	-63	16	15	13	16	
30,000	51	39	26	39	38	26	21	-54	-42	-27	-41	-40	-53	-60	17	16	11	15	
20,000	38	27	20	27	27	18	15	-40	-28	-20	-28	-28	-38	-43	13	13	8	11	
CAMPBELL AFB TO LE BOURGET AP																			3791 N.MI.
53,000	31	17	12	23	20	13	10	-32	-17	-13	-23	-20	-28	-33	9	7	6	8	
40,000	47	27	31	42	36	26	21	-50	-30	-33	-44	-39	-50	-55	14	13	12	14	
30,000	46	27	29	39	35	24	18	-50	-30	-31	-42	-37	-49	-56	16	15	12	16	
20,000	32	18	20	26	23	16	11	-34	-20	-21	-27	-25	-33	-38	12	12	8	11	
CAMPBELL AFB TO LONDON INTERNATIONAL																			3628 N.MI.
53,000	31	16	12	23	20	13	10	-33	-17	-12	-24	-20	-28	-33	9	7	6	8	
40,000	46	27	30	41	36	25	20	-50	-29	-32	-44	-38	-49	-55	14	13	12	14	
30,000	45	27	28	38	34	23	17	-50	-30	-31	-41	-37	-49	-56	17	16	13	16	
20,000	31	18	19	25	23	15	11	-34	-20	-20	-27	-24	-33	-38	13	12	9	12	
CAMPBELL AFB TO LORING AFB																			1067 N.MI.
53,000	38	23	8	25	23	11	6	-40	-24	-8	-26	-24	-36	-43	15	13	10	12	
40,000	58	37	26	43	40	24	15	-64	-41	-29	-47	-44	-62	-71	23	22	20	23	
30,000	54	33	25	38	36	20	12	-60	-37	-27	-42	-40	-58	-69	25	24	17	24	
20,000	37	22	17	26	24	13	7	-40	-24	-18	-27	-26	-39	-47	19	18	11	18	
CAMPBELL AFB TO MAURIPUR AP																			6833 N.MI.
53,000	21	9	3	14	11	5	2	-24	-10	-3	-16	-13	-20	-24	8	6	5	6	
40,000	22	14	9	18	15	9	5	-26	-16	-11	-21	-18	-26	-30	10	9	8	9	
30,000	19	13	10	15	14	7	4	-23	-16	-12	-18	-17	-24	-28	11	10	9	10	
20,000	13	10	6	11	10	4	2	-15	-12	-7	-12	-11	-17	-19	8	8	6	8	
CAMPBELL AFB TO MCCHORD AFB																			1667 N.MI.
53,000	-35	-23	-12	-24	-22	-32	-37	33	22	11	23	22	13	9	12	10	8	10	
40,000	-54	-36	-34	-40	-40	-54	-61	51	33	32	38	38	25	19	19	17	16	19	
30,000	-49	-33	-28	-37	-36	-50	-58	45	31	27	35	33	21	14	21	20	14	20	
20,000	-34	-22	-18	-26	-24	-34	-40	32	21	17	24	23	14	9	15	14	9	14	
CAMPBELL AFB TO MCGUIRE AFB																			639 N.MI.
53,000	48	31	6	27	27	13	6	-50	-32	-7	-28	-28	-44	-52	17	16	11	14	
40,000	73	49	26	49	48	28	19	-76	-52	-28	-51	-51	-72	-84	26	26	21	26	
30,000	67	44	22	42	42	23	15	-70	-47	-23	-45	-44	-66	-78	25	27	17	27	
20,000	47	30	17	27	28	15	9	-48	-31	-17	-28	-29	-45	-54	20	20	11	20	
CAMPBELL AFB TO MIDWAY NAS																			4412 N.MI.
53,000	-30	-23	-11	-20	-20	-28	-32	28	22	11	19	19	13	10	9	8	6	8	
40,000	-55	-39	-24	-39	-39	-50	-57	52	37	23	37	36	26	21	13	12	10	12	
30,000	-48	-38	-20	-34	-34	-46	-52	45	36	19	31	32	21	17	14	13	9	12	
20,000	-32	-26	-13	-23	-23	-31	-35	31	25	13	22	22	14	11	11	9	6		

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HEIGHT IN FEET	EQUIVALENT HEADWINDS*								STANDARD DEVIATION									
	DIRECT								RETURN									
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
CAMPBELL AFB TO MILDENHALL AP																		
53,000	31	16	12	23	19	13	10	-32	-17	-12	-23	-20	-28	-33	9	7	6	8
40,000	45	26	29	40	35	24	19	-49	-29	-31	-43	-37	-48	-54	14	13	12	14
30,000	44	26	27	37	33	22	16	-49	-30	-30	-40	-36	-48	-55	16	16	13	16
20,000	31	18	18	24	22	14	10	-33	-19	-19	-26	-24	-32	-37	13	12	9	12
CAMPBELL AFB TO MINOT AFB																		
53,000	-29	-18	-10	-19	-18	-28	-34	27	17	10	18	17	8	4	15	13	10	12
40,000	-45	-29	-31	-34	-35	-50	-58	39	25	28	30	30	15	7	23	21	19	24
30,000	-42	-28	-25	-30	-30	-47	-56	36	24	23	27	27	12	4	25	24	17	25
20,000	-29	-20	-15	-22	-21	-33	-39	26	18	14	21	19	8	3	18	18	11	17
CAMPBELL AFB TO MOSCOW INTERNATIONAL																		
53,000	25	11	5	17	14	7	4	-27	-12	-5	-17	-14	-22	-27	9	7	5	6
40,000	28	18	12	23	20	12	8	-31	-21	-14	-25	-22	-31	-35	11	10	9	11
30,000	26	18	11	19	18	9	5	-29	-21	-14	-22	-21	-31	-35	13	12	11	13
20,000	16	13	7	13	12	5	2	-18	-14	-8	-14	-13	-20	-24	10	10	7	9
CAMPBELL AFB TO MYRTLE BEACH AFB																		
53,000	47	33	5	23	26	10	4	-49	-35	-5	-24	-27	-44	-52	16	17	11	16
40,000	68	51	19	42	44	23	13	-72	-54	-21	-45	-47	-70	-82	26	28	21	26
30,000	60	44	14	34	36	17	8	-64	-47	-15	-37	-39	-62	-73	24	26	16	27
20,000	37	30	10	20	22	10	4	-40	-31	-10	-21	-24	-40	-48	20	20	11	19
CAMPBELL AFB TO NOUASSEUR AB																		
53,000	33	23	12	21	22	15	11	-35	-24	-12	-22	-23	-31	-35	9	8	6	8
40,000	47	37	28	40	38	28	23	-50	-39	-29	-42	-39	-50	-55	14	13	11	13
30,000	45	35	24	35	34	24	20	-47	-37	-25	-37	-36	-47	-52	14	13	10	13
20,000	33	23	18	24	24	17	14	-34	-25	-19	-25	-25	-33	-38	11	10	7	10
CAMPBELL AFB TO ORLY AP																		
53,000	31	17	13	23	20	13	10	-32	-18	-13	-23	-21	-28	-33	9	7	6	8
40,000	47	27	31	42	36	26	21	-50	-30	-33	-45	-39	-50	-55	14	13	12	14
30,000	46	27	29	39	35	24	18	-50	-30	-31	-42	-38	-49	-56	16	15	12	16
20,000	32	18	20	26	23	16	12	-34	-20	-21	-27	-25	-34	-38	12	12	8	11
CAMPBELL AFB TO PALAM AP																		
53,000	13	9	2	10	8	3	1	-16	-10	-2	-12	-10	-15	-18	7	6	4	6
40,000	11	8	6	11	9	3	0	-14	-10	-8	-14	-11	-17	-20	9	8	7	9
30,000	10	9	7	11	9	3	0	-13	-11	-9	-13	-12	-18	-21	10	9	8	9
20,000	6	7	4	6	6	1	-1	-8	-8	-5	-8	-7	-12	-15	7	7	6	7
CAMPBELL AFB TO PATRICK AFB																		
53,000	25	22	3	12	15	4	-2	-30	-24	-4	-14	-17	-30	-37	15	16	10	16
40,000	32	30	12	22	23	7	-1	-42	-37	-13	-27	-29	-47	-56	24	25	19	23
30,000	26	27	7	17	19	4	-3	-36	-32	-8	-21	-23	-40	-49	22	23	15	23
20,000	17	17	4	9	11	1	-4	-21	-19	-5	-10	-12	-24	-32	18	17	9	16
CAMPBELL AFB TO PIARCO AP																		
53,000	23	21	-2	9	12	2	-2	-26	-23	2	-10	-14	-25	-30	10	10	6	9
40,000	34	31	5	17	21	8	3	-39	-35	-5	-19	-24	-38	-45	14	15	10	14
30,000	28	25	3	12	16	6	2	-32	-27	-4	-14	-18	-30	-36	13	12	8	11
20,000	14	13	-2	2	6	-1	-4	-15	-14	2	-3	-6	-15	-19	10	9	5	8
CAMPBELL AFB TO POPE AFB																		
53,000	50	35	5	25	28	12	5	-52	-36	-6	-26	-29	-46	-54	17	17	11	16
40,000	74	54	22	46	48	26	16	-77	-56	-23	-49	-50	-74	-86	26	28	21	27
30,000	67	47	16	38	40	19	10	-69	-49	-17	-41	-42	-66	-78	25	27	17	27
20,000	43	32	12	23	25	12	6	-44	-33	-12	-24	-26	-43	-52	21	20	11	20
CAMPBELL AFB TO PRESTWICK AB																		
53,000	31	16	11	23	19	12	9	-32	-16	-11	-23	-20	-28	-33	10	8	6	8
40,000	44	26	27	38	33	23	18	-48	-28	-29	-41	-36	-47	-53	14	13	12	15
30,000	43	26	26	35	32	21	15	-47	-29	-28	-39	-35	-47	-54	17	16	13	16
20,000	29	17	17	23	21	13	9	-32	-19	-18	-24	-22	-31	-36	13	12	9	12
CAMPBELL AFB TO RAMEY AFB																		
53,000	29	26	0	12	16	4	-1	-32	-27	0	-13	-17	-30	-36	12	12	7	11
40,000	41	38	9	22	26	12	6	-47	-42	-10	-24	-30	-47	-55	17	18	13	17
30,000	34	31	6	16	21	8	3	-38	-33	-7	-18	-23	-37	-44	15	15	10	15
20,000	18	17	0	5	9	0	-3	-20	-18	0	-6	-10	-20	-25	12	11	7	10

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEADWINDS*							STANDARD DEVIATION						
	DIRECT								RETURN													
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT				
CAMPBELL AFB TO RHEIN MAIN AB																			3973 N.MI.			
53,000	30	16	11	22	19	12	9	-32	-17	-12	-23	-20	-27	-32	9	7	6	7				
40,000	44	25	28	39	34	24	19	-47	-28	-30	-42	-36	-47	-52	13	12	11	14				
30,000	43	25	27	36	32	22	16	-47	-28	-29	-39	-35	-47	-53	16	15	12	15				
20,000	30	17	18	23	21	14	10	-32	-19	-19	-25	-23	-31	-36	12	11	8	11				
CAMPBELL AFB TO SEOUL AB																			5957 N.MI.			
53,000	-24	-11	-6	-18	-14	-21	-24	21	10	6	16	12	7	5	8	6	5	6				
40,000	-21	-14	-15	-20	-17	-24	-27	18	12	13	17	15	9	6	9	8	8	9				
30,000	-19	-14	-14	-17	-16	-22	-26	16	11	12	14	13	7	4	10	10	9	10				
20,000	-12	-9	-9	-12	-10	-15	-18	10	7	8	10	9	4	2	8	7	6	7				
CAMPBELL AFB TO STEVENSON FIELD																			899 N.MI.			
53,000	-23	-13	-9	-15	-14	-24	-29	20	11	8	14	13	4	0	15	13	10	12				
40,000	-34	-22	-25	-27	-27	-42	-50	26	17	21	21	21	7	-1	23	21	20	24				
30,000	-32	-22	-20	-24	-24	-40	-49	24	18	18	20	19	5	-4	25	24	17	25				
20,000	-23	-16	-13	-18	-17	-28	-35	19	13	11	16	14	4	-2	18	18	11	18				
CAMPBELL AFB TO SUNG SHAN																			6748 N.MI.			
53,000	-28	-13	-4	-18	-15	-23	-27	25	11	3	17	13	7	3	8	6	5	6				
40,000	-25	-17	-15	-21	-19	-26	-29	20	14	13	18	16	10	7	9	8	9	9				
30,000	-23	-16	-14	-17	-17	-24	-28	18	13	12	15	14	8	5	9	9	8	10				
20,000	-14	-10	-9	-12	-11	-16	-19	12	8	8	10	9	5	2	8	7	6	7				
CAMPBELL AFB TO TACHIKAWA AB																			5733 N.MI.			
53,000	-30	-16	-7	-23	-19	-26	-30	28	15	6	21	17	10	7	8	6	5	6				
40,000	-34	-22	-19	-32	-27	-35	-39	30	20	17	29	24	16	12	10	9	10	10				
30,000	-31	-21	-18	-27	-24	-32	-36	27	18	16	24	21	13	9	11	11	10	11				
20,000	-21	-14	-10	-19	-16	-22	-25	19	12	10	17	14	8	5	9	8	7	8				
CAMPBELL AFB TO TAN SAN NHUT																			7841 N.MI.			
53,000	-21	-9	-1	-11	-10	-16	-20	18	8	0	9	8	2	0	7	6	4	6				
40,000	-17	-10	-10	-13	-12	-18	-21	12	7	9	10	9	4	1	8	8	7	8				
30,000	-15	-9	-10	-11	-11	-17	-20	11	6	9	9	9	3	1	8	8	7	8				
20,000	-8	-6	-8	-7	-7	-11	-13	6	5	7	6	6	2	0	6	6	5	6				
CAMPBELL AFB TO THULE AB																			2445 N.MI.			
53,000	3	0	-1	2	1	-4	-7	-5	-1	1	-4	-2	-8	-11	10	8	6	8				
40,000	4	1	-2	0	0	-8	-12	-9	-3	-1	-3	-4	-13	-17	13	12	12	13				
30,000	1	0	-2	-1	0	-10	-15	-7	-3	0	-3	-3	-13	-18	14	14	12	14				
20,000	2	0	-1	0	0	-7	-11	-4	-1	0	-2	-2	-9	-13	11	11	9	11				
CAMPBELL AFB TO TORBAY AP																			1662 N.MI.			
53,000	41	24	11	27	25	15	10	-42	-25	-11	-28	-26	-37	-43	13	11	9	11				
40,000	62	41	33	50	46	31	24	-66	-44	-36	-53	-49	-64	-73	20	19	17	20				
30,000	59	38	31	44	42	27	20	-63	-41	-33	-47	-45	-61	-70	22	21	15	21				
20,000	41	25	21	30	28	18	13	-43	-27	-22	-31	-29	-41	-48	17	16	10	15				
CAMPBELL AFB TO TORREJON AFB																			3790 N.MI.			
53,000	32	20	14	22	21	15	12	-33	-21	-14	-23	-22	-29	-34	9	7	6	8				
40,000	48	33	32	43	39	29	24	-51	-35	-34	-46	-41	-51	-57	14	13	12	14				
30,000	47	31	30	40	36	26	21	-50	-34	-31	-42	-39	-50	-55	15	14	11	14				
20,000	34	21	21	28	25	18	14	-36	-23	-22	-29	-27	-35	-40	12	11	8	11				
CAMPBELL AFB TO TRAVIS AFB																			1634 N.MI.			
53,000	-39	-29	-10	-24	-25	-36	-41	38	29	10	23	24	14	9	13	11	8	10				
40,000	-62	-45	-33	-43	-45	-60	-68	60	43	32	41	43	29	22	20	19	16	19				
30,000	-53	-40	-25	-35	-37	-51	-60	50	38	24	33	35	22	15	22	20	13	19				
20,000	-34	-25	-15	-22	-23	-33	-40	33	24	15	21	22	13	8	16	14	9	14				
CAMPBELL AFB TO WAKE AP																			5434 N.MI.			
53,000	-29	-21	-7	-15	-17	-25	-29	27	20	7	15	16	9	6	9	7	5	7				
40,000	-53	-40	-20	-33	-36	-48	-54	50	37	19	31	34	23	18	12	11	9	11				
30,000	-47	-37	-17	-29	-32	-43	-49	44	34	16	27	29	19	15	13	11	8	11				
20,000	-32	-24	-12	-20	-21	-29	-33	30	23	12	19	20	13	10	9	8	6	8				
CAMPBELL AFB TO WESTOVER AFB																			766 N.MI.			
53,000	45	28	7	27	26	12	6	-47	-29	-7	-27	-27	-41	-49	16	15	11	14				
40,000	68	45	27	47	46	27	18	-72	-48	-29	-50	-49	-69	-80	25	25	21	25				
30,000	63	41	24	41	40	23	14	-67	-44	-25	-44	-43	-64	-76	25	26	17	26				
20,000	44	27	17	27	27	15	9	-46	-29	-18	-29	-28	-44	-52	20	20	11	19				

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION					
	D I R E C T							R E T U R N										
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
CAMPBELL AFB TO WHEELUS AP																		
53,000	31	20	13	21	21	15	12	-32	-21	-14	-22	-21	-28	-32	4713 N.MI.			
40,000	46	32	31	40	37	28	23	-48	-34	-32	-42	-39	-48	-53	8	7	6	7
30,000	45	30	28	37	34	25	21	-46	-33	-29	-39	-36	-46	-51	13	12	10	12
20,000	31	20	20	25	24	17	14	-33	-22	-21	-26	-25	-32	-36	14	13	10	13
CHARLESTON AFB TO CHATELAUVOUX AB																		
53,000	31	19	12	21	20	13	10	-33	-20	-12	-22	-21	-29	-33	3684 N.MI.			
40,000	47	31	30	42	37	27	22	-50	-34	-32	-45	-40	-50	-56	9	8	6	8
30,000	47	31	28	39	35	25	20	-50	-34	-30	-42	-38	-50	-56	14	13	12	14
20,000	35	22	21	27	25	18	14	-37	-24	-22	-29	-27	-35	-40	16	15	12	15
CHARLESTON AFB TO CHURCHILL AP																		
53,000	-17	-10	-8	-10	-11	-18	-22	13	8	8	9	9	3	-1	1651 N.MI.			
40,000	-26	-17	-19	-19	-20	-32	-38	17	12	16	13	15	3	-3	12	10	8	10
30,000	-25	-18	-17	-19	-19	-31	-38	17	13	14	14	15	3	-3	17	17	15	19
20,000	-17	-13	-11	-12	-13	-22	-27	13	11	10	9	11	2	-3	18	19	14	19
CHARLESTON AFB TO CIAMPINO AP																		
53,000	30	19	13	20	19	13	11	-31	-20	-13	-20	-20	-27	-32	4232 N.MI.			
40,000	44	30	29	40	35	26	21	-46	-33	-31	-42	-38	-47	-53	9	7	6	7
30,000	43	30	27	37	33	24	19	-46	-32	-28	-39	-36	-46	-52	13	12	11	13
20,000	32	21	20	25	24	17	14	-34	-23	-21	-27	-25	-33	-37	15	14	10	14
CHARLESTON AFB TO CLARK AFB																		
53,000	-28	-12	-2	-16	-14	-22	-26	24	11	2	14	12	5	2	7683 N.MI.			
40,000	-26	-17	-14	-20	-19	-26	-29	21	14	12	17	16	10	7	7	6	5	6
30,000	-23	-16	-13	-17	-17	-24	-27	19	13	11	15	14	8	5	8	8	8	9
20,000	-14	-10	-9	-11	-11	-16	-18	12	9	8	10	10	5	3	9	9	8	9
CHARLESTON AFB TO DHAHRAN AB																		
53,000	30	17	10	18	18	12	9	-32	-19	-10	-19	-19	-26	-31	6253 N.MI.			
40,000	41	29	24	35	32	24	20	-45	-32	-27	-38	-35	-44	-48	8	6	5	6
30,000	39	27	24	31	30	22	17	-43	-30	-26	-34	-33	-42	-47	11	11	9	11
20,000	28	19	17	21	21	15	12	-30	-20	-18	-22	-22	-29	-32	13	12	10	12
CHARLESTON AFB TO DON MUANG																		
53,000	-4	-2	0	-1	-2	-5	-7	0	1	0	0	0	-4	-5	7991 N.MI.			
40,000	-3	0	-4	-1	-2	-7	-10	-3	-3	2	-2	-1	-7	-9	7	5	4	5
30,000	0	0	-4	-1	-1	-7	-10	-4	-4	2	-1	-2	-7	-10	8	7	7	8
20,000	1	0	-3	0	0	-5	-7	-3	-2	2	-1	-1	-5	-8	8	9	7	8
CHARLESTON AFB TO DOVER AFB																		
53,000	25	15	-2	14	12	0	-6	-30	-18	2	-15	-15	-29	-36	435 N.MI.			
40,000	33	25	5	29	22	4	-6	-44	-32	-7	-34	-29	-49	-60	17	17	11	16
30,000	30	22	7	25	19	3	-5	-40	-28	-8	-29	-25	-43	-54	26	28	21	27
20,000	26	15	7	16	14	3	-3	-30	-18	-8	-18	-17	-31	-39	25	27	17	26
CHARLESTON AFB TO OUM DUM																		
53,000	13	6	1	9	7	2	0	-16	-8	-2	-10	-8	-14	-17	7402 N.MI.			
40,000	11	9	5	12	9	3	0	-16	-12	-7	-14	-12	-18	-21	7	6	4	6
30,000	11	10	6	11	9	3	0	-15	-13	-7	-14	-12	-19	-22	9	8	7	9
20,000	8	7	3	7	6	1	-1	-10	-9	-4	-8	-7	-12	-15	10	9	8	9
CHARLESTON AFB TO ELMENDORF AFB																		
53,000	-29	-15	-9	-20	-17	-25	-30	28	14	9	19	16	10	7	3119 N.MI.			
40,000	-38	-23	-22	-28	-27	-37	-42	34	20	20	25	24	15	11	9	7	6	7
30,000	-37	-23	-19	-27	-26	-36	-42	33	20	17	24	23	13	9	12	12	11	13
20,000	-25	-16	-13	-19	-18	-25	-29	23	15	12	18	16	10	6	14	14	11	14
CHARLESTON AFB TO ENIWETOK AFB																		
53,000	-28	-21	-5	-12	-16	-24	-28	26	20	5	12	15	8	5	6357 N.MI.			
40,000	-48	-37	-17	-29	-32	-43	-49	45	34	16	27	30	20	15	8	7	5	6
30,000	-39	-32	-13	-24	-26	-37	-42	36	30	12	22	24	15	11	11	10	9	10
20,000	-25	-19	-7	-14	-16	-23	-26	23	18	7	13	15	8	6	11	10	7	10
CHARLESTON AFB TO ERNEST HARMON AFB																		
53,000	34	19	5	22	19	8	4	-37	-20	-6	-23	-21	-33	-39	1346 N.MI.			
40,000	49	33	22	41	36	20	12	-55	-38	-24	-46	-40	-57	-66	14	13	9	12
30,000	45	31	21	36	32	18	10	-52	-35	-23	-40	-36	-53	-62	22	21	18	22
20,000	34	21	15	24	22	12	7	-37	-24	-16	-26	-24	-37	-46	23	23	16	21

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MINUS SIGNS DENOTE HEADWINDS.

THE BOEING COMPANY
TRANSPORT DIVISION

NO. 06-9175

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEADWINDS*								STANDARD DEVIATION					
	DIRECT								RETURN													
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT				
CHARLESTON AFB TO GALEAO																			3951 N.MI.			
53,000	8	10	0	5	5	1	-2	-9	-11	-1	-5	-6	-11	-14	7	7	5	5				
40,000	14	12	5	7	9	3	0	-16	-15	-6	-9	-11	-18	-21	9	9	7	8				
30,000	12	11	3	6	8	3	0	-13	-12	-4	-7	-9	-14	-17	8	7	6	7				
20,000	3	3	-2	-1	0	-3	-5	-3	-4	2	1	-1	-5	-7	6	5	5	4				
CHARLESTON AFB TO GEORGE AFB																			1856 N.MI.			
53,000	-45	-35	-5	-23	-28	-40	-46	44	34	4	23	27	12	5	12	11	8	10				
40,000	-68	-54	-23	-45	-47	-64	-73	66	52	21	43	45	28	20	19	18	14	17				
30,000	-58	-46	-16	-35	-38	-55	-64	55	44	15	33	36	20	14	19	18	11	17				
20,000	-37	-30	-10	-19	-23	-35	-41	36	29	10	18	22	11	7	14	13	7	12				
CHARLESTON AFB TO GOOSE AB																			1486 N.MI.			
53,000	26	13	4	18	15	6	1	-30	-15	-5	-20	-17	-27	-33	13	12	9	11				
40,000	37	22	15	33	27	12	5	-45	-27	-19	-38	-32	-47	-55	20	19	17	20				
30,000	35	21	16	29	24	10	3	-42	-26	-19	-34	-29	-45	-53	22	22	15	21				
20,000	26	14	11	19	17	7	2	-29	-16	-13	-21	-19	-30	-36	16	16	10	16				
CHARLESTON AFB TO HICKAM AFB																			4128 N.MI.			
53,000	-32	-28	-6	-18	-21	-31	-35	31	27	6	17	21	11	6	9	8	6	7				
40,000	-51	-43	-23	-34	-37	-49	-54	48	41	22	33	35	25	20	13	12	9	11				
30,000	-41	-34	-15	-26	-28	-39	-45	39	33	15	24	27	17	13	13	11	8	10				
20,000	-25	-20	-7	-12	-15	-23	-27	24	19	7	12	14	8	5	9	8	5	7				
CHARLESTON AFB TO INCIRLIK AB																			5267 N.MI.			
53,000	30	17	12	19	18	13	10	-31	-18	-12	-20	-19	-26	-31	8	7	5	7				
40,000	41	28	29	37	33	25	21	-44	-30	-31	-40	-36	-45	-50	12	11	10	12				
30,000	40	27	27	34	32	23	18	-44	-30	-29	-37	-34	-44	-49	14	13	10	13				
20,000	29	19	19	23	22	16	12	-31	-20	-20	-25	-24	-31	-34	11	10	7	9				
CHARLESTON AFB TO IWO JIMA																			6609 N.MI.			
53,000	-35	-22	-7	-23	-22	-30	-34	33	20	6	22	20	12	7	8	6	5	6				
40,000	-47	-33	-22	-38	-35	-45	-50	42	29	20	35	32	23	18	10	10	10	11				
30,000	-44	-31	-20	-35	-32	-42	-47	39	28	18	32	29	20	16	11	11	9	11				
20,000	-30	-20	-14	-23	-21	-28	-32	27	18	13	22	19	13	10	9	8	6	8				
CHARLESTON AFB TO JOHNSTON AFB																			4835 N.MI.			
53,000	-29	-27	-6	-16	-20	-28	-32	28	26	6	15	19	10	6	8	7	5	7				
40,000	-49	-42	-23	-33	-36	-47	-52	46	40	22	31	34	24	20	12	12	9	10				
30,000	-39	-34	-15	-24	-27	-37	-43	37	32	14	23	25	17	13	12	11	7	10				
20,000	-22	-18	-6	-11	-13	-21	-24	21	17	5	10	13	7	4	9	7	5	7				
CHARLESTON AFB TO KAOENA AB																			6907 N.MI.			
53,000	-29	-14	-5	-19	-16	-24	-28	26	12	4	17	14	7	4	8	6	5	6				
40,000	-28	-19	-17	-24	-22	-28	-32	23	16	15	20	18	12	9	9	8	9	9				
30,000	-26	-18	-15	-20	-19	-26	-30	21	15	13	17	16	10	6	10	10	9	10				
20,000	-16	-11	-9	-13	-12	-17	-20	14	10	9	12	11	6	4	8	7	6	7				
CHARLESTON AFB TO KEFLAVIK AP																			2799 N.MI.			
53,000	29	13	7	20	16	9	5	-31	-15	-8	-21	-17	-27	-32	11	9	7	9				
40,000	38	23	18	34	28	17	12	-43	-26	-21	-37	-31	-43	-50	15	14	13	15				
30,000	36	22	18	30	26	14	9	-41	-26	-20	-34	-30	-42	-49	17	17	13	16				
20,000	25	15	11	18	17	8	4	-27	-17	-12	-20	-18	-28	-33	13	13	9	12				
CHARLESTON AFB TO KINOLEY AFB																			777 N.MI.			
53,000	49	36	0	22	27	8	1	-49	-37	-1	-22	-28	-45	-53	16	16	10	16				
40,000	64	55	12	38	42	20	10	-66	-58	-13	-40	-44	-66	-77	24	25	17	23				
30,000	55	46	10	31	34	15	8	-56	-48	-11	-33	-36	-56	-66	23	22	14	21				
20,000	37	31	9	18	22	10	5	-38	-32	-9	-19	-22	-37	-45	17	17	9	15				
CHARLESTON AFB TO KWAJALEIN NAS																			6204 N.MI.			
53,000	-25	-22	-6	-12	-16	-24	-27	24	21	6	11	15	8	5	8	7	5	6				
40,000	-44	-37	-18	-28	-31	-42	-47	41	35	17	26	29	20	15	11	10	8	10				
30,000	-35	-30	-12	-21	-24	-33	-38	32	28	12	20	22	14	10	11	10	7	9				
20,000	-20	-16	-5	-10	-12	-19	-22	19	15	4	9	11	6	3	8	7	5	6				
CHARLESTON AFB TO LAO AFB																			3067 N.MI.			
53,000	-29	-14	-9	-19	-16	-24	-28	27	13	8	18	15	9	6	9	7	5	7				
40,000	-34	-20	-20	-26	-25	-34	-39	30	18	18	23	22	13	9	12	11	11	13				
30,000	-34	-21	-18	-24	-24	-34	-39	30	18	16	21	21	12	7	13	13	11	14				
20,000	-23	-15	-13	-17	-17	-24	-27	21	14	12	16	15	9	6	10	10	7	10				

*HEADWINDS--COMPUED FOR A 450-KT AIRSPEED.

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEADWINDS*						STANDARD DEVIATION				
	D I R E C T								R E T U R N										
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT	
CHARLESTON AFB TO LAJES AP																			2564 N.MI.
53,000	37	26	8	21	22	12	8	-38	-27	-8	-22	-23	-34	-39	11	10	7	10	
40,000	49	42	20	38	37	24	17	-52	-44	-21	-40	-39	-52	-59	17	16	12	16	
30,000	45	40	18	33	33	21	15	-47	-42	-19	-35	-35	-48	-55	17	16	11	15	
20,000	35	27	16	23	24	16	12	-36	-29	-16	-24	-25	-35	-41	13	12	8	11	
CHARLESTON AFB TO LE BOURGET AP																			3671 N.MI.
53,000	31	18	12	22	20	13	10	-33	-19	-12	-23	-21	-29	-33	9	8	6	8	
40,000	47	31	30	43	37	27	22	-50	-33	-32	-45	-40	-51	-56	14	13	12	15	
30,000	47	30	29	39	36	25	19	-51	-33	-30	-42	-38	-50	-57	16	15	12	15	
20,000	35	22	21	27	25	18	14	-37	-23	-21	-29	-27	-36	-41	13	12	8	11	
CHARLESTON AFB TO LONDON INTERNATIONAL																			3522 N.MI.
53,000	32	17	11	22	20	13	10	-33	-18	-12	-23	-21	-29	-34	10	8	6	8	
40,000	47	31	30	43	37	27	21	-51	-33	-32	-46	-40	-51	-57	15	14	12	15	
30,000	47	30	29	39	36	25	19	-52	-34	-31	-42	-39	-51	-57	17	16	12	16	
20,000	35	22	20	27	25	17	13	-37	-24	-21	-29	-27	-36	-41	13	12	8	12	
CHARLESTON AFB TO LORING AFB																			1009 N.MI.
53,000	27	14	2	17	14	4	-1	-31	-17	-2	-19	-16	-29	-35	15	14	10	13	
40,000	37	25	13	33	26	10	2	-47	-31	-16	-38	-33	-50	-59	24	23	19	23	
30,000	35	22	14	28	24	8	1	-44	-28	-16	-33	-29	-47	-56	25	25	16	24	
20,000	27	15	11	19	17	6	1	-32	-18	-12	-21	-19	-32	-40	19	18	11	17	
CHARLESTON AFB TO MAURIPUR AP																			6851 N.MI.
53,000	27	13	5	18	15	8	5	-30	-14	-6	-20	-17	-25	-29	8	6	5	6	
40,000	33	20	16	26	23	16	12	-37	-24	-18	-29	-27	-35	-40	11	10	9	10	
30,000	30	20	16	23	22	14	10	-34	-23	-18	-26	-25	-34	-38	12	11	9	11	
20,000	20	14	10	16	14	9	6	-22	-15	-11	-17	-16	-22	-26	9	8	6	8	
CHARLESTON AFB TO MCCHORD AFB																			2098 N.MI.
53,000	-37	-24	-11	-23	-23	-33	-38	35	23	10	23	22	14	9	11	10	7	9	
40,000	-56	-38	-31	-40	-41	-54	-61	52	36	29	38	38	26	20	17	16	14	18	
30,000	-51	-35	-25	-36	-36	-49	-57	47	32	24	34	33	21	15	18	18	12	18	
20,000	-34	-24	-16	-24	-24	-33	-39	32	22	16	23	22	14	10	14	13	8	13	
CHARLESTON AFB TO MCGUIRE AFB																			501 N.MI.
53,000	26	15	-2	15	13	0	-5	-31	-18	1	-16	-15	-29	-37	17	17	11	16	
40,000	34	26	6	30	23	5	-5	-45	-33	-9	-35	-30	-50	-60	26	27	21	26	
30,000	31	22	8	26	20	4	-4	-41	-28	-10	-30	-26	-45	-55	25	27	17	26	
20,000	26	15	8	17	15	4	-2	-31	-18	-9	-19	-17	-31	-40	20	20	11	19	
CHARLESTON AFB TO MIDWAY NAS																			4841 N.MI.
53,000	-32	-25	-10	-20	-21	-29	-33	30	24	10	19	20	13	9	9	8	6	7	
40,000	-56	-41	-23	-39	-40	-51	-57	53	38	22	37	37	26	21	13	12	10	12	
30,000	-49	-39	-19	-34	-35	-46	-52	46	36	18	31	32	21	16	13	12	9	12	
20,000	-33	-26	-12	-22	-23	-31	-35	31	25	12	21	22	14	11	10	9	6	8	
CHARLESTON AFB TO MILDENHALL AP																			3542 N.MI.
53,000	32	17	11	22	19	13	9	-33	-18	-12	-23	-20	-29	-33	10	8	6	8	
40,000	47	30	29	42	37	26	21	-51	-33	-32	-45	-40	-51	-57	15	14	12	15	
30,000	47	30	28	39	35	24	19	-51	-33	-30	-42	-38	-51	-57	17	16	13	16	
20,000	34	21	20	26	25	17	13	-37	-23	-20	-28	-26	-35	-41	13	12	9	12	
CHARLESTON AFB TO MINOT AFB																			1329 N.MI.
53,000	-33	-22	-10	-20	-20	-30	-36	30	20	10	19	19	10	6	13	12	9	11	
40,000	-51	-35	-30	-36	-37	-52	-60	44	30	28	31	33	19	12	20	19	17	21	
30,000	-47	-32	-24	-31	-32	-47	-56	41	28	22	27	29	15	9	21	21	15	22	
20,000	-31	-22	-15	-22	-21	-32	-38	28	20	14	20	20	10	5	16	16	10	15	
CHARLESTON AFB TO MOSCOW INTERNATIONAL																			4603 N.MI.
53,000	29	13	6	19	16	9	6	-31	-14	-7	-20	-17	-25	-30	9	7	5	7	
40,000	35	23	17	29	26	17	13	-39	-25	-19	-32	-28	-38	-43	12	11	10	12	
30,000	33	23	16	25	24	14	10	-37	-26	-19	-28	-27	-37	-43	14	14	11	14	
20,000	22	15	10	17	16	9	5	-24	-17	-11	-18	-17	-25	-29	11	10	8	10	
CHARLESTON AFB TO MYRTLE BEACH AFB																			72 N.MI.
53,000	38	26	-3	17	19	2	-5	-41	-28	3	-19	-21	-38	-47	17	19	12	18	
40,000	52	42	4	37	33	11	0	-59	-47	-6	-41	-38	-62	-74	28	30	21	28	
30,000	46	33	6	31	28	8	-1	-51	-37	-6	-33	-31	-53	-63	24	27	17	27	
20,000	34	24	7	18	19	6	0	-36	-26	-8	-19	-20	-36	-45	21	21	11	19	

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT DIRECT							HEADWINDS* RETURN							STANDARD DEVIATION			
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
CHARLESTON AFB TO NOUASSEUR AB																		
53,000	33	25	9	18	21	12	8	-34	-26	-9	-19	-22	-31	-35	3559 N.MI.			
40,000	43	39	20	34	34	23	18	-46	-41	-21	-36	-36	-47	-52	9	8	6	8
30,000	39	36	17	30	30	19	15	-41	-38	-18	-31	-31	-42	-48	14	13	10	13
20,000	29	24	14	20	21	14	11	-30	-25	-15	-21	-22	-30	-34	14	13	9	12
CHARLESTON AFB TO ORLY AP																		
53,000	31	18	12	22	20	13	10	-33	-19	-12	-23	-21	-29	-33	3674 N.MI.			
40,000	47	31	30	43	37	27	22	-50	-33	-32	-45	-40	-51	-56	9	8	6	8
30,000	47	30	28	39	36	25	20	-51	-33	-30	-42	-38	-50	-57	14	13	12	15
20,000	35	22	21	27	25	18	14	-37	-23	-22	-29	-27	-36	-41	16	15	12	15
CHARLESTON AFB TO PALAM AP																		
53,000	21	10	4	15	12	6	3	-24	-12	-4	-17	-13	-21	-24	6889 N.MI.			
40,000	20	14	10	20	16	10	6	-24	-17	-12	-23	-19	-26	-30	8	6	5	6
30,000	18	15	11	18	15	9	5	-22	-18	-13	-21	-18	-25	-29	9	9	8	9
20,000	12	10	6	11	10	5	2	-14	-12	-7	-13	-11	-17	-20	11	10	9	10
CHARLESTON AFB TO PATRICK AFB																		
53,000	-9	-1	3	-3	-2	-13	-19	2	-3	-3	1	-1	-11	-17	281 N.MI.			
40,000	-13	-11	6	-8	-6	-23	-33	2	1	-7	3	-1	-17	-25	16	17	11	18
30,000	-10	-1	2	-6	-3	-18	-26	2	-5	-3	3	-1	-14	-22	25	27	19	25
20,000	-7	-4	-3	-6	-4	-15	-21	3	1	3	4	3	-7	-13	21	23	15	23
CHARLESTON AFB TO PIARCO AP																		
53,000	20	20	-4	7	10	0	-4	-22	-21	3	-8	-11	-22	-27	1690 N.MI.			
40,000	30	27	2	13	17	5	-1	-34	-31	-3	-15	-20	-34	-41	11	11	7	9
30,000	25	22	2	9	13	3	-1	-27	-24	-2	-10	-15	-26	-32	15	16	10	14
20,000	11	10	-4	-1	3	-4	-7	-12	-11	4	0	-3	-12	-16	13	13	8	11
CHARLESTON AFB TO POPE AFB																		
53,000	15	10	-5	7	6	-6	-11	-22	-13	4	-9	-9	-23	-30	145 N.MI.			
40,000	20	16	-2	20	13	-6	-16	-32	-25	1	-26	-20	-40	-52	17	18	12	18
30,000	18	12	1	17	11	-5	-13	-28	-19	-2	-21	-16	-35	-45	27	30	21	28
20,000	18	10	4	11	10	-2	-8	-23	-13	-5	-12	-12	-25	-34	24	28	17	27
CHARLESTON AFB TO PRESTWICK AB																		
53,000	32	16	11	23	19	12	9	-33	-18	-11	-24	-20	-29	-34	3327 N.MI.			
40,000	47	30	28	42	36	25	20	-51	-33	-31	-45	-39	-51	-57	10	8	6	8
30,000	47	30	28	38	35	23	18	-51	-33	-30	-41	-38	-51	-57	15	14	13	15
20,000	33	21	18	25	24	15	11	-36	-23	-19	-27	-25	-35	-40	17	16	13	16
CHARLESTON AFB TO RAMEY AFB																		
53,000	25	24	-1	9	13	1	-3	-27	-25	1	-10	-14	-28	-34	1108 N.MI.			
40,000	36	34	6	17	22	8	1	-41	-39	-7	-19	-25	-42	-51	13	14	8	13
30,000	29	27	5	12	17	5	0	-32	-30	-5	-14	-19	-33	-40	19	20	13	19
20,000	14	14	-2	1	5	-3	-7	-16	-15	2	-1	-6	-16	-22	17	16	10	15
CHARLESTON AFB TO RHEIN MAIN AB																		
53,000	31	17	11	21	19	13	10	-32	-18	-12	-22	-20	-28	-32	3874 N.MI.			
40,000	46	29	29	41	36	26	21	-49	-32	-31	-44	-39	-49	-55	9	7	6	8
30,000	45	29	28	38	35	24	18	-50	-32	-30	-41	-37	-49	-55	14	13	12	14
20,000	33	21	19	26	24	17	13	-36	-22	-20	-28	-26	-34	-39	16	15	12	15
CHARLESTON AFB TO SEOUL AB																		
53,000	-22	-10	-6	-15	-12	-19	-22	20	9	6	14	11	6	4	6314 N.MI.			
40,000	-19	-13	-15	-18	-16	-22	-26	15	11	13	15	14	8	5	8	6	4	6
30,000	-17	-14	-14	-15	-15	-21	-25	14	11	12	13	13	6	3	9	8	8	9
20,000	-11	-9	-10	-10	-10	-14	-17	9	7	9	9	8	4	1	9	9	8	9
CHARLESTON AFB TO STEVENSON FIELD																		
53,000	-29	-18	-10	-17	-18	-27	-32	25	16	9	16	16	8	4	1274 N.MI.			
40,000	-44	-29	-27	-30	-32	-46	-54	35	24	25	25	27	14	7	13	12	9	12
30,000	-41	-28	-22	-27	-29	-43	-51	33	24	20	23	24	11	4	20	20	17	22
20,000	-27	-20	-14	-18	-19	-30	-35	23	18	13	16	17	7	2	21	21	15	22
CHARLESTON AFB TO SUNG SHAN																		
53,000	-25	-11	-4	-15	-13	-20	-24	22	9	4	14	11	6	3	7110 N.MI.			
40,000	-21	-15	-15	-18	-17	-23	-26	16	12	13	15	14	8	5	8	6	5	6
30,000	-19	-14	-14	-15	-16	-22	-25	15	11	12	13	13	7	4	9	8	8	9
20,000	-12	-9	-9	-10	-10	-14	-17	9	7	9	8	8	4	2	9	9	8	9

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION					
	DIRECT							RETURN							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85				
CHARLESTON AFB TO TACHIKAWA AB																		
53,000	-29	-15	-7	-21	-18	-25	-29	27	14	6	20	16	9	6	8	6	5	6
40,000	-32	-21	-18	-24	-25	-33	-36	27	19	16	26	22	15	11	9	9	9	10
30,000	-29	-20	-17	-25	-22	-30	-34	25	17	15	22	20	12	9	10	10	9	11
20,000	-20	-14	-10	-17	-15	-21	-24	18	12	9	16	13	8	5	9	8	6	8
CHARLESTON AFB TO TAN SAN NHUT																		
53,000	-14	-7	-1	-6	-6	-11	-14	10	5	0	5	4	0	-2	7	5	4	5
40,000	-10	-5	-8	-8	-8	-13	-16	5	2	7	5	5	0	-3	8	7	7	8
30,000	-8	-5	-8	-7	-7	-12	-15	4	2	6	5	4	-1	-4	8	9	7	8
20,000	-3	-4	-6	-4	-4	-8	-10	1	2	5	3	3	-1	-4	7	6	5	6
CHARLESTON AFB TO THULE AB																		
53,000	4	0	-2	3	1	-4	-7	-7	-1	1	-4	-2	-8	-12	10	8	6	8
40,000	3	0	-3	2	0	-8	-12	-10	-3	1	-7	-5	-13	-18	13	12	11	13
30,000	2	-1	-2	2	0	-9	-14	-8	-3	0	-6	-4	-14	-19	14	14	12	14
20,000	3	-1	-1	2	1	-6	-10	-6	-1	0	-4	-3	-10	-14	11	11	8	11
CHARLESTON AFB TO TORBAY AP																		
53,000	37	21	7	24	21	11	6	-40	-23	-7	-25	-23	-35	-41	14	12	9	12
40,000	54	39	25	45	40	25	17	-59	-43	-28	-49	-44	-60	-68	21	20	17	21
30,000	51	36	24	40	37	22	15	-56	-40	-26	-43	-40	-56	-65	22	21	15	20
20,000	38	25	17	26	25	15	10	-40	-27	-18	-28	-27	-39	-46	17	16	10	15
CHARLESTON AFB TO TORREJON AFB																		
53,000	32	22	12	19	20	13	10	-33	-22	-12	-20	-21	-29	-34	9	8	6	8
40,000	45	35	26	39	36	26	21	-47	-37	-27	-41	-38	-48	-54	14	13	11	14
30,000	43	33	24	35	33	23	18	-46	-35	-25	-37	-35	-46	-52	15	14	10	14
20,000	32	23	19	25	24	17	14	-34	-25	-20	-26	-25	-33	-38	12	11	7	10
CHARLESTON AFB TO TRAVIS AFB																		
53,000	-42	-31	-8	-24	-26	-37	-43	41	31	7	23	25	13	8	11	10	7	10
40,000	-64	-48	-28	-43	-45	-60	-69	61	46	26	41	43	29	22	18	17	14	17
30,000	-55	-42	-20	-35	-37	-52	-61	52	40	19	33	35	21	15	19	18	11	17
20,000	-35	-27	-13	-21	-22	-34	-40	34	26	12	20	21	13	8	14	13	8	12
CHARLESTON AFB TO WAKE AP																		
53,000	-30	-22	-7	-16	-18	-27	-31	28	21	6	15	17	10	6	8	7	5	7
40,000	-55	-41	-20	-34	-37	-49	-55	51	38	18	32	34	23	18	11	11	9	11
30,000	-48	-37	-16	-29	-32	-44	-49	44	35	15	27	30	19	14	12	11	8	11
20,000	-32	-25	-11	-20	-21	-29	-33	30	23	11	19	20	13	10	9	8	5	8
CHARLESTON AFB TO WESTOVER AFB																		
53,000	27	15	-1	16	13	2	-4	-32	-18	0	-18	-16	-29	-36	16	16	11	15
40,000	35	26	9	31	24	7	-2	-46	-33	-12	-36	-31	-50	-60	26	26	21	26
30,000	33	23	10	27	22	6	-2	-42	-29	-12	-31	-27	-46	-56	25	26	17	25
20,000	27	15	9	18	16	5	-1	-31	-18	-10	-20	-18	-32	-40	20	20	11	19
CHARLESTON AFB TO WHEELUS AP																		
53,000	31	23	12	19	20	14	11	-32	-24	-12	-19	-21	-29	-33	8	7	6	7
40,000	43	35	25	36	34	25	21	-45	-37	-26	-38	-36	-45	-51	13	12	10	12
30,000	39	33	22	32	31	23	18	-42	-35	-24	-34	-33	-42	-48	13	12	9	12
20,000	30	23	18	22	23	17	14	-32	-24	-19	-23	-24	-31	-35	10	9	6	9
CHATEAUROUX AB TO CHURCHILL AP																		
53,000	-23	-10	-6	-14	-12	-19	-23	21	9	6	13	11	6	3	9	7	5	7
40,000	-26	-17	-16	-22	-20	-28	-33	23	15	14	20	18	10	5	12	11	11	13
30,000	-24	-18	-16	-21	-20	-30	-35	21	16	14	19	17	8	3	15	14	13	15
20,000	-15	-13	-9	-13	-12	-20	-24	14	11	8	12	11	4	0	12	11	9	11
CHATEAUROUX AB TO CIAMPINO AP																		
53,000	20	15	14	12	15	6	1	-21	-16	-15	-12	-16	-25	-30	16	13	12	12
40,000	27	18	25	26	24	8	0	-29	-20	-26	-29	-26	-42	-50	26	23	20	25
30,000	24	17	20	26	22	5	-4	-27	-19	-22	-28	-24	-40	-49	28	25	19	26
20,000	17	11	16	15	15	3	-4	-18	-12	-17	-16	-16	-28	-34	21	18	14	18
CHATEAUROUX AB TO CLARK AFB																		
53,000	25	17	8	15	16	10	7	-28	-18	-9	-17	-17	-24	-28	8	7	6	6
40,000	25	24	16	22	22	15	11	-29	-26	-17	-24	-24	-31	-35	9	9	9	10
30,000	23	22	12	19	19	12	8	-27	-24	-13	-20	-21	-28	-32	10	10	8	10
20,000	16	13	7	14	12	7	5	-17	-14	-9	-15	-13	-18	-21	7	7	6	7

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEAD WINDS*							STANDARD DEVIATION			
	DIRECT							RETURN							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85				
CHATEAURDUX AB TO DHAKKAN AB																	2589 N.MI.	
53,000	31	22	9	14	18	11	7	-33	-24	-10	-15	-19	-29	-34	10	9	7	8
40,000	37	33	22	28	30	20	15	-41	-36	-24	-31	-32	-43	-48	15	14	11	14
30,000	32	29	21	23	25	16	11	-35	-31	-23	-25	-28	-38	-43	17	14	11	14
20,000	20	19	17	14	17	11	7	-22	-20	-17	-15	-18	-25	-29	12	10	8	9
CHATEAUROUX AB TO OON MUANG																	5149 N.MI.	
53,000	29	17	3	15	16	8	4	-32	-19	-4	-16	-17	-26	-31	9	7	6	7
40,000	27	23	15	21	21	14	11	-31	-25	-16	-23	-23	-31	-35	10	9	8	10
30,000	24	21	15	20	20	13	10	-27	-22	-16	-22	-22	-28	-32	10	10	8	9
20,000	16	13	8	12	12	7	5	-18	-13	-8	-13	-13	-18	-21	7	7	6	6
CHATEAUROUX AB TO OOVER AFB																	3281 N.MI.	
53,000	-32	-18	-15	-23	-21	-28	-33	31	17	14	23	20	14	11	10	8	7	8
40,000	-50	-31	-36	-47	-41	-52	-58	47	29	34	44	38	28	22	15	14	13	15
30,000	-51	-32	-34	-44	-40	-52	-58	48	29	32	41	37	26	20	17	16	13	16
20,000	-36	-22	-24	-30	-27	-36	-41	34	21	23	29	26	18	14	14	12	9	12
CHATEAUROUX AB TO DUM DUM																	4291 N.MI.	
53,000	32	20	9	21	20	12	9	-35	-22	-9	-22	-21	-29	-34	10	7	6	7
40,000	31	24	20	25	25	17	13	-35	-26	-22	-27	-27	-35	-40	12	10	9	11
30,000	26	23	20	23	23	16	12	-29	-24	-21	-24	-24	-32	-36	12	11	9	10
20,000	17	14	10	14	14	8	6	-19	-15	-10	-15	-14	-20	-23	8	8	6	7
CHATEAUROUX AB TO ELMENOORF AFB																	4169 N.MI.	
53,000	-12	-6	0	-9	-6	-12	-15	11	6	0	8	5	1	-1	8	6	4	6
40,000	-8	-9	-6	-9	-8	-14	-17	6	8	4	7	6	0	-3	10	8	8	9
30,000	-8	-9	-6	-8	-8	-15	-19	5	7	4	6	5	-2	-6	12	11	11	11
20,000	-3	-5	-4	-3	-4	-9	-13	2	4	3	1	2	-3	-7	10	9	7	8
CHATEAUROUX AB TO ENIWETOK AFB																	7156 N.MI.	
53,000	5	7	5	5	6	2	0	-8	-9	-5	-7	-7	-11	-13	8	6	4	6
40,000	9	10	9	10	9	4	1	-14	-13	-11	-14	-13	-19	-22	9	8	8	9
30,000	9	10	8	10	9	4	0	-14	-14	-10	-13	-12	-18	-22	9	9	8	9
20,000	5	7	4	6	6	1	-1	-8	-9	-5	-7	-7	-12	-14	7	7	6	7
CHATEAUROUX AB TO ERNEST HARMON AFB																	2372 N.MI.	
53,000	-28	-15	-16	-21	-19	-27	-31	27	15	15	21	19	12	9	11	9	8	9
40,000	-44	-26	-36	-44	-37	-49	-56	42	24	34	41	35	23	17	17	15	15	18
30,000	-46	-28	-33	-42	-37	-51	-58	43	25	31	40	34	21	14	20	19	16	19
20,000	-33	-19	-23	-29	-26	-35	-41	31	18	22	27	24	15	10	16	14	11	14
CHATEAUROUX AB TO GALEAO																	4836 N.MI.	
53,000	-9	-10	-5	-4	-7	-11	-13	7	9	4	4	6	2	0	7	6	5	5
40,000	-13	-16	-9	-11	-12	-18	-21	10	14	8	9	10	4	1	9	9	7	8
30,000	-5	-11	-9	-8	-8	-13	-16	3	9	8	7	7	2	-1	8	8	6	7
20,000	-2	-3	-2	-3	-3	-6	-8	1	3	1	2	2	-2	-4	6	5	5	5
CHATEAUROUX AB TO GEORGE AFB																	4916 N.MI.	
53,000	-23	-12	-10	-16	-14	-20	-23	21	11	10	15	14	9	7	8	6	5	6
40,000	-31	-20	-25	-27	-26	-34	-38	28	18	23	25	23	16	12	11	10	10	12
30,000	-30	-21	-23	-25	-25	-33	-38	26	18	21	22	22	13	9	13	13	11	13
20,000	-19	-13	-14	-16	-15	-22	-25	17	12	13	14	14	8	5	10	9	7	9
CHATEAUROUX AB TO GOOSE AB																	2345 N.MI.	
53,000	-27	-14	-14	-20	-18	-25	-30	26	13	13	20	17	11	8	11	9	8	9
40,000	-40	-22	-31	-39	-33	-45	-51	37	20	29	37	31	19	13	17	15	14	18
30,000	-42	-25	-30	-38	-33	-47	-55	38	22	28	35	31	17	11	20	19	17	20
20,000	-28	-17	-19	-25	-22	-32	-38	26	15	18	23	20	11	6	16	15	11	14
CHATEAUROUX AB TO HICKAM AFB																	6563 N.MI.	
53,000	-10	-6	-3	-8	-7	-11	-14	8	5	3	7	6	2	0	8	6	4	6
40,000	-12	-12	-7	-15	-11	-18	-21	9	9	6	12	9	3	0	9	8	8	9
30,000	-11	-12	-8	-14	-11	-18	-22	8	9	6	11	8	1	-2	11	10	9	10
20,000	-7	-9	-5	-7	-7	-12	-15	5	7	4	6	5	0	-2	9	8	6	7
CHATEAUROUX AB TO INCIRLIK AB																	1602 N.MI.	
53,000	26	20	16	14	18	11	7	-28	-21	-16	-15	-19	-27	-32	13	11	9	10
40,000	30	27	31	28	29	17	11	-32	-28	-33	-30	-31	-42	-49	19	17	15	18
30,000	25	24	27	24	25	13	6	-27	-26	-28	-26	-27	-39	-46	21	18	15	18
20,000	17	15	19	16	17	8	3	-19	-14	-20	-17	-18	-27	-31	15	13	11	13

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.

MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEADWINDS*								STANDARD DEVIATION					
	D I R E C T								R E T U R N													
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT				
CHATEAUROUX AB TO IWO JIMA																			5977 N.M.I.			
53,000	16	15	8	13	13	8	6	-20	-17	-9	-15	-15	-20	-23	8	6	5	6				
40,000	23	21	15	24	21	14	10	-28	-24	-16	-27	-24	-31	-34	10	9	9	10				
30,000	20	21	12	19	18	10	6	-24	-24	-13	-22	-21	-28	-32	10	11	9	11				
20,000	15	15	8	15	13	8	5	-17	-17	-9	-16	-15	-20	-23	8	8	6	8				
CHATEAUROUX AB TO JOHNSTON AFB																			6956 N.M.I.			
53,000	-7	-4	-1	-5	-4	-8	-11	5	3	1	4	3	-1	-3	8	6	4	6				
40,000	-9	-7	-3	-6	-6	-12	-15	5	4	2	3	3	-2	-5	9	8	8	9				
30,000	-8	-7	-5	-6	-6	-13	-16	4	4	3	3	3	-3	-7	11	10	9	10				
20,000	-5	-5	-4	-2	-4	-9	-12	3	4	3	0	2	-3	-5	9	7	6	7				
CHATEAUROUX AB TO KADENA AB																			5527 N.M.I.			
53,000	21	18	11	17	16	11	9	-25	-20	-11	-18	-18	-24	-27	8	7	5	6				
40,000	27	26	17	28	24	17	14	-30	-28	-19	-30	-27	-34	-38	10	9	9	10				
30,000	24	25	13	21	20	13	9	-27	-27	-15	-23	-23	-31	-35	11	11	10	11				
20,000	17	17	10	17	15	10	7	-19	-18	-11	-18	-16	-22	-25	8	8	7	8				
CHATEAUROUX AB TO KEFLAVIK AP																			1303 N.M.I.			
53,000	-21	-10	-4	-11	-11	-19	-25	20	9	4	10	10	2	-2	14	11	8	10				
40,000	-28	-16	-14	-19	-19	-33	-40	25	14	12	16	16	3	-4	21	18	17	22				
30,000	-27	-17	-15	-19	-19	-36	-45	23	14	12	15	16	-1	-9	26	24	21	26				
20,000	-16	-12	-8	-10	-11	-23	-30	14	10	7	8	9	-2	-9	20	18	14	18				
CHATEAUROUX AB TO KINDLEY AFB																			3093 N.M.I.			
53,000	-28	-19	-12	-16	-18	-25	-29	26	18	11	15	17	10	7	10	8	7	9				
40,000	-40	-31	-25	-35	-32	-43	-48	38	29	23	33	30	20	15	15	14	12	15				
30,000	-40	-31	-23	-33	-31	-42	-48	37	28	22	31	29	19	14	16	15	11	15				
20,000	-30	-22	-19	-24	-23	-31	-36	28	21	19	23	22	15	11	13	12	8	11				
CHATEAUROUX AB TO KWAJALEIN NAS																			7383 N.M.I.			
53,000	3	5	4	4	4	0	-2	-6	-7	-5	-5	-6	-9	-11	7	5	4	6				
40,000	4	6	9	7	7	1	-2	-9	-10	-10	-11	-10	-15	-18	8	8	7	9				
30,000	5	7	7	7	6	1	-2	-9	-10	-9	-10	-9	-15	-18	9	9	8	9				
20,000	3	4	4	4	4	-1	-3	-5	-6	-4	-6	-5	-10	-12	7	7	6	7				
CHATEAUROUX AB TO LADO AFB																			3947 N.M.I.			
53,000	-12	-6	0	-8	-6	-12	-15	11	6	0	8	5	1	-2	8	6	4	6				
40,000	-8	-9	-5	-8	-7	-14	-17	6	7	4	7	6	0	-3	10	9	8	10				
30,000	-7	-8	-6	-7	-7	-15	-19	5	6	4	5	5	-3	-7	12	11	11	12				
20,000	-3	-5	-4	-2	-3	-9	-12	1	3	3	1	2	-4	-7	10	9	8	9				
CHATEAUROUX AB TO LAJES AP																			1348 N.M.I.			
53,000	-17	-14	-13	-9	-13	-20	-24	16	14	12	9	12	5	2	12	10	9	10				
40,000	-22	-19	-24	-27	-23	-35	-42	19	17	22	25	21	9	2	20	18	16	19				
30,000	-22	-17	-21	-26	-21	-34	-41	19	15	20	23	19	7	0	21	19	15	20				
20,000	-16	-12	-17	-19	-16	-26	-31	15	11	16	17	15	5	0	17	15	11	15				
CHATEAUROUX AB TO LE BOURGET AP																			130 N.M.I.			
53,000	-6	0	3	-2	-1	-11	-16	4	-1	-4	1	0	-10	-15	18	14	12	14				
40,000	-12	-2	5	-1	-2	-21	-31	9	0	-8	-4	-1	-19	-29	28	25	23	30				
30,000	-15	-2	7	-1	-2	-23	-35	11	-1	-9	-4	-1	-22	-33	33	31	25	32				
20,000	-7	0	5	3	1	-14	-22	5	-1	-7	-5	-3	-17	-24	25	22	17	22				
CHATEAUROUX AB TO LDNOON INTERNATIONAL																			290 N.M.I.			
53,000	-17	-7	-4	-8	-8	-18	-24	16	6	4	7	7	-2	-7	17	13	11	13				
40,000	-24	-10	-9	-16	-14	-32	-42	21	8	7	12	12	-6	-15	27	24	23	29				
30,000	-26	-11	-8	-16	-15	-36	-47	23	8	5	12	11	-9	-20	32	30	25	32				
20,000	-16	-6	-4	-7	-8	-22	-30	14	5	2	5	6	-8	-16	24	22	17	22				
CHATEAUROUX AB TO LORING AFB																			2754 N.M.I.			
53,000	-29	-15	-16	-22	-20	-27	-31	28	15	15	22	19	13	10	11	8	7	9				
40,000	-45	-26	-36	-45	-38	-49	-55	43	24	34	42	36	24	18	16	14	14	16				
30,000	-47	-28	-34	-43	-37	-50	-57	44	25	31	40	35	22	16	19	18	15	18				
20,000	-32	-19	-23	-28	-25	-35	-40	30	17	22	27	24	15	10	15	13	10	13				
CHATEAUROUX AB TO MAURIPUR AP																			3327 N.M.I.			
53,000	32	22	9	18	20	12	8	-34	-23	-9	-20	-21	-30	-34	10	8	7	8				
40,000	40	31	21	28	29	20	16	-44	-34	-22	-30	-32	-42	-48	13	12	10	13				
30,000	35	27	21	24	26	17	13	-37	-29	-22	-26	-28	-37	-42	14	13	10	12				
20,000	21	17	14	15	16	10	7	-22	-18	-14	-15	-17	-23	-27	10	9	7	8				

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.

MINUS SIGNS DENOTE HEADWINDS.

THE BOEING COMPANY
TRANSPORT DIVISION

NO. D6-9175

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	D I R E C T							R E T U R N										
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
CHATEAUROUX AB TO MCCHORO AFB																		
53,000	-19	-9	-6	-13	-11	-17	-20	17	8	5	12	10	5	3	8	6	4	6
40,000	-20	-15	-13	-19	-17	-24	-28	18	14	12	17	15	8	4	10	10	9	11
30,000	-20	-17	-14	-19	-17	-26	-30	17	14	12	16	15	7	2	13	12	11	13
20,000	-12	-12	-8	-12	-11	-17	-20	10	10	7	10	9	3	0	10	9	7	9
CHATEAUROUX AB TO MCGUIRE AFB																		
53,000	-31	-18	-15	-23	-21	-28	-33	30	17	15	22	20	14	11	10	8	7	8
40,000	-49	-31	-36	-47	-40	-52	-58	47	29	34	44	38	27	22	15	14	13	15
30,000	-51	-32	-34	-44	-40	-52	-58	47	29	32	41	37	25	20	18	16	13	16
20,000	-36	-22	-24	-30	-27	-36	-41	34	20	23	29	26	18	13	14	13	9	12
CHATEAUROUX AB TO MIDWAY NAS																		
53,000	-5	-3	1	-1	-2	-6	-8	3	2	-1	0	1	-3	-5	8	6	4	6
40,000	-9	-4	0	-1	-3	-9	-13	5	1	-2	-3	0	-6	-9	9	8	8	9
30,000	-6	-4	-1	0	-3	-10	-13	2	0	-1	-3	-1	-7	-11	11	10	9	10
20,000	-4	-4	-1	1	-2	-7	-10	2	2	0	-2	0	-5	-8	9	8	7	7
CHATEAUROUX AB TO MILOENHALL AP																		
53,000	-14	-5	-2	-6	-6	-16	-22	13	4	1	6	5	-4	-9	17	13	11	13
40,000	-21	-8	-5	-11	-11	-29	-38	18	6	2	7	8	-9	-18	26	24	23	29
30,000	-23	-9	-4	-12	-12	-32	-44	20	6	1	7	8	-12	-23	32	30	25	32
20,000	-14	-5	-1	-4	-5	-20	-28	11	3	-1	2	3	-11	-18	24	22	17	22
CHATEAUROUX AB TO MINOT AFB																		
53,000	-24	-11	-10	-16	-14	-20	-24	22	10	9	15	13	8	6	9	7	5	7
40,000	-32	-18	-23	-27	-25	-33	-38	29	17	21	25	23	14	10	12	11	11	13
30,000	-30	-20	-22	-26	-25	-34	-39	27	18	20	24	22	13	8	14	14	12	14
20,000	-20	-13	-13	-17	-16	-23	-27	18	12	12	15	14	7	4	11	10	8	10
CHATEAUROUX AB TO MOSCOW INTERNATIONAL																		
53,000	15	11	11	11	12	5	2	-17	-12	-11	-12	-13	-20	-24	14	10	8	10
40,000	14	12	23	21	18	5	-2	-17	-14	-24	-23	-20	-32	-39	19	18	17	20
30,000	12	11	22	20	16	1	-7	-15	-14	-24	-23	-19	-34	-42	23	22	19	23
20,000	11	9	16	15	13	2	-4	-12	-11	-16	-17	-14	-25	-30	17	16	13	16
CHATEAUROUX AB TO MYRTLE BEACH AFB																		
53,000	-33	-19	-13	-22	-21	-28	-33	31	18	12	21	20	13	10	9	8	6	8
40,000	-50	-34	-32	-45	-40	-51	-56	47	31	30	42	37	27	22	14	13	12	15
30,000	-50	-34	-30	-42	-38	-50	-56	47	31	29	39	36	25	20	16	15	12	15
20,000	-37	-24	-22	-29	-27	-36	-41	35	22	21	27	26	18	14	13	12	8	11
CHATEAUROUX AB TO NOUASSEUR AB																		
53,000	-5	-8	-11	-3	-7	-15	-19	4	7	10	2	6	-2	-7	14	12	10	10
40,000	-1	-11	-16	-14	-11	-25	-32	-3	8	14	11	8	-6	-14	23	20	16	20
30,000	0	-9	-17	-12	-10	-24	-31	-4	6	15	9	7	-7	-15	23	21	16	21
20,000	-1	-7	-11	-8	-7	-17	-22	-1	6	10	6	6	-4	-10	17	15	11	14
CHATEAUROUX AB TO ORLY AP																		
53,000	-5	0	3	-2	-1	-11	-16	4	-1	-4	1	0	-10	-15	18	14	12	14
40,000	-12	-2	5	0	-2	-20	-31	9	0	-8	-4	-1	-19	-29	28	26	23	30
30,000	-15	-2	7	0	-2	-23	-35	11	-1	-10	-4	-1	-22	-33	33	31	25	32
20,000	-7	0	5	3	1	-14	-22	4	-1	-7	-5	-3	-17	-25	25	22	17	22
CHATEAUROUX AB TO PALAM AP																		
53,000	31	19	13	23	20	14	11	-33	-20	-13	-24	-22	-29	-34	10	7	6	8
40,000	31	23	24	28	26	18	14	-35	-25	-25	-30	-29	-37	-42	13	11	11	12
30,000	25	22	23	25	24	16	12	-28	-24	-24	-26	-26	-34	-38	13	12	10	11
20,000	17	14	12	16	15	9	6	-18	-15	-13	-16	-15	-21	-24	9	9	7	8
CHATEAUROUX AB TO PATRICK AFB																		
53,000	-32	-20	-10	-20	-20	-28	-32	31	19	10	19	19	12	9	9	8	6	8
40,000	-47	-35	-27	-40	-37	-47	-53	44	32	25	38	34	25	20	14	13	11	14
30,000	-46	-33	-25	-38	-35	-46	-52	43	30	24	35	32	23	18	15	14	10	14
20,000	-34	-24	-20	-26	-25	-33	-38	32	22	19	25	24	17	13	12	11	7	10
CHATEAUROUX AB TO PIARCO AP																		
53,000	-14	-15	-5	-5	-9	-16	-19	13	14	5	5	9	3	1	8	7	5	7
40,000	-24	-25	-14	-14	-19	-27	-32	21	23	13	13	17	10	6	12	11	9	11
30,000	-16	-18	-12	-12	-14	-21	-25	14	16	11	10	13	6	3	11	11	7	10
20,000	-8	-8	-8	-8	-8	-13	-16	7	7	7	7	7	2	-1	9	8	6	7

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	D I R E C T							R E T U R N							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85				
CHATEAUROUX AB TO POPE AFB																		
53,000	-33	-19	-13	-23	-21	-29	-33	31	18	13	22	20	14	11	3559 N.MI.			
40,000	-50	-33	-34	-46	-40	-51	-57	47	31	32	43	38	28	22	10	8	6	8
30,000	-51	-33	-32	-43	-39	-51	-57	48	31	30	40	36	26	20	15	13	12	15
20,000	-37	-23	-23	-30	-27	-36	-41	35	22	22	28	26	18	14	16	15	12	15
CHATEAUROUX AB TO PRESTWICK AB																		
53,000	-19	-8	-5	-9	-9	-19	-24	18	8	4	8	8	0	-4	570 N.MI.			
40,000	-26	-13	-12	-18	-17	-34	-43	24	11	10	15	14	-2	-11	16	12	10	12
30,000	-28	-13	-11	-19	-17	-37	-49	24	10	8	15	14	-6	-16	25	22	22	27
20,000	-18	-8	-6	-9	-10	-24	-32	16	7	4	7	8	-6	-13	31	29	25	31
CHATEAUROUX AB TO RAMEY AFB																		
53,000	-20	-17	-6	-9	-12	-19	-23	18	16	5	8	11	5	2	3735 N.MI.			
40,000	-30	-29	-16	-21	-23	-33	-38	27	27	14	18	21	13	8	9	8	6	7
30,000	-24	-24	-13	-19	-20	-28	-33	22	22	12	17	18	10	6	13	12	9	12
20,000	-15	-15	-11	-14	-14	-19	-23	14	14	11	13	13	7	4	13	12	9	11
CHATEAUROUX AB TO RHEIN MAIN AB																		
53,000	10	10	11	7	9	0	-5	-11	-11	-12	-8	-10	-20	-25	333 N.MI.			
40,000	9	9	22	20	15	-2	-12	-13	-11	-24	-23	-18	-35	-44	17	13	12	13
30,000	5	9	22	19	14	-6	-17	-10	-12	-24	-23	-18	-37	-48	27	24	22	29
20,000	7	8	16	15	12	-2	-10	-9	-9	-17	-17	-14	-27	-35	32	30	24	31
CHATEAUROUX AB TO SEOUL AB																		
53,000	18	15	10	15	14	9	7	-20	-16	-10	-16	-15	-20	-23	4947 N.MI.			
40,000	23	22	18	25	22	15	11	-25	-23	-19	-27	-24	-31	-35	9	6	5	6
30,000	18	21	14	20	18	11	7	-21	-23	-16	-22	-21	-28	-33	11	9	9	10
20,000	15	16	11	16	14	9	6	-17	-17	-11	-18	-15	-21	-25	11	11	10	12
CHATEAUROUX AB TO STEVENSON FIELD																		
53,000	-24	-11	-10	-17	-14	-21	-25	23	10	9	16	14	8	6	3641 N.MI.			
40,000	-32	-18	-23	-28	-25	-34	-39	30	17	21	26	23	14	10	9	7	5	7
30,000	-31	-20	-22	-27	-25	-35	-40	28	18	20	24	22	13	8	12	11	11	13
20,000	-20	-13	-14	-17	-16	-23	-27	18	12	12	16	14	7	4	15	14	13	15
CHATEAUROUX AB TO SUNG SHAN																		
53,000	23	18	11	18	17	12	9	-27	-20	-12	-19	-19	-25	-28	5397 N.MI.			
40,000	27	26	18	27	25	18	14	-30	-28	-20	-29	-27	-34	-38	8	7	6	6
30,000	25	25	13	21	21	13	9	-28	-27	-15	-23	-23	-31	-36	10	9	9	10
20,000	17	15	10	17	15	9	6	-19	-16	-11	-18	-16	-21	-25	11	11	9	11
CHATEAUROUX AB TO TACHIKAWA AB																		
53,000	14	12	8	11	11	7	5	-17	-13	-8	-13	-12	-17	-20	5348 N.MI.			
40,000	20	17	14	21	18	11	8	-23	-19	-15	-24	-20	-27	-31	8	6	5	6
30,000	16	18	11	19	16	9	5	-19	-20	-13	-21	-18	-26	-30	10	9	9	10
20,000	13	14	9	14	12	7	4	-15	-15	-9	-15	-13	-19	-22	11	11	10	11
CHATEAUROUX AB TO TAN SAN NHUT																		
53,000	27	15	3	13	14	7	3	-30	-17	-4	-14	-15	-24	-28	5524 N.MI.			
40,000	24	22	13	19	19	13	9	-28	-24	-14	-21	-22	-29	-32	8	7	6	7
30,000	22	20	13	19	18	12	9	-25	-22	-14	-20	-20	-27	-30	10	9	8	9
20,000	15	12	7	11	11	6	4	-16	-13	-7	-12	-12	-17	-19	10	10	8	9
CHATEAUROUX AB TO THULE AB																		
53,000	-16	-7	0	-9	-7	-14	-19	14	7	0	8	6	0	-3	2418 N.MI.			
40,000	-15	-11	-7	-11	-11	-20	-25	13	9	5	8	9	0	-4	11	9	6	8
30,000	-14	-12	-7	-10	-11	-22	-28	11	9	5	7	8	-3	-9	14	12	11	14
20,000	-7	-8	-4	-4	-5	-14	-18	5	6	3	2	4	-4	-9	17	16	15	17
CHATEAUROUX AB TO TORBAY AP																		
53,000	-27	-15	-16	-21	-19	-26	-31	26	15	16	20	19	12	9	2173 N.MI.			
40,000	-43	-26	-35	-43	-37	-49	-56	41	24	34	41	35	22	16	12	9	8	10
30,000	-46	-28	-33	-42	-37	-51	-59	43	25	31	39	34	21	14	18	16	15	18
20,000	-33	-20	-24	-29	-26	-36	-42	31	18	23	28	25	15	10	21	19	16	20
CHATEAUROUX AB TO TORREJON AFB																		
53,000	-4	-7	-10	-3	-6	-15	-20	3	6	9	2	5	-4	-9	443 N.MI.			
40,000	1	-8	-17	-14	-10	-26	-35	-4	6	14	10	7	-9	-19	16	13	12	13
30,000	1	-8	-19	-12	-10	-27	-36	-4	5	17	9	8	-10	-20	26	23	20	25
20,000	-1	-6	-11	-9	-7	-19	-26	-1	5	10	8	6	-6	-13	28	25	20	26

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.THE BOEING COMPANY
TRANSPORT DIVISION

NO. 06-9175

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	DIRECT							RETURN							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85				
CHATEAUROUX AB TO TRAVIS AFB																		
53,000	-20	-11	-9	-14	-13	-18	-21	19	10	8	13	12	7	5	8	6	5	6
40,000	-25	-17	-20	-23	-21	-29	-33	23	15	19	20	19	12	8	11	10	9	11
30,000	-25	-18	-19	-22	-21	-29	-34	21	16	17	18	18	10	6	13	12	11	13
20,000	-15	-12	-11	-14	-13	-19	-22	13	11	10	12	12	6	2	10	9	7	9
CHATEAUROUX AB TO WAKE AP																		
53,000	4	5	5	4	4	1	-2	-7	-6	-5	-5	-6	-10	-12	8	6	4	6
40,000	3	6	9	7	6	1	-3	-9	-9	-11	-11	-10	-15	-19	9	8	8	9
30,000	3	6	8	7	6	0	-3	-8	-10	-9	-10	-9	-15	-19	10	9	8	9
20,000	3	4	4	5	4	-1	-3	-6	-6	-5	-6	-6	-10	-13	8	7	6	7
CHATEAUROUX AB TO WESTOVER AFB																		
53,000	-31	-17	-15	-23	-21	-28	-32	30	16	15	22	20	14	11	10	8	7	8
40,000	-49	-30	-37	-46	-40	-51	-57	46	28	35	44	38	27	21	15	14	13	16
30,000	-50	-31	-34	-44	-39	-52	-58	47	28	32	41	37	25	19	18	17	14	17
20,000	-35	-21	-24	-30	-27	-36	-41	33	20	23	28	26	17	13	14	13	9	12
CHATEAUROUX AB TO WHEELUS AP																		
53,000	18	13	5	10	11	3	-1	-20	-15	-6	-11	-13	-21	-26	14	12	11	10
40,000	27	16	14	16	18	5	-2	-30	-19	-16	-19	-21	-34	-42	23	20	16	20
30,000	22	15	10	17	15	2	-5	-25	-18	-12	-20	-18	-32	-40	23	20	16	21
20,000	16	9	9	10	11	1	-4	-18	-11	-11	-11	-12	-22	-27	17	15	11	14
CHURCHILL AP TO CIAMPINO AP																		
53,000	21	9	5	12	11	6	3	-22	-10	-6	-13	-12	-18	-22	9	7	5	7
40,000	23	15	13	18	17	9	5	-25	-17	-15	-21	-19	-27	-31	12	11	10	12
30,000	21	16	13	17	16	7	3	-23	-18	-15	-20	-19	-28	-33	14	13	12	14
20,000	13	11	8	11	10	4	0	-15	-12	-9	-12	-12	-19	-23	11	10	8	10
CHURCHILL AP TO CLARK AFB																		
53,000	-25	-10	0	-13	-11	-19	-24	22	8	0	11	9	3	0	8	6	5	6
40,000	-18	-13	-11	-15	-14	-20	-23	14	10	9	13	11	6	3	8	8	8	8
30,000	-15	-12	-11	-13	-13	-18	-21	11	9	10	11	10	5	2	8	9	8	8
20,000	-8	-7	-8	-8	-8	-12	-14	6	6	7	6	6	2	0	7	6	6	6
CHURCHILL AP TO OHARRAN AB																		
53,000	17	7	0	10	8	2	-1	-19	-8	-1	-11	-9	-15	-19	8	6	4	6
40,000	15	11	3	10	10	3	0	-19	-13	-5	-13	-12	-19	-23	9	9	8	9
30,000	13	12	6	8	9	2	-1	-16	-14	-8	-11	-12	-19	-23	11	10	9	10
20,000	8	9	3	6	6	1	-2	-10	-10	-4	-7	-7	-13	-16	8	8	6	8
CHURCHILL AP TO OON MUANG																		
53,000	-14	-7	0	-6	-6	-11	-15	11	5	0	5	4	0	-2	7	6	4	6
40,000	-10	-4	-7	-7	-7	-12	-15	6	1	6	5	4	-1	-3	8	7	7	8
30,000	-6	-3	-7	-6	-5	-11	-13	2	0	6	5	3	-2	-5	8	8	7	7
20,000	-2	-2	-6	-4	-4	-8	-10	1	1	5	3	3	-2	-4	7	6	5	6
CHURCHILL AP TO OOVER AFB																		
53,000	18	11	10	12	12	6	2	-21	-12	-11	-14	-14	-21	-26	13	10	9	11
40,000	25	17	22	21	21	9	2	-31	-20	-26	-25	-25	-38	-45	18	17	17	20
30,000	25	18	21	21	21	9	2	-31	-22	-24	-25	-26	-39	-46	20	20	16	20
20,000	18	14	15	14	15	6	1	-21	-16	-17	-16	-17	-27	-32	16	15	11	15
CHURCHILL AP TO OUM DUM																		
53,000	-5	-3	-3	-3	-3	-7	-9	2	2	2	1	2	-2	-4	7	5	4	5
40,000	-4	-1	-3	-3	-3	-8	-11	0	-1	1	1	0	-5	-7	8	7	7	8
30,000	-2	0	-3	-2	-2	-7	-10	-1	-2	2	0	0	-6	-9	8	9	8	8
20,000	-1	-1	-3	-2	-2	-6	-8	0	-1	2	1	1	-4	-6	7	7	6	6
CHURCHILL AP TO ELMENDORF AFB																		
53,000	-29	-11	-7	-20	-15	-25	-30	28	11	7	20	15	7	4	11	9	6	9
40,000	-26	-17	-16	-26	-21	-31	-36	25	16	15	25	20	10	5	14	12	13	14
30,000	-26	-18	-15	-24	-21	-32	-38	24	17	14	23	20	9	3	15	16	15	16
20,000	-18	-13	-12	-17	-15	-22	-27	17	12	12	16	14	7	3	12	11	10	11
CHURCHILL AP TO ENIWETOK AFB																		
53,000	-22	-11	-2	-11	-11	-18	-22	20	10	2	10	10	4	1	8	7	5	6
40,000	-35	-29	-12	-23	-25	-34	-38	31	26	11	20	22	13	9	10	10	9	10
30,000	-31	-25	-13	-23	-23	-31	-36	28	23	12	20	20	13	9	11	10	9	10
20,000	-23	-17	-12	-16	-16	-22	-25	21	16	11	15	15	10	7	9	7	6	7

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*						STANDARD DEVIATION				
	DIRECT							RETURN										
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
CHURCHILL AP TO ERNEST HARMON AFB																		
53,000	22	12	12	18	15	8	4	-24	-12	-13	-19	-16	-24	-29	13	10	8	11
40,000	28	18	30	32	27	15	9	-31	-20	-32	-34	-29	-41	-48	17	16	16	18
30,000	27	20	29	29	26	13	6	-30	-22	-31	-32	-29	-42	-49	19	20	17	20
20,000	20	11	19	21	18	8	3	-22	-12	-20	-22	-19	-29	-34	15	15	12	15
CHURCHILL AP TO GALEAO																		
53,000	12	10	3	7	8	4	1	-13	-11	-4	-8	-9	-14	-16	7	6	5	5
40,000	15	11	9	11	11	6	2	-19	-14	-11	-13	-14	-20	-24	9	9	7	9
30,000	16	12	8	10	11	5	3	-19	-15	-9	-12	-13	-19	-22	9	8	7	8
20,000	8	7	4	3	5	1	-1	-9	-8	-4	-4	-6	-10	-13	7	6	5	6
CHURCHILL AP TO GEORGE AFB																		
53,000	-10	-10	-10	-9	-10	-16	-19	8	9	9	7	8	2	-1	11	9	7	9
40,000	-16	-14	-24	-17	-18	-29	-35	11	11	21	13	14	3	-3	17	15	15	18
30,000	-16	-13	-19	-13	-16	-27	-34	11	10	17	9	12	0	-7	19	18	14	18
20,000	-8	-8	-12	-8	-9	-17	-21	5	6	11	6	7	-1	-6	14	13	9	13
CHURCHILL AP TO GOOSE AB																		
53,000	23	10	11	17	15	7	3	-24	-11	-12	-17	-15	-23	-28	14	10	9	11
40,000	28	17	27	30	25	14	7	-30	-18	-29	-32	-27	-39	-46	17	16	17	19
30,000	26	18	26	28	25	12	5	-28	-20	-28	-30	-27	-40	-47	19	20	18	20
20,000	19	11	17	20	17	7	1	-20	-12	-18	-21	-18	-27	-33	15	15	12	15
CHURCHILL AP TO HICKAM AFB																		
53,000	-13	-13	-10	-14	-12	-18	-21	11	12	10	13	11	6	3	10	8	6	8
40,000	-27	-22	-16	-26	-22	-31	-36	22	18	14	23	19	11	7	13	12	11	12
30,000	-25	-21	-14	-24	-21	-30	-35	20	18	13	21	18	9	5	14	13	10	13
20,000	-17	-15	-8	-16	-13	-20	-24	15	14	7	14	12	6	2	11	9	7	9
CHURCHILL AP TO INCIRLIK AB																		
53,000	20	9	3	12	10	4	2	-22	-9	-3	-12	-11	-18	-21	8	7	4	6
40,000	19	14	7	14	13	6	3	-20	-16	-9	-16	-15	-22	-26	10	9	9	10
30,000	16	15	8	12	13	5	0	-19	-17	-10	-14	-15	-23	-28	12	11	11	12
20,000	10	10	5	8	8	2	-1	-11	-12	-6	-9	-9	-16	-19	10	9	7	9
CHURCHILL AP TO IWO JIMA																		
53,000	-32	-16	-3	-19	-17	-26	-31	29	14	2	18	15	7	3	9	6	5	7
40,000	-32	-22	-13	-30	-24	-33	-37	26	18	11	26	20	13	8	10	9	10	10
30,000	-29	-21	-14	-26	-22	-30	-34	24	17	12	23	19	11	7	10	10	10	11
20,000	-19	-13	-10	-16	-14	-20	-23	17	12	9	15	13	7	5	9	8	7	8
CHURCHILL AP TO JOHNSTON AFB																		
53,000	-14	-13	-9	-13	-12	-17	-20	12	11	9	12	11	6	3	9	7	6	7
40,000	-29	-24	-14	-27	-24	-32	-37	25	20	12	25	20	12	8	12	11	10	11
30,000	-27	-24	-14	-25	-22	-31	-36	23	21	12	23	19	11	7	13	12	10	12
20,000	-18	-16	-8	-16	-14	-20	-24	16	15	7	15	13	7	4	10	8	7	8
CHURCHILL AP TO KADENA AB																		
53,000	-26	-11	-3	-16	-13	-21	-26	23	9	3	15	11	5	2	8	6	5	6
40,000	-19	-14	-13	-19	-16	-22	-26	15	11	12	15	13	7	4	9	8	9	9
30,000	-16	-14	-13	-15	-15	-21	-24	12	11	11	13	12	6	2	9	9	9	9
20,000	-10	-8	-9	-9	-9	-13	-16	7	6	8	8	7	3	0	8	7	6	7
CHURCHILL AP TO KEFLAVIK AP																		
53,000	20	7	4	12	10	3	0	-21	-8	-4	-13	-10	-18	-23	12	9	6	9
40,000	17	14	10	15	14	5	1	-18	-15	-11	-17	-15	-24	-29	13	12	12	13
30,000	14	15	9	14	13	3	-3	-16	-17	-11	-16	-15	-25	-31	16	15	15	16
20,000	8	10	5	9	8	0	-4	-10	-11	-6	-10	-9	-18	-22	13	13	10	12
CHURCHILL AP TO KINDLEY AFB																		
53,000	22	15	10	13	14	8	4	-25	-16	-11	-15	-16	-23	-28	11	10	7	10
40,000	28	20	22	21	23	12	6	-34	-24	-24	-26	-27	-38	-45	17	16	14	17
30,000	27	21	21	20	22	11	5	-34	-25	-23	-24	-26	-38	-44	19	18	13	17
20,000	19	15	14	13	15	7	3	-22	-17	-15	-15	-17	-25	-30	14	13	9	13
CHURCHILL AP TO KWAJALEIN NAS																		
53,000	-19	-10	-3	-10	-10	-16	-20	17	9	3	9	9	4	1	8	7	5	6
40,000	-31	-26	-11	-22	-23	-31	-35	28	23	10	20	20	12	8	10	10	9	10
30,000	-28	-23	-12	-21	-21	-29	-33	24	21	10	19	18	11	7	11	10	8	10
20,000	-20	-16	-9	-15	-15	-20	-24	18	15	8	14	13	8	5	9	7	6	7

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*							STANDARD DEVIATION						
	D I R E C T							R E T U R N						
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85
CHURCHILL AP TO LADD AFB														
53,000	-30	-11	-7	-19	-15	-25	-30	29	11	7	19	15	7	4
40,000	-25	-15	-15	-25	-20	-30	-35	24	15	14	24	19	10	5
30,000	-25	-18	-16	-24	-21	-31	-37	24	16	14	22	19	9	3
20,000	-17	-13	-13	-16	-15	-22	-26	17	12	13	15	14	7	3
1512 N.MI.														
CHURCHILL AP TO LAJES AP														
53,000	19	10	12	17	14	8	5	-21	-11	-13	-18	-15	-21	-25
40,000	24	16	26	30	24	14	9	-28	-18	-28	-33	-27	-36	-42
30,000	24	16	23	27	23	12	6	-28	-19	-25	-31	-26	-36	-42
20,000	17	10	15	19	15	7	3	-19	-11	-16	-21	-17	-25	-29
2767 N.MI.														
CHURCHILL AP TO LE BOURGET AP														
53,000	22	9	5	13	11	5	3	-23	-10	-5	-14	-12	-19	-23
40,000	23	15	13	19	17	9	5	-25	-17	-15	-21	-19	-28	-32
30,000	20	16	13	18	17	7	2	-23	-19	-15	-20	-19	-29	-35
20,000	13	11	8	11	11	3	-1	-15	-13	-9	-13	-12	-20	-24
3161 N.MI.														
CHURCHILL AP TO LONDON INTERNATIONAL														
53,000	21	9	5	13	11	5	2	-23	-10	-5	-14	-11	-19	-23
40,000	22	16	13	18	17	9	4	-24	-17	-14	-20	-19	-27	-32
30,000	20	17	13	17	16	7	1	-23	-19	-15	-20	-19	-29	-34
20,000	12	11	7	11	10	3	-1	-14	-13	-8	-12	-12	-20	-24
2975 N.MI.														
CHURCHILL AP TO LORING AFB														
53,000	23	12	13	16	15	8	4	-24	-13	-13	-18	-16	-24	-29
40,000	29	19	30	30	27	15	8	-32	-21	-32	-33	-29	-42	-49
30,000	29	21	30	28	27	14	6	-32	-23	-31	-31	-29	-43	-50
20,000	21	14	21	20	19	9	4	-23	-15	-22	-22	-20	-30	-36
1172 N.MI.														
CHURCHILL AP TO MAURIPUR AP														
53,000	9	5	-1	7	5	0	-2	-11	-6	0	-9	-6	-11	-14
40,000	5	4	3	6	4	-1	-4	-9	-6	-5	-9	-7	-12	-15
30,000	4	5	5	7	5	-1	-4	-7	-7	-6	-9	-7	-13	-17
20,000	3	4	3	4	4	-1	-3	-5	-6	-4	-5	-5	-9	-12
5693 N.MI.														
CHURCHILL AP TO MCCHORO AFB														
53,000	-17	-12	-11	-17	-14	-21	-25	15	11	10	16	13	6	3
40,000	-21	-17	-20	-23	-20	-32	-38	18	15	18	21	18	7	0
30,000	-25	-18	-20	-25	-22	-35	-42	21	16	18	21	19	6	-1
20,000	-15	-13	-13	-16	-14	-23	-28	13	12	12	15	13	4	-1
1226 N.MI.														
CHURCHILL AP TO MCGUIRE AFB														
53,000	19	12	11	13	13	6	2	-22	-13	-11	-14	-14	-22	-26
40,000	25	18	23	22	22	10	3	-31	-21	-26	-26	-26	-38	-45
30,000	26	19	22	22	22	9	2	-32	-23	-25	-26	-26	-40	-47
20,000	19	14	16	15	16	7	1	-22	-16	-17	-17	-18	-27	-33
1347 N.MI.														
CHURCHILL AP TO MIDWAY NAS														
53,000	-21	-13	-8	-16	-14	-20	-24	19	12	7	15	13	7	4
40,000	-36	-28	-16	-32	-28	-37	-43	33	25	14	28	25	16	11
30,000	-36	-28	-17	-31	-28	-38	-43	32	25	15	27	25	15	10
20,000	-25	-22	-13	-22	-20	-27	-31	23	21	12	21	19	12	9
3767 N.MI.														
CHURCHILL AP TO MILDENHALL AP														
53,000	22	9	4	13	11	5	2	-23	-10	-5	-14	-11	-19	-23
40,000	22	16	12	18	17	8	4	-24	-17	-14	-20	-18	-27	-32
30,000	19	17	12	17	16	6	1	-22	-19	-14	-19	-18	-28	-34
20,000	12	11	7	11	10	3	-1	-14	-13	-8	-12	-11	-19	-23
2959 N.MI.														
CHURCHILL AP TO MINOT AFB														
53,000	-2	-4	-4	-2	-3	-11	-15	0	3	3	1	2	-6	-10
40,000	-6	-7	-12	-5	-8	-21	-28	2	5	9	1	4	-9	-16
30,000	-6	-6	-9	-5	-6	-21	-29	1	3	5	1	3	-12	-20
20,000	0	-1	-5	-2	-2	-12	-18	-3	0	3	-1	0	-10	-16
679 N.MI.														
CHURCHILL AP TO MOSCOW INTERNATIONAL														
53,000	17	8	1	12	9	3	0	-18	-8	-1	-13	-9	-16	-20
40,000	14	11	5	11	10	4	0	-16	-13	-6	-13	-12	-19	-22
30,000	11	12	6	9	10	2	-3	-14	-14	-8	-11	-12	-20	-24
20,000	7	10	3	6	6	0	-3	-8	-11	-4	-7	-7	-14	-17
3550 N.MI.														

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION							
	O I R E C T							R E T U R N					JAN	APR	JUL	OCT				
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50					A75	A85		
CHURCHILL AP TO MYRTLE BEACH AFB																	1621 N.MI.			
53,000	14	9	8	9	10	3	0	-18	-11	-9	-11	-12	-19	-23	12	10	8	10		
40,000	19	13	17	14	16	4	-2	-27	-18	-20	-20	-21	-33	-39	17	17	15	19		
30,000	19	14	15	15	16	4	-3	-27	-19	-18	-19	-20	-33	-39	18	19	14	19		
20,000	14	12	11	10	12	3	-2	-18	-14	-12	-12	-14	-23	-27	15	14	10	14		
CHURCHILL AP TO NOUASSEUR AB																	3612 N.MI.			
53,000	19	10	10	14	13	8	5	-21	-11	-11	-15	-14	-19	-23	9	7	6	7		
40,000	24	15	19	25	21	12	8	-27	-17	-21	-28	-23	-31	-36	12	11	11	12		
30,000	23	16	18	23	20	11	6	-27	-19	-20	-26	-23	-32	-37	14	13	12	13		
20,000	15	11	12	16	13	7	3	-17	-12	-13	-18	-15	-22	-26	11	10	8	10		
CHURCHILL AP TO ORLY AP																	3170 N.MI.			
53,000	22	9	5	13	11	5	3	-23	-10	-5	-14	-12	-19	-23	10	7	5	7		
40,000	23	15	13	19	17	9	5	-25	-17	-15	-21	-19	-28	-32	12	11	11	13		
30,000	21	16	14	18	17	7	2	-23	-19	-16	-20	-19	-29	-35	15	14	13	15		
20,000	13	11	8	11	11	3	-1	-15	-13	-9	-13	-12	-20	-24	12	11	9	11		
CHURCHILL AP TO PALAM AP																	5543 N.MI.			
53,000	4	1	-1	4	2	-2	-4	-6	-3	1	-5	-3	-7	-10	7	5	4	5		
40,000	1	1	2	3	2	-3	-6	-3	-3	-3	-6	-4	-9	-12	8	7	7	8		
30,000	1	2	2	4	2	-3	-7	-3	-5	-4	-6	-4	-10	-13	9	9	8	8		
20,000	1	2	1	0	1	-4	-6	-2	-3	-2	-1	-2	-6	-9	7	7	6	7		
CHURCHILL AP TO PATRICK AFB																	1914 N.MI.			
53,000	12	8	7	8	8	2	-1	-16	-10	-7	-9	-10	-17	-21	11	10	7	10		
40,000	14	10	14	12	12	2	-4	-23	-16	-17	-17	-18	-29	-35	16	16	14	17		
30,000	14	12	12	12	12	2	-4	-22	-17	-14	-16	-17	-28	-34	17	17	13	18		
20,000	10	9	8	8	9	1	-3	-14	-11	-9	-10	-11	-19	-24	13	13	8	13		
CHURCHILL AP TO PIARCO AP																	3248 N.MI.			
53,000	17	14	5	9	10	5	2	-20	-15	-5	-10	-12	-19	-23	9	8	6	7		
40,000	23	16	11	14	16	8	3	-29	-21	-13	-18	-20	-29	-34	12	12	10	12		
30,000	22	17	11	13	15	7	3	-27	-20	-12	-16	-18	-27	-32	13	12	9	11		
20,000	13	11	6	5	8	3	0	-16	-12	-6	-7	-10	-16	-20	9	9	6	8		
CHURCHILL AP TO POPE AFB																	1535 N.MI.			
53,000	14	9	8	10	10	3	0	-18	-11	-9	-11	-12	-19	-23	12	10	8	10		
40,000	19	13	18	15	17	5	-2	-27	-18	-21	-21	-22	-34	-40	18	17	16	19		
30,000	20	15	16	16	17	5	-2	-27	-19	-19	-20	-21	-34	-40	19	19	15	20		
20,000	15	12	12	10	12	3	-2	-18	-14	-13	-13	-14	-24	-29	15	14	10	14		
CHURCHILL AP TO PRESTWICK AB																	2700 N.MI.			
53,000	21	9	4	13	11	4	2	-23	-9	-4	-14	-11	-19	-24	10	8	5	8		
40,000	21	16	12	17	16	8	3	-23	-17	-13	-19	-18	-26	-31	13	12	11	13		
30,000	18	17	12	16	16	6	0	-21	-19	-14	-18	-18	-28	-34	16	15	14	15		
20,000	11	11	7	10	10	2	-2	-13	-13	-7	-12	-11	-19	-23	12	12	10	12		
CHURCHILL AP TO RAMEY AFB																	2687 N.MI.			
53,000	17	14	6	9	11	5	2	-20	-15	-7	-11	-13	-20	-24	10	9	6	8		
40,000	23	18	14	15	17	8	3	-31	-23	-16	-19	-22	-32	-37	14	14	11	14		
30,000	22	17	13	14	16	7	3	-28	-21	-14	-17	-20	-29	-35	14	14	10	14		
20,000	14	12	7	6	9	3	0	-17	-14	-8	-8	-11	-18	-22	11	10	7	10		
CHURCHILL AP TO RHEIN MAIN AB																	3263 N.MI.			
53,000	22	9	4	13	11	5	2	-23	-10	-4	-13	-11	-19	-23	9	7	5	7		
40,000	22	16	12	17	16	8	4	-24	-17	-13	-19	-18	-26	-31	12	11	10	12		
30,000	20	16	11	16	15	6	1	-22	-18	-13	-18	-18	-28	-33	15	14	13	15		
20,000	12	11	6	10	10	3	-1	-14	-13	-7	-12	-11	-19	-23	12	11	9	11		
CHURCHILL AP TO SEOUL AB																	4672 N.MI.			
53,000	-21	-8	-5	-14	-11	-17	-21	19	7	4	13	10	5	2	9	6	5	6		
40,000	-13	-10	-12	-15	-12	-18	-21	10	8	11	13	10	5	2	9	8	8	8		
30,000	-10	-10	-12	-12	-11	-17	-21	8	8	11	10	9	3	0	9	10	9	9		
20,000	-6	-6	-8	-8	-7	-12	-14	4	5	8	7	6	1	-2	8	7	6	7		
CHURCHILL AP TO STEVENSON FIELD																	542 N.MI.			
53,000	3	0	0	1	1	-7	-11	-5	0	-1	-2	-2	-10	-14	15	11	9	12		
40,000	0	-2	-5	2	-1	-15	-22	-4	0	1	-6	-2	-16	-23	19	18	20	23		
30,000	2	-1	-1	2	0	-14	-22	-6	-1	-2	-6	-4	-19	-27	22	23	20	24		
20,000	5	-2	0	3	2	-8	-14	-7	-4	-2	-5	-4	-15	-21	17	16	14	17		

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION			
	O I R E C T						R E T U R N						JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85		
CHURCHILL AP TO SUNG SHAN																5468 N.MI.
53,000	-24	-10	-3	-14	-11	-19	-23	20	8	2	12	10	4	1	8	6 5 6
40,000	-15	-12	-12	-14	-13	-19	-22	11	9	11	11	10	5	2	8	8 8 8
30,000	-13	-11	-12	-12	-12	-18	-21	9	8	11	10	9	3	0	9	9 8 9
20,000	-7	-6	-8	-7	-7	-12	-14	5	5	8	6	6	1	-1	7	7 6 7
CHURCHILL AP TO TACHIKAWA AB																4538 N.MI.
53,000	-27	-12	-4	-18	-14	-23	-27	25	11	4	17	13	6	3	9	6 5 7
40,000	-22	-16	-13	-24	-19	-26	-29	18	14	12	22	16	10	6	9	9 9 9
30,000	-19	-15	-14	-20	-17	-24	-28	16	13	12	17	15	8	4	10	10 10 10
20,000	-12	-10	-9	-13	-11	-16	-19	11	8	8	12	10	4	2	9	8 7 8
CHURCHILL AP TO TAN SAN NHUT																6506 N.MI.
53,000	-18	-8	1	-8	-8	-14	-18	15	7	-2	7	6	1	-2	8	6 4 6
40,000	-12	-6	-8	-9	-9	-14	-17	8	3	6	7	6	1	-2	8	7 7 7
30,000	-9	-5	-8	-8	-7	-13	-15	5	3	7	6	5	0	-3	8	8 7 7
20,000	-3	-3	-7	-4	-4	-8	-11	1	2	6	4	3	-1	-3	6	6 5 6
CHURCHILL AP TO THULE AB																1191 N.MI.
53,000	4	1	-1	4	2	-4	-8	-6	-2	0	-4	-2	-9	-13	13	9 6 9
40,000	3	2	1	1	2	-7	-12	-5	-3	-3	-3	-3	-12	-17	13	13 13 14
30,000	1	3	1	2	2	-9	-15	-3	-5	-2	-4	-3	-14	-20	15	16 16 16
20,000	1	1	0	1	1	-8	-12	-2	-2	-1	-2	-2	-11	-15	13	13 12 13
CHURCHILL AP TO TORBAY AP																1597 N.MI.
53,000	22	11	12	18	15	8	4	-23	-12	-12	-19	-16	-24	-28	13	10 8 10
40,000	28	18	30	32	27	15	9	-31	-20	-32	-35	-29	-41	-47	17	15 16 18
30,000	26	19	28	29	26	13	6	-30	-21	-30	-33	-28	-41	-48	18	19 17 19
20,000	20	10	18	21	17	8	3	-22	-12	-19	-22	-19	-28	-33	15	14 11 14
CHURCHILL AP TO TORREJON AFB																3395 N.MI.
53,000	20	9	9	13	12	7	4	-22	-10	-9	-14	-13	-19	-23	9	7 6 7
40,000	25	15	17	22	19	11	7	-27	-16	-19	-25	-22	-30	-35	12	11 11 13
30,000	23	16	17	22	19	10	5	-27	-18	-19	-25	-22	-32	-37	15	14 12 14
20,000	15	11	11	14	12	5	2	-17	-12	-12	-16	-14	-21	-25	12	11 9 11
CHURCHILL AP TO TRAVIS AFB																1631 N.MI.
53,000	-13	-11	-11	-13	-12	-18	-21	10	10	11	11	11	4	1	12	9 7 9
40,000	-19	-15	-24	-19	-19	-31	-36	14	13	22	16	16	5	-1	17	16 15 18
30,000	-20	-15	-20	-17	-18	-30	-37	16	12	18	13	15	3	-4	19	18 15 19
20,000	-11	-10	-13	-11	-11	-20	-24	8	8	12	9	10	1	-4	14	13 10 13
CHURCHILL AP TO WAKE AP																4696 N.MI.
53,000	-24	-13	-3	-14	-13	-20	-24	21	11	3	13	11	5	2	9	7 5 7
40,000	-38	-31	-14	-26	-27	-37	-41	33	27	12	23	24	15	11	11	10 10 11
30,000	-36	-28	-15	-26	-26	-35	-40	31	24	14	23	23	14	10	12	11 9 11
20,000	-25	-19	-13	-18	-18	-25	-28	23	18	12	17	17	11	8	9	8 7 8
CHURCHILL AP TO WESTOVER AFB																1277 N.MI.
53,000	21	12	12	14	14	7	3	-23	-13	-12	-16	-15	-23	-28	13	10 9 11
40,000	27	19	26	25	24	12	5	-32	-21	-28	-29	-28	-40	-47	18	17 17 20
30,000	27	21	25	25	24	11	4	-32	-24	-28	-28	-28	-41	-49	21	21 17 21
20,000	20	14	18	17	17	8	2	-22	-16	-19	-19	-19	-29	-34	16	15 11 15
CHURCHILL AP TO WHEELUS AP																4228 N.MI.
53,000	21	10	6	13	11	6	4	-22	-11	-7	-13	-12	-18	-22	8	6 5 6
40,000	25	16	15	19	18	11	7	-27	-17	-17	-22	-20	-28	-33	12	10 10 12
30,000	22	16	14	19	17	9	4	-25	-19	-16	-21	-20	-29	-34	13	13 11 13
20,000	14	11	9	12	11	5	2	-16	-12	-10	-13	-13	-19	-23	10	10 8 9
CIAMPINO AP TO CLARK AFB																5562 N.MI.
53,000	32	20	8	19	19	12	8	-34	-22	-9	-20	-20	-29	-33	8	7 6 7
40,000	31	29	17	23	25	18	14	-35	-31	-19	-25	-27	-35	-39	10	9 9 10
30,000	28	26	15	19	22	15	11	-31	-28	-16	-21	-23	-31	-35	10	9 7 9
20,000	18	14	7	13	13	8	5	-19	-15	-7	-13	-13	-19	-22	7	6 5 6
CIAMPINO AP TO DHAHRAN AB																2066 N.MI.
53,000	38	28	8	17	22	12	7	-39	-29	-9	-18	-23	-34	-40	11	10 9 9
40,000	45	42	23	31	34	23	17	-48	-44	-25	-33	-37	-49	-56	17	16 12 15
30,000	37	36	21	23	28	18	13	-40	-38	-22	-25	-30	-42	-49	14	15 11 14
20,000	24	23	17	14	19	12	8	-25	-24	-17	-15	-20	-27	-32	13	11 8 9

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*								STANDARD DEVIATION			
	O I R E C T				R E T U R N							
	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT	
CIAMPINO AP TO OON MUANG												
53,000	36	25	0	16	20	7	2	-39	-27	-1	-17	4758 N.MI.
40,000	38	33	15	23	27	18	14	-43	-35	-17	-24	9 7 6 7
30,000	31	28	16	21	23	16	13	-34	-30	-17	-22	11 10 8 10
20,000	20	17	8	12	14	9	6	-21	-18	-8	-12	11 10 7 8
CIAMPINO AP TO OOVER AFB												
53,000	-30	-18	-15	-22	-20	-27	-31	29	17	15	21	3833 N.MI.
40,000	-46	-30	-35	-44	-39	-49	-54	44	28	33	42	9 7 6 7
30,000	-47	-31	-32	-42	-37	-48	-54	44	28	30	39	14 13 12 14
20,000	-34	-21	-23	-28	-26	-34	-38	32	20	22	27	16 15 12 15
CIAMPINO AP TO OUM OUM												
53,000	39	29	8	23	25	14	9	-42	-30	-9	-24	3891 N.MI.
40,000	43	35	23	28	32	23	19	-47	-37	-24	-30	10 8 7 8
30,000	34	31	22	24	27	20	16	-37	-33	-22	-26	12 11 9 11
20,000	22	19	10	14	16	10	8	-23	-20	-11	-15	12 11 8 10
CIAMPINO AP TO ELMENOORF AFB												
53,000	-10	-6	0	-8	-5	-11	-14	9	5	0	7	4558 N.MI.
40,000	-8	-8	-4	-7	-7	-12	-16	6	6	2	5	8 6 4 6
30,000	-7	-7	-4	-6	-6	-13	-17	5	5	2	4	9 8 8 9
20,000	-3	-5	-3	-2	-3	-9	-12	2	4	2	0	11 11 10 11
CIAMPINO AP TO ENIWETOK AFB												
53,000	13	14	7	10	11	6	4	-16	-15	-8	-12	7200 N.MI.
40,000	19	19	14	18	18	11	8	-24	-22	-15	-21	8 6 5 6
30,000	17	17	10	15	15	9	5	-21	-20	-12	-18	9 9 8 9
20,000	9	13	6	10	9	4	2	-12	-14	-7	-11	9 10 8 9
CIAMPINO AP TO ERNEST HARMON AFB												
53,000	-27	-15	-16	-20	-19	-25	-29	26	15	15	19	2927 N.MI.
40,000	-41	-25	-34	-41	-35	-46	-52	39	23	32	39	10 8 7 8
30,000	-43	-26	-31	-40	-35	-47	-53	40	23	29	37	15 14 13 16
20,000	-30	-18	-22	-26	-24	-32	-37	28	16	21	25	18 17 14 17
CIAMPINO AP TO GALLAO												
53,000	-13	-13	-5	-7	-9	-14	-16	11	12	5	6	4961 N.MI.
40,000	-20	-23	-8	-15	-16	-23	-27	17	21	7	14	7 6 5 5
30,000	-14	-17	-8	-11	-12	-18	-21	11	15	7	10	9 8 7 8
20,000	-6	-7	-2	-5	-4	-8	-10	5	6	1	2	8 7 6 7
CIAMPINO AP TO GEORGE AFB												
53,000	-22	-12	-9	-14	-13	-19	-22	20	11	9	13	5455 N.MI.
40,000	-29	-19	-23	-25	-24	-31	-35	26	17	21	22	8 6 5 6
30,000	-27	-19	-21	-23	-23	-31	-35	24	17	19	20	11 10 9 11
20,000	-17	-13	-13	-14	-14	-20	-23	15	11	12	13	12 12 10 12
CIAMPINO AP TO GOOSE AB												
53,000	-26	-14	-14	-19	-17	-24	-28	25	13	13	18	2900 N.MI.
40,000	-38	-22	-29	-37	-31	-42	-48	36	20	28	35	10 8 7 8
30,000	-39	-24	-28	-36	-31	-44	-50	36	21	26	33	15 14 13 16
20,000	-26	-16	-19	-23	-21	-29	-34	24	14	18	21	18 17 14 18
CIAMPINO AP TO HICKAM AFB												
53,000	-7	-5	-2	-7	-5	-9	-12	5	4	2	6	6976 N.MI.
40,000	-9	-9	-4	-10	-8	-14	-17	6	6	3	7	8 6 4 6
30,000	-8	-8	-5	-9	-8	-14	-18	5	5	3	6	9 8 8 9
20,000	-6	-6	-4	-4	-5	-10	-13	4	5	3	3	11 10 9 10
CIAMPINO AP TO INCIRLIK AB												
53,000	33	27	18	18	23	14	10	-34	-28	-19	-18	1093 N.MI.
40,000	36	36	37	31	35	22	15	-38	-38	-38	-32	16 13 11 11
30,000	29	31	30	24	29	15	8	-31	-33	-31	-26	22 19 17 20
20,000	20	20	21	17	19	10	5	-21	-21	-22	-18	24 20 17 20
CIAMPINO AP TO TWO JIMA												
53,000	24	20	12	19	18	13	10	-27	-22	-12	-20	5897 N.MI.
40,000	30	27	21	29	27	20	16	-33	-30	-22	-31	8 7 5 6
30,000	26	25	14	23	22	14	10	-30	-28	-15	-25	10 9 9 10
20,000	20	17	10	17	16	10	7	-22	-18	-11	-19	10 10 9 10

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	D I R E C T							R E T U R N							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
CIAMPINO AP TO JOHNSTON AFB																		
53,000	-1	-2	1	1	0	-4	-6	-1	0	-1	-2	-1	-5	-7	7	6	4	5
40,000	-5	0	1	1	0	-6	-10	1	-3	-3	-4	-2	-8	-11	9	8	8	9
30,000	-2	-1	0	2	0	-7	-10	-1	-3	-2	-5	-3	-9	-13	10	10	9	9
20,000	-2	-2	0	2	0	-5	-8	0	1	-1	-4	-1	-6	-9	8	7	6	7
CIAMPINO AP TO KADENA AB																		
53,000	29	21	14	23	21	16	13	-32	-23	-15	-24	-23	-29	-33	9	7	6	7
40,000	31	29	22	31	28	21	18	-35	-32	-24	-33	-31	-38	-41	10	9	10	10
30,000	29	27	14	23	23	15	11	-32	-30	-15	-25	-25	-33	-38	11	11	9	10
20,000	20	16	10	18	16	10	8	-21	-17	-11	-19	-17	-23	-26	8	7	6	7
CIAMPINO AP TO KEFLAVIK AP																		
53,000	-23	-11	-6	-12	-12	-20	-25	21	11	5	11	11	4	1	12	9	7	9
40,000	-30	-17	-16	-21	-21	-33	-40	27	15	14	18	18	7	0	18	16	15	19
30,000	-29	-18	-16	-21	-20	-35	-43	25	15	13	17	17	3	-4	22	20	18	22
20,000	-18	-12	-9	-12	-13	-23	-28	16	11	8	10	11	1	-4	17	15	12	15
CIAMPINO AP TO KINOLEY AFB																		
53,000	-26	-19	-12	-15	-18	-24	-28	25	19	12	14	17	11	8	9	8	6	8
40,000	-37	-30	-24	-33	-31	-40	-45	34	28	23	31	29	20	15	14	13	11	13
30,000	-35	-29	-22	-31	-29	-38	-43	32	27	21	29	27	18	14	14	13	10	13
20,000	-27	-21	-19	-22	-21	-28	-32	25	20	18	21	20	14	11	12	10	7	10
CIAMPINO AP TO KWAJALEIN NAS																		
53,000	10	11	6	8	9	5	2	-13	-13	-7	-9	-10	-15	-17	8	6	5	6
40,000	15	15	13	15	15	9	6	-20	-19	-14	-18	-18	-24	-27	9	8	8	9
30,000	13	14	9	13	12	6	3	-18	-17	-11	-16	-15	-22	-25	9	9	8	9
20,000	8	11	5	7	8	3	0	-11	-12	-6	-9	-9	-14	-17	7	7	6	7
CIAMPINO AP TO LAO AFB																		
53,000	-11	-6	0	-8	-5	-11	-14	9	5	0	7	5	0	-2	8	6	4	6
40,000	-8	-7	-4	-7	-6	-12	-16	6	6	2	5	5	-1	-4	10	8	8	9
30,000	-7	-7	-4	-5	-6	-13	-17	5	5	2	3	4	-4	-8	12	11	11	11
20,000	-3	-5	-3	-1	-3	-9	-12	2	4	2	0	2	-4	-7	9	9	7	8
CIAMPINO AP TO LAJES AP																		
53,000	-20	-18	-16	-11	-16	-23	-26	19	17	16	11	16	9	6	11	9	8	9
40,000	-25	-23	-27	-29	-26	-37	-43	23	22	26	27	24	14	8	18	16	14	17
30,000	-22	-21	-24	-27	-24	-35	-41	20	19	23	25	22	11	5	18	17	13	17
20,000	-17	-14	-19	-18	-17	-25	-29	15	13	18	17	16	8	3	14	13	9	12
CIAMPINO AP TO LE BOURGET AP																		
53,000	-20	-14	-12	-11	-14	-23	-28	19	13	11	11	13	4	0	16	13	11	12
40,000	-29	-17	-22	-26	-23	-39	-48	27	15	20	23	21	6	-3	25	22	20	25
30,000	-27	-17	-18	-25	-21	-38	-48	25	14	16	23	19	2	-7	28	25	20	27
20,000	-18	-11	-14	-14	-14	-26	-33	17	10	13	13	13	1	-6	21	19	14	18
CIAMPINO AP TO LONDON INTERNATIONAL																		
53,000	-21	-13	-11	-11	-13	-22	-27	20	12	10	11	13	4	0	15	12	10	11
40,000	-29	-16	-21	-25	-22	-38	-46	27	14	18	22	20	5	-3	24	21	19	24
30,000	-28	-16	-18	-25	-21	-38	-47	26	14	15	22	19	2	-7	27	25	20	26
20,000	-19	-10	-13	-14	-14	-25	-32	17	9	12	12	12	1	-5	20	18	14	18
CIAMPINO AP TO LORING AFB																		
53,000	-28	-16	-16	-21	-19	-26	-29	27	15	15	20	19	13	10	10	7	7	8
40,000	-42	-25	-34	-42	-36	-46	-52	40	23	32	40	34	23	18	15	13	12	15
30,000	-43	-27	-31	-40	-35	-47	-53	40	24	29	38	33	21	16	17	16	13	16
20,000	-30	-18	-22	-26	-24	-32	-37	28	16	21	25	22	14	10	13	12	9	12
CIAMPINO AP TO MAURIPUR AP																		
53,000	39	29	8	21	24	14	9	-41	-30	-9	-22	-25	-36	-41	10	9	7	8
40,000	51	43	23	32	36	25	20	-55	-46	-24	-34	-39	-52	-58	15	13	10	13
30,000	41	35	22	26	30	21	16	-44	-37	-23	-27	-32	-43	-49	15	13	9	12
20,000	25	23	15	15	19	13	10	-26	-24	-15	-16	-19	-26	-30	10	9	7	8
CIAMPINO AP TO MCCORO AFB																		
53,000	-18	-9	-5	-12	-10	-16	-19	16	8	4	11	9	5	2	8	6	4	6
40,000	-19	-14	-12	-18	-15	-22	-26	17	13	10	15	14	7	4	10	9	9	10
30,000	-18	-16	-12	-17	-16	-24	-28	15	14	10	14	13	5	1	12	11	10	12
20,000	-11	-11	-7	-10	-10	-15	-19	9	9	6	9	8	3	0	9	9	7	9

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	O I R E C T							R E T U R N							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85				
CIAMPINO AP TO MCGUIRE AFB																		
53,000	-30	-18	-15	-22	-20	-27	-31	29	17	15	21	19	14	11	9	7	6	7
40,000	-46	-30	-35	-44	-38	-49	-54	44	28	33	42	36	27	21	14	13	12	14
30,000	-47	-30	-33	-42	-37	-48	-54	44	28	31	39	35	25	19	16	15	12	15
20,000	-33	-21	-23	-28	-26	-34	-38	31	19	22	27	25	17	13	12	11	8	11
CIAMPINO AP TO MIDWAY NAS																		
53,000	1	2	3	4	3	-1	-3	-4	-3	-4	-5	-4	-7	-10	8	5	4	6
40,000	-3	2	6	5	3	-4	-7	-1	-5	-8	-9	-6	-12	-15	9	8	8	9
30,000	-2	2	6	5	3	-4	-8	-2	-5	-8	-8	-6	-12	-16	10	10	9	10
20,000	0	1	5	4	3	-3	-6	-2	-2	-6	-6	-4	-9	-12	8	8	6	7
CIAMPINO AP TO MILDENHALL AP																		
53,000	-20	-12	-9	-11	-13	-21	-26	19	11	9	10	12	4	-1	15	12	10	11
40,000	-28	-15	-19	-24	-21	-36	-45	26	13	16	21	19	4	-4	24	21	19	24
30,000	-28	-15	-16	-24	-20	-38	-47	26	13	13	20	17	1	-8	27	25	20	26
20,000	-18	-10	-11	-13	-13	-25	-31	17	9	10	11	11	0	-7	20	18	14	18
CIAMPINO AP TO MINOT AFB																		
53,000	-23	-11	-9	-15	-13	-19	-23	22	10	8	14	13	8	6	8	6	5	6
40,000	-30	-18	-21	-26	-23	-31	-36	28	16	19	23	21	14	10	11	10	10	12
30,000	-28	-19	-20	-25	-23	-32	-37	25	17	18	22	20	12	7	13	13	11	13
20,000	-18	-13	-12	-15	-14	-21	-25	16	11	11	14	13	7	3	10	10	8	10
CIAMPINO AP TO MOSCOW INTERNATIONAL																		
53,000	10	8	11	9	10	2	-2	-12	-9	-12	-10	-11	-18	-22	15	11	9	11
40,000	7	10	21	15	13	0	-7	-10	-12	-23	-17	-16	-28	-35	20	18	17	19
30,000	6	9	16	13	11	-3	-11	-9	-12	-19	-16	-14	-28	-36	22	21	19	22
20,000	6	6	12	10	9	-2	-8	-8	-7	-13	-11	-10	-20	-26	17	16	13	16
CIAMPINO AP TO MYRTLE BEACH AFB																		
53,000	-31	-20	-13	-20	-20	-27	-31	30	19	13	20	19	13	11	9	7	6	7
40,000	-46	-32	-31	-42	-38	-47	-53	43	30	30	40	35	26	21	13	12	11	13
30,000	-46	-32	-29	-40	-36	-46	-52	43	30	27	37	34	24	19	15	14	10	14
20,000	-34	-23	-21	-27	-25	-33	-37	32	21	21	26	24	17	14	12	11	7	10
CIAMPINO AP TO NOUASSEUR AB																		
53,000	-21	-21	-20	-12	-18	-26	-31	19	20	19	12	18	10	6	14	11	10	10
40,000	-22	-27	-29	-27	-26	-39	-46	18	25	27	25	25	12	5	22	19	15	18
30,000	-17	-25	-26	-24	-23	-36	-42	14	23	25	22	22	9	2	22	19	15	19
20,000	-12	-17	-19	-14	-16	-25	-30	11	16	19	14	15	6	1	16	14	10	13
CIAMPINO AP TO ORLY AP																		
53,000	-20	-14	-12	-12	-14	-23	-28	19	13	11	11	13	5	0	16	13	11	12
40,000	-29	-17	-22	-26	-23	-39	-48	27	15	20	23	21	6	-3	25	22	20	25
30,000	-27	-17	-19	-26	-22	-39	-48	25	15	16	23	19	3	-6	28	25	20	27
20,000	-18	-11	-14	-14	-14	-26	-33	17	10	13	13	13	1	-5	21	19	14	18
CIAMPINO AP TO PALAM AP																		
53,000	38	28	14	26	26	18	14	-40	-29	-15	-27	-27	-36	-41	11	8	7	8
40,000	43	35	28	31	34	25	21	-46	-37	-30	-33	-36	-46	-51	14	12	11	12
30,000	33	31	26	26	29	21	17	-36	-33	-27	-28	-30	-39	-43	14	12	10	11
20,000	21	19	13	16	17	11	9	-22	-20	-14	-17	-18	-24	-27	9	8	7	8
CIAMPINO AP TO PATRICK AFB																		
53,000	-31	-21	-11	-18	-19	-27	-31	29	20	11	17	18	12	9	8	7	6	7
40,000	-44	-34	-26	-38	-35	-45	-50	41	32	24	36	33	24	19	13	12	10	13
30,000	-42	-32	-24	-35	-33	-42	-48	39	29	23	33	30	22	17	14	13	9	13
20,000	-31	-23	-19	-24	-24	-31	-35	29	21	18	23	22	16	13	11	10	7	9
CIAMPINO AP TO PIARCO AP																		
53,000	-17	-19	-6	-7	-11	-18	-22	16	18	6	6	11	5	3	8	7	5	6
40,000	-27	-29	-18	-16	-22	-30	-34	24	27	17	15	20	13	9	11	10	8	10
30,000	-17	-21	-15	-12	-16	-22	-26	15	19	14	11	15	9	5	10	10	7	9
20,000	-7	-10	-9	-7	-8	-13	-15	6	9	8	7	8	3	0	8	7	6	6
CIAMPINO AP TO PDPE AFB																		
53,000	-31	-19	-14	-21	-20	-27	-31	30	18	13	20	20	14	11	9	7	6	7
40,000	-47	-32	-33	-43	-38	-48	-54	44	30	31	41	36	27	22	13	12	11	14
30,000	-47	-32	-30	-41	-37	-47	-53	44	29	29	38	34	25	20	15	14	11	14
20,000	-34	-22	-22	-28	-26	-34	-38	32	21	21	26	24	18	14	12	11	7	10

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES																
HEIGHT IN FEET	EQUIVALENT HEADWINDS*								STANDARD DEVIATION							
	D I R E C T								R E T U R N							
	JAN	APR	JUL	OCT	**A50	A75	A85		JAN	APR	JUL	OCT	A50	A75	A85	
CIAMPINO AP TO PRESTWICK AB																
53,000	-21	-12	-8	-11	-12	-21	-25		20	11	8	11	12	4	0	1062 N.MI.
40,000	-29	-16	-19	-24	-21	-36	-44		27	14	16	21	19	5	-2	14 11 9 11
30,000	-29	-16	-16	-24	-21	-37	-46		26	13	14	21	18	2	-7	22 19 18 23
20,000	-20	-10	-11	-13	-13	-25	-31		18	9	10	12	12	1	-5	26 24 20 26
CIAMPINO AP TO RAMEY AFB																
53,000	-20	-19	-8	-9	-13	-20	-23		19	18	7	8	12	7	4	4217 N.MI.
40,000	-29	-31	-17	-20	-24	-32	-37		26	28	16	19	22	14	10	8 7 5 7
30,000	-22	-24	-15	-18	-19	-27	-31		20	22	14	17	18	11	7	12 11 9 11
20,000	-13	-14	-11	-12	-12	-18	-21		12	13	11	12	12	7	4	12 11 8 10
CIAMPINO AP TO RHEIN MAIN AB																
53,000	-15	-8	-5	-8	-9	-18	-23		14	7	4	7	8	-1	-6	522 N.MI.
40,000	-24	-11	-11	-16	-15	-31	-40		22	9	8	12	12	-4	-12	16 13 12 12
30,000	-24	-11	-8	-16	-14	-32	-42		21	8	5	12	11	-6	-16	26 23 20 26
20,000	-14	-6	-6	-7	-8	-21	-28		13	5	5	6	7	-5	-12	29 26 21 28
CIAMPINO AP TO SEOUL AB																
53,000	23	18	13	20	18	13	11		-25	-19	-14	-21	-19	-25	-28	4840 N.MI.
40,000	26	25	23	28	25	19	15		-28	-26	-25	-30	-27	-34	-38	9 7 5 6
30,000	22	23	15	22	21	13	9		-24	-25	-17	-24	-23	-30	-35	11 9 9 10
20,000	18	15	11	18	15	10	7		-19	-16	-12	-19	-16	-22	-26	11 11 10 11
CIAMPINO AP TO STEVENSON FIELD																
53,000	-24	-11	-9	-15	-14	-20	-24		22	10	9	15	13	8	6	4182 N.MI.
40,000	-31	-18	-21	-26	-24	-32	-37		28	17	19	24	22	14	10	8 6 5 7
30,000	-29	-20	-20	-25	-23	-33	-38		26	17	18	22	21	12	7	12 10 10 12
20,000	-19	-13	-12	-16	-15	-22	-25		17	12	11	14	13	7	3	14 13 12 14
CIAMPINO AP TO SUNG SHAN																
53,000	31	22	14	23	22	16	13		-34	-23	-15	-25	-23	-30	-34	5183 N.MI.
40,000	32	30	22	30	28	21	18		-35	-32	-24	-32	-31	-38	-42	9 7 6 7
30,000	30	28	14	22	23	16	12		-32	-30	-16	-24	-25	-33	-38	10 9 10 10
20,000	20	16	9	17	15	10	7		-21	-17	-10	-17	-16	-22	-25	11 10 8 10
CIAMPINO AP TO TACHIKAWA AB																
53,000	19	16	11	16	15	10	8		-21	-17	-11	-17	-16	-22	-25	5310 N.MI.
40,000	24	22	19	24	22	16	12		-27	-24	-21	-27	-24	-31	-35	9 6 5 6
30,000	20	21	13	21	19	11	7		-22	-23	-15	-23	-21	-29	-33	10 9 9 10
20,000	16	15	10	16	14	8	5		-17	-16	-11	-17	-15	-21	-24	11 11 10 11
CIAMPINO AP TO TAN SAN NHUT																
53,000	33	22	0	13	18	6	1		-36	-24	-1	-15	-19	-29	-35	5148 N.MI.
40,000	34	31	13	21	24	16	12		-39	-33	-15	-22	-27	-36	-41	9 7 6 7
30,000	29	26	14	19	21	15	12		-31	-28	-15	-20	-23	-31	-35	10 9 8 9
20,000	19	16	7	11	13	8	5		-20	-17	-7	-11	-13	-19	-22	10 9 7 8
CIAMPINO AP TO THULE AB																
53,000	-17	-8	-1	-10	-8	-15	-19		15	7	1	9	7	1	-1	2856 N.MI.
40,000	-18	-12	-7	-13	-12	-21	-25		15	11	6	10	10	2	-2	10 8 5 7
30,000	-17	-12	-7	-11	-12	-22	-28		14	10	5	8	9	1	-7	13 11 10 13
20,000	-9	-9	-4	-5	-6	-14	-18		7	7	3	3	5	-2	-6	16 14 14 16
CIAMPINO AP TO TORBAY AP																
53,000	-26	-16	-16	-19	-19	-25	-29		25	15	16	18	18	12	9	2725 N.MI.
40,000	-40	-25	-34	-40	-35	-46	-51		38	23	32	38	33	22	16	10 8 7 8
30,000	-42	-26	-31	-39	-34	-46	-53		39	24	29	37	32	20	14	16 14 13 16
20,000	-30	-18	-23	-27	-24	-33	-38		28	17	22	25	23	14	10	18 17 14 17
CIAMPINO AP TO TORREJON AFB																
53,000	-21	-20	-20	-13	-18	-27	-32		20	19	19	12	18	9	4	729 N.MI.
40,000	-25	-25	-32	-29	-28	-42	-50		22	23	31	28	26	11	3	15 13 12 11
30,000	-20	-23	-30	-28	-26	-41	-48		17	21	29	26	24	9	0	24 21 18 22
20,000	-15	-16	-22	-17	-18	-28	-34		14	15	21	16	17	6	0	25 22 18 23
CIAMPINO AP TO TRAVIS AFB																
53,000	-19	-10	-7	-13	-12	-17	-20		18	10	7	12	11	7	4	5392 N.MI.
40,000	-23	-16	-18	-20	-19	-26	-30		20	14	16	18	17	10	7	8 6 4 6
30,000	-23	-17	-17	-19	-19	-27	-31		19	15	14	16	16	8	4	10 9 9 11
20,000	-14	-11	-10	-12	-12	-17	-21		12	10	9	10	10	5	2	12 11 10 12

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES																	
	D I R E C T							R E T U R N					STANDARD DEVIATION					
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
CIAMPINO AP TO WAKE AP																		
53,000	9	10	7	7	8	4	2	-13	-12	-7	-8	-10	-14	-16	8	6	5	6
40,000	13	14	13	14	14	8	5	-18	-17	-15	-17	-17	-23	-26	9	9	8	9
30,000	11	13	10	12	12	5	2	-15	-16	-12	-15	-14	-21	-24	10	9	8	10
20,000	8	10	6	7	7	3	0	-10	-11	-6	-9	-9	-14	-17	8	7	6	7
CIAMPINO AP TO WESTOVER AFB																		
53,000	-29	-17	-16	-21	-20	-26	-30	28	16	15	21	19	14	11	9	7	6	8
40,000	-45	-28	-36	-44	-38	-48	-54	43	26	34	42	36	26	21	14	13	12	14
30,000	-46	-29	-33	-42	-37	-48	-54	43	27	31	39	35	24	18	16	15	12	15
20,000	-32	-20	-23	-28	-25	-34	-38	31	19	22	27	24	17	12	13	12	8	11
CIAMPINO AP TO WHEELUS AP																		
53,000	7	3	-6	3	1	-8	-13	-10	-5	5	-4	-3	-13	-18	17	14	12	11
40,000	14	3	-2	0	3	-12	-20	-18	-7	-2	-4	-7	-23	-31	26	22	18	22
30,000	10	2	-2	3	3	-12	-20	-14	-6	-1	-6	-6	-22	-30	26	23	18	22
20,000	8	1	2	2	3	-7	-13	-10	-3	-3	-3	-4	-15	-21	19	16	12	15
CLARK AFB TO DARWIN																		
53,000	-13	-2	-7	-4	-6	-13	-17	12	2	4	2	5	-2	-5	9	8	10	9
40,000	-9	-1	-7	-4	-6	-11	-14	8	1	6	4	5	-1	-4	7	9	8	8
30,000	-6	-1	-5	-3	-4	-8	-10	6	0	4	3	3	-1	-4	6	6	7	7
20,000	-3	-2	-3	-2	-3	-6	-8	3	2	3	2	2	-1	-3	6	5	6	5
CLARK AFB TO DHAHRAN AB																		
53,000	-50	-33	25	-5	-19	-42	-49	49	32	-26	4	17	-12	-24	9	8	7	8
40,000	-63	-47	12	-16	-31	-55	-62	60	45	-13	15	29	-2	-11	11	10	6	9
30,000	-49	-37	6	-16	-25	-43	-49	48	36	-7	16	24	3	-6	10	9	5	7
20,000	-29	-20	2	-7	-13	-24	-29	29	20	-3	6	12	2	-2	7	6	5	5
CLARK AFB TO DON MUANG																		
53,000	-11	3	46	28	16	-3	-10	10	-4	-46	-28	-17	-36	-45	12	10	11	9
40,000	-10	-14	33	3	0	-13	-19	9	13	-33	-4	-1	-18	-31	13	13	10	9
30,000	-9	-9	16	2	0	-10	-15	9	8	-16	-3	-1	-11	-16	10	12	8	9
20,000	-3	-2	3	3	0	-5	-8	2	2	-3	-3	-1	-6	-8	8	8	7	6
CLARK AFB TO DOVER AFB																		
53,000	18	7	1	9	8	3	0	-21	-9	-2	-11	-10	-16	-20	7	6	5	6
40,000	12	9	10	11	10	5	2	-16	-12	-12	-14	-14	-19	-22	8	8	8	8
30,000	10	9	11	10	10	4	1	-15	-12	-12	-13	-13	-18	-21	8	9	8	8
20,000	6	6	8	6	6	2	0	-8	-7	-9	-8	-8	-12	-14	7	6	5	6
CLARK AFB TO DUM DUM																		
53,000	-33	-16	39	18	2	-24	-32	32	15	-40	-18	-3	-29	-37	11	10	9	9
40,000	-42	-32	21	-2	-14	-37	-44	39	30	-22	1	13	-11	-20	13	13	8	9
30,000	-34	-23	12	-6	-12	-29	-36	33	22	-13	6	12	-4	-11	11	13	7	8
20,000	-18	-12	3	-2	-7	-15	-19	17	12	-3	2	6	-1	-4	8	7	6	6
CLARK AFB TO ELMENDORF AFB																		
53,000	32	16	-3	17	16	5	-1	-35	-18	2	-19	-18	-28	-33	9	7	6	7
40,000	28	22	11	25	22	14	9	-34	-25	-13	-29	-26	-34	-38	10	10	10	10
30,000	24	18	11	20	18	11	7	-29	-21	-13	-23	-21	-30	-34	11	11	10	11
20,000	16	11	7	12	11	5	3	-18	-13	-7	-14	-13	-19	-22	9	8	7	8
CLARK AFB TO ENIWETOK AFB																		
53,000	-9	-4	-27	-15	-13	-21	-25	8	3	26	14	12	5	1	8	8	8	6
40,000	-1	8	-13	-7	-3	-11	-14	0	-8	12	6	3	-4	-9	7	9	8	8
30,000	0	5	-7	-6	-2	-7	-10	-1	-5	7	5	2	-4	-7	6	7	6	6
20,000	-7	-3	-7	-7	-6	-10	-12	6	3	6	7	6	2	0	6	5	5	5
CLARK AFB TO ERNEST HARMON AFB																		
53,000	-3	-3	-3	-3	-3	-7	-9	-1	1	3	2	1	-3	-5	7	6	4	5
40,000	-11	-7	-1	-8	-7	-12	-15	6	4	0	6	4	-1	-4	8	7	7	8
30,000	-10	-8	-1	-7	-7	-13	-16	6	5	0	5	4	-2	-5	9	9	8	8
20,000	-8	-5	-1	-5	-5	-10	-12	6	4	1	4	4	-1	-3	7	7	6	6
CLARK AFB TO GALEAO																		
53,000	-8	-16	-14	-9	-12	-17	-19	7	16	13	9	11	6	4	6	6	6	6
40,000	-18	-27	-28	-27	-25	-31	-34	17	26	27	25	24	18	15	8	8	8	8
30,000	-14	-22	-27	-23	-21	-27	-31	13	21	26	21	20	14	11	7	7	8	8
20,000	-7	-10	-13	-12	-11	-14	-16	7	10	13	11	10	6	4	5	5	6	5

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES																
HEIGHT IN FEET	EQUIVALENT HEADWINDS*								STANDARD DEVIATION							
	D I R E C T				R E T U R N				JAN				APR			
	JAN	APR	JUL	OCT	**A50	A75	A85		JAN	APR	JUL	OCT	A50	A75	A85	
CLARK AFB TO GEORGE AFB																
53,000	42	28	2	23	25	12	3	-44	-29	-3	-24	-26	-36	-42		6351 N.MI.
40,000	58	48	22	45	45	31	24	-62	-51	-24	-48	-48	-59	-64		9 7 6 7
30,000	53	45	20	42	41	28	22	-57	-47	-21	-44	-44	-54	-59		11 11 9 11
20,000	35	29	16	27	27	19	16	-37	-30	-16	-28	-28	-35	-39		11 11 8 11
CLARK AFB TO GOOSE AB																
53,000	-1	-2	-3	-2	-2	-6	-8	-3	0	2	0	0	-4	-6		6690 N.MI.
40,000	-9	-5	0	-7	-5	-11	-14	5	3	-1	4	3	-3	-5		7 6 4 5
30,000	-9	-6	0	-6	-5	-11	-14	5	3	-1	4	3	-3	-6		8 7 7 7
20,000	-7	-4	-1	-4	-4	-9	-11	5	3	0	3	3	-2	-4		8 8 8 8
CLARK AFB TO HICKAM AFB																
53,000	29	17	-16	-4	5	-10	-15	-30	-17	16	4	-6	-23	-29		4610 N.MI.
40,000	45	40	-1	10	24	4	-1	-47	-42	0	-11	-25	-44	-50		8 7 5 6
30,000	40	29	1	8	17	4	0	-41	-30	-1	-9	-18	-35	-41		9 10 8 8
20,000	16	12	0	2	7	1	-2	-17	-13	0	-2	-7	-15	-18		9 9 6 7
CLARK AFB TO HILL AFB																
53,000	36	21	2	21	21	10	3	-38	-23	-3	-22	-22	-31	-36		6340 N.MI.
40,000	44	35	20	38	35	25	20	-48	-38	-22	-41	-38	-47	-52		8 7 6 7
30,000	40	31	19	34	31	22	17	-44	-35	-21	-37	-34	-44	-49		10 10 10 11
20,000	27	20	13	22	20	14	11	-29	-21	-13	-23	-21	-28	-32		11 11 9 11
CLARK AFB TO INCIRLIK AB																
53,000	-45	-31	0	-20	-25	-38	-44	43	29	-2	19	24	8	0		4626 N.MI.
40,000	-54	-43	-14	-26	-34	-48	-54	50	41	13	25	32	18	13		9 8 7 8
30,000	-44	-37	-14	-23	-28	-40	-46	42	35	13	22	27	17	13		11 10 8 10
20,000	-25	-21	-5	-13	-16	-23	-26	24	20	5	12	15	9	5		10 9 6 8
CLARK AFB TO IWO JIMA																
53,000	36	10	-29	-7	1	-18	-27	-37	-11	29	7	-1	-24	-34		1303 N.MI.
40,000	45	34	-10	10	20	-1	-9	-46	-35	10	-11	-21	-41	-48		12 11 10 10
30,000	41	26	-4	9	17	1	-4	-41	-27	3	-10	-18	-35	-42		13 15 11 12
20,000	21	14	1	4	10	2	-2	-22	-14	-1	-4	-10	-19	-23		12 13 8 11
CLARK AFB TO JOHNSTON AFB																
53,000	17	9	-19	-10	-2	-14	-19	-17	-9	19	10	1	-13	-18		4013 N.MI.
40,000	25	30	-4	2	13	-1	-5	-26	-31	3	-3	-14	-28	-33		7 7 6 5
30,000	23	19	-2	1	9	-1	-4	-24	-20	2	-2	-9	-22	-26		8 9 7 8
20,000	2	5	-3	-2	0	-4	-6	-3	-5	3	2	0	-5	-7		8 8 5 6
CLARK AFB TO KADENA AB																
53,000	31	9	-27	-7	1	-17	-25	-34	-11	25	6	-2	-22	-32		782 N.MI.
40,000	36	19	-10	12	14	-2	-10	-39	-23	9	-13	-17	-33	-41		14 13 12 12
30,000	30	16	-2	10	12	1	-5	-34	-19	2	-11	-14	-28	-36		15 17 13 14
20,000	17	12	2	5	8	1	-2	-18	-12	-3	-5	-9	-17	-21		14 15 10 13
CLARK AFB TO KEFLAVIK AP																
53,000	-15	-14	-6	-11	-11	-16	-19	11	12	5	10	9	5	2		5756 N.MI.
40,000	-20	-20	-7	-19	-17	-23	-27	16	17	6	17	14	7	4		8 6 5 6
30,000	-21	-22	-5	-15	-16	-23	-27	17	19	4	14	13	6	2		9 8 7 9
20,000	-13	-13	-3	-11	-10	-15	-18	12	12	3	10	9	4	1		9 9 8 9
CLARK AFB TO KINOLEY AFB																
53,000	6	3	-1	2	2	-2	-4	-10	-4	0	-3	-4	-8	-11		7932 N.MI.
40,000	-3	0	3	-1	0	-5	-8	-2	-4	-5	-2	-3	-9	-11		7 5 4 6
30,000	-3	0	3	-1	0	-6	-9	-2	-3	-5	-2	-3	-8	-11		8 8 7 8
20,000	-3	0	2	0	0	-5	-7	1	-1	-3	-1	-1	-6	-8		8 9 8 8
CLARK AFB TO KWAJALEIN NAS																
53,000	-14	-5	-24	-14	-14	-21	-25	13	4	24	13	13	7	3		2791 N.MI.
40,000	-3	6	-11	-7	-4	-10	-14	2	-6	11	7	4	-3	-7		7 8 7 6
30,000	-2	3	-7	-6	-3	-8	-10	2	-4	7	6	3	-2	-4		6 8 7 8
20,000	-9	-5	-8	-8	-7	-11	-13	8	4	7	8	7	4	2		6 7 5 6
CLARK AFB TO LADD AFB																
53,000	28	13	-3	15	13	3	-1	-31	-15	2	-17	-15	-25	-30		4623 N.MI.
40,000	22	17	10	19	17	10	6	-28	-21	-12	-23	-21	-28	-32		9 7 6 7
30,000	19	14	9	15	14	7	3	-24	-17	-10	-18	-17	-25	-29		10 9 10 10
20,000	11	8	5	9	8	3	0	-14	-10	-6	-10	-10	-15	-18		10 10 9 10

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*							STANDARD DEVIATION						
	DIRECT							RETURN						
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85
CLARK AFB TO LAJES AP														
53,000	-22	-15	-7	-13	-14	-19	-23	18	13	7	12	12	7	5
40,000	-26	-24	-15	-23	-22	-29	-32	22	22	13	21	19	13	9
30,000	-25	-24	-12	-19	-20	-28	-32	21	21	11	17	17	10	6
20,000	-18	-14	-9	-15	-14	-19	-22	16	13	8	14	13	7	5
CLARK AFB TO LE BOURGET AP														
53,000	-27	-18	-8	-16	-17	-23	-27	24	17	7	15	15	9	7
40,000	-29	-27	-17	-24	-24	-31	-34	25	24	15	22	22	15	11
30,000	-27	-25	-13	-20	-21	-28	-33	23	22	11	18	19	11	8
20,000	-18	-14	-8	-15	-13	-19	-22	16	13	7	14	12	7	5
CLARK AFB TO LONDON INTERNATIONAL														
53,000	-25	-17	-8	-15	-16	-22	-26	22	16	7	14	14	8	6
40,000	-28	-27	-16	-24	-24	-31	-34	24	24	14	22	21	14	11
30,000	-26	-25	-12	-20	-20	-28	-33	22	22	11	18	18	11	7
20,000	-17	-15	-8	-15	-14	-19	-22	16	14	7	14	13	7	5
CLARK AFB TO LORING AFB														
53,000	7	3	-1	2	2	-2	-4	-10	-4	1	-4	-4	-9	-12
40,000	-2	1	4	0	1	-5	-7	-2	-4	-5	-3	-4	-9	-11
30,000	-2	0	4	0	0	-5	-8	-1	-3	-5	-2	-3	-8	-11
20,000	-3	0	3	0	0	-4	-7	1	-1	-4	-1	-1	-6	-8
CLARK AFB TO MAURIPUR AP														
53,000	-46	-30	34	3	-13	-38	-45	44	29	-35	-4	12	-20	-33
40,000	-57	-40	18	-9	-23	-48	-56	54	39	-18	8	22	-7	-17
30,000	-43	-30	9	-11	-19	-36	-43	41	29	-9	11	18	-1	-8
20,000	-25	-16	3	-4	-10	-21	-25	25	16	-3	4	9	0	-3
CLARK AFB TO MCCHORD AFB														
53,000	36	21	1	21	21	9	3	-39	-23	-2	-22	-22	-31	-37
40,000	43	34	19	38	34	24	19	-47	-37	-21	-41	-37	-47	-51
30,000	39	30	18	33	30	21	17	-43	-34	-20	-36	-33	-42	-47
20,000	26	19	12	21	19	13	10	-28	-21	-13	-22	-21	-27	-31
CLARK AFB TO MCGUIRE AFB														
53,000	17	7	1	8	7	2	0	-20	-8	-2	-10	-9	-15	-19
40,000	10	8	10	10	9	4	1	-15	-11	-12	-13	-13	-18	-21
30,000	9	8	10	9	9	3	0	-13	-11	-12	-11	-12	-17	-20
20,000	4	5	7	6	6	1	-1	-7	-6	-8	-7	-7	-11	-14
CLARK AFB TO MIDWAY NAS														
53,000	41	21	-18	-2	8	-11	-17	-42	-22	18	2	-9	-32	-40
40,000	59	47	-4	14	29	4	-3	-61	-48	4	-15	-30	-55	-62
30,000	54	36	1	13	24	6	1	-56	-37	-1	-14	-25	-47	-54
20,000	31	21	3	7	14	5	2	-32	-22	-4	-8	-15	-27	-31
CLARK AFB TO MILDENHALL AP														
53,000	-25	-17	-8	-15	-16	-22	-26	22	16	7	14	14	8	6
40,000	-28	-27	-16	-24	-24	-31	-34	24	24	14	22	21	14	11
30,000	-26	-25	-12	-20	-20	-28	-33	22	23	11	18	18	11	7
20,000	-17	-15	-8	-15	-14	-19	-22	16	14	7	14	13	7	5
CLARK AFB TO MINOT AFB														
53,000	29	13	0	17	15	6	1	-32	-15	-1	-18	-16	-25	-30
40,000	26	17	11	22	19	12	8	-30	-20	-13	-25	-22	-30	-33
30,000	23	15	11	18	17	10	6	-27	-18	-12	-21	-20	-27	-31
20,000	15	10	7	12	11	6	3	-17	-11	-8	-13	-12	-18	-21
CLARK AFB TO MOSCOW INTERNATIONAL														
53,000	-30	-20	-8	-17	-18	-26	-30	26	18	6	16	16	9	6
40,000	-32	-30	-15	-24	-25	-33	-37	27	28	13	22	23	15	11
30,000	-29	-28	-9	-19	-21	-30	-35	26	25	8	18	19	11	7
20,000	-19	-15	-5	-14	-13	-19	-22	17	14	5	13	12	7	4
CLARK AFB TO MYRTLE BEACH AFB														
53,000	23	10	2	13	11	5	2	-26	-12	-2	-15	-13	-21	-25
40,000	19	13	12	16	15	9	6	-24	-16	-14	-19	-18	-24	-28
30,000	17	12	11	14	14	8	5	-22	-16	-13	-16	-17	-23	-26
20,000	11	8	8	9	9	5	2	-13	-10	-9	-10	-10	-15	-17

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	D I R E C T							R E T U R N										
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
CLARK AFB TO NOUASSEUR AB																		
53,000	-32	-21	-11	-18	-20	-27	-31	29	20	10	17	18	12	9	8	6	6	6
40,000	-32	-30	-20	-25	-27	-33	-37	28	28	19	23	24	18	14	10	9	8	9
30,000	-28	-27	-17	-21	-23	-30	-34	25	25	16	20	21	15	12	10	9	7	9
20,000	-18	-15	-9	-14	-14	-18	-21	17	14	8	13	13	8	6	7	6	5	6
CLARK AFB TO ORLY AP																		
53,000	-27	-18	-8	-16	-17	-24	-27	24	17	7	15	15	9	7	8	7	6	6
40,000	-29	-27	-17	-24	-24	-31	-34	25	24	15	22	22	15	11	10	9	9	10
30,000	-27	-25	-13	-20	-21	-28	-33	23	22	11	18	19	11	8	10	10	8	10
20,000	-18	-14	-8	-15	-13	-19	-22	16	13	7	14	12	7	5	7	7	6	7
CLARK AFB TO PALAM AP																		
53,000	-48	-29	27	5	-11	-38	-46	46	27	-28	-6	10	-18	-26	11	11	9	10
40,000	-55	-40	13	-9	-24	-48	-55	51	39	-14	8	23	-4	-12	12	12	8	11
30,000	-44	-32	7	-11	-20	-38	-45	42	31	-8	11	19	0	-6	11	11	6	8
20,000	-26	-17	3	-5	-11	-21	-26	25	17	-4	5	10	1	-3	8	7	6	6
CLARK AFB TO PATRICK AFB																		
53,000	27	13	1	16	14	6	2	-30	-14	-2	-17	-16	-24	-28	7	6	5	6
40,000	25	17	12	20	18	12	8	-30	-20	-14	-23	-22	-29	-32	9	8	8	9
30,000	22	15	11	17	16	10	6	-27	-19	-13	-19	-19	-26	-30	9	9	8	9
20,000	15	10	7	11	11	6	4	-17	-12	-8	-13	-12	-17	-20	7	7	5	7
CLARK AFB TO PIARCO AP																		
53,000	4	2	-1	1	1	-2	-4	-8	-4	0	-3	-3	-8	-10	7	6	4	5
40,000	-4	-1	2	-2	-1	-6	-9	-1	-2	-3	-2	-2	-7	-10	8	8	7	8
30,000	-3	-1	1	-2	-1	-6	-9	-2	-2	-3	-1	-2	-7	-10	8	8	7	8
20,000	-3	-1	1	-2	-1	-5	-8	1	-1	-1	1	0	-4	-6	7	6	5	6
CLARK AFB TO POPE AFB																		
53,000	22	9	2	13	11	5	2	-26	-11	-2	-14	-13	-20	-24	7	6	5	6
40,000	18	12	12	16	14	9	6	-23	-16	-14	-19	-18	-24	-27	8	8	8	8
30,000	16	12	11	13	13	7	4	-21	-15	-13	-16	-16	-22	-26	9	9	8	9
20,000	10	8	8	9	9	5	2	-13	-9	-9	-10	-10	-15	-17	7	7	5	6
CLARK AFB TO PRESTWICK AB																		
53,000	-23	-16	-7	-14	-15	-21	-24	20	14	6	13	13	8	5	8	7	5	6
40,000	-27	-26	-14	-24	-23	-30	-34	23	24	12	21	20	13	10	10	9	8	10
30,000	-26	-27	-11	-19	-20	-28	-33	22	24	10	17	18	10	6	10	10	9	10
20,000	-18	-15	-7	-15	-14	-19	-22	16	14	7	14	13	7	4	8	7	6	7
CLARK AFB TO RAMEY AFB																		
53,000	15	7	1	7	7	2	0	-18	-9	-2	-8	-9	-15	-18	7	6	4	6
40,000	10	8	9	9	9	3	1	-15	-12	-10	-12	-12	-17	-20	8	8	7	8
30,000	8	8	9	7	8	3	0	-13	-11	-10	-10	-11	-16	-19	8	9	7	8
20,000	4	5	6	4	5	1	-2	-6	-6	-6	-5	-6	-10	-12	7	6	5	6
CLARK AFB TO RHEIN MAIN AB																		
53,000	-28	-18	-8	-17	-17	-24	-28	25	17	7	16	16	10	7	8	7	6	7
40,000	-30	-27	-17	-24	-24	-31	-35	26	25	15	22	22	15	11	10	9	9	10
30,000	-27	-25	-12	-20	-21	-29	-33	24	23	11	18	19	11	8	10	10	8	10
20,000	-18	-14	-7	-14	-13	-19	-22	16	13	7	14	12	7	5	7	7	6	7
CLARK AFB TO SEOUL AB																		
53,000	23	6	-16	2	3	-10	-16	-32	-10	14	-4	-7	-23	-31	14	14	12	13
40,000	16	7	3	5	7	-3	-9	-26	-14	-4	-9	-13	-25	-31	16	15	14	15
30,000	13	5	5	6	7	-2	-7	-23	-11	-6	-8	-11	-22	-28	15	14	11	14
20,000	7	4	4	2	4	-2	-5	-11	-6	-5	-3	-6	-12	-16	10	9	8	8
CLARK AFB TO STEVENSON FIELD																		
53,000	27	11	0	16	13	5	1	-30	-13	-1	-17	-15	-23	-28	8	6	5	6
40,000	22	15	10	18	16	10	7	-26	-18	-12	-21	-19	-26	-29	9	8	8	9
30,000	20	13	10	15	14	8	5	-24	-16	-11	-18	-17	-24	-28	9	9	8	9
20,000	13	8	7	10	9	5	2	-15	-10	-8	-11	-11	-16	-18	7	7	6	7
CLARK AFB TO SUNG SHAN																		
53,000	15	3	-16	-6	-2	-13	-19	-19	-4	13	5	0	-13	-20	15	13	13	12
40,000	17	1	-7	8	5	-7	-13	-22	-5	5	-9	-7	-20	-27	16	17	13	14
30,000	11	1	0	5	4	-5	-10	-16	-4	0	-6	-6	-16	-22	15	16	10	13
20,000	5	4	3	3	4	-3	-6	-7	-5	-3	-4	-5	-11	-15	10	10	9	9

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION			
	O I R E C T						R E T U R N						JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85		
CLARK AFB TO TACHIKAWA AB																
53,000	46	18	-18	6	12	-6	-16	-51	-21	17	-8	-14	-36	-47	1593 N.MI.	
40,000	47	33	3	22	27	11	3	-54	-39	-5	-26	-31	-48	-56	13	13 11 12
30,000	43	28	6	21	24	11	4	-50	-32	-7	-23	-28	-43	-50	15	15 14 15
20,000	25	17	6	10	14	7	3	-28	-19	-7	-11	-15	-24	-29	14	14 11 14
CLARK AFB TO TAN SAN NHUT																
53,000	-7	6	44	29	18	0	-7	6	-7	-45	-29	-18	-36	-44	854 N.MI.	
40,000	-7	-5	33	4	3	-8	-14	6	5	-34	-5	-4	-20	-31	13	10 12 10
30,000	-6	-6	16	2	1	-8	-12	6	5	-16	-3	-2	-11	-16	13	13 10 10
20,000	-3	-1	3	4	1	-5	-8	2	1	-4	-4	-1	-7	-9	10	12 8 9
CLARK AFB TO THULE AB																
53,000	4	0	-3	0	0	-4	-6	-8	-2	3	-2	-2	-7	-10	5287 N.MI.	
40,000	-6	-4	1	-4	-3	-9	-12	1	1	-2	2	0	-5	-8	8	6 5 6
30,000	-6	-4	1	-3	-3	-9	-12	2	1	-2	2	1	-5	-8	8	8 7 8
20,000	-5	-3	1	-3	-3	-7	-10	4	2	-1	2	1	-3	-5	8	9 8 8
CLARK AFB TO TORBAY AP																
53,000	-8	-5	-4	-7	-6	-10	-12	4	4	3	5	4	0	-2	7015 N.MI.	
40,000	-15	-12	-3	-13	-11	-17	-20	11	9	1	10	8	2	-1	7	6 4 6
30,000	-14	-12	-3	-11	-10	-17	-20	10	9	1	9	7	1	-2	8	7 7 8
20,000	-11	-8	-2	-7	-7	-12	-15	9	7	1	6	6	1	-2	9	9 8 9
CLARK AFB TO TORREJON AFB																
53,000	-29	-18	-10	-17	-18	-24	-29	26	17	8	16	16	11	8	6235 N.MI.	
40,000	-29	-26	-18	-24	-24	-31	-35	25	24	17	22	22	16	12	8	7 6 6
30,000	-27	-24	-14	-21	-21	-28	-32	24	22	13	19	19	13	9	9	8 8 9
20,000	-17	-13	-8	-14	-13	-18	-21	16	12	8	13	12	7	5	10	10 8 9
CLARK AFB TO TRAVIS AFB																
53,000	42	27	2	23	25	12	4	-44	-29	-3	-24	-26	-36	-42	6050 N.MI.	
40,000	57	47	23	46	45	32	25	-61	-50	-25	-49	-48	-58	-63	9	7 6 7
30,000	52	44	21	42	41	29	22	-56	-47	-22	-45	-44	-54	-59	11	11 10 11
20,000	35	28	16	28	27	19	16	-37	-30	-17	-29	-28	-35	-39	11	11 9 11
CLARK AFB TO WAKE AP																
53,000	17	5	-26	-12	-5	-18	-24	-18	-5	25	12	5	-12	-18	2646 N.MI.	
40,000	22	26	-9	-1	10	-5	-10	-23	-27	9	0	-10	-25	-30	8	8 7 6
30,000	24	17	-4	0	7	-2	-6	-24	-18	4	-1	-8	-21	-26	9	10 8 9
20,000	0	5	-2	-1	0	-4	-6	-1	-5	2	1	-1	-5	-8	8	9 6 7
CLARK AFB TO WESTOVER AFB																
53,000	13	6	0	6	6	1	-1	-17	-7	-1	-7	-7	-13	-17	7282 N.MI.	
40,000	6	6	8	7	7	1	-1	-10	-9	-10	-10	-10	-15	-18	7	5 4 6
30,000	5	5	8	6	6	1	-2	-9	-8	-10	-9	-9	-14	-17	8	8 7 8
20,000	2	3	6	4	4	0	-3	-4	-5	-7	-5	-5	-9	-12	8	9 8 8
CLARK AFB TO WHEELUS AP																
53,000	-43	-31	-5	-21	-26	-36	-42	40	29	4	20	24	11	5	5738 N.MI.	
40,000	-51	-43	-19	-28	-35	-47	-52	47	41	18	27	33	22	17	8	7 6 7
30,000	-42	-37	-17	-24	-29	-39	-45	39	35	16	22	27	19	15	10	9 8 9
20,000	-25	-21	-7	-14	-17	-23	-26	24	21	7	14	16	10	7	10	9 6 8
DARWIN TO ELMENDORF AFB																
53,000	19	9	-5	6	7	0	-4	-22	-11	4	-7	-9	-17	-21	5750 N.MI.	
40,000	26	19	4	14	16	7	3	-30	-22	-5	-17	-19	-27	-32	8	6 6 6
30,000	24	16	5	15	15	8	4	-27	-18	-7	-17	-17	-25	-29	8	9 8 9
20,000	15	10	6	10	10	5	3	-17	-11	-6	-11	-11	-16	-19	8	8 7 8
DARWIN TO HICKAM AFB																
53,000	-5	7	-2	-2	-1	-6	-8	4	-7	2	2	0	-5	-8	4655 N.MI.	
40,000	7	15	4	3	7	2	-1	-8	-16	-5	-4	-8	-13	-16	6	6 5 6
30,000	2	8	2	1	3	-1	-3	-2	-8	-2	-1	-3	-8	-10	6	7 7 6
20,000	-6	-2	-6	-6	-5	-8	-10	6	2	6	6	5	2	0	6	6 5 5
DARWIN TO HILL AFB																
53,000	12	10	-1	3	6	0	-2	-14	-11	1	-4	-7	-13	-16	7111 N.MI.	
40,000	27	23	6	14	17	9	5	-30	-25	-7	-15	-19	-28	-32	7	6 5 6
30,000	22	20	5	13	15	8	5	-24	-21	-6	-14	-16	-24	-27	8	8 7 8
20,000	14	11	3	7	8	4	2	-14	-12	-3	-8	-9	-14	-17	9	8 6 7

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION					
	DIRECT							RETURN										
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
DARWIN TO TACHIKAWA AB																		
53,000	10	-2	-10	-4	-2	-9	-13	-15	0	8	3	0	-8	-13	9	8	8	8
40,000	10	5	-3	-2	2	-4	-8	-15	-9	1	-1	-6	-13	-17	8	9	9	9
30,000	7	2	0	3	3	-2	-5	-12	-5	-1	-5	-6	-12	-15	7	7	7	8
20,000	4	2	2	2	2	-1	-3	-6	-3	-2	-3	-4	-7	-10	6	6	6	6
DHAHRAN AB TO DON MUANG																		
53,000	40	28	-39	3	14	-14	-37	-42	-29	38	-3	-16	-35	-42	9	9	8	8
40,000	53	41	-20	14	25	-5	-18	-56	-42	19	-15	-27	-49	-56	12	12	7	9
30,000	41	31	-8	14	21	1	-7	-43	-32	8	-15	-22	-37	-44	11	11	6	8
20,000	24	16	-2	5	10	1	-2	-25	-16	2	-5	-10	-21	-25	8	7	5	5
DHAHRAN AB TO DOVER AFB																		
53,000	-31	-17	-11	-19	-18	-26	-30	30	16	10	18	17	12	9	8	6	5	6
40,000	-43	-30	-27	-36	-34	-42	-47	40	27	25	34	31	23	19	11	10	9	11
30,000	-42	-29	-27	-33	-32	-41	-46	38	26	25	30	29	21	16	13	12	10	12
20,000	-28	-19	-18	-21	-21	-28	-31	26	17	17	20	20	14	11	10	9	7	9
DHAHRAN AB TO DUM OUM																		
53,000	57	43	-22	19	31	-4	-20	-59	-44	21	-20	-32	-52	-59	12	12	10	12
40,000	75	55	-10	25	39	3	-7	-78	-57	9	-26	-41	-67	-77	16	15	8	14
30,000	56	43	-4	22	31	7	-2	-58	-44	4	-23	-32	-51	-59	14	13	7	10
20,000	36	24	-2	9	16	3	-1	-36	-25	1	-9	-16	-30	-36	10	9	6	7
DHAHRAN AB TO ELMENDORF AFB																		
53,000	4	4	5	3	4	1	-1	-6	-5	-5	-5	-5	-9	-11	7	5	4	5
40,000	4	6	6	4	5	0	-3	-8	-8	-7	-7	-8	-13	-16	9	8	7	8
30,000	4	4	3	3	4	-2	-5	-7	-6	-5	-5	-6	-12	-15	9	9	8	9
20,000	3	2	3	2	3	-2	-5	-4	-3	-4	-3	-4	-8	-11	8	7	6	7
DHAHRAN AB TO ENIWETOK AFB																		
53,000	47	35	-6	20	27	6	-4	-49	-36	5	-21	-28	-43	-49	8	8	6	7
40,000	56	50	4	26	38	14	6	-58	-51	-5	-27	-40	-55	-60	9	9	7	9
30,000	49	41	2	21	31	10	4	-52	-43	-3	-22	-32	-47	-52	9	8	5	7
20,000	26	22	0	9	15	5	1	-26	-23	-1	-9	-15	-24	-28	6	5	4	5
DHAHRAN AB TO ERNEST HARMON AFB																		
53,000	-30	-17	-11	-18	-17	-25	-29	28	15	10	17	16	11	8	8	6	5	7
40,000	-40	-28	-25	-34	-31	-40	-45	37	25	23	31	29	21	16	12	11	10	12
30,000	-39	-27	-26	-31	-30	-40	-45	35	24	24	28	27	19	14	14	13	11	13
20,000	-26	-18	-17	-20	-20	-27	-30	24	16	17	18	19	12	9	11	10	7	9
DHAHRAN AB TO GALEAO																		
53,000	-11	-10	7	-3	-5	-11	-14	10	10	-8	2	4	-2	-7	6	5	5	4
40,000	-20	-19	-1	-15	-15	-21	-24	19	18	0	14	14	6	1	7	7	6	7
30,000	-10	-13	-2	-11	-9	-14	-17	10	12	1	11	9	3	1	7	6	5	6
20,000	-1	-2	2	-1	0	-4	-5	1	2	-3	1	0	-3	-5	5	4	4	4
DHAHRAN AB TO GEORGE AFB																		
53,000	-10	-8	-1	-7	-6	-11	-13	7	6	0	6	5	1	-1	7	6	4	5
40,000	-10	-8	-5	-8	-8	-13	-16	6	5	3	5	5	-1	-4	9	8	7	9
30,000	-8	-8	-6	-6	-7	-13	-17	4	5	4	3	4	-2	-5	10	9	8	9
20,000	-4	-6	-3	-3	-4	-8	-11	2	4	2	1	3	-2	-5	8	7	6	7
DHAHRAN AB TO GOOSE AB																		
53,000	-29	-15	-8	-17	-16	-23	-28	28	14	7	16	15	9	6	9	7	5	7
40,000	-36	-25	-19	-28	-27	-36	-40	33	23	17	26	24	16	12	12	11	10	12
30,000	-34	-25	-21	-26	-26	-35	-40	31	22	19	23	23	14	10	14	13	11	13
20,000	-22	-16	-13	-16	-17	-23	-27	20	15	13	15	15	9	6	10	10	7	9
DHAHRAN AB TO HICKAM AFB																		
53,000	19	16	10	16	15	10	8	-21	-17	-10	-18	-16	-21	-24	8	6	5	6
40,000	21	22	18	25	21	15	12	-25	-25	-20	-28	-24	-31	-34	10	9	8	9
30,000	16	20	13	21	17	11	8	-20	-23	-14	-23	-20	-27	-30	10	9	8	9
20,000	11	12	8	15	11	6	4	-13	-13	-8	-16	-12	-18	-20	8	7	6	7
DHAHRAN AB TO INCIRLIK AB																		
53,000	-40	-26	0	-15	-20	-34	-41	37	23	-1	14	18	4	-2	14	13	11	13
40,000	-52	-45	-11	-30	-33	-52	-62	46	41	9	26	29	13	5	22	21	14	18
30,000	-44	-38	-13	-21	-26	-43	-52	39	35	12	18	24	11	4	23	20	13	16
20,000	-26	-24	-13	-10	-17	-27	-32	24	22	12	9	16	7	3	15	13	9	11

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION					
	D I R E C T							R E T U R N										
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
DHAHRAN AB TO IWO JIMA																		
53,000	60	43	3	32	37	16	5	-63	-44	-4	-33	-38	-53	-61	9	9	7	8
40,000	72	59	11	38	49	23	13	-75	-61	-12	-40	-51	-68	-75	11	10	9	11
30,000	62	50	6	30	40	17	8	-64	-52	-7	-31	-41	-58	-64	11	10	7	9
20,000	37	28	4	15	21	9	5	-38	-29	-5	-15	-22	-33	-38	7	6	5	5
DHAHRAN AB TO JOHNSTON AFB																		
53,000	36	29	13	25	26	18	14	-39	-30	-14	-26	-27	-35	-39	8	7	5	6
40,000	46	39	26	35	37	28	24	-50	-42	-27	-38	-39	-48	-53	10	9	9	9
30,000	37	34	19	27	29	21	17	-41	-36	-20	-29	-31	-40	-45	10	10	7	9
20,000	25	21	9	18	18	12	9	-27	-22	-10	-19	-19	-26	-29	7	7	5	6
DHAHRAN AB TO KAOENA AB																		
53,000	63	43	-4	29	36	11	-2	-65	-44	3	-30	-37	-55	-63	10	10	8	9
40,000	73	58	5	33	46	17	8	-76	-60	-7	-35	-48	-67	-75	12	11	8	11
30,000	62	50	3	28	38	13	4	-64	-51	-3	-29	-39	-57	-64	11	10	6	9
20,000	37	27	1	14	20	7	3	-37	-28	-2	-14	-21	-32	-37	7	6	5	5
DHAHRAN AB TO KEFLAVIK AP																		
53,000	-28	-13	-4	-14	-14	-22	-27	26	12	4	13	12	6	3	10	7	6	7
40,000	-31	-23	-12	-21	-22	-31	-36	27	20	10	18	19	10	5	13	12	10	13
30,000	-29	-22	-14	-17	-20	-30	-36	25	19	12	15	17	8	3	15	14	12	14
20,000	-18	-15	-10	-12	-13	-20	-24	16	13	9	10	12	5	2	11	10	8	10
DHAHRAN AB TO KINOLEY AFB																		
53,000	-30	-22	-11	-16	-19	-26	-30	29	21	10	15	18	12	9	8	7	5	6
40,000	-40	-34	-25	-33	-33	-41	-45	37	32	23	31	30	23	19	12	11	9	11
30,000	-37	-31	-23	-29	-29	-38	-42	34	29	21	27	27	20	16	12	11	8	11
20,000	-26	-21	-18	-19	-21	-27	-30	25	20	18	18	20	15	12	9	8	6	8
DHAHRAN AB TO KWAJALEIN NAS																		
53,000	44	33	-5	19	26	7	-3	-46	-34	4	-20	-27	-40	-46	8	8	6	7
40,000	53	48	5	26	36	14	7	-56	-50	-6	-27	-38	-53	-58	9	9	7	9
30,000	47	40	3	21	30	11	4	-49	-41	-3	-22	-31	-45	-50	8	8	5	7
20,000	24	21	0	8	14	4	1	-25	-22	-1	-9	-15	-23	-26	6	5	4	5
DHAHRAN AB TO LAO AFB																		
53,000	3	4	4	3	4	0	-2	-5	-5	-5	-4	-5	-8	-10	7	5	4	5
40,000	4	5	6	4	5	-1	-4	-7	-7	-7	-6	-7	-12	-15	9	8	7	8
30,000	4	4	3	3	3	-2	-6	-7	-6	-5	-5	-5	-11	-15	9	9	8	8
20,000	3	2	3	2	2	-2	-5	-4	-3	-4	-3	-4	-8	-11	8	7	6	7
DHAHRAN AB TO LAJES AP																		
53,000	-32	-26	-13	-16	-21	-29	-33	31	25	12	15	20	13	10	8	7	6	7
40,000	-40	-37	-26	-32	-33	-42	-47	37	35	25	30	31	23	19	13	12	9	11
30,000	-34	-33	-23	-27	-28	-37	-41	31	31	22	25	27	19	15	13	12	9	11
20,000	-23	-21	-18	-17	-19	-25	-28	21	20	18	16	18	13	10	10	9	6	8
DHAHRAN AB TO LE BOURGET AP																		
53,000	-32	-22	-9	-15	-18	-27	-32	30	20	8	14	17	10	6	10	9	7	8
40,000	-39	-33	-23	-29	-31	-41	-46	36	31	20	26	28	18	13	15	14	11	14
30,000	-34	-29	-22	-24	-26	-37	-42	30	27	20	21	24	15	10	17	15	11	14
20,000	-21	-18	-16	-14	-17	-24	-28	20	17	16	13	16	10	6	12	10	8	10
DHAHRAN AB TO LONDON INTERNATIONAL																		
53,000	-31	-20	-9	-14	-17	-26	-31	29	18	8	13	16	9	6	10	8	7	8
40,000	-37	-30	-21	-28	-29	-39	-44	34	28	19	25	26	16	11	15	13	11	14
30,000	-33	-27	-21	-23	-25	-35	-41	29	24	19	21	23	13	8	16	15	12	14
20,000	-21	-17	-16	-14	-17	-23	-27	19	16	15	13	15	9	5	12	10	8	10
DHAHRAN AB TO LORING AFB																		
53,000	-30	-16	-10	-18	-17	-25	-29	29	15	9	17	16	11	8	8	6	5	6
40,000	-40	-27	-24	-33	-30	-39	-43	37	24	21	30	28	20	16	12	10	10	12
30,000	-38	-26	-24	-30	-29	-38	-43	34	23	22	27	26	18	13	14	13	11	13
20,000	-25	-17	-16	-19	-19	-25	-29	23	16	15	17	18	11	8	10	9	7	9
DHAHRAN AB TO MAURIPUR AP																		
53,000	52	35	-18	19	26	-1	-14	-53	-36	17	-20	-27	-45	-53	14	15	13	15
40,000	77	61	-8	33	44	7	-6	-79	-62	8	-35	-46	-71	-83	22	22	11	19
30,000	61	49	-4	26	33	8	-2	-63	-50	3	-27	-35	-56	-67	21	18	9	14
20,000	37	27	0	10	17	4	0	-37	-28	-1	-10	-17	-32	-40	13	12	8	9

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*								STANDARD DEVIATION							
	O I R E C T								R E T U R N							
	JAN	APR	JUL	OCT	**A50	A75	A85		JAN	APR	JUL	OCT	A50	A75	A85	
OHAHRAN AB TO MCCHORO AFB																
53,000	-4	-3	2	-5	-2	-6	-9		2	2	-2	3	1	-3	-5	6377 N.MI.
40,000	-3	-3	1	-4	-2	-8	-11		0	1	-3	1	0	-5	-8	7 6 4 5
30,000	-2	-3	-1	-2	-2	-8	-11		-1	1	-1	0	0	-6	-10	8 8 7 8
20,000	-1	-2	0	0	-1	-5	-8		0	1	-1	-1	0	-5	-7	9 9 8 9
DHAHRAN AB TO MCGUIRE AFB																
53,000	-31	-17	-11	-19	-18	-26	-30		30	16	10	18	17	11	9	5768 N.MI.
40,000	-43	-29	-27	-36	-33	-42	-47		40	27	24	33	31	22	18	8 6 5 6
30,000	-42	-28	-27	-33	-32	-41	-46		38	25	25	30	29	20	16	11 10 10 11
20,000	-28	-19	-18	-21	-21	-28	-31		26	17	17	20	20	14	10	14 12 10 12
DHAHRAN AB TO MIOWAY NAS																
53,000	34	26	15	26	25	18	15		-37	-28	-15	-27	-26	-34	-38	6535 N.MI.
40,000	41	35	26	36	35	27	23		-46	-38	-28	-39	-38	-45	-50	9 7 6 7
30,000	32	31	20	28	27	20	17		-36	-34	-21	-31	-30	-38	-42	10 9 9 10
20,000	23	20	10	20	18	12	9		-25	-21	-11	-21	-20	-25	-28	10 10 8 9
OHAHRAN AB TO MILOENHALL AP																
53,000	-31	-19	-8	-14	-17	-25	-30		29	17	7	13	15	8	5	2711 N.MI.
40,000	-37	-30	-20	-27	-28	-38	-43		33	27	17	24	25	15	10	10 8 7 8
30,000	-32	-26	-20	-23	-25	-35	-41		29	23	19	20	22	13	8	15 13 11 14
20,000	-20	-16	-15	-14	-16	-23	-27		19	15	14	13	15	8	5	16 15 12 14
DHAHRAN AB TO MINOT AFB																
53,000	-18	-8	-1	-11	-9	-15	-19		16	7	1	10	8	2	0	6071 N.MI.
40,000	-19	-14	-7	-13	-13	-20	-23		16	12	5	11	11	4	1	8 6 4 6
30,000	-17	-15	-9	-11	-13	-20	-24		13	12	6	9	10	3	-1	9 8 8 9
20,000	-10	-10	-5	-7	-8	-13	-16		8	9	4	6	6	1	-1	11 10 9 10
DHAHRAN AB TO MOSCOW INTERNATIONAL																
53,000	-16	-5	3	-6	-5	-13	-18		12	2	-4	4	3	-5	-8	1851 N.MI.
40,000	-19	-10	0	-9	-9	-21	-27		12	5	-3	5	4	-6	-12	13 10 8 10
30,000	-16	-9	-5	-7	-9	-19	-25		10	5	2	3	5	-5	-11	16 15 14 15
20,000	-9	-6	-2	-4	-5	-13	-17		7	4	1	3	4	-4	-8	18 16 13 15
OHAHRAN AB TO MYRTLE BEACH AFB																
53,000	-32	-19	-10	-19	-19	-26	-31		30	17	10	18	18	12	9	6181 N.MI.
40,000	-45	-32	-27	-38	-35	-44	-48		41	29	25	35	32	24	20	8 6 5 6
30,000	-43	-30	-26	-34	-33	-42	-47		39	27	25	31	30	22	17	11 11 9 11
20,000	-30	-20	-18	-22	-22	-29	-32		28	19	18	21	21	15	12	13 12 10 12
OHAHRAN AB TO NOUASSEUR AB																
53,000	-42	-35	-10	-20	-26	-38	-43		41	34	9	19	25	14	9	2999 N.MI.
40,000	-53	-50	-23	-37	-40	-53	-59		51	48	22	35	38	27	22	9 8 7 7
30,000	-45	-45	-19	-29	-33	-46	-52		43	43	18	28	32	21	16	15 13 9 12
20,000	-29	-28	-13	-16	-20	-29	-33		28	27	13	15	20	13	10	15 12 8 11
OHAHRAN AB TO ORLY AP																
53,000	-32	-22	-9	-15	-18	-27	-33		30	20	8	14	17	10	6	2586 N.MI.
40,000	-39	-34	-23	-29	-31	-41	-46		36	31	21	27	28	18	13	10 9 7 8
30,000	-34	-29	-22	-24	-27	-37	-42		30	27	20	21	24	15	10	15 14 11 14
20,000	-21	-18	-17	-14	-17	-24	-28		20	17	16	13	16	10	6	17 15 11 14
OHAHRAN AB TO PALAM AP																
53,000	59	42	-4	30	35	11	-2		-60	-43	3	-31	-36	-52	-60	1439 N.MI.
40,000	78	60	0	33	45	13	2		-80	-62	-1	-34	-46	-71	-82	14 13 11 13
30,000	59	50	0	30	36	12	3		-61	-51	-1	-30	-37	-56	-65	19 18 10 17
20,000	36	27	-1	12	18	5	0		-37	-28	1	-12	-18	-32	-38	18 15 8 12
OHAHRAN AB TO PATRICK AFB																
53,000	-32	-20	-10	-18	-19	-27	-31		30	19	9	17	18	12	9	6470 N.MI.
40,000	-44	-34	-26	-36	-35	-43	-48		41	31	24	34	32	24	20	8 6 5 6
30,000	-42	-31	-25	-33	-32	-41	-46		39	28	23	30	29	21	17	11 11 9 11
20,000	-29	-21	-18	-22	-22	-28	-32		27	20	18	21	21	15	13	12 11 9 11
OHAHRAN AB TO PIARCO AP																
53,000	-32	-29	-2	-13	-20	-31	-34		31	28	2	13	19	7	3	6240 N.MI.
40,000	-46	-45	-17	-25	-33	-46	-51		44	44	16	24	31	19	15	7 6 5 5
30,000	-35	-36	-13	-18	-24	-36	-41		33	35	12	17	23	14	11	10 9 6 8
20,000	-17	-18	-4	-9	-12	-18	-21		16	17	4	8	11	6	3	10 8 5 7

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	O I R E C T							R E T U R N							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85				
DHAHRAN AB TO POPE AFB																		6121 N.MI.
53,000	-32	-18	-10	-19	-19	-26	-31	30	17	10	18	18	12	9	8	6	5	6
40,000	-44	-31	-27	-37	-34	-43	-48	41	28	25	34	31	23	19	11	10	9	11
30,000	-43	-30	-27	-34	-32	-42	-47	39	27	25	31	30	21	17	13	12	10	12
20,000	-29	-20	-18	-22	-22	-28	-32	27	18	17	20	20	14	11	10	9	7	9
DHAHRAN AB TO PRESTWICK AB																		2932 N.MI.
53,000	-30	-17	-7	-14	-16	-24	-29	28	16	6	13	14	8	5	10	8	6	8
40,000	-35	-27	-18	-26	-26	-36	-41	31	24	16	23	23	14	9	14	13	11	14
30,000	-32	-24	-19	-22	-24	-34	-40	28	21	17	20	21	12	6	16	15	12	14
20,000	-20	-16	-14	-14	-16	-23	-27	18	14	13	13	14	8	4	12	10	8	10
DHAHRAN AB TO RAMEY AFB																		6267 N.MI.
53,000	-29	-25	-8	-13	-18	-27	-31	27	24	7	12	17	10	7	7	6	5	6
40,000	-39	-39	-20	-25	-30	-40	-44	36	37	19	24	28	20	16	11	10	7	9
30,000	-30	-32	-17	-21	-24	-32	-37	27	30	16	19	22	16	12	10	9	6	9
20,000	-18	-19	-12	-13	-15	-20	-23	16	18	12	12	14	10	8	8	7	5	6
DHAHRAN AB TO RHEIN MAIN AB																		2379 N.MI.
53,000	-32	-20	-8	-14	-17	-27	-32	30	18	7	13	16	8	5	11	9	7	9
40,000	-38	-32	-20	-27	-29	-39	-45	34	29	17	24	26	15	10	15	14	12	14
30,000	-33	-28	-20	-22	-25	-36	-42	29	25	18	19	23	13	7	17	15	12	14
20,000	-20	-17	-15	-13	-16	-23	-27	19	16	15	12	15	8	5	12	11	8	10
DHAHRAN AB TO SEOUL AB																		3863 N.MI.
53,000	51	40	15	43	40	26	17	-53	-41	-16	-44	-41	-50	-55	10	9	7	8
40,000	62	51	28	44	46	34	28	-64	-53	-29	-46	-48	-60	-66	13	11	10	12
30,000	50	44	19	32	36	25	19	-53	-46	-20	-33	-38	-50	-56	12	11	8	9
20,000	32	25	8	18	21	13	9	-32	-25	-9	-19	-21	-29	-33	8	7	6	6
DHAHRAN AB TO STEVENSON FIELD																		5911 N.MI.
53,000	-20	-9	-2	-12	-10	-16	-20	18	7	1	11	9	3	1	8	6	4	6
40,000	-21	-15	-8	-15	-14	-21	-25	18	13	6	12	12	5	2	9	9	8	9
30,000	-18	-16	-9	-13	-14	-21	-25	15	13	7	10	11	4	0	11	10	9	10
20,000	-11	-11	-5	-8	-9	-14	-17	9	9	4	7	7	2	-1	8	8	6	8
DHAHRAN AB TO SUNG SHAN																		3808 N.MI.
53,000	64	43	-11	24	34	5	-9	-66	-45	10	-25	-35	-55	-64	10	10	8	10
40,000	74	57	0	28	43	11	2	-76	-59	-1	-30	-45	-67	-75	12	11	8	12
30,000	61	49	0	25	36	11	2	-63	-50	-1	-26	-37	-56	-63	11	10	6	9
20,000	37	27	-1	12	19	6	0	-37	-27	0	-13	-20	-32	-37	7	6	5	5
DHAHRAN AB TO TACHIKAWA AB																		4467 N.MI.
53,000	52	41	17	44	41	28	18	-54	-42	-17	-45	-42	-51	-55	10	8	7	8
40,000	62	51	30	47	48	36	30	-65	-53	-31	-49	-49	-60	-66	12	10	10	11
30,000	52	45	20	35	38	26	21	-54	-47	-21	-36	-39	-51	-56	11	11	8	9
20,000	33	26	9	20	22	14	10	-34	-27	-10	-21	-23	-31	-34	7	7	6	6
DHAHRAN AB TO TAN SAN NHUT																		3317 N.MI.
53,000	34	23	-40	-2	10	-21	-38	-35	-24	39	2	-11	-29	-35	8	8	7	7
40,000	45	36	-22	10	22	-7	-20	-48	-37	21	-11	-23	-42	-49	11	11	7	9
30,000	35	28	-9	11	17	0	-8	-37	-29	9	-12	-18	-33	-38	10	10	5	7
20,000	21	14	-2	3	8	0	-3	-21	-14	2	-4	-8	-17	-21	7	6	5	5
DHAHRAN AB TO THULE AB																		4246 N.MI.
53,000	-16	-10	1	-10	-8	-15	-18	13	9	-2	9	7	1	-2	9	7	5	6
40,000	-16	-10	-2	-10	-9	-17	-20	12	7	1	7	6	0	-4	10	9	8	10
30,000	-13	-10	-6	-8	-9	-17	-21	9	8	4	5	6	-1	-5	12	11	10	11
20,000	-8	-8	-3	-4	-5	-11	-14	6	7	2	3	4	-1	-4	9	9	7	8
DHAHRAN AB TO TORBAY AP																		4737 N.MI.
53,000	-30	-18	-11	-17	-18	-25	-29	28	16	11	17	17	11	9	8	7	6	7
40,000	-41	-29	-27	-34	-32	-41	-45	38	26	25	32	30	22	17	12	11	10	12
30,000	-39	-28	-26	-31	-31	-40	-45	36	25	25	28	28	19	15	14	13	11	13
20,000	-27	-19	-19	-20	-21	-27	-31	25	17	18	19	19	13	10	11	10	7	9
DHAHRAN AB TO TORREJON AFB																		2774 N.MI.
53,000	-37	-29	-12	-18	-23	-33	-38	36	28	11	17	22	14	10	10	9	8	8
40,000	-46	-43	-27	-34	-36	-47	-53	43	40	25	32	34	25	20	15	14	10	13
30,000	-38	-38	-24	-27	-31	-41	-47	36	36	23	26	29	20	16	16	13	10	12
20,000	-25	-24	-18	-16	-20	-27	-31	24	23	18	15	20	13	10	11	9	7	8

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEADWINDS*							STANDARD DEVIATION						
	DIRECT								RETURN													
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT				
DHAHRAN AB TO TRAVIS AFB																			6903 N.MI.			
53,000	-5	-5	1	-5	-3	-8	-10	3	4	-1	4	2	-2	-4	7	6	4	5				
40,000	-5	-4	-1	-5	-3	-9	-12	1	2	-1	2	1	-5	-7	8	8	7	8				
30,000	-4	-4	-2	-3	-3	-9	-13	0	1	0	0	1	-5	-9	10	9	8	9				
20,000	-2	-3	-1	-1	-2	-6	-9	0	2	0	-1	0	-4	-7	7	7	6	7				
DHAHRAN AB TO WAKE AP																			6202 N.MI.			
53,000	52	41	9	34	37	21	11	-54	-42	-10	-35	-38	-48	-54	9	8	7	7				
40,000	66	55	22	42	48	31	23	-69	-57	-23	-44	-50	-63	-69	11	10	9	10				
30,000	57	46	15	32	38	23	16	-60	-48	-16	-33	-40	-54	-60	10	9	7	8				
20,000	33	27	7	17	21	12	8	-35	-28	-7	-18	-22	-31	-35	7	6	5	5				
DHAHRAN AB TO WESTOVER AFB																			5613 N.MI.			
53,000	-31	-17	-10	-19	-18	-25	-30	29	16	10	18	17	11	9	8	6	5	6				
40,000	-42	-28	-26	-35	-33	-41	-46	39	26	24	33	30	22	18	12	10	10	12				
30,000	-41	-28	-26	-32	-31	-40	-46	37	25	24	29	28	20	15	14	12	10	12				
20,000	-27	-18	-18	-21	-20	-27	-31	25	17	17	19	19	13	10	10	9	7	9				
DHAHRAN AB TO WHEELUS AP																			1955 N.MI.			
53,000	-47	-37	-4	-20	-27	-42	-48	46	36	4	19	26	11	5	11	10	9	9				
40,000	-61	-54	-20	-39	-43	-59	-67	59	53	19	38	41	25	19	18	16	11	14				
30,000	-54	-48	-15	-30	-35	-52	-60	51	47	15	28	33	19	14	18	15	9	13				
20,000	-32	-29	-11	-16	-20	-31	-36	31	29	10	15	20	11	8	13	10	7	8				
DON MUANG TO DOVER AFB																			7609 N.MI.			
53,000	-6	-2	-2	-4	-3	-7	-9	3	1	1	3	2	-2	-4	7	6	4	5				
40,000	-8	-8	-2	-7	-6	-12	-14	3	5	0	4	3	-2	-5	8	7	7	8				
30,000	-10	-9	-1	-7	-7	-13	-16	6	6	-1	5	4	-2	-5	9	9	7	8				
20,000	-7	-6	-1	-4	-4	-9	-11	5	4	0	3	3	-1	-4	7	7	6	6				
DON MUANG TO DUM DUM																			867 N.MI.			
53,000	-25	-13	36	17	4	-19	-27	23	11	-39	-18	-5	-28	-37	14	13	12	11				
40,000	-23	-25	19	2	-5	-24	-33	18	23	-21	-3	3	-12	-20	17	16	11	11				
30,000	-22	-16	11	-7	-7	-21	-28	19	15	-11	6	6	-6	-11	15	17	9	10				
20,000	-14	-9	3	0	-5	-13	-17	14	9	-3	0	4	-3	-7	11	10	8	8				
DON MUANG TO ELMENDORF AFB																			5213 N.MI.			
53,000	24	13	-3	14	13	3	-2	-27	-15	2	-15	-14	-22	-27	9	7	6	7				
40,000	20	13	9	14	14	8	4	-25	-17	-11	-17	-17	-24	-28	9	9	8	9				
30,000	15	10	8	9	11	4	1	-19	-13	-9	-11	-13	-20	-23	10	10	8	9				
20,000	6	5	5	6	5	1	-2	-8	-6	-6	-7	-7	-11	-14	8	7	6	7				
DON MUANG TO ENIWETOK AFB																			3608 N.MI.			
53,000	-3	-4	-33	-19	-14	-25	-31	2	4	32	19	13	3	-1	7	7	7	5				
40,000	2	9	-19	-6	-3	-13	-18	-3	-10	19	6	2	-6	-10	7	8	7	7				
30,000	3	6	-10	-5	-2	-8	-10	-3	-6	10	5	2	-5	-8	6	7	5	5				
20,000	-4	-2	-6	-6	-4	-8	-9	4	1	5	6	4	1	-1	5	5	5	4				
DON MUANG TO ERNEST HARMON AFB																			6892 N.MI.			
53,000	-19	-13	-4	-11	-11	-17	-20	16	11	3	9	9	5	2	8	6	5	6				
40,000	-19	-17	-8	-16	-15	-21	-24	15	15	6	14	12	6	3	9	8	7	9				
30,000	-19	-18	-7	-16	-15	-22	-26	16	16	6	14	13	6	3	10	9	8	9				
20,000	-12	-12	-4	-10	-9	-15	-17	11	11	3	9	8	3	0	7	7	6	7				
DON MUANG TO GALEAO																			8679 N.MI.			
53,000	3	-11	0	0	-2	-7	-10	-3	11	-1	0	1	-4	-6	6	5	6	5				
40,000	-4	-20	-16	-19	-16	-21	-24	3	19	15	19	15	8	4	7	7	7	6				
30,000	-3	-15	-18	-14	-13	-18	-21	2	14	17	14	12	6	3	6	6	6	6				
20,000	1	-3	-6	-4	-3	-6	-8	-2	3	6	4	3	-1	-2	4	4	5	4				
DON MUANG TO GEORGE AFB																			7174 N.MI.			
53,000	30	19	-1	18	18	7	1	-33	-20	0	-19	-19	-27	-32	8	7	5	7				
40,000	33	26	15	27	25	17	13	-37	-29	-17	-30	-28	-36	-40	10	9	9	10				
30,000	29	22	13	21	21	13	9	-33	-25	-14	-23	-24	-32	-36	10	10	8	10				
20,000	17	13	9	14	13	8	5	-19	-14	-10	-15	-14	-20	-23	8	7	6	7				
DON MUANG TO GODSE AB																			6649 N.MI.			
53,000	-15	-8	-4	-9	-9	-14	-17	12	7	3	8	7	2	0	7	6	5	6				
40,000	-15	-15	-6	-13	-12	-18	-21	11	13	4	11	10	4	1	9	8	7	8				
30,000	-16	-16	-5	-14	-13	-19	-23	13	14	4	12	11	4	1	9	9	8	8				
20,000	-11	-11	-3	-8	-8	-13	-16	9	9	2	7	7	2	-1	7	7	6	7				

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION							
	DIRECT							RETURN							JAN	APR	JUL	OCT				
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85								
DON MUANG TO HICKAM AFB																			5718 N.MI.			
53,000	42	25	-18	-1	11	-10	-17	-43	-26	18	1	-12	-34	-41	8	7	6	6				
40,000	59	47	-3	18	32	7	-1	-61	-49	2	-20	-33	-55	-61	9	10	7	8				
30,000	53	38	1	15	26	7	2	-54	-39	-1	-16	-27	-46	-53	9	9	6	7				
20,000	29	20	2	6	13	4	1	-30	-20	-2	-7	-13	-25	-29	6	5	4	5				
DON MUANG TO INCIRLIK AB																			3717 N.MI.			
53,000	-46	-33	10	-16	-24	-39	-45	44	31	-11	15	23	1	-9	9	8	7	8				
40,000	-57	-44	-8	-24	-34	-50	-57	52	42	6	23	31	14	7	12	11	8	10				
30,000	-44	-36	-10	-23	-28	-40	-46	41	34	9	22	26	15	10	11	10	6	8				
20,000	-27	-21	-5	-11	-15	-24	-28	26	20	5	11	15	7	4	7	7	5	6				
DON MUANG TO IWO JIMA																			2385 N.MI.			
53,000	40	17	-36	-10	3	-23	-34	-40	-17	35	9	-3	-28	-38	10	9	8	8				
40,000	48	36	-16	11	22	-3	-14	-49	-37	15	-12	-23	-43	-50	11	12	9	9				
30,000	44	29	-7	10	18	0	-6	-45	-30	7	-10	-19	-38	-45	10	11	7	9				
20,000	21	15	0	4	9	2	-1	-21	-15	0	-5	-10	-18	-22	7	7	6	6				
DON MUANG TO JOHNSTON AFB																			5155 N.MI.			
53,000	25	13	-24	-10	1	-17	-23	-26	-14	24	10	-1	-20	-25	7	6	5	5				
40,000	36	34	-7	5	18	-1	-6	-37	-35	7	-6	-19	-36	-40	8	9	7	7				
30,000	32	24	-4	4	13	0	-4	-33	-25	3	-5	-13	-29	-34	7	8	5	6				
20,000	9	9	-2	0	3	-2	-4	-10	-9	2	0	-4	-9	-12	6	5	4	4				
DON MUANG TO KADENA AB																			1697 N.MI.			
53,000	42	19	-39	-10	4	-24	-37	-43	-20	39	9	-5	-31	-41	11	11	10	10				
40,000	51	33	-19	12	22	-4	-17	-52	-34	19	-13	-23	-44	-52	13	13	10	11				
30,000	46	28	-9	9	17	-1	-8	-47	-29	9	-10	-18	-38	-47	12	13	8	10				
20,000	20	14	0	5	9	2	-1	-21	-14	0	-5	-9	-18	-22	8	8	7	7				
DON MUANG TO KEFLAVIK AP																			5458 N.MI.			
53,000	-23	-12	-4	-12	-12	-19	-23	19	10	3	11	10	5	2	8	7	5	6				
40,000	-21	-21	-10	-16	-17	-24	-27	16	18	8	14	14	8	4	10	9	8	9				
30,000	-21	-22	-9	-16	-17	-24	-28	17	19	8	14	14	7	4	10	10	8	9				
20,000	-13	-13	-4	-10	-10	-16	-18	12	12	4	10	9	4	1	8	7	6	7				
DON MUANG TO KINDLEY AFB																			7898 N.MI.			
53,000	-20	-13	-4	-12	-12	-18	-21	17	11	3	10	10	5	2	8	6	5	6				
40,000	-22	-19	-9	-18	-17	-24	-27	17	16	7	15	14	8	4	9	8	7	9				
30,000	-21	-20	-9	-18	-17	-24	-28	17	17	7	16	14	7	4	10	10	8	9				
20,000	-14	-13	-5	-11	-11	-16	-19	12	12	4	10	9	4	2	8	7	6	7				
DON MUANG TO KWAJALEIN NAS																			3950 N.MI.			
53,000	-8	-5	-31	-19	-15	-24	-29	7	5	30	18	14	6	3	7	6	6	5				
40,000	0	7	-18	-7	-4	-13	-17	0	-7	18	7	4	-4	-7	6	7	6	6				
30,000	0	5	-10	-6	-3	-8	-11	0	-5	10	5	3	-3	-6	5	6	5	5				
20,000	-6	-3	-7	-7	-6	-9	-10	6	3	6	7	5	2	1	5	4	4	4				
DON MUANG TO LADD AFB																			5178 N.MI.			
53,000	21	11	-3	12	10	2	-2	-25	-13	2	-13	-12	-20	-24	9	7	6	7				
40,000	16	10	8	11	11	5	2	-21	-13	-10	-14	-14	-21	-24	9	9	8	9				
30,000	12	7	8	7	8	2	-1	-16	-10	-9	-9	-11	-17	-21	9	10	8	9				
20,000	4	3	5	5	4	0	-3	-6	-5	-5	-6	-5	-10	-12	7	7	6	7				
DON MUANG TO LAJES AP																			6492 N.MI.			
53,000	-28	-17	-6	-15	-15	-23	-27	26	15	5	13	14	8	5	8	6	5	6				
40,000	-28	-22	-17	-23	-22	-29	-33	23	20	16	21	20	14	10	10	9	8	10				
30,000	-25	-20	-17	-22	-21	-27	-31	22	18	15	20	19	12	9	10	10	8	9				
20,000	-17	-12	-10	-14	-13	-18	-21	16	12	9	13	12	7	5	7	7	6	7				
DON MUANG TO LE BOURGET AP																			5087 N.MI.			
53,000	-31	-18	-4	-16	-17	-25	-30	28	16	3	15	15	7	4	9	7	6	7				
40,000	-29	-23	-16	-22	-22	-30	-34	25	21	14	20	20	13	10	10	9	9	10				
30,000	-26	-21	-16	-21	-21	-28	-32	23	19	15	20	19	12	9	11	10	8	9				
20,000	-17	-13	-8	-13	-12	-18	-20	16	12	7	12	12	7	4	7	7	6	7				
DON MUANG TO LONDON INTERNATIONAL																			5151 N.MI.			
53,000	-30	-17	-4	-16	-16	-24	-29	27	15	3	15	14	7	4	9	7	6	7				
40,000	-27	-23	-16	-22	-22	-29	-33	23	20	14	20	19	12	9	10	9	9	10				
30,000	-25	-21	-15	-21	-20	-27	-31	22	18	14	19	18	12	8	11	10	8	10				
20,000	-16	-13	-8	-13	-12	-17	-20	15	12	7	12	11	6	4	8	7	6	7				

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**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION							
	D I R E C T							R E T U R N							JAN	APR	JUL	OCT				
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85								
DON MUANG TO LORING AFB																			7096 N.MI.			
53,000	-12	-5	-3	-8	-7	-11	-14	9	4	2	6	5	1	-1	7	6	4	6				
40,000	-13	-13	-4	-12	-10	-16	-19	9	10	3	9	8	2	-1	8	7	7	8				
30,000	-15	-14	-4	-12	-11	-18	-21	11	11	2	10	9	2	-1	9	9	8	8				
20,000	-10	-9	-3	-7	-7	-12	-14	8	8	2	6	6	1	-1	7	7	6	6				
DON MUANG TO MAURIPUR AP																			2009 N.MI.			
53,000	-39	-28	44	2	-12	-33	-40	37	27	-45	-3	11	-22	-43	11	10	9	9				
40,000	-47	-35	22	-7	-19	-41	-48	43	33	-23	6	17	-10	-21	14	13	8	10				
30,000	-35	-25	9	-11	-16	-30	-37	33	24	-10	10	15	-1	-8	12	12	6	8				
20,000	-21	-12	3	-4	-7	-16	-21	20	12	-3	3	7	0	-4	8	8	6	6				
DON MUANG TO MCCORD AFB																			6468 N.MI.			
53,000	25	14	-2	15	14	4	0	-28	-15	1	-17	-15	-23	-27	8	6	5	6				
40,000	24	16	11	18	17	11	7	-29	-19	-13	-21	-20	-27	-31	9	9	8	9				
30,000	20	13	10	12	14	7	3	-24	-16	-12	-15	-16	-23	-27	10	10	8	9				
20,000	10	6	6	8	7	3	0	-12	-8	-7	-10	-9	-14	-16	8	7	6	7				
DON MUANG TO MCGUIRE AFB																			7553 N.MI.			
53,000	-7	-3	-2	-5	-4	-8	-10	4	1	1	3	2	-1	-3	7	6	4	5				
40,000	-9	-9	-2	-8	-7	-12	-15	4	6	0	5	4	-1	-4	8	7	7	8				
30,000	-11	-10	-1	-8	-7	-14	-17	7	7	0	6	5	-1	-4	9	9	7	8				
20,000	-7	-6	-2	-5	-5	-9	-12	6	5	1	3	3	-1	-3	7	7	6	6				
DON MUANG TO MIDWAY NAS																			4593 N.MI.			
53,000	51	30	-20	2	15	-10	-18	-52	-31	19	-3	-16	-42	-50	9	8	7	7				
40,000	70	53	-4	24	38	9	-1	-71	-55	2	-25	-39	-63	-71	10	11	8	10				
30,000	63	43	1	21	31	10	3	-65	-44	-2	-22	-33	-55	-63	9	9	6	8				
20,000	38	26	5	12	19	8	5	-39	-27	-5	-12	-19	-32	-38	7	6	5	6				
DON MUANG TO MILDENHALL AP																			5103 N.MI.			
53,000	-30	-17	-4	-16	-16	-24	-29	27	15	3	14	14	7	3	9	7	6	7				
40,000	-27	-23	-16	-21	-22	-29	-32	23	20	14	20	19	12	9	10	9	9	10				
30,000	-25	-20	-15	-21	-20	-27	-31	21	18	14	19	18	11	8	11	10	8	10				
20,000	-16	-13	-7	-13	-12	-17	-20	15	12	7	12	11	6	4	8	7	6	7				
DON MUANG TO MINOT AFB																			6890 N.MI.			
53,000	18	8	0	10	8	3	0	-21	-10	-1	-11	-10	-17	-20	8	6	4	6				
40,000	13	6	7	9	9	3	0	-17	-9	-9	-11	-11	-17	-20	8	8	7	8				
30,000	9	5	8	8	7	2	-1	-13	-8	-9	-10	-10	-15	-18	8	9	7	8				
20,000	5	4	6	5	5	1	-1	-7	-5	-7	-6	-6	-10	-13	7	6	5	6				
DON MUANG TO MOSCOW INTERNATIONAL																			3807 N.MI.			
53,000	-30	-17	-3	-15	-16	-25	-29	26	15	1	13	13	5	1	10	8	7	8				
40,000	-26	-23	-13	-19	-20	-28	-32	21	20	12	17	17	10	6	11	10	9	10				
30,000	-23	-21	-12	-18	-18	-26	-30	20	18	11	17	16	9	6	11	11	8	9				
20,000	-15	-12	-4	-11	-10	-16	-19	14	11	4	10	10	4	1	7	7	6	7				
DON MUANG TO MYRTLE BEACH AFB																			7944 N.MI.			
53,000	-2	0	-1	-1	-1	-5	-6	-2	-1	0	0	-1	-4	-6	7	5	4	5				
40,000	-4	-5	1	-3	-3	-8	-11	-1	2	-3	0	0	-6	-8	8	7	7	8				
30,000	-6	-5	1	-3	-3	-9	-12	1	2	-3	0	0	-5	-8	8	9	7	8				
20,000	-4	-3	1	-2	-2	-6	-9	2	1	-2	1	0	-4	-6	7	7	5	6				
DON MUANG TO NOUASSEUR AB																			5816 N.MI.			
53,000	-40	-30	-3	-17	-23	-35	-39	38	29	2	16	22	9	3	8	7	6	6				
40,000	-47	-40	-19	-27	-32	-43	-49	43	38	18	25	30	21	17	11	9	7	9				
30,000	-36	-34	-18	-24	-27	-36	-40	34	32	17	23	26	18	15	10	9	6	8				
20,000	-23	-21	-10	-13	-16	-22	-25	22	20	10	13	16	11	8	7	6	5	5				
DON MUANG TO ORLY AP																			5093 N.MI.			
53,000	-31	-18	-4	-16	-17	-25	-30	29	16	3	15	15	7	4	9	7	6	7				
40,000	-30	-23	-16	-22	-23	-30	-34	25	21	14	20	20	13	10	10	9	9	10				
30,000	-26	-21	-16	-21	-21	-28	-32	23	19	15	20	19	13	9	11	10	8	9				
20,000	-17	-13	-8	-13	-12	-18	-20	16	12	7	12	12	7	4	7	7	6	7				
DON MUANG TO PALAM AP																			1575 N.MI.			
53,000	-39	-26	31	6	-9	-32	-40	36	23	-33	-7	7	-21	-30	13	13	10	11				
40,000	-40	-34	13	-6	-17	-37	-45	34	31	-14	5	14	-6	-14	15	14	9	12				
30,000	-33	-25	7	-11	-15	-29	-36	30	24	-7	10	14	0	-6	13	14	7	9				
20,000	-21	-14	3	-4	-8	-18	-23	21	13	-3	3	8	0	-4	9	9	7	7				

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	O I R E C T							R E T U R N										
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
DON MUANG TO PATRICK AFB																		
53,000	1	2	0	0	1	-3	-5	-5	-3	-1	-2	-2	-6	-8	7	5	4	5
40,000	-2	-3	3	-1	-1	-6	-9	-4	-1	-5	-2	-3	-8	-11	8	7	7	8
30,000	-3	-3	3	0	-1	-6	-10	-1	-1	-4	-2	-2	-7	-10	8	9	7	8
20,000	-3	-1	2	0	0	-5	-7	1	0	-3	-1	-1	-5	-7	7	7	5	6
DON MUANG TO PIARCO AP																		
53,000	-23	-15	-4	-11	-13	-20	-23	21	14	4	10	12	6	3	7	6	5	6
40,000	-26	-23	-15	-19	-21	-27	-31	22	21	14	17	18	12	9	10	9	8	9
30,000	-22	-19	-14	-18	-18	-24	-28	19	17	13	16	16	10	7	10	9	7	9
20,000	-14	-11	-8	-12	-11	-16	-18	13	10	7	11	10	6	4	7	7	5	6
DON MUANG TO POPE AFB																		
53,000	-2	0	-1	-1	-1	-4	-6	-2	-2	0	0	-1	-4	-6	7	5	4	5
40,000	-4	-5	1	-3	-3	-8	-11	-1	2	-3	0	-1	-6	-8	8	7	7	8
30,000	-5	-5	1	-3	-3	-9	-12	1	2	-3	0	0	-5	-8	8	9	7	8
20,000	-4	-2	1	-2	-2	-6	-9	2	1	-2	0	0	-4	-6	7	7	5	6
DON MUANG TO PRESTWICK AB																		
53,000	-28	-16	-5	-15	-15	-23	-28	25	14	3	14	13	7	3	8	7	6	6
40,000	-26	-22	-16	-21	-21	-28	-32	21	20	14	19	18	12	8	10	9	9	10
30,000	-23	-20	-15	-20	-19	-27	-30	20	18	14	18	17	10	7	11	11	8	10
20,000	-16	-13	-7	-13	-12	-17	-20	14	12	7	12	11	6	3	8	7	6	7
DON MUANG TO RAMEY AFB																		
53,000	-21	-11	-4	-12	-11	-17	-21	18	9	3	10	9	4	2	8	6	5	6
40,000	-24	-22	-11	-18	-19	-25	-29	19	19	9	15	15	9	6	9	9	7	9
30,000	-24	-22	-10	-18	-18	-25	-29	20	19	9	15	15	9	5	10	10	8	9
20,000	-15	-14	-6	-12	-11	-17	-20	13	13	5	11	10	5	3	8	7	6	7
DON MUANG TO RHEIN MAIN AB																		
53,000	-32	-18	-4	-17	-17	-26	-31	29	16	3	15	15	7	3	9	7	6	7
40,000	-30	-24	-15	-22	-22	-30	-34	25	21	14	20	20	13	9	11	9	9	10
30,000	-26	-22	-15	-21	-21	-28	-32	23	20	14	20	19	12	9	11	10	8	9
20,000	-17	-13	-7	-12	-12	-17	-20	16	12	7	12	11	6	4	7	7	6	7
DON MUANG TO SEQUIL AB																		
53,000	48	27	-25	8	17	-9	-22	-52	-30	27	-9	-19	-41	-50	13	13	11	11
40,000	48	30	-2	19	24	7	-1	-54	-34	1	-22	-28	-44	-53	14	13	12	13
30,000	43	25	1	12	18	5	0	-49	-28	-2	-14	-21	-39	-47	13	13	9	12
20,000	19	13	5	8	11	5	2	-21	-14	-5	-9	-12	-19	-23	9	8	7	7
DON MUANG TO STEVENSON FIELD																		
53,000	16	7	0	8	7	2	-1	-19	-8	-1	-9	-9	-15	-18	7	6	4	6
40,000	10	4	7	8	7	2	-1	-14	-7	-9	-10	-10	-15	-18	8	7	7	8
30,000	7	3	8	7	6	1	-2	-10	-6	-9	-9	-9	-14	-17	8	8	7	8
20,000	4	3	7	5	5	1	-2	-5	-4	-7	-6	-6	-10	-12	6	6	5	6
DON MUANG TO SUNG SHAN																		
53,000	38	17	-42	-12	2	-26	-39	-39	-18	41	12	-2	-28	-37	12	11	11	10
40,000	48	28	-22	10	18	-6	-19	-49	-30	21	-11	-19	-40	-49	14	14	10	11
30,000	42	24	-10	7	14	-3	-9	-43	-25	10	-7	-15	-34	-43	12	14	8	10
20,000	16	11	-1	4	7	0	-3	-16	-11	1	-5	-7	-15	-18	9	8	7	7
DON MUANG TO TACHIKAWA AB																		
53,000	57	32	-24	9	20	-7	-21	-59	-34	23	-11	-21	-46	-57	11	11	10	10
40,000	61	42	-1	27	34	12	1	-64	-45	0	-29	-37	-55	-64	13	12	11	12
30,000	57	36	2	21	28	11	3	-60	-38	-3	-23	-31	-49	-59	12	12	9	11
20,000	28	20	5	12	16	8	5	-30	-21	-6	-13	-16	-25	-30	8	8	6	7
DON MUANG TO TAN SAN NHUT																		
53,000	-6	-8	-43	-31	-22	-37	-45	5	8	41	30	21	6	-1	15	12	14	12
40,000	-6	8	-33	-12	-11	-25	-32	5	-9	32	11	10	-4	-11	16	15	13	11
30,000	-2	7	-16	-6	-5	-14	-19	1	-7	16	5	5	-5	-11	12	15	10	11
20,000	-2	0	-4	-7	-3	-10	-13	1	0	4	7	3	-3	-7	10	9	9	8
DON MUANG TO THULE AB																		
53,000	-3	-2	-3	-2	-2	-6	-8	-1	0	2	1	1	-3	-6	8	6	4	6
40,000	-5	-8	-1	-5	-5	-10	-13	0	5	-1	3	2	-4	-6	9	7	7	8
30,000	-8	-9	0	-5	-5	-11	-15	4	6	-1	4	3	-3	-6	9	9	8	8
20,000	-6	-6	0	-3	-3	-8	-11	4	5	0	2	2	-2	-4	7	7	6	6

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION							
	DIRECT							RETURN							JAN	APR	JUL	OCT				
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85								
DON MUANG TO TORBAY AP																			6842 N.MI.			
53,000	-22	-12	-5	-13	-12	-19	-22	19	10	4	11	11	5	3	8	6	5	6				
40,000	-23	-21	-11	-18	-18	-25	-28	19	18	9	16	15	9	6	9	8	8	9				
30,000	-23	-21	-10	-18	-18	-25	-29	20	19	9	16	16	9	5	10	10	8	9				
20,000	-15	-14	-5	-12	-11	-17	-20	14	12	4	10	10	5	2	8	7	6	7				
DON MUANG TO TORREJON AFB																			5480 N.MI.			
53,000	-35	-24	-4	-16	-20	-29	-34	32	22	3	15	18	9	4	8	7	6	7				
40,000	-37	-31	-18	-24	-27	-35	-40	32	28	17	23	25	17	14	10	9	8	10				
30,000	-30	-27	-18	-22	-24	-31	-35	27	25	17	21	22	16	13	10	9	7	8				
20,000	-19	-16	-10	-13	-14	-19	-22	18	15	9	12	13	9	6	7	7	5	6				
DON MUANG TO TRAVIS AFB																			6862 N.MI.			
53,000	30	19	-1	18	18	7	1	-33	-20	0	-20	-20	-28	-32	9	7	6	7				
40,000	33	25	15	27	25	17	13	-37	-28	-17	-30	-28	-36	-40	10	9	9	10				
30,000	29	22	13	21	21	13	10	-33	-25	-15	-23	-24	-32	-36	10	10	9	10				
20,000	17	13	9	14	13	8	5	-19	-14	-10	-15	-14	-20	-23	8	7	6	7				
DON MUANG TO WAKE AP																			3790 N.MI.			
53,000	24	9	-31	-13	-4	-22	-29	-25	-10	30	13	3	-17	-23	7	7	6	5				
40,000	30	29	-14	3	14	-6	-12	-31	-30	13	-3	-15	-31	-35	8	9	7	7				
30,000	30	20	-7	3	10	-2	-6	-31	-21	6	-3	-11	-26	-31	7	8	5	6				
20,000	5	8	-2	0	2	-2	-4	-6	-8	1	0	-3	-8	-10	6	5	5	5				
DON MUANG TO WESTOVER AFB																			7412 N.MI.			
53,000	-9	-4	-3	-6	-5	-9	-11	6	2	2	4	3	0	-2	7	6	4	5				
40,000	-11	-10	-3	-10	-8	-14	-17	6	7	1	7	5	0	-3	8	7	7	8				
30,000	-13	-11	-2	-10	-9	-15	-19	9	8	1	8	6	0	-3	9	9	8	8				
20,000	-8	-7	-2	-5	-6	-10	-13	7	6	1	4	4	0	-2	7	7	6	6				
DON MUANG TO WHEELUS AP																			4817 N.MI.			
53,000	-46	-35	7	-17	-26	-40	-46	45	33	-8	16	24	4	-6	8	7	6	7				
40,000	-59	-49	-10	-28	-37	-54	-60	55	47	9	27	35	17	10	11	10	7	9				
30,000	-47	-40	-11	-25	-31	-43	-49	45	38	10	24	29	16	11	11	10	6	8				
20,000	-29	-23	-6	-13	-17	-26	-30	28	23	6	12	16	9	6	7	6	5	5				
DOVER AFB TO DUM DUM																			6985 N.MI.			
53,000	16	9	2	10	9	4	1	-18	-11	-3	-12	-11	-17	-20	7	6	4	6				
40,000	14	11	7	14	11	5	2	-18	-14	-9	-16	-14	-20	-23	9	8	7	9				
30,000	13	12	8	13	11	5	2	-17	-14	-9	-16	-14	-21	-24	10	9	8	9				
20,000	9	9	3	8	7	2	0	-11	-10	-4	-9	-8	-13	-16	7	7	6	7				
DOVER AFB TO ELMENDORF AFB																			2949 N.MI.			
53,000	-29	-14	-10	-20	-17	-25	-29	27	13	10	19	16	10	7	9	7	6	7				
40,000	-35	-21	-23	-29	-27	-36	-41	32	19	21	26	25	16	12	12	11	11	13				
30,000	-35	-23	-21	-28	-27	-36	-42	32	21	20	25	24	15	10	14	14	12	14				
20,000	-24	-17	-16	-19	-19	-25	-29	23	15	15	18	17	11	8	11	10	8	10				
DOVER AFB TO ENIWETOK AFB																			6379 N.MI.			
53,000	-25	-17	-7	-14	-15	-22	-26	24	16	6	13	14	8	6	8	7	5	6				
40,000	-46	-35	-20	-31	-32	-42	-47	42	32	19	28	30	21	17	10	10	9	10				
30,000	-41	-33	-18	-28	-29	-39	-44	38	30	17	26	27	19	15	11	10	8	10				
20,000	-29	-22	-13	-20	-20	-27	-31	27	21	12	19	19	13	11	9	7	5	7				
DOVER AFB TO ERNEST HARMON AFB																			921 N.MI.			
53,000	36	19	10	26	21	11	6	-38	-20	-10	-27	-23	-35	-42	16	14	10	13				
40,000	54	34	31	46	41	24	15	-59	-38	-34	-50	-45	-62	-72	25	23	22	25				
30,000	51	33	29	41	37	21	12	-56	-37	-31	-44	-41	-59	-69	28	26	19	25				
20,000	37	22	19	28	26	13	7	-39	-24	-20	-30	-27	-41	-48	20	20	13	19				
DOVER AFB TO GALEAO																			4134 N.MI.			
53,000	9	10	1	5	6	1	-1	-10	-11	-1	-6	-7	-12	-15	7	7	5	6				
40,000	13	10	4	7	8	2	-1	-16	-13	-6	-9	-11	-17	-21	10	10	7	8				
30,000	13	11	3	6	7	2	-1	-15	-12	-4	-7	-9	-15	-19	9	8	6	7				
20,000	4	4	-1	-1	1	-3	-5	-5	-5	1	0	-2	-6	-9	6	6	5	5				
DOVER AFB TO GEORGE AFB																			2013 N.MI.			
53,000	-42	-31	-10	-25	-27	-38	-43	41	31	9	24	26	15	10	12	10	8	10				
40,000	-68	-49	-34	-45	-47	-62	-71	66	46	32	42	45	32	26	19	17	14	18				
30,000	-59	-43	-26	-38	-40	-55	-64	57	41	25	36	38	25	19	20	18	12	18				
20,000	-39	-28	-17	-23	-25	-36	-43	37	27	17	22	24	15	11	14	13	8	13				

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.THE BOEING COMPANY
TRANSPORT DIVISIONNO. D6-9175
PAGE 95

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION				
	DIRECT							RETURN							JAN	APR	JUL	OCT	
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT	
DOVER AFB TO GOOSE AB																			1052 N.MI.
53,000	27	13	7	20	16	6	2	-30	-14	-8	-22	-17	-28	-34	15	13	10	13	
40,000	39	21	20	35	28	13	5	-46	-25	-24	-40	-34	-50	-59	23	21	20	23	
30,000	37	20	19	31	26	10	1	-44	-25	-23	-36	-31	-48	-58	27	25	19	24	
20,000	26	13	13	20	18	6	0	-29	-16	-15	-23	-20	-32	-39	19	19	12	18	
DOVER AFB TO HICKAM AFB																			4265 N.MI.
53,000	-29	-25	-11	-19	-20	-28	-32	27	24	11	18	20	13	10	9	8	6	7	
40,000	-50	-37	-31	-35	-37	-47	-52	47	35	30	33	35	27	22	13	12	10	12	
30,000	-42	-32	-22	-28	-30	-40	-45	39	30	21	26	28	20	16	13	12	8	11	
20,000	-26	-19	-12	-16	-17	-24	-29	25	18	11	16	16	11	8	10	9	6	8	
DOVER AFB TO INCIRLIK AB																			4852 N.MI.
53,000	29	16	13	20	18	13	10	-30	-17	-13	-20	-19	-26	-30	9	7	5	7	
40,000	40	26	30	37	33	24	20	-43	-28	-32	-39	-35	-44	-49	12	11	11	13	
30,000	39	26	28	34	31	22	17	-43	-28	-31	-37	-34	-44	-49	15	13	11	14	
20,000	28	18	19	23	22	15	11	-30	-19	-20	-24	-23	-30	-34	11	10	8	10	
DOVER AFB TO IWO JIMA																			6446 N.MI.
53,000	-33	-17	-5	-21	-19	-27	-32	30	16	5	19	17	9	6	8	6	5	6	
40,000	-38	-25	-18	-32	-28	-37	-41	32	22	16	28	25	17	13	10	9	9	10	
30,000	-35	-24	-17	-29	-26	-35	-39	30	21	15	26	23	15	11	10	10	9	11	
20,000	-24	-16	-12	-19	-17	-23	-27	21	14	11	17	16	10	8	8	8	6	8	
DOVER AFB TO JOHNSTON AFB																			4954 N.MI.
53,000	-26	-23	-11	-17	-19	-25	-29	25	22	10	16	18	12	9	8	7	5	7	
40,000	-47	-37	-28	-34	-36	-45	-50	44	34	27	32	34	25	21	12	11	9	11	
30,000	-40	-31	-21	-27	-29	-38	-43	37	29	20	25	27	19	15	12	11	8	11	
20,000	-24	-18	-10	-15	-16	-23	-27	23	17	10	14	15	10	7	9	8	5	7	
DOVER AFB TO KADENA AB																			6661 N.MI.
53,000	-24	-11	-5	-15	-13	-20	-24	21	9	4	13	11	5	3	8	6	5	6	
40,000	-20	-15	-15	-19	-17	-23	-26	15	11	14	15	14	8	5	8	8	8	9	
30,000	-18	-15	-15	-16	-16	-22	-25	13	11	13	14	13	7	4	9	9	8	9	
20,000	-11	-9	-10	-10	-10	-14	-17	8	7	9	9	8	4	1	7	7	6	7	
DOVER AFB TO KEFLAVIK AP																			2365 N.MI.
53,000	29	13	9	21	17	9	6	-31	-14	-9	-22	-18	-27	-32	12	9	7	9	
40,000	39	23	20	34	29	17	11	-43	-25	-23	-37	-32	-44	-50	16	15	14	16	
30,000	36	22	19	31	27	14	8	-41	-26	-22	-34	-30	-43	-51	19	18	15	18	
20,000	24	15	12	19	17	8	3	-26	-16	-13	-21	-19	-28	-34	14	14	10	14	
DOVER AFB TO KINDLEY AFB																			664 N.MI.
53,000	38	30	7	19	22	9	4	-41	-32	-7	-21	-24	-39	-47	17	17	10	16	
40,000	51	41	18	29	33	15	6	-56	-45	-19	-33	-37	-57	-68	26	26	19	25	
30,000	46	37	14	24	28	12	4	-51	-41	-15	-27	-31	-51	-62	27	25	16	24	
20,000	32	26	10	13	18	7	1	-35	-28	-11	-15	-20	-34	-43	19	19	11	17	
DOVER AFB TO KWAJALEIN NAS																			6269 N.MI.
53,000	-24	-18	-8	-13	-15	-21	-25	22	17	8	13	14	9	6	8	7	5	6	
40,000	-43	-33	-21	-29	-31	-40	-45	40	30	20	27	29	21	17	11	10	9	10	
30,000	-37	-30	-17	-25	-27	-35	-40	34	28	16	23	25	17	13	11	10	8	10	
20,000	-24	-18	-10	-16	-16	-23	-26	23	17	9	15	15	10	7	8	7	5	7	
DOVER AFB TO LADD AFB																			2866 N.MI.
53,000	-28	-13	-10	-19	-16	-24	-28	27	12	9	18	15	9	7	9	7	6	7	
40,000	-32	-19	-22	-27	-25	-34	-38	29	18	20	24	23	14	10	12	11	11	13	
30,000	-33	-21	-21	-26	-25	-34	-40	29	19	19	24	23	14	9	13	13	12	14	
20,000	-23	-16	-16	-18	-18	-24	-28	21	15	15	16	16	10	7	10	10	7	10	
DOVER AFB TO LAJES AP																			2230 N.MI.
53,000	35	24	12	23	23	14	10	-36	-25	-13	-24	-23	-33	-39	12	10	8	10	
40,000	49	39	29	42	39	27	21	-51	-41	-31	-44	-41	-54	-61	18	17	14	18	
30,000	47	38	27	37	36	25	19	-50	-41	-28	-39	-38	-51	-59	19	18	13	17	
20,000	36	27	20	26	26	18	13	-38	-28	-21	-27	-27	-37	-43	15	14	9	13	
DOVER AFB TO LE BOURGET AP																			3261 N.MI.
53,000	31	16	14	23	20	13	11	-32	-17	-14	-23	-21	-28	-33	10	8	7	8	
40,000	47	28	34	44	38	27	21	-50	-31	-36	-46	-40	-52	-57	15	14	13	15	
30,000	47	29	32	41	37	25	19	-51	-32	-34	-44	-39	-52	-58	18	16	13	17	
20,000	34	20	22	28	25	17	13	-36	-22	-23	-30	-27	-36	-41	14	13	9	12	

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*						STANDARD DEVIATION				
	DIRECT							RETURN										
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
DOVER AFB TO LONDON INTERNATIONAL																		
53,000	31	16	13	23	20	13	10	-32	-17	-14	-24	-21	-29	-33	10	8	7	8
40,000	47	29	33	44	38	27	21	-50	-31	-35	-47	-40	-52	-58	15	14	13	16
30,000	48	29	32	41	37	25	19	-51	-32	-34	-44	-40	-52	-59	18	17	14	17
20,000	34	20	21	28	25	17	12	-36	-22	-22	-29	-27	-36	-41	14	13	9	13
DOVER AFB TO LORING AFB																		
53,000	28	14	5	20	16	5	-1	-32	-16	-6	-22	-18	-30	-37	17	15	12	14
40,000	41	25	20	35	30	11	2	-50	-30	-24	-40	-35	-55	-65	28	26	24	27
30,000	39	23	19	31	27	9	-1	-48	-28	-23	-35	-32	-52	-63	32	29	21	28
20,000	29	15	13	21	19	6	-1	-33	-18	-15	-24	-21	-36	-44	22	22	13	21
DOVER AFB TO MAURIPUR AP																		
53,000	27	12	6	19	15	8	5	-29	-14	-6	-20	-16	-24	-29	8	6	5	6
40,000	32	19	16	26	23	15	11	-36	-22	-18	-29	-26	-34	-39	11	10	9	10
30,000	29	19	16	23	21	13	9	-33	-22	-18	-26	-24	-33	-37	12	11	10	11
20,000	19	13	10	15	14	8	5	-21	-15	-10	-17	-15	-22	-25	9	9	7	8
DOVER AFB TO MCCORD AFB																		
53,000	-35	-22	-14	-25	-23	-32	-37	34	22	14	24	23	15	12	11	9	7	9
40,000	-54	-36	-39	-42	-42	-54	-61	51	34	37	39	40	29	22	17	16	15	18
30,000	-53	-35	-33	-39	-39	-52	-60	50	33	32	37	37	25	19	19	18	13	19
20,000	-36	-24	-22	-27	-27	-36	-41	35	23	21	26	25	17	13	14	13	9	13
DOVER AFB TO MCGUIRE AFB																		
53,000	32	16	3	21	17	4	-3	-36	-19	-3	-22	-19	-34	-42	20	18	13	17
40,000	41	29	17	36	30	10	-1	-51	-35	-20	-41	-36	-58	-70	31	31	26	31
30,000	39	27	17	31	27	8	-2	-49	-33	-19	-36	-33	-55	-66	32	32	21	31
20,000	32	17	13	22	19	5	-2	-36	-20	-14	-24	-22	-38	-48	25	24	14	23
DOVER AFB TO MIDWAY NAS																		
53,000	-28	-21	-12	-21	-20	-26	-30	26	20	12	20	19	13	10	9	7	6	7
40,000	-52	-37	-27	-40	-38	-48	-54	48	35	26	37	36	27	22	12	11	10	12
30,000	-49	-38	-24	-37	-36	-47	-53	45	35	23	34	33	24	19	13	12	9	13
20,000	-34	-27	-17	-26	-25	-33	-37	32	25	16	25	24	17	14	10	9	6	9
DOVER AFB TO MILDENHALL AP																		
53,000	31	16	13	23	20	13	10	-32	-17	-13	-24	-20	-29	-33	10	8	7	8
40,000	47	28	32	43	37	26	21	-50	-31	-35	-46	-40	-51	-57	15	14	13	16
30,000	47	29	31	40	36	24	18	-51	-32	-33	-43	-39	-52	-59	18	17	14	17
20,000	33	20	21	27	25	16	12	-36	-22	-22	-29	-26	-36	-41	14	13	10	13
DOVER AFB TO MINOT AFB																		
53,000	-36	-23	-14	-24	-24	-33	-39	35	22	14	24	23	14	10	13	12	9	11
40,000	-58	-38	-41	-42	-44	-59	-67	54	35	39	39	42	27	20	21	19	18	22
30,000	-56	-37	-34	-39	-41	-56	-65	52	34	33	36	38	23	16	23	22	16	23
20,000	-38	-26	-22	-27	-27	-39	-45	36	25	22	25	26	16	11	17	17	11	16
DOVER AFB TO MOSCOW INTERNATIONAL																		
53,000	29	13	7	20	16	9	6	-30	-14	-8	-21	-17	-26	-30	9	7	5	7
40,000	35	22	18	29	26	17	13	-38	-24	-20	-32	-28	-37	-42	12	11	10	12
30,000	33	23	17	25	24	14	9	-37	-26	-19	-28	-27	-38	-43	15	14	12	14
20,000	21	15	10	17	15	8	5	-23	-17	-11	-18	-17	-25	-29	11	11	8	10
DOVER AFB TO MYRTLE BEACH AFB																		
53,000	-28	-16	2	-14	-13	-27	-35	23	13	-2	12	10	-2	-7	17	18	11	16
40,000	-41	-29	-7	-33	-27	-47	-58	28	22	4	27	20	1	-9	27	29	21	27
30,000	-37	-26	-8	-28	-23	-42	-53	26	19	6	23	18	1	-7	26	28	17	27
20,000	-28	-16	-7	-17	-16	-30	-38	24	13	7	15	13	1	-5	21	21	12	20
DOVER AFB TO NOUASSEUR AB																		
53,000	31	23	13	20	21	14	11	-32	-23	-13	-21	-21	-29	-34	10	8	6	8
40,000	43	35	27	38	35	26	21	-45	-37	-29	-39	-37	-47	-53	15	14	11	14
30,000	40	34	24	33	32	23	18	-43	-36	-25	-35	-34	-44	-50	15	14	10	14
20,000	31	23	18	23	23	16	12	-32	-24	-19	-24	-24	-32	-36	12	11	7	10
DOVER AFB TO ORLY AP																		
53,000	31	17	14	23	20	14	11	-32	-17	-14	-23	-21	-28	-33	10	8	7	8
40,000	47	29	34	44	38	27	22	-50	-31	-36	-46	-40	-52	-58	15	14	13	15
30,000	47	29	32	41	37	25	19	-51	-32	-34	-44	-39	-52	-58	18	16	13	17
20,000	34	20	22	28	26	17	13	-36	-22	-23	-30	-27	-36	-41	14	13	9	12

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	JAN	APR	JUL	OCT	**ASD	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
DOVER AFB TO PALAM AP																		
53,000	22	10	5	16	13	6	4	-25	-11	-5	-17	-14	-21	-25	8	6	5	6
40,000	21	15	12	21	17	10	7	-25	-17	-14	-23	-20	-27	-30	10	9	8	9
30,000	19	16	12	19	16	9	6	-23	-18	-14	-21	-19	-26	-30	11	10	9	10
20,000	13	11	6	12	10	5	2	-14	-12	-7	-13	-12	-17	-20	8	8	6	8
DOVER AFB TO PATRICK AFB																		
53,000	-22	-12	3	-10	-9	-22	-28	16	8	-3	8	6	-4	-9	15	16	10	15
40,000	-32	-25	-1	-24	-20	-38	-48	20	17	-1	19	13	-3	-12	24	25	18	24
30,000	-27	-18	-3	-20	-16	-32	-41	18	11	2	16	11	-3	-10	21	23	15	23
20,000	-20	-13	-5	-13	-12	-23	-30	16	10	5	11	9	0	-5	18	18	10	16
DOVER AFB TO PIARCO AP																		
53,000	16	16	0	7	9	1	-3	-19	-18	-1	-8	-10	-20	-25	11	11	7	9
40,000	22	17	3	9	12	2	-4	-28	-23	-4	-12	-16	-28	-35	15	16	11	15
30,000	20	16	2	7	10	1	-3	-24	-19	-3	-9	-12	-24	-30	15	14	9	12
20,000	10	9	-2	-1	3	-4	-7	-12	-10	2	0	-4	-12	-17	11	10	6	8
DOVER AFB TO POPE AFB																		
53,000	-34	-20	0	-18	-17	-32	-40	30	17	-1	17	15	2	-4	18	18	12	16
40,000	-50	-35	-12	-38	-33	-54	-65	39	29	9	34	27	7	-3	28	29	22	28
30,000	-45	-32	-12	-33	-29	-49	-61	36	26	10	29	24	6	-3	27	29	18	28
20,000	-33	-20	-10	-21	-19	-34	-43	29	17	9	19	17	5	-2	22	22	12	21
DOVER AFB TO PRESTWICK AB																		
53,000	31	16	12	24	20	13	9	-33	-16	-13	-24	-20	-29	-34	11	8	7	9
40,000	47	28	31	42	37	25	20	-50	-30	-33	-45	-39	-51	-57	16	14	13	16
30,000	47	29	30	39	36	23	17	-51	-32	-32	-42	-39	-52	-59	19	18	15	18
20,000	33	20	19	26	24	15	10	-35	-22	-20	-28	-25	-35	-40	14	14	10	13
DOVER AFB TO RAMEY AFB																		
53,000	15	16	3	6	9	1	-3	-19	-18	-3	-8	-11	-21	-27	13	13	8	12
40,000	21	17	6	8	12	0	-6	-29	-24	-7	-12	-17	-31	-39	19	20	14	18
30,000	19	16	4	6	10	0	-6	-25	-20	-5	-9	-13	-26	-33	18	17	11	16
20,000	10	9	-1	-2	3	-5	-9	-13	-11	1	1	-4	-13	-19	13	13	7	11
DOVER AFB TO RHEIN MAIN AB																		
53,000	30	16	13	22	19	13	10	-32	-17	-13	-23	-20	-28	-32	10	7	6	8
40,000	45	27	32	42	36	26	20	-48	-29	-34	-45	-39	-50	-55	15	13	13	15
30,000	45	27	30	39	35	24	18	-49	-30	-33	-42	-38	-50	-57	18	16	13	17
20,000	32	19	20	26	24	16	12	-35	-21	-21	-28	-26	-35	-39	13	12	9	12
DOVER AFB TO SEOUL AB																		
53,000	-18	-8	-5	-11	-10	-15	-18	15	7	5	10	9	4	2	8	5	4	6
40,000	-13	-10	-14	-14	-13	-18	-21	9	8	12	12	10	5	2	8	8	8	8
30,000	-11	-11	-13	-13	-12	-18	-21	8	8	12	10	10	4	0	9	9	8	9
20,000	-6	-7	-9	-8	-8	-12	-15	4	5	8	7	6	2	-1	7	7	6	7
DOVER AFB TO STEVENSON FIELD																		
53,000	-33	-21	-14	-23	-22	-31	-37	31	20	13	22	21	12	8	14	12	10	12
40,000	-53	-34	-38	-39	-41	-56	-64	49	32	36	35	38	23	16	21	20	19	22
30,000	-52	-35	-32	-36	-38	-54	-62	47	32	30	33	35	20	13	23	23	17	23
20,000	-36	-25	-22	-24	-26	-37	-44	33	23	21	23	24	14	8	18	17	11	17
DOVER AFB TO SUNG SHAN																		
53,000	-19	-9	-3	-11	-9	-16	-19	16	7	3	9	8	3	1	8	6	4	6
40,000	-13	-11	-13	-13	-12	-18	-21	8	8	11	9	9	4	1	8	8	8	8
30,000	-12	-10	-12	-11	-12	-17	-20	7	7	11	9	9	3	0	9	9	8	9
20,000	-6	-6	-9	-7	-7	-11	-14	4	5	8	6	6	1	-1	7	7	6	7
DOVER AFB TO TACHIKAWA AB																		
53,000	-26	-13	-6	-18	-15	-22	-26	24	11	5	17	14	8	5	8	6	5	6
40,000	-25	-18	-17	-25	-21	-28	-31	21	15	15	22	18	12	9	9	8	9	9
30,000	-23	-17	-16	-22	-20	-26	-30	19	15	15	19	17	10	7	10	10	9	10
20,000	-16	-12	-11	-14	-13	-18	-21	13	10	10	13	12	7	4	8	8	6	8
DOVER AFB TO TAN SAN NHUT																		
53,000	-5	-3	0	-2	-2	-6	-8	2	1	-1	0	0	-3	-5	7	5	4	5
40,000	-2	0	-4	-1	-2	-7	-9	-3	-3	2	-2	-1	-6	-9	8	7	7	8
30,000	-1	1	-4	-1	-1	-7	-10	-3	-4	2	-1	-1	-7	-10	8	9	7	8
20,000	2	0	-3	0	0	-5	-7	-4	-1	2	-1	-1	-5	-8	7	6	5	6

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEADWINDS*							STANDARD DEVIATION			
	D I R E C T								R E T U R N							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85					
DOVER AFB TO THULE A8																			
53,000	5	0	-1	3	1	-4	-7	-7	-1	1	-5	-3	-9	-12	11	8	6	8	
40,000	5	0	-2	3	1	-8	-12	-11	-2	-1	-7	-5	-14	-19	14	13	12	14	
30,000	4	0	-2	3	1	-9	-14	-9	-3	-1	-6	-5	-15	-20	15	15	13	15	
20,000	4	0	-1	2	1	-6	-10	-7	-2	-1	-4	-3	-11	-15	12	12	9	12	
DOVER AFB TO TORBAY AP																			
53,000	39	22	12	28	24	13	8	-40	-23	-12	-28	-25	-37	-43	16	13	10	13	
40,000	58	39	35	51	45	29	21	-62	-42	-38	-54	-48	-65	-75	24	22	20	24	
30,000	56	38	33	45	42	26	18	-60	-41	-35	-48	-45	-63	-72	27	25	18	24	
20,000	40	26	22	31	29	17	11	-43	-28	-23	-32	-30	-43	-51	20	19	12	18	
DOVER AFB TO TORREJON AFB																			
53,000	31	19	15	21	21	14	11	-32	-20	-15	-22	-21	-28	-33	10	8	7	8	
40,000	45	32	32	42	37	27	22	-47	-34	-34	-44	-39	-50	-56	15	14	12	15	
30,000	44	31	30	39	35	25	20	-47	-33	-31	-41	-37	-49	-54	16	15	12	15	
20,000	33	22	22	28	26	18	14	-35	-23	-23	-29	-27	-35	-40	13	12	8	11	
DOVER AFB TO TRAVIS AFB																			
53,000	-39	-28	-13	-25	-25	-35	-40	38	27	12	24	25	16	12	11	10	7	9	
40,000	-63	-43	-39	-44	-46	-60	-67	61	41	37	42	44	32	26	18	16	14	18	
30,000	-56	-40	-30	-38	-39	-53	-62	53	38	29	35	37	25	20	19	18	12	18	
20,000	-37	-26	-19	-25	-26	-35	-41	36	25	19	23	25	16	12	14	13	8	13	
DOVER AFB TO WAKE AP																			
53,000	-27	-18	-8	-17	-17	-24	-28	25	17	8	16	16	10	7	8	7	5	7	
40,000	-50	-38	-23	-35	-36	-46	-52	46	35	21	32	33	24	19	11	10	9	11	
30,000	-47	-36	-21	-33	-34	-44	-50	44	33	20	30	31	22	18	12	11	9	11	
20,000	-33	-25	-16	-24	-24	-31	-35	31	24	15	23	23	16	13	9	8	6	8	
DOVER AFB TO WHEELUS AP																			
53,000	30	17	3	20	16	4	-2	-34	-17	-4	-22	-18	-32	-40	19	17	12	16	
40,000	39	27	18	35	29	9	-1	-49	-33	-21	-40	-35	-56	-68	30	29	25	30	
30,000	38	25	18	30	26	7	-3	-48	-31	-20	-35	-32	-53	-65	32	32	21	30	
20,000	30	16	13	21	19	5	-2	-35	-19	-14	-23	-21	-37	-46	24	24	14	23	
DUM DUM TO ELMENDORF AFB																			
53,000	17	11	3	14	11	5	2	-21	-12	-4	-15	-12	-19	-23	9	6	5	7	
40,000	13	10	11	11	11	5	2	-18	-13	-12	-13	-14	-20	-23	10	8	8	9	
30,000	8	6	9	9	8	2	-1	-11	-9	-10	-11	-10	-16	-20	9	10	8	9	
20,000	6	4	6	5	5	0	-2	-7	-5	-6	-6	-6	-11	-13	7	7	6	7	
DUM DUM TO ENIWETOK AFB																			
53,000	28	19	-29	-7	5	-18	-27	-30	-20	28	6	-5	-25	-30	8	8	6	6	
40,000	36	31	-12	6	18	-3	-10	-37	-32	11	-7	-19	-35	-39	8	9	7	8	
30,000	33	24	-6	4	13	-2	-6	-34	-25	6	-5	-14	-30	-34	7	8	5	6	
20,000	12	11	-4	1	5	-2	-4	-13	-11	4	-1	-5	-12	-15	6	5	5	5	
DUM DUM TO ERNEST HARMON AFB																			
53,000	-26	-13	-5	-16	-14	-21	-25	23	11	4	15	12	6	4	8	6	5	6	
40,000	-25	-20	-14	-22	-20	-27	-30	21	17	12	20	17	11	8	10	9	8	9	
30,000	-23	-21	-14	-20	-19	-27	-31	20	18	12	18	17	10	6	11	10	9	10	
20,000	-14	-13	-6	-13	-11	-17	-20	13	12	5	11	10	5	2	8	8	6	7	
DUM DUM TO GALEAO																			
53,000	-7	-10	15	-1	-3	-9	-11	6	10	-16	0	2	-7	-15	6	5	5	4	
40,000	-15	-18	3	-10	-11	-17	-20	14	17	-4	10	10	2	-3	7	7	6	6	
30,000	-8	-12	-2	-10	-8	-13	-15	8	11	2	10	8	3	1	6	6	5	5	
20,000	1	-1	1	0	0	-2	-4	-1	0	-2	0	-1	-3	-5	4	4	4	4	
DUM DUM TO GEORGE AFB																			
53,000	18	10	3	13	10	5	2	-21	-11	-3	-14	-12	-18	-21	8	6	5	6	
40,000	17	12	11	12	13	7	4	-21	-15	-13	-15	-16	-22	-25	9	8	8	9	
30,000	12	8	9	10	10	4	0	-16	-12	-11	-12	-12	-19	-22	10	10	8	9	
20,000	8	4	6	5	6	1	-1	-10	-6	-7	-7	-7	-12	-15	8	7	6	7	

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.THE BOEING COMPANY
TRANSPORT DIVISIONNO. D6-9175
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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION							
	D I R E C T							R E T U R N							JAN	APR	JUL	OCT				
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85								
DUM DUM TO GODSE AB																			5963 N.M.I.			
53,000	-23	-14	-4	-14	-13	-20	-23	20	12	3	13	12	6	3	8	6	5	6				
40,000	-21	-17	-11	-19	-17	-23	-26	17	14	9	16	14	8	5	9	8	7	9				
30,000	-19	-18	-11	-17	-16	-23	-27	16	15	10	15	14	7	4	10	10	9	10				
20,000	-12	-12	-5	-11	-10	-15	-18	10	11	4	10	8	3	1	8	8	6	7				
DUM DUM TO HICKAM AFB																			6107 N.M.I.			
53,000	61	43	-1	24	33	10	1	-63	-44	0	-25	-34	-53	-61	9	9	7	8				
40,000	77	58	19	42	50	29	21	-80	-60	-20	-44	-52	-69	-78	11	10	9	11				
30,000	66	48	13	33	40	22	15	-69	-50	-14	-35	-42	-59	-67	11	10	7	9				
20,000	41	29	9	19	24	14	10	-42	-30	-9	-20	-25	-35	-41	7	6	5	6				
DUM DUM TO INCIRLIK AB																			2852 N.M.I.			
53,000	-53	-39	-1	-27	-33	-46	-53	51	37	1	26	31	12	3	11	10	8	10				
40,000	-66	-50	-18	-33	-41	-58	-67	62	48	17	31	39	23	17	14	13	9	12				
30,000	-51	-42	-18	-29	-33	-47	-53	48	40	17	28	32	21	17	14	12	8	10				
20,000	-31	-25	-8	-15	-19	-28	-32	30	24	7	14	18	10	7	9	8	6	7				
DUM DUM TO IWO JIMA																			2889 N.M.I.			
53,000	66	41	-28	3	22	-14	-26	-68	-42	27	-4	-22	-56	-65	11	11	9	11				
40,000	75	54	-10	23	39	4	-8	-76	-55	10	-25	-40	-66	-75	12	12	10	12				
30,000	67	45	-5	19	32	5	-3	-68	-46	4	-20	-34	-57	-66	11	10	7	11				
20,000	39	27	0	11	19	5	1	-40	-28	0	-11	-19	-33	-39	8	7	6	6				
DUM DUM TO JOHNSTON AFB																			5652 N.M.I.			
53,000	58	39	-13	9	23	-3	-12	-59	-40	13	-10	-24	-50	-57	8	9	6	8				
40,000	73	58	4	28	43	15	6	-75	-60	-6	-30	-44	-67	-74	10	10	8	10				
30,000	65	45	3	23	34	12	5	-67	-47	-4	-24	-35	-57	-64	9	9	6	8				
20,000	38	26	4	12	18	7	4	-39	-27	-4	-12	-19	-32	-38	7	6	5	5				
DUM DUM TO KADENA AB																			2150 N.M.I.			
53,000	68	42	-32	0	21	-18	-29	-69	-43	31	-2	-22	-57	-67	12	13	10	13				
40,000	76	51	-14	22	37	1	-11	-77	-53	13	-23	-38	-65	-75	13	14	10	14				
30,000	66	43	-7	18	30	3	-5	-67	-44	6	-18	-31	-55	-65	13	12	8	11				
20,000	38	25	-1	11	18	5	0	-39	-26	0	-11	-18	-32	-38	9	8	7	7				
DUM DUM TO KEFLAVIK AP																			4705 N.M.I.			
53,000	-27	-14	-5	-17	-15	-23	-27	23	12	4	15	13	6	3	9	7	5	7				
40,000	-24	-21	-14	-20	-20	-27	-30	20	18	13	18	17	10	7	11	9	8	10				
30,000	-22	-22	-14	-18	-19	-26	-30	19	19	13	16	17	9	5	12	11	9	11				
20,000	-13	-13	-6	-12	-11	-17	-20	12	12	5	11	10	5	2	8	8	7	8				
DUM DUM TO KINDLEY AFB																			7158 N.M.I.			
53,000	-27	-14	-6	-18	-16	-23	-27	24	13	5	16	14	8	5	8	6	5	6				
40,000	-30	-24	-17	-25	-24	-31	-35	26	21	15	23	21	14	11	10	9	8	10				
30,000	-29	-24	-17	-23	-23	-31	-35	26	21	15	21	20	13	9	11	11	9	10				
20,000	-19	-16	-9	-15	-15	-20	-24	17	14	8	14	13	8	5	8	8	6	8				
DUM DUM TO KWAJALEIN NAS																			4609 N.M.I.			
53,000	23	16	-28	-8	3	-17	-26	-24	-17	27	7	-4	-21	-25	7	7	6	6				
40,000	31	28	-11	5	16	-4	-10	-33	-29	10	-6	-17	-31	-35	7	8	6	7				
30,000	29	21	-6	3	11	-2	-6	-30	-22	6	-4	-12	-26	-30	7	7	5	6				
20,000	9	9	-5	0	3	-3	-5	-10	-9	4	0	-4	-10	-12	5	5	4	5				
DUM DUM TO LADD AFB																			4953 N.M.I.			
53,000	16	10	3	11	9	4	2	-19	-11	-3	-13	-11	-17	-21	9	6	5	6				
40,000	11	8	10	9	9	3	0	-16	-11	-11	-11	-12	-18	-21	9	8	8	9				
30,000	6	5	8	8	7	1	-2	-9	-8	-9	-10	-9	-15	-18	9	10	8	8				
20,000	5	3	6	4	4	0	-3	-6	-4	-6	-5	-6	-10	-13	7	7	6	7				
DUM DUM TO LAJES AP																			5638 N.M.I.			
53,000	-30	-19	-10	-19	-19	-25	-30	27	17	9	18	17	11	8	8	6	5	6				
40,000	-31	-23	-22	-27	-25	-33	-37	27	21	20	25	23	16	13	11	9	9	10				
30,000	-27	-22	-21	-25	-23	-30	-34	24	20	19	23	21	15	11	11	10	8	10				
20,000	-18	-14	-12	-16	-15	-20	-23	16	13	11	15	14	9	6	8	7	6	7				
DUM DUM TO LE BOURGET AP																			4234 N.M.I.			
53,000	-34	-20	-9	-22	-20	-29	-33	31	18	8	20	19	11	8	10	7	6	7				
40,000	-33	-24	-21	-27	-26	-34	-38	29	22	19	25	23	16	12	12	10	10	11				
30,000	-28	-23	-20	-24	-24	-31	-35	25	21	19	23	22	15	11	12	11	9	10				
20,000	-18	-14	-10	-15	-14	-20	-23	17	13	9	14	13	8	5	8	8	6	8				

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION			
	DIRECT								RETURN				JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50				
DUM DUM TO LONDON INTERNATIONAL																
53,000	-32	-19	-8	-21	-19	-27	-32	29	17	7	20	18	10	7	9	4308 N.MI.
40,000	-31	-23	-20	-26	-25	-32	-37	26	20	19	24	22	15	11	7	6
30,000	-27	-22	-20	-24	-23	-30	-35	24	19	19	22	21	13	10	10	11
20,000	-18	-13	-9	-15	-14	-19	-22	16	12	9	14	13	7	5	11	9
DUM DUM TO LORING AFB																
53,000	-21	-14	-4	-14	-13	-19	-22	18	12	3	12	11	5	3	8	6432 N.MI.
40,000	-20	-16	-10	-18	-16	-22	-25	16	13	9	16	13	7	4	5	6
30,000	-18	-16	-11	-17	-16	-22	-26	15	14	9	15	13	7	3	7	9
20,000	-11	-11	-5	-10	-9	-14	-17	10	10	4	9	8	3	0	8	9
DUM DUM TO MAURIPUR AP																
53,000	-62	-49	30	-19	-32	-56	-65	60	47	-31	17	31	-9	-27	16	1188 N.MI.
40,000	-76	-51	14	-18	-34	-63	-75	73	50	-15	17	33	-3	-13	16	12
30,000	-53	-38	5	-19	-26	-45	-55	52	37	-6	18	25	4	-4	17	10
20,000	-35	-21	3	-7	-13	-28	-35	34	21	-3	7	13	1	-3	10	17
DUM DUM TO MCCHORD AFB																
53,000	17	9	3	12	9	4	2	-19	-10	-4	-13	-11	-17	-20	16	6290 N.MI.
40,000	14	8	10	9	10	5	2	-18	-11	-11	-12	-13	-19	-22	8	5
30,000	9	5	8	8	8	2	-2	-13	-8	-10	-10	-10	-16	-19	9	8
20,000	6	3	6	4	5	0	-2	-8	-4	-7	-6	-6	-11	-13	9	9
DUM DUM TO MCGUIRE AFB																
53,000	-19	-12	-3	-12	-11	-17	-20	16	10	2	11	9	4	2	7	6922 N.MI.
40,000	-19	-14	-9	-17	-14	-21	-24	14	11	7	14	12	6	3	8	5
30,000	-17	-15	-10	-16	-14	-21	-24	14	12	8	14	12	5	2	9	7
20,000	-11	-10	-4	-9	-9	-14	-16	9	9	4	8	7	2	0	10	9
DUM DUM TO MIDWAY NAS																
53,000	69	47	-4	25	36	10	-2	-71	-49	3	-26	-37	-60	-69	8	4976 N.MI.
40,000	85	62	18	44	53	29	20	-87	-65	-19	-46	-56	-76	-85	9	8
30,000	74	52	13	36	44	23	15	-77	-54	-14	-38	-46	-65	-74	11	10
20,000	47	33	10	22	27	15	11	-48	-34	-10	-22	-28	-40	-46	11	8
DUM DUM TO MILDENHALL AP																
53,000	-32	-18	-8	-21	-19	-27	-32	29	16	7	20	17	10	7	9	4262 N.MI.
40,000	-30	-22	-20	-26	-24	-32	-36	26	20	19	24	22	15	11	7	6
30,000	-26	-22	-20	-24	-23	-30	-34	23	19	18	22	21	13	9	12	10
20,000	-17	-13	-9	-15	-14	-19	-22	16	12	9	14	13	7	4	12	11
DUM DUM TO MINOT AFB																
53,000	9	5	3	5	5	1	0	-12	-7	-4	-7	-7	-11	-14	8	6513 N.MI.
40,000	6	2	5	5	4	-1	-3	-10	-4	-6	-8	-7	-12	-15	7	5
30,000	4	1	5	4	4	-2	-5	-7	-4	-6	-6	-6	-11	-14	8	7
20,000	4	3	5	4	4	0	-3	-5	-4	-6	-5	-5	-9	-11	8	8
DUM DUM TO MOSCOW INTERNATIONAL																
53,000	-32	-18	-6	-21	-19	-28	-33	28	16	5	19	16	8	4	7	2984 N.MI.
40,000	-28	-22	-18	-23	-23	-31	-36	23	19	17	21	20	12	7	9	7
30,000	-24	-21	-17	-21	-21	-28	-33	21	19	16	19	18	11	7	13	11
20,000	-15	-12	-6	-13	-11	-17	-20	13	11	5	12	10	5	2	13	12
DUM DUM TO MYRTLE BEACH AFB																
53,000	-17	-9	-2	-11	-9	-15	-18	14	7	1	9	7	2	0	9	7344 N.MI.
40,000	-17	-13	-7	-15	-13	-19	-22	12	10	5	12	10	4	1	8	4
30,000	-16	-13	-8	-15	-13	-19	-23	12	11	6	12	10	4	1	9	7
20,000	-10	-9	-4	-9	-8	-13	-15	8	8	3	7	6	2	-1	10	8
DUM DUM TO NOUASSEUR AB																
53,000	-42	-33	-11	-23	-28	-37	-42	40	32	10	22	26	16	11	9	4949 N.MI.
40,000	-50	-42	-26	-32	-37	-47	-52	46	40	25	30	35	26	22	7	6
30,000	-38	-36	-23	-27	-30	-39	-43	35	35	22	26	29	22	18	12	10
20,000	-25	-22	-13	-16	-18	-24	-28	23	22	12	15	18	12	10	11	7
DUM DUM TO ORLY AP																
53,000	-34	-20	-9	-22	-20	-29	-33	31	18	8	20	19	11	8	10	4239 N.MI.
40,000	-33	-24	-21	-27	-26	-34	-38	29	22	19	25	23	16	12	7	6
30,000	-28	-23	-20	-24	-24	-31	-35	25	21	19	23	22	15	11	12	10
20,000	-18	-14	-10	-15	-14	-20	-23	17	13	9	14	13	8	5	12	11

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	D I R E C T							R E T U R N							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A5D	A75	A85	JAN	APR	JUL	OCT	A5D	A75	A85	JAN	APR	JUL	OCT
DUM DUM TO PALAM AP																		
53,000	-58	-43	23	-10	-25	-50	-61	53	39	-23	8	21	-10	-22	20	19	708 N.MI.	19
40,000	-63	-45	5	-16	-29	-54	-66	56	43	-6	14	26	2	-7	22	20	12	20
30,000	-47	-37	1	-16	-23	-42	-52	45	36	-1	15	22	5	-1	19	17	9	13
20,000	-31	-20	3	-8	-13	-26	-33	30	20	-4	8	12	1	-4	13	12	9	10
DUM DUM TO PATRICK AFB																		
53,000	-17	-9	-2	-11	-9	-15	-18	13	7	1	9	7	2	0	7	6	7681 N.MI.	6
40,000	-17	-13	-7	-15	-13	-19	-22	12	10	5	12	9	4	1	9	8	7	9
30,000	-16	-13	-8	-14	-13	-19	-22	12	10	6	12	10	4	0	10	9	8	9
20,000	-10	-9	-4	-9	-8	-13	-15	8	8	3	7	6	2	-1	7	7	6	7
DUM DUM TO PIARCO AP																		
53,000	-25	-18	-7	-14	-15	-22	-25	23	16	6	13	14	8	6	7	6	8130 N.MI.	6
40,000	-29	-25	-18	-21	-23	-30	-33	26	22	17	19	21	14	11	10	9	8	9
30,000	-23	-21	-16	-18	-19	-25	-29	20	19	15	17	18	12	9	10	9	7	8
20,000	-14	-11	-9	-12	-11	-16	-18	12	11	9	11	11	6	4	7	7	5	6
DUM DUM TO POPE AFB																		
53,000	-16	-8	-2	-11	-9	-15	-18	13	7	1	9	7	2	0	7	6	7258 N.MI.	6
40,000	-16	-12	-7	-15	-12	-18	-22	11	9	5	12	9	4	1	9	8	7	9
30,000	-16	-13	-8	-14	-13	-19	-22	12	10	6	12	10	4	0	10	9	8	9
20,000	-10	-9	-4	-8	-8	-12	-15	8	7	3	7	6	1	-1	7	7	6	7
DUM DUM TO PRESTWICK AB																		
53,000	-31	-17	-7	-20	-18	-26	-30	28	15	6	19	16	9	6	9	7	4390 N.MI.	7
40,000	-28	-22	-20	-25	-23	-31	-35	24	19	18	23	21	14	10	11	10	10	11
30,000	-25	-21	-19	-23	-22	-30	-34	22	19	18	21	20	12	8	12	11	10	11
20,000	-17	-13	-9	-15	-13	-19	-22	15	12	8	14	12	7	4	9	8	7	8
DUM DUM TO RAMEY AFB																		
53,000	-26	-15	-6	-16	-15	-22	-26	23	13	6	15	13	8	5	8	6	7946 N.MI.	6
40,000	-31	-25	-18	-24	-24	-31	-35	26	22	16	21	21	15	11	10	9	8	10
30,000	-28	-24	-18	-22	-23	-30	-34	25	21	16	20	20	13	10	11	10	8	10
20,000	-19	-16	-10	-15	-15	-20	-23	17	14	10	14	14	9	6	8	8	6	7
DUM DUM TO RHEIN MAIN AB																		
53,000	-34	-20	-8	-22	-21	-29	-34	31	18	8	21	19	11	7	10	8	3988 N.MI.	8
40,000	-33	-24	-20	-27	-26	-34	-38	29	22	19	24	23	16	12	12	10	10	11
30,000	-28	-23	-20	-24	-23	-31	-35	25	21	19	22	22	14	11	12	11	9	10
20,000	-18	-14	-9	-15	-14	-19	-22	17	13	9	14	13	8	5	8	8	6	8
DUM DUM TO SEDUL AB																		
53,000	68	43	-12	24	33	5	-9	-70	-45	11	-26	-35	-58	-68	14	14	2169 N.MI.	13
40,000	70	49	12	33	41	21	12	-73	-51	-13	-35	-43	-62	-72	15	14	12	15
30,000	57	38	6	23	30	13	7	-61	-41	-7	-24	-32	-51	-60	15	13	9	12
20,000	34	23	6	14	18	9	6	-36	-24	-6	-15	-19	-30	-36	10	9	7	7
DUM DUM TO STEVENSON FIELD																		
53,000	6	3	3	3	4	0	-2	-9	-5	-3	-5	-5	-9	-11	7	5	6436 N.MI.	5
40,000	4	1	3	4	3	-2	-5	-7	-3	-5	-6	-5	-10	-13	8	7	7	8
30,000	2	0	4	3	2	-3	-6	-5	-2	-5	-5	-4	-10	-13	8	9	8	8
20,000	3	1	4	3	3	-1	-4	-4	-2	-5	-4	-4	-8	-10	7	6	6	6
DUM DUM TO SUNG SHAN																		
53,000	65	41	-36	-4	18	-22	-33	-66	-42	35	3	-19	-54	-65	13	14	1818 N.MI.	14
40,000	74	48	-17	18	33	-3	-15	-75	-49	17	-19	-34	-63	-73	14	15	10	15
30,000	63	40	-8	15	27	1	-6	-64	-41	8	-15	-28	-52	-62	14	12	8	12
20,000	36	24	-2	10	16	4	-1	-37	-24	2	-10	-17	-30	-36	9	8	7	7
DUM DUM TO TACHIKAWA AB																		
53,000	74	47	-11	25	36	6	-8	-76	-49	10	-27	-38	-62	-73	13	12	2749 N.MI.	12
40,000	76	55	13	39	47	25	15	-78	-57	-15	-41	-49	-68	-77	14	13	11	14
30,000	67	45	7	29	37	17	9	-70	-47	-8	-31	-39	-58	-68	13	12	9	12
20,000	39	28	7	18	22	12	7	-41	-28	-7	-19	-23	-34	-40	9	8	7	7
DUM DUM TO TAN SAN NHUT																		
53,000	16	6	-39	-21	-9	-30	-38	-18	-8	37	20	7	-13	-20	13	11	1262 N.MI.	10
40,000	15	20	-24	-5	1	-15	-22	-17	-21	22	4	-3	-19	-27	15	14	10	10
30,000	15	13	-13	3	4	-7	-12	-17	-15	12	-3	-5	-17	-23	13	14	8	9
20,000	10	7	-3	-2	3	-4	-7	-11	-7	3	2	-3	-10	-14	9	8	7	7

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*								STANDARD DEVIATION			
	D I R E C T				R E T U R N							
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	
DUM DUM TO THULE AB												
53,000	-8	-4	0	-5	-4	-9	-11	5	2	0	3	4790 N.MI.
40,000	-7	-8	-4	-8	-7	-12	-15	3	5	2	6	6
30,000	-8	-10	-3	-8	-7	-14	-17	5	7	2	7	9
20,000	-4	-6	-2	-4	-4	-9	-11	3	5	1	3	10
DUM DUM TO TORBAY AP												
53,000	-28	-14	-6	-18	-16	-23	-27	25	13	6	17	6094 N.MI.
40,000	-29	-22	-17	-24	-23	-30	-34	25	20	15	22	6
30,000	-28	-23	-17	-22	-22	-30	-34	24	21	15	20	10
20,000	-17	-15	-8	-14	-13	-19	-22	16	13	7	13	12
DUM DUM TO TORREJON AFB												
53,000	-37	-27	-11	-22	-23	-32	-37	35	25	10	21	4614 N.MI.
40,000	-41	-33	-24	-29	-31	-39	-44	37	30	23	27	7
30,000	-32	-29	-23	-25	-27	-34	-38	29	27	22	24	10
20,000	-21	-18	-12	-15	-16	-21	-24	19	17	11	15	12
DUM DUM TO TRAVIS AFB												
53,000	18	11	3	14	11	5	3	-21	-12	-4	-15	6764 N.MI.
40,000	17	12	13	13	14	8	5	-22	-16	-14	-16	8
30,000	13	9	10	10	11	4	1	-17	-12	-12	-13	9
20,000	8	5	7	6	6	2	-1	-10	-6	-7	-7	10
DUM DUM TO WAKE AP												
53,000	56	36	-23	2	18	-11	-21	-58	-37	22	-3	4333 N.MI.
40,000	66	52	-7	20	35	5	-5	-68	-53	6	-21	9
30,000	60	42	-2	17	29	6	-1	-62	-43	2	-18	10
20,000	29	24	0	8	16	4	0	-31	-25	0	-9	9
DUM DUM TO WESTOVER AFB												
53,000	-20	-13	-3	-13	-12	-18	-21	17	11	2	11	6769 N.MI.
40,000	-19	-15	-10	-18	-15	-21	-25	15	12	8	15	7
30,000	-18	-15	-10	-17	-15	-21	-25	14	13	8	14	9
20,000	-11	-11	-5	-10	-9	-14	-17	9	9	4	9	10
DUM DUM TO WHEELUS AP												
53,000	-52	-40	-5	-27	-33	-46	-51	50	39	4	26	3957 N.MI.
40,000	-66	-54	-21	-36	-44	-60	-67	63	52	20	34	9
30,000	-52	-45	-19	-30	-35	-49	-55	50	44	18	29	13
20,000	-32	-27	-9	-16	-20	-29	-34	31	26	9	16	13
ELMENDORF AFB TO ENIWETOK AFB												
53,000	-20	-9	1	-7	-8	-16	-21	17	8	-2	5	3644 N.MI.
40,000	-35	-27	-9	-18	-22	-33	-38	28	22	7	14	10
30,000	-29	-23	-11	-18	-20	-29	-34	24	19	9	15	12
20,000	-22	-14	-11	-13	-14	-21	-24	19	12	10	11	13
ELMENDORF AFB TO ERNEST HARMON AFB												
53,000	21	9	7	15	12	7	4	-23	-10	-7	-16	2967 N.MI.
40,000	20	15	18	24	19	11	7	-22	-16	-19	-26	9
30,000	19	16	17	22	19	10	6	-21	-17	-19	-24	11
20,000	14	10	13	15	13	7	3	-15	-11	-13	-16	12
ELMENDORF AFB TO GALEAD												
53,000	17	12	4	11	11	6	4	-18	-13	-4	-12	7068 N.MI.
40,000	23	15	11	15	16	10	7	-26	-18	-13	-17	6
30,000	21	15	10	14	15	9	6	-24	-17	-11	-16	8
20,000	12	9	4	7	8	4	2	-13	-9	-5	-8	8
ELMENDORF AFB TO GEORGE AFB												
53,000	19	9	3	11	9	3	-1	-21	-10	-3	-12	2022 N.MI.
40,000	26	17	12	15	17	6	0	-30	-20	-14	-19	11
30,000	24	14	10	12	15	2	-4	-28	-18	-12	-16	17
20,000	15	6	7	7	8	0	-5	-17	-8	-8	-9	19
ELMENDORF AFB TO GOOSE AB												
53,000	21	9	6	14	11	6	3	-23	-9	-7	-15	2705 N.MI.
40,000	19	14	15	22	17	10	6	-20	-15	-17	-24	10
30,000	17	15	15	21	17	9	4	-19	-17	-16	-23	11
20,000	12	10	11	14	12	5	2	-13	-11	-12	-15	12

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION					
	DIRECT							RETURN										
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
ELMENDORF AFB TO HICKAM AFB																		
53,000	0	-3	-4	-4	-3	-9	-13	-3	1	4	2	1	-5	-9	13	10	7	10
40,000	-9	-8	-4	-12	-8	-18	-24	3	3	2	7	4	-6	-11	16	14	13	14
30,000	-9	-8	-6	-12	-8	-19	-24	3	3	4	7	4	-6	-11	17	15	12	15
20,000	-8	-8	-5	-7	-7	-14	-18	6	6	3	5	5	-3	-7	13	11	9	11
ELMENDORF AFB TO HILL AFB																		
53,000	23	10	5	15	12	5	2	-24	-11	-5	-16	-13	-21	-26	11	10	7	9
40,000	30	16	14	21	20	8	3	-33	-18	-16	-24	-22	-34	-40	16	15	15	17
30,000	27	14	13	18	18	5	-2	-31	-17	-15	-21	-21	-34	-41	19	19	16	19
20,000	18	8	8	12	11	2	-3	-20	-9	-9	-13	-12	-22	-27	15	13	11	13
ELMENDORF AFB TO INCIRLIK AB																		
53,000	0	0	-2	1	0	-4	-6	-3	-1	2	-2	-1	-5	-7	8	6	4	5
40,000	-1	-2	-5	-1	-2	-8	-11	-1	0	3	-1	1	-5	-8	9	8	8	8
30,000	-4	-1	-3	-2	-3	-9	-13	2	-1	2	0	1	-6	-9	10	10	9	9
20,000	-2	0	-2	-1	-1	-6	-9	1	-1	1	0	0	-5	-8	8	8	7	7
ELMENDORF AFB TO IWO JIMA																		
53,000	-38	-23	-3	-23	-22	-32	-38	34	20	2	21	20	9	4	11	8	7	9
40,000	-45	-33	-17	-39	-34	-45	-51	38	28	14	34	29	18	12	13	12	13	14
30,000	-40	-29	-16	-34	-30	-41	-46	34	25	14	30	26	15	10	13	13	12	14
20,000	-27	-18	-11	-21	-19	-27	-31	24	16	10	19	17	10	6	11	10	8	10
ELMENDORF AFB TO JOHNSTON AFB																		
53,000	-4	-4	-4	-5	-4	-10	-14	2	3	3	3	3	-3	-7	12	9	7	9
40,000	-17	-13	-5	-14	-12	-22	-27	11	7	3	9	7	-2	-7	15	14	12	13
30,000	-15	-12	-8	-13	-12	-21	-26	9	7	6	9	8	-1	-6	15	14	11	14
20,000	-12	-10	-5	-8	-9	-16	-19	9	9	4	6	7	0	-3	12	10	8	10
ELMENDORF AFB TO KAOENA AB																		
53,000	-36	-19	-3	-24	-21	-30	-36	32	17	2	22	19	8	3	11	8	7	8
40,000	-33	-26	-18	-32	-27	-36	-41	27	22	16	28	23	15	10	12	11	12	12
30,000	-29	-22	-16	-25	-23	-32	-36	23	18	14	22	19	11	7	12	12	11	12
20,000	-18	-13	-8	-15	-13	-20	-24	16	11	8	14	12	5	2	10	9	8	9
ELMENDORF AFB TO KEFLAVIK AP																		
53,000	11	6	1	9	6	1	-2	-13	-6	-1	-10	-7	-13	-16	9	7	4	7
40,000	2	8	6	9	6	0	-3	-4	-9	-7	-10	-7	-14	-17	10	9	8	9
30,000	1	8	6	8	6	-2	-7	-3	-9	-7	-9	-7	-15	-20	12	11	12	12
20,000	-2	4	4	3	3	-4	-7	0	-5	-5	-4	-4	-10	-13	10	10	8	9
ELMENDORF AFB TO KINDLEY AFB																		
53,000	27	15	9	18	16	10	8	-29	-16	-10	-19	-17	-25	-29	8	7	5	7
40,000	31	21	20	25	24	16	12	-35	-23	-22	-28	-27	-35	-40	12	11	11	12
30,000	31	21	19	23	23	15	10	-35	-24	-20	-26	-26	-35	-40	13	13	11	13
20,000	21	15	14	16	16	10	7	-23	-17	-15	-17	-18	-24	-28	10	9	7	9
ELMENDORF AFB TO KWAJALEIN NAS																		
53,000	-15	-7	0	-5	-6	-13	-17	13	5	-1	4	4	-1	-4	10	8	6	8
40,000	-29	-24	-8	-13	-18	-28	-33	23	19	6	9	14	5	0	12	12	10	12
30,000	-24	-20	-9	-14	-16	-25	-30	18	16	8	11	13	5	1	12	11	9	11
20,000	-17	-12	-8	-9	-11	-17	-21	15	10	7	8	10	4	1	10	8	7	9
ELMENDORF AFB TO LADO AFB																		
53,000	7	5	1	9	5	-4	-9	-9	-5	-1	-10	-6	-15	-21	18	14	9	13
40,000	5	9	7	14	9	-5	-13	-7	-10	-8	-15	-10	-24	-32	22	19	20	21
30,000	3	11	6	14	8	-9	-18	-6	-12	-8	-16	-10	-28	-37	27	25	25	27
20,000	2	9	5	9	7	-6	-13	-4	-10	-6	-10	-8	-20	-27	22	18	16	18
ELMENDORF AFB TO LAJES AP																		
53,000	13	6	5	11	8	4	2	-15	-7	-6	-12	-9	-15	-18	8	6	5	7
40,000	9	9	11	16	11	4	1	-12	-11	-13	-18	-13	-20	-24	10	9	9	10
30,000	8	11	10	15	11	3	-1	-11	-13	-12	-18	-14	-21	-26	12	11	10	12
20,000	5	7	7	10	7	1	-2	-7	-8	-8	-11	-9	-15	-18	10	9	7	9
ELMENDORF AFB TO LE BOURGET AP																		
53,000	10	6	0	8	5	1	-2	-12	-6	0	-9	-6	-12	-15	8	6	4	6
40,000	5	8	4	7	6	0	-3	-7	-9	-5	-9	-8	-13	-17	10	8	8	9
30,000	4	7	4	5	5	-3	-7	-7	-8	-6	-7	-7	-15	-19	12	11	11	11
20,000	1	4	3	1	2	-4	-7	-3	-5	-4	-2	-3	-9	-12	10	9	7	8

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	O I R E C T							R E T U R N							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85				
ELMENDORF AFB TO LONDON INTERNATIONAL																		
53,000	10	6	0	8	5	1	-2	-12	-6	0	-9	-6	-12	-15	8	7	4	6
40,000	5	8	4	7	6	0	-3	-7	-9	-5	-9	-7	-13	-17	10	8	8	9
30,000	4	7	4	5	5	-3	-7	-6	-9	-6	-7	-7	-15	-19	12	11	11	12
20,000	1	4	3	1	2	-4	-7	-2	-5	-4	-2	-3	-9	-12	10	9	8	9
ELMENDORF AFB TO LORING AFB																		
53,000	25	11	9	18	15	9	6	-27	-12	-9	-18	-15	-23	-27	9	7	5	7
40,000	26	17	20	26	22	14	10	-28	-18	-22	-28	-24	-32	-36	11	10	11	12
30,000	25	18	20	25	22	13	8	-27	-20	-22	-27	-24	-33	-38	13	13	12	13
20,000	18	13	15	17	16	9	6	-19	-13	-16	-18	-17	-23	-26	10	10	8	9
ELMENDORF AFB TO MAURIPUR AP																		
53,000	-12	-9	-6	-8	-9	-13	-15	9	8	6	7	7	3	2	7	5	4	6
40,000	-13	-10	-6	-9	-10	-15	-18	10	8	5	7	7	2	-1	9	8	8	8
30,000	-9	-8	-4	-6	-7	-13	-16	7	5	3	4	4	-2	-5	9	9	8	9
20,000	-6	-4	-4	-4	-4	-9	-11	5	3	3	3	3	-1	-4	7	7	6	7
ELMENDORF AFB TO MCCHORO AFB																		
53,000	21	8	5	13	11	3	-1	-22	-9	-5	-14	-12	-20	-26	13	11	8	10
40,000	28	15	15	18	19	6	-1	-31	-17	-17	-21	-21	-34	-41	19	17	17	19
30,000	25	12	13	13	15	1	-7	-28	-15	-15	-17	-18	-33	-42	22	22	20	23
20,000	15	5	8	9	9	-2	-7	-17	-6	-9	-10	-10	-21	-27	18	16	13	16
ELMENDORF AFB TO MCGUIRE AFB																		
53,000	27	13	10	19	16	10	7	-29	-14	-10	-20	-17	-25	-29	9	7	6	7
40,000	32	19	21	26	24	16	11	-35	-21	-23	-29	-27	-36	-40	12	11	11	13
30,000	32	21	20	25	24	15	10	-35	-23	-22	-28	-26	-36	-42	14	14	12	14
20,000	22	15	15	18	17	11	7	-24	-16	-16	-19	-18	-25	-29	11	10	8	10
ELMENDORF AFB TO MIOWAY NAS																		
53,000	-13	-9	-4	-10	-8	-16	-20	10	7	3	8	7	0	-4	14	10	8	10
40,000	-31	-24	-11	-19	-21	-33	-39	25	19	8	14	16	5	-1	16	15	14	16
30,000	-28	-22	-13	-20	-20	-32	-38	23	17	11	15	16	5	-1	18	16	14	16
20,000	-21	-17	-10	-13	-15	-24	-29	18	15	9	11	13	5	0	14	12	10	12
ELMENDORF AFB TO MILOENHALL AP																		
53,000	10	6	0	8	5	0	-2	-12	-6	0	-9	-6	-12	-15	9	7	4	6
40,000	5	8	4	7	6	0	-3	-7	-9	-5	-8	-7	-13	-16	10	8	8	9
30,000	4	6	4	5	5	-3	-7	-6	-8	-6	-7	-7	-14	-19	12	11	11	11
20,000	1	4	3	1	2	-4	-7	-2	-5	-4	-2	-3	-9	-12	10	9	8	9
ELMENDORF AFB TO MINOT AFB																		
53,000	27	11	7	20	15	8	5	-28	-12	-8	-20	-16	-25	-30	11	9	7	9
40,000	31	15	15	22	20	10	4	-32	-16	-16	-24	-22	-33	-39	15	13	14	15
30,000	30	16	14	23	20	8	2	-32	-18	-16	-25	-22	-35	-41	17	17	15	18
20,000	21	11	10	17	14	6	2	-22	-12	-11	-18	-15	-24	-29	13	12	10	12
ELMENDORF AFB TO MOSCOW INTERNATIONAL																		
53,000	-1	1	-1	2	0	-4	-6	-1	-1	1	-3	-1	-5	-7	8	6	4	6
40,000	-3	-1	-3	-1	-2	-8	-11	1	0	3	-1	1	-5	-8	9	8	8	9
30,000	-6	-1	-4	-3	-3	-10	-14	4	-1	3	1	2	-5	-9	10	10	10	10
20,000	-3	0	-2	-2	-2	-7	-10	2	-1	1	1	1	-4	-7	9	9	7	8
ELMENDORF AFB TO MYRTLE BEACH AFB																		
53,000	28	14	9	19	16	10	7	-29	-15	-9	-20	-17	-25	-30	9	7	6	7
40,000	34	20	20	25	24	15	11	-38	-22	-22	-28	-27	-37	-42	12	12	11	13
30,000	33	20	18	24	23	14	9	-37	-23	-19	-27	-26	-36	-42	14	14	11	14
20,000	23	15	12	18	17	10	7	-25	-16	-13	-19	-18	-25	-29	11	10	7	10
ELMENDORF AFB TO NOUASSEUR AB																		
53,000	12	6	2	9	7	2	0	-13	-7	-3	-10	-7	-13	-16	8	6	4	6
40,000	8	8	6	10	8	2	-1	-11	-10	-8	-12	-10	-16	-20	10	9	8	9
30,000	6	9	7	9	8	1	-3	-9	-11	-9	-12	-10	-17	-21	11	11	10	11
20,000	3	6	4	5	4	-1	-4	-5	-7	-5	-6	-6	-11	-14	9	9	7	8
ELMENDORF AFB TO ORLY AP																		
53,000	10	6	0	8	5	1	-2	-12	-6	0	-9	-6	-12	-15	8	6	4	6
40,000	6	8	4	7	6	0	-3	-7	-9	-5	-9	-8	-14	-17	10	8	8	9
30,000	5	7	4	5	5	-2	-7	-7	-8	-6	-7	-7	-15	-19	12	11	11	11
20,000	1	4	3	1	2	-4	-7	-3	-5	-4	-2	-3	-9	-12	10	9	7	8

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEADWINDS*								STANDARD DEVIATION			
	DIRECT								RETURN											
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT		
ELMENDORF AFB TO PALAM AP																				
53,000	-14	-10	-7	-10	-10	-14	-17	11	9	6	8	8	4	2	4949 N.M.I.					
40,000	-13	-10	-10	-11	-11	-16	-20	10	7	9	8	9	3	0	8	6	5	6		
30,000	-9	-9	-7	-8	-8	-14	-18	7	6	6	6	6	0	-3	9	8	8	9		
20,000	-6	-4	-6	-5	-6	-10	-13	5	3	6	4	5	0	-3	10	9	9	9		
ELMENDORF AFB TO PATRICK AFB																				
53,000	27	15	7	18	16	9	6	-29	-16	-8	-19	-17	-25	-29	3334 N.M.I.					
40,000	33	20	18	24	23	15	10	-38	-23	-20	-28	-27	-36	-41	9	7	5	7		
30,000	31	20	15	23	22	13	8	-36	-23	-17	-26	-25	-35	-41	12	12	11	13		
20,000	22	14	10	17	15	9	5	-24	-16	-11	-18	-16	-24	-28	13	13	11	14		
ELMENDORF AFB TO PIARCO AP																				
53,000	24	15	5	15	14	8	5	-26	-17	-5	-16	-16	-23	-26	4799 N.M.I.					
40,000	31	21	14	20	21	14	10	-36	-24	-16	-23	-24	-33	-37	7	7	5	6		
30,000	30	20	12	18	20	12	8	-33	-23	-14	-21	-22	-30	-35	10	10	9	10		
20,000	19	13	7	11	12	7	4	-20	-15	-8	-12	-13	-19	-23	11	10	8	10		
ELMENDORF AFB TO POPE AFB																				
53,000	28	14	9	19	16	10	7	-29	-15	-9	-20	-17	-25	-29	3038 N.M.I.					
40,000	34	20	21	25	24	16	11	-37	-22	-22	-28	-27	-37	-42	9	7	6	7		
30,000	33	20	18	24	23	14	9	-37	-23	-20	-27	-26	-36	-42	12	12	11	13		
20,000	23	15	13	18	17	10	7	-25	-16	-14	-19	-18	-25	-29	14	14	11	14		
ELMENDORF AFB TO PRESTWICK AB																				
53,000	10	6	0	8	5	0	-2	-12	-6	0	-9	-6	-12	-15	3605 N.M.I.					
40,000	4	8	5	7	6	0	-4	-6	-9	-5	-8	-7	-13	-17	9	7	4	6		
30,000	2	7	5	5	5	-3	-7	-5	-9	-7	-7	-7	-15	-19	10	9	8	9		
20,000	0	4	3	1	2	-4	-7	-1	-5	-4	-2	-3	-9	-12	12	11	11	12		
ELMENDORF AFB TO RAMEY AFB																				
53,000	26	16	6	16	16	9	6	-28	-17	-7	-17	-17	-24	-28	4220 N.M.I.					
40,000	33	22	17	22	23	15	11	-38	-26	-18	-25	-26	-35	-40	8	7	5	7		
30,000	31	22	14	20	21	13	9	-35	-24	-16	-23	-24	-33	-38	11	11	9	11		
20,000	21	14	9	13	14	8	5	-22	-16	-9	-14	-15	-21	-25	11	11	9	12		
ELMENDORF AFB TO RHEIN MAIN AB																				
53,000	9	5	0	7	5	0	-2	-11	-6	0	-8	-6	-11	-14	4042 N.M.I.					
40,000	5	7	3	6	5	-1	-4	-7	-8	-4	-7	-6	-12	-16	8	6	4	6		
30,000	3	5	3	4	4	-4	-8	-6	-7	-4	-6	-6	-13	-17	9	8	8	9		
20,000	1	4	2	0	2	-4	-7	-3	-5	-3	-1	-3	-9	-12	12	11	11	11		
ELMENDORF AFB TO SEOUL AB																				
53,000	-25	-13	-5	-22	-16	-24	-29	22	12	5	21	14	7	4	3279 N.M.I.					
40,000	-21	-17	-16	-25	-20	-28	-32	17	15	14	22	17	9	5	11	8	6	8		
30,000	-16	-15	-13	-17	-15	-24	-28	13	12	12	15	13	5	0	12	11	12	11		
20,000	-10	-8	-7	-11	-9	-16	-19	8	6	6	10	7	1	-3	12	13	12	12		
ELMENDORF AFB TO STEVENSON FIELD																				
53,000	28	12	8	20	16	8	5	-29	-12	-8	-21	-16	-25	-30	1848 N.M.I.					
40,000	30	15	15	23	21	11	5	-31	-16	-17	-25	-22	-32	-38	11	9	6	8		
30,000	30	16	15	23	21	9	3	-32	-18	-16	-25	-23	-34	-41	14	13	14	15		
20,000	21	12	11	18	15	7	3	-22	-13	-12	-18	-16	-24	-29	16	16	15	17		
ELMENDORF AFB TO SUNG SHAN																				
53,000	-34	-18	-2	-23	-20	-29	-34	30	16	1	21	17	7	2	4054 N.M.I.					
40,000	-29	-23	-17	-27	-24	-32	-36	24	20	15	24	20	13	9	10	8	6	8		
30,000	-25	-20	-14	-20	-20	-28	-32	21	16	12	18	17	9	5	11	10	11	11		
20,000	-16	-11	-8	-13	-11	-18	-21	13	9	7	11	10	4	1	11	11	11	11		
ELMENDORF AFB TO TACHIKAWA AB																				
53,000	-32	-18	-5	-25	-20	-29	-34	29	17	5	24	18	9	5	3012 N.M.I.					
40,000	-31	-24	-18	-36	-27	-37	-43	27	22	15	33	24	15	10	12	8	7	9		
30,000	-27	-21	-18	-28	-23	-33	-38	23	18	15	25	20	11	6	13	12	13	13		
20,000	-18	-13	-9	-18	-14	-22	-27	16	12	8	16	13	5	1	14	14	13	14		
ELMENDORF AFB TO TAN SAN NHUT																				
53,000	-30	-15	4	-16	-15	-24	-28	26	13	-5	14	13	3	-4	5215 N.M.I.					
40,000	-26	-18	-10	-20	-19	-26	-30	22	15	8	17	16	9	5	9	7	6	7		
30,000	-22	-15	-9	-14	-15	-22	-26	18	12	8	12	12	6	2	9	9	9	9		
20,000	-11	-8	-6	-9	-8	-13	-16	9	6	5	7	7	2	0	9	10	8	9		

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EQUIVALENT HEADWINDS AND STANOARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEADWINDS*								STANOARD DEVIATION			
	D I R E C T								R E T U R N											
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT		
ELMENOORF AFB TO THULE AB																				
53,000	13	7	2	11	7	2	-1	-15	-7	-3	-12	-8	-15	-19	11	8	5	8	1772 N.MI.	
40,000	4	9	8	12	9	1	-3	-5	-10	-9	-13	-10	-17	-21	12	10	11	11		
30,000	2	9	8	12	8	-2	-7	-3	-10	-9	-13	-9	-18	-23	14	13	14	13		
20,000	0	5	5	6	4	-3	-7	-1	-6	-6	-7	-5	-12	-16	12	11	10	10		
ELMENOORF AFB TO TORBAY AP																				
53,000	20	9	7	14	11	6	3	-21	-9	-7	-15	-12	-19	-23	9	7	5	7	3154 N.MI.	
40,000	18	13	17	22	17	10	6	-21	-15	-18	-25	-19	-27	-31	11	10	10	11		
30,000	17	14	16	21	17	8	4	-19	-16	-17	-23	-19	-27	-32	12	13	12	12		
20,000	12	9	11	14	12	5	2	-13	-10	-12	-16	-13	-19	-22	10	9	8	9		
ELMENOORF AFB TO TORREJON AFB																				
53,000	11	6	1	8	6	1	-1	-13	-7	-1	-9	-7	-12	-15	8	6	4	6	4479 N.MI.	
40,000	7	8	6	8	7	1	-2	-10	-9	-7	-10	-9	-15	-19	10	9	8	9		
30,000	6	8	6	8	7	-1	-5	-8	-10	-8	-10	-9	-16	-20	12	11	10	11		
20,000	2	5	4	3	3	-2	-6	-4	-6	-5	-4	-5	-10	-13	10	9	7	8		
ELMENOORF AFB TO TRAVIS AFB																				
53,000	18	8	3	10	9	2	-2	-20	-9	-4	-11	-10	-18	-23	12	10	8	10	1724 N.MI.	
40,000	25	16	14	14	17	5	-1	-29	-18	-16	-18	-20	-32	-39	18	16	16	18		
30,000	23	13	11	10	14	1	-6	-27	-17	-13	-15	-18	-31	-39	21	20	17	21		
20,000	14	5	9	6	8	-1	-7	-17	-7	-10	-8	-10	-20	-26	17	15	11	14		
ELMENOORF AFB TO WAKE AP																				
53,000	-21	-11	0	-9	-9	-18	-23	17	9	0	8	8	1	-3	11	9	7	9	3107 N.MI.	
40,000	-38	-30	-12	-21	-25	-36	-43	31	24	9	17	20	10	4	14	13	12	13		
30,000	-35	-26	-13	-22	-23	-34	-40	28	22	11	18	19	10	5	14	13	11	13		
20,000	-25	-16	-12	-14	-16	-24	-28	22	14	11	13	14	8	4	11	10	8	9		
ELMENOORF AFB TO WESTOVER AFB																				
53,000	27	12	10	19	16	10	7	-28	-13	-10	-20	-17	-24	-29	9	7	5	7	2887 N.MI.	
40,000	30	19	21	27	24	16	11	-32	-20	-23	-29	-26	-35	-39	12	11	11	13		
30,000	30	20	20	25	24	15	10	-33	-22	-22	-28	-26	-35	-41	14	13	12	14		
20,000	21	15	15	18	17	11	7	-22	-16	-16	-19	-18	-25	-28	11	10	8	10		
ELMENDORF AFB TO WHEELUS AP																				
53,000	9	5	0	7	5	0	-2	-11	-6	0	-8	-6	-11	-14	8	6	4	5	5091 N.MI.	
40,000	7	6	2	5	5	0	-3	-10	-8	-4	-8	-7	-13	-16	9	8	7	9		
30,000	6	5	2	4	4	-3	-7	-8	-7	-4	-6	-6	-14	-17	11	10	10	10		
20,000	3	4	2	1	2	-3	-6	-5	-5	-3	-2	-4	-9	-12	9	8	7	8		
ENIWETOK AFB TO ERNEST HARMON AFB																				
53,000	20	9	3	11	10	4	2	-22	-10	-3	-12	-11	-18	-21	8	6	5	6	6605 N.MI.	
40,000	27	22	13	20	20	13	10	-31	-25	-15	-23	-23	-31	-35	9	9	8	10		
30,000	24	20	14	20	19	13	9	-28	-23	-16	-23	-22	-29	-33	10	10	8	10		
20,000	18	13	12	14	14	9	7	-20	-14	-13	-16	-15	-21	-23	8	7	6	7		
ENIWETOK AFB TO GALEAO																				
53,000	8	20	22	17	17	12	8	-8	-20	-23	-18	-18	-23	-25	5	5	6	5	9184 N.MI.	
40,000	22	31	36	33	31	24	21	-23	-32	-37	-35	-32	-38	-41	8	8	8	7		
30,000	17	24	29	28	25	19	16	-18	-25	-31	-29	-26	-31	-34	7	7	8	7		
20,000	8	8	15	10	10	6	4	-8	-8	-16	-11	-10	-14	-17	5	5	6	5		
ENIWETOK AFB TO GEORGE AFB																				
53,000	20	17	3	5	10	3	1	-22	-18	-3	-6	-11	-20	-24	9	8	6	7	4539 N.MI.	
40,000	35	31	11	18	24	14	9	-38	-34	-12	-20	-25	-36	-42	11	11	9	10		
30,000	26	24	7	13	17	9	5	-28	-26	-8	-14	-18	-28	-32	11	10	7	9		
20,000	15	11	1	5	7	2	-1	-16	-12	-1	-5	-8	-14	-18	8	7	5	6		
ENIWETOK AFB TO GOOSE AB																				
53,000	19	8	2	9	9	3	1	-21	-9	-2	-10	-10	-17	-21	8	6	5	6	6349 N.MI.	
40,000	25	19	11	18	18	11	8	-29	-22	-13	-21	-21	-28	-32	9	9	8	9		
30,000	22	18	12	18	17	11	7	-25	-21	-13	-21	-20	-27	-30	10	9	8	9		
20,000	16	11	10	13	13	8	5	-18	-13	-11	-14	-14	-19	-22	8	7	6	7		
ENIWETOK AFB TO HICKAM AFB																				
53,000	10	13	-5	-5	2	-5	-8	-11	-14	4	5	-3	-12	-17	9	9	6	8	2358 N.MI.	
40,000	24	32	10	9	18	8	3	-25	-34	-10	-10	-19	-30	-36	11	13	11	11		
30,000	13	20	4	3	9	2	-2	-14	-21	-4	-4	-10	-19	-24	11	10	8	9		
20,000	1	2	-5	-5	-2	-7	-9	-2	-2	5	5	2	-3	-6	8	6	5	6		

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	D I R E C T							R E T U R N										
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
ENIWETOK AFB TO INCIRLIK AB																		
53,000	-35	-29	-15	-26	-26	-33	-37	32	28	14	25	25	18	15	8	7	6	6
40,000	-42	-39	-26	-37	-36	-43	-47	39	36	25	35	34	27	23	9	9	9	9
30,000	-39	-34	-19	-27	-30	-38	-42	36	32	18	25	28	20	16	9	9	8	9
20,000	-21	-20	-9	-18	-17	-22	-25	19	19	9	17	16	11	8	7	6	5	6
ENIWETOK AFB TO IWO JIMA																		
53,000	-7	-15	11	2	-1	-11	-17	5	14	-12	-3	0	-9	-13	11	12	10	9
40,000	-13	-26	0	-6	-10	-21	-27	10	24	0	5	9	-1	-6	11	14	12	13
30,000	-18	-19	-1	-5	-10	-20	-25	16	18	0	4	9	1	-3	11	11	8	10
20,000	9	-8	5	4	3	-5	-9	-10	8	-5	-4	-3	-10	-14	9	8	7	8
ENIWETOK AFB TO JOHNSTON AFB																		
53,000	5	10	-6	-8	-1	-8	-12	-6	-10	6	8	0	-9	-14	10	10	8	9
40,000	15	27	6	4	12	2	-3	-16	-28	-7	-4	-13	-24	-29	12	13	12	12
30,000	6	16	1	-1	4	-3	-6	-7	-16	-1	0	-5	-13	-18	11	11	8	9
20,000	-4	0	-7	-7	-5	-10	-12	3	0	7	7	4	-1	-4	9	7	6	6
ENIWETOK AFB TO KADENA AB																		
53,000	-19	-19	14	0	-6	-19	-24	17	18	-15	-1	5	-8	-14	10	11	8	8
40,000	-24	-32	1	-9	-17	-29	-34	22	31	-2	8	15	3	-3	10	12	10	11
30,000	-27	-25	0	-7	-14	-26	-31	25	24	-1	6	13	2	-2	10	10	7	9
20,000	-5	-12	3	1	-3	-9	-13	3	11	-4	-1	2	-4	-7	8	7	6	7
ENIWETOK AFB TO KEFLAVIK AP																		
53,000	4	1	-3	0	0	-4	-6	-7	-2	3	-1	-1	-6	-9	8	6	4	6
40,000	2	0	-4	-1	-1	-6	-9	-7	-4	2	-2	-3	-8	-12	8	8	7	8
30,000	0	0	-2	-1	-1	-7	-10	-4	-3	1	-2	-2	-8	-11	9	9	8	9
20,000	1	-1	1	0	0	-4	-7	-3	-1	-2	-2	-2	-7	-9	8	7	6	7
ENIWETOK AFB TO KINDLEY AFB																		
53,000	26	18	6	14	15	9	6	-27	-19	-7	-14	-16	-23	-27	8	7	5	6
40,000	44	33	19	29	31	22	17	-47	-36	-20	-31	-33	-43	-49	10	10	9	10
30,000	39	31	16	26	27	19	15	-43	-34	-18	-28	-30	-40	-45	11	10	8	10
20,000	28	21	12	18	19	13	10	-30	-22	-12	-19	-20	-27	-31	8	7	5	7
ENIWETOK AFB TO KWAJALEIN NAS																		
53,000	-22	0	-10	-9	-10	-20	-25	21	0	9	9	10	0	-5	13	14	12	12
40,000	-5	7	1	-2	0	-9	-14	4	-7	-2	1	-1	-10	-16	11	13	15	15
30,000	-7	1	-5	-4	-4	-11	-14	7	-1	4	4	3	-4	-7	11	10	10	10
20,000	-14	-2	-11	-10	-9	-16	-19	14	2	10	10	9	3	-1	10	8	8	8
ENIWETOK AFB TO LADD AFB																		
53,000	17	7	-2	5	6	-1	-4	-20	-9	1	-7	-7	-15	-20	10	8	6	8
40,000	26	19	7	12	16	7	2	-32	-24	-9	-16	-20	-30	-35	12	11	10	12
30,000	21	17	8	13	15	7	3	-27	-21	-10	-17	-18	-27	-32	12	11	9	11
20,000	17	10	9	10	11	6	3	-20	-12	-10	-12	-13	-19	-23	10	8	7	8
ENIWETOK AFB TO LAJES AP																		
53,000	9	3	-1	4	3	-1	-3	-11	-4	1	-5	-4	-9	-13	8	6	4	6
40,000	6	4	1	4	4	-2	-5	-11	-8	-3	-8	-7	-13	-16	9	8	8	9
30,000	3	4	2	4	3	-3	-6	-8	-7	-4	-7	-6	-13	-16	10	9	8	9
20,000	2	2	3	3	3	-2	-5	-5	-4	-4	-5	-4	-9	-12	8	7	6	7
ENIWETOK AFB TO LE BOURGET AP																		
53,000	-8	-9	-5	-7	-7	-11	-13	5	7	5	5	6	2	0	8	6	4	6
40,000	-14	-13	-11	-14	-13	-18	-22	9	9	9	10	9	4	1	9	8	8	9
30,000	-14	-13	-9	-13	-12	-18	-22	9	10	8	10	9	3	0	9	9	8	9
20,000	-8	-8	-5	-7	-7	-12	-14	5	7	4	6	5	1	-2	7	7	6	7
ENIWETOK AFB TO LONDON INTERNATIONAL																		
53,000	-7	-8	-5	-6	-6	-10	-12	3	6	5	4	5	1	-1	8	6	4	6
40,000	-11	-11	-10	-11	-11	-16	-19	6	7	8	8	7	2	-1	8	8	7	9
30,000	-12	-11	-9	-11	-11	-17	-20	7	8	7	8	8	2	-1	9	9	8	9
20,000	-6	-7	-4	-6	-6	-10	-13	4	5	3	4	4	0	-3	7	7	6	7
ENIWETOK AFB TO LORING AFB																		
53,000	21	11	5	12	12	6	4	-23	-12	-5	-13	-13	-19	-23	8	6	5	6
40,000	33	26	15	24	25	17	13	-37	-29	-17	-27	-28	-36	-40	10	9	9	10
30,000	31	24	16	24	24	16	13	-34	-27	-18	-27	-26	-34	-38	10	10	8	10
20,000	23	17	13	17	17	12	10	-25	-19	-14	-19	-19	-24	-27	8	7	6	7

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	DIRECT							RETURN							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85				
ENIWETOK AFB TO MAURIPUR AP															5403 N.MI.			
53,000	-47	-33	20	-8	-20	-40	-46	45	32	-21	7	19	-8	-19	8	8	6	7
40,000	-53	-44	6	-16	-30	-49	-54	52	43	-7	15	29	3	-5	8	9	7	9
30,000	-46	-35	3	-13	-24	-40	-46	45	34	-4	13	22	3	-3	8	7	5	7
20,000	-23	-19	3	-5	-12	-21	-24	23	18	-3	5	11	1	-2	6	5	4	5
ENIWETOK AFB TO MCCORD AFB															4299 N.MI.			
53,000	19	13	3	7	10	4	1	-21	-14	-3	-8	-11	-18	-22	9	8	6	7
40,000	38	31	10	23	26	15	9	-42	-34	-11	-25	-28	-39	-45	12	11	10	11
30,000	32	29	10	20	22	13	8	-36	-32	-11	-22	-25	-35	-41	12	11	8	11
20,000	24	19	8	15	16	9	6	-25	-20	-8	-16	-17	-24	-28	10	8	6	8
ENIWETOK AFB TO MCGUIRE AFB															6388 N.MI.			
53,000	23	15	6	13	14	8	5	-25	-16	-7	-14	-15	-21	-25	8	7	5	6
40,000	41	31	19	28	30	21	16	-45	-34	-20	-31	-32	-42	-47	10	10	9	10
30,000	38	30	17	26	27	19	15	-41	-32	-19	-28	-29	-39	-44	11	10	8	10
20,000	27	21	13	19	19	14	11	-29	-22	-13	-20	-20	-27	-31	9	7	6	7
ENIWETOK AFB TO MIOWAY NAS															1523 N.MI.			
53,000	15	4	-10	-9	-2	-11	-15	-16	-5	10	9	1	-11	-17	12	11	8	9
40,000	23	23	-3	-1	10	-3	-9	-26	-26	2	0	-12	-26	-33	14	16	13	14
30,000	13	14	-3	-2	4	-5	-9	-15	-15	3	2	-5	-16	-22	14	12	9	11
20,000	9	3	-3	-3	1	-5	-8	-10	-4	2	3	-1	-8	-12	10	9	7	8
ENIWETOK AFB TO MILOENHALL AP															6864 N.MI.			
53,000	-7	-8	-5	-6	-6	-10	-12	3	6	5	5	5	1	-1	8	6	4	6
40,000	-11	-11	-10	-12	-11	-16	-19	6	7	8	8	8	2	-1	8	8	7	9
30,000	-12	-12	-9	-11	-11	-17	-20	8	8	7	8	8	2	-1	9	9	8	9
20,000	-7	-7	-4	-6	-6	-10	-13	4	5	3	5	4	0	-3	7	7	6	7
ENIWETOK AFB TO MINOT AFB															5144 N.MI.			
53,000	20	13	5	10	11	6	3	-22	-14	-5	-11	-12	-19	-23	8	7	5	7
40,000	38	30	13	25	27	17	12	-41	-33	-15	-28	-29	-39	-44	11	10	9	11
30,000	34	28	13	24	24	15	11	-37	-31	-15	-26	-27	-36	-41	12	11	8	11
20,000	25	20	11	18	18	12	9	-26	-21	-11	-19	-19	-25	-29	9	8	6	8
ENIWETOK AFB TO MOSCOW INTERNATIONAL															5923 N.MI.			
53,000	-19	-19	-8	-14	-15	-20	-23	16	17	7	13	13	8	5	8	6	5	6
40,000	-30	-27	-15	-24	-24	-31	-35	25	23	14	21	21	14	11	9	9	8	9
30,000	-26	-24	-11	-21	-21	-28	-32	22	21	10	18	18	11	7	9	10	8	9
20,000	-14	-16	-6	-13	-12	-18	-21	12	15	5	11	11	5	3	8	7	6	7
ENIWETOK AFB TO MYRTLE BEACH AFB															6387 N.MI.			
53,000	26	19	5	12	15	8	5	-27	-20	-6	-13	-16	-24	-28	8	7	5	6
40,000	45	34	16	27	30	20	15	-48	-36	-18	-29	-32	-44	-49	11	10	9	10
30,000	37	30	13	23	25	16	12	-40	-32	-14	-24	-27	-37	-42	11	10	7	10
20,000	24	19	8	14	16	9	7	-26	-20	-8	-15	-16	-24	-27	8	7	5	7
ENIWETOK AFB TO NOUASSEUR AB															8055 N.MI.			
53,000	-6	-7	-5	-5	-6	-9	-12	2	5	5	4	4	0	-2	7	5	4	5
40,000	-9	-10	-10	-11	-10	-15	-18	4	6	8	7	6	1	-2	8	8	7	9
30,000	-9	-10	-9	-10	-10	-15	-19	5	7	7	7	7	1	-2	9	9	8	9
20,000	-5	-6	-5	-6	-5	-10	-12	3	5	4	4	4	-1	-3	7	7	6	7
ENIWETOK AFB TO ORLY AP															7041 N.MI.			
53,000	-8	-9	-5	-7	-7	-11	-13	5	7	5	5	6	2	0	8	6	4	6
40,000	-14	-13	-11	-14	-13	-18	-22	9	10	9	10	9	4	1	9	8	8	9
30,000	-14	-13	-9	-13	-12	-18	-22	9	10	8	10	9	3	0	9	9	8	9
20,000	-8	-8	-5	-7	-7	-12	-14	5	7	4	6	5	1	-2	7	7	6	7
ENIWETOK AFB TO PALAM AP															4827 N.MI.			
53,000	-47	-33	17	-10	-21	-40	-46	45	32	-18	9	20	-5	-16	8	9	7	8
40,000	-52	-45	2	-18	-32	-48	-53	50	44	-3	17	31	6	-1	9	9	7	9
30,000	-47	-37	1	-15	-25	-42	-47	46	36	-2	14	24	5	-1	8	8	5	7
20,000	-23	-20	2	-6	-12	-21	-24	22	19	-2	6	12	2	-2	6	5	5	5
ENIWETOK AFB TO PATRICK AFB															6447 N.MI.			
53,000	26	21	3	10	15	6	2	-28	-22	-3	-11	-16	-25	-29	8	7	5	6
40,000	43	37	12	25	29	18	12	-46	-39	-13	-27	-32	-43	-48	11	10	8	9
30,000	34	30	9	19	22	13	9	-36	-32	-10	-20	-24	-34	-39	11	9	7	9
20,000	21	16	3	9	12	5	2	-22	-17	-3	-10	-12	-20	-23	8	7	4	6

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HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION			
	DIRECT						RETURN						JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85		
ENIWETOK AFB TO PIARCO AP																
53,000	20	19	-6	4	9	-1	-5	-21	-19	5	-4	-10	-20	-23	7	7882 N.MI.
40,000	33	34	5	15	22	10	5	-35	-36	-6	-16	-23	-36	-40	9	6 4 5
30,000	24	24	3	9	14	6	2	-25	-25	-3	-9	-15	-25	-29	8	9 6 7
20,000	9	8	-4	0	3	-2	-4	-10	-9	3	0	-3	-9	-12	6	7 5 6
ENIWETOK AFB TO POPE AFB																
53,000	25	18	6	12	15	8	5	-27	-19	-6	-13	-16	-23	-27	8	6343 N.MI.
40,000	45	34	17	27	30	20	16	-48	-36	-18	-30	-23	-43	-49	11	7 5 6
30,000	37	30	14	23	26	17	12	-41	-33	-15	-25	-38	-38	-43	11	10 9 10
20,000	25	19	9	16	17	10	8	-27	-20	-9	-16	-17	-25	-28	8	10 7 10
ENIWETOK AFB TO PRESTWICK AB																
53,000	-5	-5	-5	-5	-5	-9	-11	1	3	4	3	3	-1	-3	8	6735 N.MI.
40,000	-7	-8	-8	-9	-8	-13	-16	2	4	7	5	5	-1	-4	8	6 4 6
30,000	-9	-8	-7	-8	-8	-14	-17	4	5	6	5	5	-1	-4	9	8 7 8
20,000	-5	-4	-3	-4	-4	-9	-11	2	3	2	3	2	-2	-4	7	9 8 9
ENIWETOK AFB TO RAMEY AFB																
53,000	25	22	-1	8	14	3	-1	-26	-23	1	-8	-15	-25	-28	7	7368 N.MI.
40,000	41	38	9	22	28	15	10	-43	-41	-10	-23	-30	-42	-47	10	7 5 6
30,000	31	29	6	15	20	10	6	-33	-31	-7	-16	-21	-32	-36	9	9 7 9
20,000	16	14	-1	5	8	2	-1	-17	-15	0	-5	-9	-16	-19	7	8 6 7
ENIWETOK AFB TO RHEIN MAIN AB																
53,000	-11	-11	-6	-8	-9	-13	-15	7	10	5	7	7	3	1	8	6868 N.MI.
40,000	-18	-16	-12	-16	-16	-22	-25	13	13	11	13	12	7	3	9	6 5 6
30,000	-16	-16	-10	-15	-14	-21	-24	12	13	9	12	11	5	2	9	8 8 9
20,000	-9	-11	-5	-8	-8	-13	-16	7	9	5	7	7	2	0	7	9 8 9
ENIWETOK AFB TO SEOUL AB																
53,000	-31	-31	0	-14	-19	-31	-37	26	29	-1	12	17	5	0	11	2465 N.MI.
40,000	-44	-43	-12	-29	-33	-45	-51	39	40	10	26	30	16	10	12	11 9 9
30,000	-45	-36	-7	-22	-28	-41	-47	41	33	7	20	25	12	6	12	13 12 13
20,000	-14	-20	-2	-9	-11	-19	-23	12	19	1	8	10	3	-1	11	11 9 11
ENIWETOK AFB TO STEVENSON FIELD																
53,000	20	13	4	11	11	6	3	-22	-14	-5	-12	-12	-19	-23	8	5276 N.MI.
40,000	37	30	13	25	26	17	12	-41	-33	-15	-28	-29	-39	-44	10	7 5 7
30,000	34	28	14	24	25	16	12	-37	-30	-15	-27	-27	-36	-41	11	10 9 11
20,000	25	20	11	18	18	12	9	-27	-21	-12	-19	-19	-26	-29	9	11 8 11
ENIWETOK AFB TO SUNG SHAN																
53,000	-19	-16	18	1	-6	-18	-23	17	16	-19	-1	5	-10	-17	9	2454 N.MI.
40,000	-24	-31	4	-8	-15	-27	-33	22	29	-5	7	14	1	-5	9	10 8 7
30,000	-26	-23	2	-4	-12	-25	-30	24	23	-3	4	11	0	-4	9	11 9 10
20,000	-5	-10	3	1	-2	-9	-12	4	10	-4	-2	2	-4	-6	9	9 6 8
ENIWETOK AFB TO TACHIKAWA AB																
53,000	-21	-25	0	-9	-13	-24	-30	15	23	-1	7	10	1	-3	12	1920 N.MI.
40,000	-37	-37	-10	-22	-26	-39	-46	29	32	9	19	22	10	4	14	12 10 10
30,000	-38	-30	-7	-17	-22	-35	-41	31	26	6	14	19	8	3	15	15 13 15
20,000	-6	-16	0	-4	-6	-14	-18	3	15	-1	3	4	-2	-6	13	13 10 12
ENIWETOK AFB TO TAN SAN NHUT																
53,000	12	7	31	21	17	9	6	-13	-8	-31	-21	-18	-26	-30	7	3274 N.MI.
40,000	2	-3	19	9	6	-1	-4	-3	3	-19	-10	-7	-15	-19	6	7 7 6
30,000	1	-4	11	6	4	-2	-5	-2	4	-11	-7	-4	-9	-12	5	7 7 7
20,000	6	3	6	8	6	3	1	-6	-4	-7	-8	-6	-9	-11	5	6 5 5
ENIWETOK AFB TO THULE AB																
53,000	13	5	-2	4	4	-1	-3	-17	-6	2	-6	-6	-12	-16	8	5235 N.MI.
40,000	12	8	0	6	7	0	-3	-17	-12	-2	-10	-10	-17	-21	9	6 5 6
30,000	9	7	3	6	6	0	-4	-12	-10	-4	-9	-9	-16	-19	10	9 8 9
20,000	7	4	5	5	5	0	-2	-5	-5	-7	-7	-7	-12	-14	8	10 9 9
ENIWETOK AFB TO TORBAY AP																
53,000	18	8	2	9	9	4	1	-21	-9	-3	-11	-10	-16	-20	8	6798 N.MI.
40,000	24	19	12	18	18	12	8	-29	-22	-14	-21	-21	-28	-32	9	6 5 6
30,000	21	18	13	18	17	11	7	-25	-21	-14	-21	-20	-27	-31	10	9 8 9
20,000	16	11	11	13	12	8	5	-18	-12	-11	-14	-14	-19	-22	8	10 8 9

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEADWINDS*								STANDARD DEVIATION			
	DIRECT								RETURN											
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT		
ENIWETOK AFB TO TORREJON AFB																				
53,000	-7	-8	-5	-6	-6	-10	-12	4	6	5	5	5	1	-1	7	6	4	5		
40,000	-11	-11	-10	-12	-11	-17	-20	6	8	9	9	8	2	-1	9	8	7	9		
30,000	-12	-12	-9	-12	-11	-17	-20	7	9	8	9	8	2	-1	9	9	8	9		
20,000	-6	-7	-5	-7	-6	-11	-13	4	6	4	5	5	0	-2	7	7	6	7		
ENIWETOK AFB TO TRAVIS AFB																				
53,000	20	16	3	6	10	3	1	-21	-17	-4	-6	-11	-19	-24	9	8	6	7		
40,000	37	30	10	19	24	13	8	-40	-33	-11	-21	-26	-37	-42	12	11	9	11		
30,000	28	25	7	15	18	9	5	-30	-27	-8	-16	-20	-30	-35	12	10	7	9		
20,000	17	13	2	7	9	3	1	-18	-14	-2	-8	-10	-17	-20	9	7	5	7		
ENIWETOK AFB TO WAKE AP																				
53,000	13	-4	-9	-10	-4	-13	-18	-14	4	8	10	3	-8	-14	13	14	11	11		
40,000	11	11	-4	-5	3	-8	-15	-12	-13	4	4	-4	-16	-22	14	16	15	16		
30,000	-4	5	-4	-5	-2	-10	-15	3	-6	3	5	2	-7	-12	14	13	10	11		
20,000	3	-2	0	-2	0	-7	-10	-3	2	0	1	0	-7	-10	11	9	9	9		
ENIWETOK AFB TO WESTOVER AFB																				
53,000	23	14	6	13	13	8	5	-24	-15	-7	-14	-14	-21	-24	8	6	5	6		
40,000	39	30	18	27	28	20	16	-43	-33	-19	-30	-31	-40	-45	10	10	9	10		
30,000	36	28	18	26	27	19	15	-40	-31	-19	-29	-29	-38	-43	11	10	8	10		
20,000	26	20	14	19	19	14	11	-28	-21	-14	-21	-21	-27	-31	9	7	6	7		
ENIWETOK AFB TO WHEELUS AP																				
53,000	-23	-21	-11	-17	-18	-23	-26	20	19	10	16	16	11	8	8	6	5	6		
40,000	-31	-28	-20	-26	-26	-33	-36	26	25	18	24	23	17	14	9	9	8	9		
30,000	-27	-26	-13	-22	-22	-29	-33	23	23	12	20	19	13	9	9	9	8	9		
20,000	-15	-16	-8	-15	-13	-19	-21	13	15	7	13	12	7	4	7	7	6	7		
ERNEST HARMON AFB TO GALEAO																				
53,000	3	4	1	3	3	-2	-4	-5	-5	-2	-4	-4	-8	-11	8	7	5	6		
40,000	2	0	2	4	2	-4	-7	-6	-4	-4	-6	-5	-11	-14	10	10	8	9		
30,000	5	3	0	2	3	-3	-6	-8	-6	-2	-4	-5	-10	-14	9	9	7	8		
20,000	2	1	-1	1	1	-3	-5	-4	-2	0	-2	-2	-6	-8	7	6	5	5		
ERNEST HARMON AFB TO GEORGE AFB																				
53,000	-32	-22	-14	-23	-22	-30	-34	31	21	14	22	21	15	11	10	8	7	8		
40,000	-52	-34	-40	-42	-42	-52	-58	48	32	38	39	39	29	23	16	14	13	16		
30,000	-47	-33	-34	-37	-37	-48	-54	44	30	32	34	35	24	19	17	16	12	16		
20,000	-31	-21	-22	-24	-24	-32	-36	29	19	21	23	23	15	11	13	12	8	12		
ERNEST HARMON AFB TO GDOSE AB																				
53,000	2	-1	-2	-2	-1	-12	-17	-5	0	1	0	-1	-12	-18	19	16	13	16		
40,000	2	-2	-13	-6	-5	-23	-33	-9	-1	7	-3	-1	-20	-30	28	25	25	29		
30,000	1	-3	-9	-5	-4	-24	-35	-9	-2	5	-3	-2	-22	-34	32	32	26	31		
20,000	-2	1	-6	-4	-3	-17	-25	-1	-3	4	0	0	-15	-23	24	23	17	23		
ERNEST HARMON AFB TO HICKAM AFB																				
53,000	-21	-16	-14	-18	-17	-22	-25	19	15	13	18	16	11	9	8	7	5	7		
40,000	-36	-26	-28	-32	-30	-38	-42	33	23	27	30	28	20	16	12	11	10	11		
30,000	-34	-25	-24	-29	-28	-36	-40	30	23	23	27	25	18	14	13	12	9	12		
20,000	-22	-16	-14	-19	-17	-23	-27	21	15	14	18	16	11	8	9	8	6	8		
ERNEST HARMON AFB TO INCIRLIK AB																				
53,000	27	15	13	18	17	12	9	-28	-16	-14	-19	-18	-25	-29	9	7	6	7		
40,000	37	23	29	34	30	21	17	-39	-25	-31	-36	-32	-42	-47	13	12	11	14		
30,000	36	23	28	32	29	19	14	-39	-26	-30	-34	-32	-42	-48	16	15	13	15		
20,000	25	16	19	21	20	13	9	-27	-17	-20	-23	-21	-29	-33	12	11	9	11		
ERNEST HARMON AFB TO IWD JIMA																				
53,000	-18	-8	-1	-10	-8	-15	-18	15	6	1	8	7	2	0	8	6	5	6		
40,000	-13	-12	-8	-15	-12	-18	-21	8	8	6	12	8	3	0	8	8	8	9		
30,000	-10	-11	-9	-12	-10	-17	-20	5	7	7	9	7	1	-2	9	9	9	9		
20,000	-6	-6	-6	-9	-7	-12	-14	3	5	5	7	5	0	-2	8	7	6	7		
ERNEST HARMON AFB TO JOHNSTON AFB																				
53,000	-19	-15	-12	-16	-15	-20	-23	17	14	12	16	14	10	8	8	6	5	6		
40,000	-35	-26	-23	-31	-29	-36	-40	31	23	21	29	26	19	15	11	10	9	11		
30,000	-32	-26	-21	-29	-27	-35	-39	29	23	20	27	24	17	13	12	11	9	11		
20,000	-22	-16	-13	-19	-17	-23	-26	20	15	12	17	16	10	8	9	8	6	8		

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEADWINDS*								STANDARD DEVIATION			
	D I R E C T								R E T U R N											
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT		
ERNEST HARMON AFB TO KADENA AFB																			6294 N.MI.	
53,000	-5	-2	0	-3	-2	-6	-9	2	0	-1	1	0	-3	-5	8	6	4	6		
40,000	5	-1	-3	1	0	-5	-8	-9	-2	2	-4	-3	-9	-12	8	8	7	8		
30,000	4	0	-2	1	1	-5	-8	-8	-3	0	-4	-4	-10	-13	9	9	9	9		
20,000	4	2	-1	1	2	-3	-6	-6	-3	0	-3	-3	-8	-11	7	7	6	7		
ERNEST HARMON AFB TO KEFLAVIK AP																			1482 N.MI.	
53,000	29	13	10	20	17	8	4	-31	-13	-11	-21	-18	-28	-34	15	11	9	12		
40,000	39	23	21	33	29	16	9	-42	-25	-24	-36	-31	-45	-52	19	18	16	20		
30,000	38	23	20	31	28	12	4	-41	-26	-22	-35	-30	-46	-55	23	23	20	23		
20,000	24	16	12	18	17	6	0	-26	-17	-13	-20	-19	-30	-37	18	18	14	17		
ERNEST HARMON AFB TO KINOLEY AFB																			1010 N.MI.	
53,000	-15	-7	-1	-10	-7	-18	-23	10	4	0	7	5	-4	-9	17	14	10	14		
40,000	-27	-20	-9	-22	-19	-35	-44	18	14	5	16	13	-2	-10	25	23	19	23		
30,000	-23	-20	-10	-21	-18	-33	-41	15	13	7	16	12	-2	-10	25	23	16	22		
20,000	-16	-14	-8	-14	-13	-24	-30	11	11	7	12	10	-1	-6	19	18	11	16		
ERNEST HARMON AFB TO KWAJALEIN NAS																			6588 N.MI.	
53,000	-20	-10	-5	-12	-11	-17	-20	18	9	5	11	10	5	3	8	6	5	6		
40,000	-31	-25	-15	-25	-24	-31	-35	27	22	14	22	21	14	10	9	9	9	10		
30,000	-28	-23	-16	-23	-22	-30	-33	25	20	14	21	20	13	9	10	10	8	10		
20,000	-20	-15	-11	-16	-15	-21	-24	18	14	10	15	14	9	7	8	7	6	7		
ERNEST HARMON AFB TO LAO AFB																			2817 N.MI.	
53,000	-22	-9	-7	-14	-12	-19	-23	20	9	7	13	11	6	3	10	7	5	7		
40,000	-20	-15	-19	-24	-19	-27	-31	17	13	17	22	17	10	6	11	10	11	12		
30,000	-19	-16	-18	-23	-19	-27	-32	16	15	17	21	17	9	4	12	13	12	12		
20,000	-13	-10	-13	-15	-13	-19	-23	12	9	12	14	12	6	2	10	10	8	9		
ERNEST HARMON AFB TO LAJES AP																			1474 N.MI.	
53,000	24	16	15	21	19	10	6	-25	-17	-15	-22	-19	-28	-33	14	12	10	12		
40,000	35	26	32	40	33	20	12	-38	-29	-34	-43	-36	-50	-57	21	20	18	21		
30,000	33	26	28	36	31	16	9	-37	-29	-30	-39	-34	-48	-56	23	22	17	22		
20,000	26	16	21	26	22	11	6	-29	-18	-21	-27	-24	-35	-41	18	17	12	16		
ERNEST HARMON AFB TO LE BOURGET AP																			2346 N.MI.	
53,000	28	14	15	21	19	12	9	-29	-15	-15	-22	-19	-27	-31	11	9	8	9		
40,000	42	24	33	41	35	23	17	-44	-26	-35	-44	-37	-49	-56	17	15	15	18		
30,000	44	25	31	39	34	21	14	-47	-28	-33	-42	-37	-51	-59	21	19	17	20		
20,000	31	18	22	27	24	14	9	-33	-19	-23	-28	-25	-35	-41	16	15	11	14		
ERNEST HARMON AFB TO LONDON INTERNATIONAL																			2188 N.MI.	
53,000	28	14	15	22	19	12	9	-29	-15	-15	-23	-20	-27	-32	12	9	8	10		
40,000	43	25	33	42	35	23	17	-45	-27	-35	-44	-37	-50	-57	18	16	15	19		
30,000	45	26	32	39	35	21	14	-48	-29	-34	-42	-38	-52	-60	22	20	17	21		
20,000	31	19	21	26	24	14	8	-34	-20	-22	-28	-26	-36	-42	17	16	12	15		
ERNEST HARMON AFB TO LORING AFB																			388 N.MI.	
53,000	-37	-20	-16	-30	-25	-37	-44	36	20	15	29	24	13	7	19	15	13	16		
40,000	-58	-36	-43	-56	-48	-67	-78	56	34	41	54	46	27	17	29	26	25	29		
30,000	-55	-37	-40	-51	-45	-65	-77	52	34	38	48	43	23	13	32	31	24	29		
20,000	-38	-23	-26	-33	-29	-44	-52	36	21	25	32	28	14	6	24	23	16	22		
ERNEST HARMON AFB TO MAURIPUR AP																			5514 N.MI.	
53,000	27	13	7	19	15	9	6	-29	-14	-7	-20	-17	-25	-29	9	6	5	6		
40,000	33	20	18	26	24	16	12	-37	-23	-19	-29	-26	-35	-40	11	10	9	11		
30,000	30	20	18	23	23	14	10	-34	-23	-20	-26	-25	-34	-39	13	12	10	12		
20,000	20	14	11	16	15	9	6	-22	-16	-12	-17	-16	-23	-26	9	9	7	9		
ERNEST HARMON AFB TO MCCORD AFB																			2499 N.MI.	
53,000	-27	-16	-15	-23	-20	-26	-30	26	15	15	23	19	13	10	10	8	7	8		
40,000	-39	-24	-35	-37	-34	-44	-49	36	23	33	35	32	22	17	14	13	13	15		
30,000	-39	-26	-33	-36	-34	-44	-50	36	24	31	34	31	21	15	16	16	13	16		
20,000	-27	-17	-22	-25	-23	-30	-35	26	16	21	23	22	14	10	12	11	9	12		
ERNEST HARMON AFB TO MCGUIRE AFB																			855 N.MI.	
53,000	-38	-20	-11	-27	-23	-35	-42	36	19	10	26	22	11	6	17	14	11	14		
40,000	-60	-38	-35	-51	-45	-63	-73	55	34	32	47	41	24	15	26	24	22	25		
30,000	-57	-37	-32	-45	-42	-60	-71	51	33	30	42	38	21	12	29	27	20	26		
20,000	-39	-24	-21	-30	-28	-41	-49	37	22	20	28	26	13	7	21	20	13	19		

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION					
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT		
ERNEST HARMON AFB TO MIDWAY NAS																			5150 N.MI.	
53,000	-22	-13	-9	-17	-15	-20	-24	20	12	9	16	14	9	6	8	7	5	7		
40,000	-35	-26	-20	-32	-28	-36	-40	32	23	19	29	26	18	14	11	10	9	11		
30,000	-34	-27	-21	-31	-28	-36	-41	31	24	19	28	25	17	13	12	11	10	12		
20,000	-25	-20	-15	-22	-20	-26	-30	23	18	14	21	19	13	10	9	8	7	8		
ERNEST HARMON AFB TO MILDENHALL AP																			2204 N.MI.	
53,000	29	14	14	22	19	12	8	-30	-15	-15	-23	-19	-27	-32	12	9	8	10		
40,000	43	25	33	41	35	23	17	-45	-27	-34	-44	-37	-50	-57	18	16	15	19		
30,000	44	26	31	39	35	21	13	-48	-29	-34	-42	-38	-52	-60	22	20	18	21		
20,000	31	19	21	26	24	13	8	-33	-20	-22	-28	-25	-36	-42	17	16	12	15		
ERNEST HARMON AFB TO MINOT AFB																			1680 N.MI.	
53,000	-31	-17	-16	-25	-22	-30	-34	30	17	16	24	21	14	10	12	9	8	10		
40,000	-46	-27	-40	-43	-39	-52	-58	44	26	39	40	37	25	18	17	16	16	19		
30,000	-44	-30	-37	-40	-38	-51	-58	42	28	36	37	35	23	16	20	19	16	20		
20,000	-32	-18	-25	-27	-26	-35	-40	30	17	25	26	24	15	10	15	14	11	14		
ERNEST HARMON AFB TO MOSCOW INTERNATIONAL																			3276 N.MI.	
53,000	29	13	9	20	16	10	7	-30	-14	-9	-21	-17	-26	-31	11	8	6	8		
40,000	35	23	20	29	27	17	12	-37	-25	-22	-32	-28	-38	-44	14	12	11	14		
30,000	34	24	19	26	26	14	9	-37	-27	-21	-29	-28	-40	-46	17	16	14	16		
20,000	23	17	12	17	17	9	4	-24	-18	-13	-19	-18	-27	-31	13	12	10	12		
ERNEST HARMON AFB TO MYRTLE BEACH AFB																			1274 N.MI.	
53,000	-36	-20	-6	-24	-21	-33	-39	34	18	6	22	19	8	4	14	13	9	12		
40,000	-55	-38	-25	-46	-41	-57	-66	49	33	22	42	36	20	12	22	22	19	22		
30,000	-52	-36	-24	-40	-37	-53	-62	45	31	22	36	32	18	10	24	23	16	22		
20,000	-37	-24	-16	-26	-25	-37	-44	34	21	15	24	23	12	7	18	17	11	16		
ERNEST HARMON AFB TO NOUASSEUR AB																			2429 N.MI.	
53,000	24	16	15	19	18	12	9	-25	-17	-16	-19	-19	-25	-29	11	9	7	9		
40,000	34	26	29	36	31	21	15	-37	-28	-31	-38	-33	-44	-49	16	15	13	16		
30,000	33	24	25	33	28	18	12	-36	-27	-26	-35	-31	-42	-48	17	16	13	16		
20,000	25	16	19	23	20	12	8	-26	-17	-19	-24	-22	-30	-35	14	13	9	12		
ERNEST HARMON AFB TO ORLY AP																			2349 N.MI.	
53,000	28	14	15	21	19	12	9	-29	-15	-15	-22	-19	-27	-31	11	9	8	9		
40,000	42	24	33	41	35	23	17	-44	-26	-35	-44	-37	-49	-56	17	15	15	18		
30,000	43	25	31	39	34	21	14	-47	-28	-33	-42	-37	-51	-59	21	19	17	20		
20,000	31	18	22	27	24	14	9	-33	-19	-23	-28	-25	-35	-41	16	15	11	14		
ERNEST HARMON AFB TO PALAM AP																			5598 N.MI.	
53,000	26	12	7	19	15	9	6	-28	-13	-8	-20	-16	-24	-28	8	7	5	6		
40,000	26	18	17	23	21	14	10	-29	-20	-18	-26	-23	-30	-34	10	9	9	10		
30,000	24	20	16	21	20	12	8	-27	-22	-18	-24	-23	-30	-35	12	11	10	11		
20,000	16	13	8	14	13	7	4	-17	-14	-9	-15	-14	-20	-23	9	9	7	8		
ERNEST HARMON AFB TO PATRICK AFB																			1587 N.MI.	
53,000	-33	-18	-3	-20	-18	-29	-35	29	16	3	18	16	6	1	13	12	8	12		
40,000	-49	-36	-18	-39	-35	-50	-59	41	31	15	35	30	16	9	20	20	16	20		
30,000	-45	-31	-17	-34	-31	-46	-54	38	27	15	30	26	13	7	21	20	14	19		
20,000	-32	-22	-13	-22	-21	-32	-38	29	19	12	21	19	10	5	16	15	9	14		
ERNEST HARMON AFB TO PIARCO AP																			2281 N.MI.	
53,000	1	2	1	1	2	-5	-8	-5	-5	-2	-3	-3	-9	-13	12	10	7	9		
40,000	-7	-9	-2	-2	-5	-15	-20	0	3	0	-1	1	-9	-14	16	15	11	14		
30,000	-3	-5	-3	-3	-3	-11	-16	-3	0	1	1	0	-8	-13	15	14	9	12		
20,000	0	-3	-3	-4	-3	-9	-12	-3	1	3	3	1	-5	-9	11	10	7	9		
ERNEST HARMON AFB TO PDPE AFB																			1210 N.MI.	
53,000	-38	-21	-7	-25	-22	-34	-40	35	19	7	24	20	9	5	15	13	9	13		
40,000	-58	-38	-28	-48	-42	-59	-68	51	34	25	44	38	22	14	23	22	19	23		
30,000	-54	-37	-26	-42	-38	-56	-65	48	32	24	38	34	19	12	25	24	17	23		
20,000	-38	-24	-18	-28	-26	-38	-46	35	22	17	26	24	13	7	18	18	11	17		
ERNEST HARMON AFB TO PRESTWICK AB																			1983 N.MI.	
53,000	29	14	14	23	19	12	8	-30	-15	-14	-23	-20	-28	-33	13	9	8	10		
40,000	44	26	32	41	35	22	16	-46	-28	-34	-43	-37	-50	-58	19	17	16	19		
30,000	45	27	31	38	35	20	13	-49	-30	-33	-42	-38	-53	-62	23	21	19	22		
20,000	31	19	20	25	23	13	7	-33	-21	-21	-27	-25	-36	-43	18	17	13	16		

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	DIRECT							RETURN							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85				
ERNEST HARMON AFB TO RAMEY AFB																		
53,000	-8	-3	1	-4	-3	-10	-15	3	0	-2	2	1	-7	-10	13	12	8	11
40,000	-16	-15	-4	-11	-11	-23	-29	8	8	2	7	6	-5	-11	18	18	13	17
30,000	-12	-12	-4	-11	-9	-20	-26	5	7	3	7	5	-5	-10	18	16	11	15
20,000	-7	-8	-6	-9	-7	-15	-19	3	6	5	8	6	-2	-6	13	12	8	11
ERNEST HARMON AFB TO RHEIN MAIN AB																		
53,000	28	14	14	21	18	12	9	-29	-15	-14	-21	-19	-26	-31	11	8	7	9
40,000	41	24	32	39	34	22	16	-43	-25	-33	-42	-36	-48	-54	16	15	14	17
30,000	42	24	30	38	33	20	13	-46	-27	-33	-41	-36	-50	-57	20	19	16	20
20,000	30	18	20	25	23	13	8	-32	-19	-21	-27	-24	-34	-40	16	14	11	14
ERNEST HARMON AFB TO SEOUL AB																		
53,000	-1	-1	0	-2	-1	-5	-7	-1	0	0	0	0	-4	-6	8	5	4	6
40,000	7	1	-2	2	2	-4	-7	-10	-3	0	-5	-4	-10	-13	8	8	7	8
30,000	7	1	-1	3	3	-4	-7	-9	-3	-1	-5	-5	-11	-14	9	9	9	9
20,000	6	3	0	2	3	-2	-5	-7	-4	-1	-3	-4	-9	-12	8	7	6	7
ERNEST HARMON AFB TO STEVENSON FIELD																		
53,000	-31	-17	-16	-25	-22	-30	-35	30	16	16	24	21	13	10	12	10	9	10
40,000	-45	-27	-40	-43	-39	-52	-58	43	25	38	41	37	24	17	18	16	17	19
30,000	-43	-30	-37	-40	-37	-51	-58	41	27	35	37	35	22	15	20	20	16	20
20,000	-31	-18	-25	-27	-25	-35	-40	30	17	25	26	24	14	9	15	15	11	15
ERNEST HARMON AFB TO SUNG SHAN																		
53,000	-1	1	2	1	1	-3	-5	-3	-2	-2	-2	-2	-6	-8	7	6	4	6
40,000	8	4	-1	6	4	-2	-5	-12	-6	0	-9	-7	-13	-16	8	8	7	8
30,000	7	4	-1	5	4	-2	-6	-11	-7	-1	-7	-7	-13	-16	9	9	8	9
20,000	7	4	1	4	4	-1	-3	-9	-5	-1	-5	-5	-10	-13	7	7	6	7
ERNEST HARMON AFB TO TACHIKAWA AB																		
53,000	-12	-5	-2	-8	-6	-11	-14	9	4	2	7	5	1	-1	8	5	4	6
40,000	-5	-7	-7	-10	-7	-13	-16	2	5	5	7	5	-1	-4	8	8	8	8
30,000	-3	-6	-6	-7	-5	-12	-15	0	4	4	4	3	-3	-7	9	9	9	9
20,000	0	-3	-4	-5	-3	-8	-11	-2	2	3	3	2	-3	-6	8	8	7	7
ERNEST HARMON AFB TO TAN SAN NHUT																		
53,000	11	6	3	7	6	2	0	-14	-7	-4	-9	-8	-13	-16	7	6	5	6
40,000	12	13	4	12	10	4	1	-16	-16	-6	-14	-13	-19	-22	9	7	7	8
30,000	13	14	3	11	10	4	0	-17	-16	-5	-13	-13	-19	-23	9	9	8	8
20,000	9	9	2	7	7	2	0	-11	-11	-3	-8	-8	-13	-16	7	7	6	7
ERNEST HARMON AFB TO THULE AB																		
53,000	6	2	0	2	2	-4	-8	-8	-2	-1	-3	-3	-10	-14	12	10	7	10
40,000	10	2	-1	4	4	-6	-11	-13	-4	-2	-7	-6	-16	-22	15	14	13	15
30,000	9	2	0	4	4	-8	-14	-12	-4	-3	-8	-7	-19	-25	18	17	16	17
20,000	6	3	2	2	3	-6	-10	-8	-4	-3	-4	-5	-14	-19	14	14	11	14
ERNEST HARMON AFB TO TORBAY AP																		
53,000	30	18	16	26	22	10	4	-31	-19	-16	-27	-23	-35	-42	21	16	14	18
40,000	46	31	43	51	42	23	12	-50	-33	-45	-54	-45	-65	-76	30	28	26	31
30,000	44	29	38	46	39	18	6	-49	-33	-40	-49	-43	-64	-76	34	33	27	32
20,000	33	17	25	31	26	11	2	-35	-19	-25	-32	-28	-44	-53	26	25	18	24
ERNEST HARMON AFB TO TORREJON AFB																		
53,000	25	15	16	20	19	12	9	-26	-16	-17	-20	-19	-26	-30	11	9	8	9
40,000	38	24	33	40	34	22	16	-40	-26	-34	-42	-36	-47	-53	17	15	14	17
30,000	39	24	30	38	32	20	14	-42	-27	-31	-40	-35	-47	-54	19	18	14	18
20,000	28	17	22	26	23	14	9	-30	-18	-23	-28	-24	-34	-39	15	14	10	13
ERNEST HARMON AFB TO TRAVIS AFB																		
53,000	-30	-19	-16	-23	-21	-28	-32	29	18	15	22	21	15	12	10	8	7	8
40,000	-45	-30	-40	-40	-39	-49	-55	42	28	39	38	37	26	21	15	13	13	15
30,000	-43	-30	-35	-36	-36	-46	-52	40	27	34	33	33	23	17	17	16	12	16
20,000	-29	-19	-23	-24	-24	-31	-36	28	17	23	23	23	15	11	12	12	8	11
ERNEST HARMON AFB TO WAKE AP																		
53,000	-23	-12	-4	-13	-12	-19	-23	20	10	4	12	11	5	3	8	6	5	6
40,000	-33	-26	-17	-26	-25	-33	-37	28	22	15	22	22	15	11	10	9	9	10
30,000	-31	-24	-17	-25	-24	-32	-36	27	21	16	22	21	14	10	10	10	9	10
20,000	-22	-16	-14	-17	-17	-22	-25	20	14	13	16	15	10	8	8	7	6	7

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	DIRECT							RETURN										
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
ERNEST HARMON AFB TO WESTOVER AFB																		
53,000	-38	-20	-12	-28	-23	-36	-43	36	19	12	27	22	12	6	17	14	11	14
40,000	-61	-38	-37	-52	-47	-65	-75	57	35	34	49	43	25	16	27	25	23	27
30,000	-57	-37	-35	-47	-43	-62	-74	53	34	33	44	40	22	12	31	28	21	27
20,000	-39	-24	-22	-31	-28	-42	-50	37	23	21	30	27	14	7	22	21	14	20
ERNEST HARMON AFB TO WHEELUS AP																		
53,000	26	17	15	19	19	13	10	-27	-18	-15	-19	-19	-25	-29	9	7	7	8
40,000	38	25	30	36	32	23	18	-40	-27	-32	-38	-34	-44	-49	14	13	12	14
30,000	36	25	27	34	30	20	15	-39	-27	-29	-37	-32	-43	-48	16	15	12	15
20,000	26	17	20	23	21	14	10	-28	-18	-21	-24	-23	-30	-34	13	11	8	11
GALEAO TO GEORGE AFB																		
53,000	-10	-12	1	-6	-7	-12	-15	9	11	-2	6	6	1	-2	7	6	5	5
40,000	-20	-19	-6	-11	-14	-21	-24	18	17	5	10	12	6	3	8	8	7	7
30,000	-14	-15	-3	-9	-10	-16	-19	13	14	2	8	9	4	1	8	6	6	6
20,000	-3	-4	3	1	-1	-4	-7	2	3	-3	-1	0	-3	-5	5	5	4	4
GALEAO TO GOOSE AB																		
53,000	-5	-5	-2	-4	-4	-8	-11	3	4	1	3	3	-2	-4	8	7	5	6
40,000	-6	-4	-4	-6	-5	-11	-14	1	0	2	4	2	-4	-8	10	10	8	9
30,000	-7	-6	-2	-4	-5	-10	-14	4	3	1	2	2	-3	-6	9	9	7	8
20,000	-3	-2	0	-2	-2	-6	-8	2	1	0	1	1	-3	-5	7	6	5	6
GALEAO TO HICKAM AFB																		
53,000	-9	-10	-3	-8	-7	-11	-13	8	10	3	7	7	3	1	6	5	5	4
40,000	-21	-20	-11	-12	-16	-22	-25	20	19	11	12	15	10	7	8	7	6	6
30,000	-11	-12	-11	-10	-11	-15	-17	10	12	10	10	10	7	4	7	6	5	6
20,000	2	0	0	2	1	-2	-3	-2	0	0	-2	-1	-4	-6	5	4	4	4
GALEAO TO INCIRLIK AB																		
53,000	16	14	1	7	9	4	1	-18	-15	-2	-7	-10	-16	-20	6	6	5	5
40,000	28	26	8	18	20	12	8	-30	-28	-9	-19	-22	-30	-33	9	8	7	7
30,000	20	19	6	13	14	8	5	-22	-20	-7	-14	-16	-22	-25	8	7	6	7
20,000	8	7	-2	3	4	0	-2	-9	-8	1	-4	-5	-9	-11	6	5	5	4
GALEAO TO IWO JIMA																		
53,000	-26	-20	0	-10	-14	-23	-27	24	20	0	10	14	5	1	7	6	5	5
40,000	-41	-34	-9	-21	-27	-37	-42	39	32	8	20	25	14	9	9	8	7	7
30,000	-33	-27	-7	-17	-21	-30	-34	32	26	7	16	20	11	7	8	7	5	7
20,000	-17	-14	-3	-7	-10	-15	-18	16	13	3	7	9	4	2	6	5	4	5
GALEAO TO JOHNSTON AFB																		
53,000	-8	-12	-6	-9	-9	-12	-14	7	11	5	9	8	5	3	6	5	5	4
40,000	-21	-22	-18	-17	-19	-24	-27	20	21	17	16	18	14	11	7	7	6	6
30,000	-11	-15	-14	-14	-13	-17	-20	10	14	14	13	13	9	7	6	6	5	5
20,000	-1	0	-3	1	0	-3	-5	0	0	2	-2	0	-3	-4	5	4	4	4
GALEAO TO KADENA AB																		
53,000	32	23	-4	14	18	5	-3	-33	-24	3	-15	-19	-29	-33	6	6	5	5
40,000	41	34	4	23	28	13	6	-43	-36	-5	-24	-29	-39	-44	8	8	6	7
30,000	31	28	3	19	22	10	4	-32	-29	-4	-19	-23	-31	-34	7	7	5	6
20,000	16	12	0	7	9	3	0	-16	-13	0	-7	-9	-15	-17	5	5	4	4
GALEAO TO KEFLAVIK AP																		
53,000	4	3	2	1	2	-2	-4	-5	-4	-3	-2	-3	-7	-10	7	6	5	5
40,000	7	5	3	2	4	-2	-5	-10	-8	-5	-4	-7	-13	-16	10	9	8	9
30,000	3	3	4	2	3	-3	-6	-5	-5	-5	-4	-5	-11	-14	10	9	8	9
20,000	3	1	-1	1	1	-4	-6	-5	-2	0	-2	-2	-7	-9	8	7	6	6
GALEAO TO KINDLEY AFB																		
53,000	-8	-8	-1	-5	-5	-10	-13	7	7	0	5	4	0	-3	8	7	6	6
40,000	-10	-8	-4	-7	-7	-13	-17	8	5	2	6	5	-1	-4	10	10	8	8
30,000	-10	-9	-2	-5	-6	-12	-15	9	7	1	4	5	0	-3	9	8	7	7
20,000	-3	-3	1	0	-1	-5	-7	2	2	-2	-1	0	-3	-5	6	6	5	5
GALEAO TO KWAJALEIN NAS																		
53,000	-9	-21	-24	-18	-19	-23	-26	9	20	23	18	18	12	9	5	5	6	5
40,000	-24	-33	-38	-36	-33	-39	-42	23	32	37	35	32	25	22	8	8	8	7
30,000	-18	-26	-31	-30	-26	-32	-35	18	25	30	29	25	19	16	7	7	8	7
20,000	-9	-8	-16	-11	-11	-15	-17	8	8	16	11	10	7	5	5	5	6	5

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HEIGHT IN FEET	EQUIVALENT								HEADWINDS*							STANDARD DEVIATION						
	D I R E C T								R E T U R N													
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT				
GALEAO TO LADD AFB																			6999 N.M.I.			
53,000	-18	-12	-5	-11	-11	-16	-19	16	11	4	11	10	6	3	6	6	4	5				
40,000	-23	-16	-12	-16	-17	-23	-26	20	14	11	14	14	9	6	8	8	7	8				
30,000	-22	-16	-11	-15	-16	-22	-25	20	14	9	13	14	8	5	8	8	7	8				
20,000	-12	-9	-6	-7	-8	-13	-15	11	8	5	6	8	4	2	6	6	5	5				
GALEAO TO LAJES AP																			3804 N.M.I.			
53,000	3	4	2	0	2	-2	-4	-4	-5	-3	-1	-3	-7	-10	7	7	6	6				
40,000	5	5	3	1	3	-2	-6	-8	-8	-5	-2	-6	-12	-15	10	9	8	8				
30,000	-2	2	3	0	1	-4	-7	1	-4	-4	-2	-2	-8	-10	8	8	7	7				
20,000	-1	-1	-3	-2	-2	-6	-8	0	1	3	1	1	-3	-5	6	6	5	5				
GALEAO TO LE BOURGET AP																			4951 N.M.I.			
53,000	7	9	4	3	5	1	0	-8	-10	-5	-4	-6	-11	-13	7	6	5	5				
40,000	9	13	8	9	9	4	1	-12	-15	-9	-10	-12	-17	-20	9	9	7	8				
30,000	2	9	8	7	6	1	-2	-4	-10	-9	-8	-8	-13	-16	8	8	6	7				
20,000	1	2	1	3	2	-2	-4	-2	-3	-2	-3	-2	-6	-8	6	5	5	5				
GALEAO TO LONDON INTERNATIONAL																			4993 N.M.I.			
53,000	6	8	3	2	4	1	-1	-7	-9	-4	-3	-5	-10	-12	7	6	5	5				
40,000	8	10	7	7	8	3	0	-11	-13	-9	-9	-10	-16	-19	9	9	7	8				
30,000	1	7	7	5	5	0	-3	-3	-9	-8	-7	-7	-12	-15	9	8	7	8				
20,000	1	1	0	2	1	-3	-5	-2	-2	-1	-3	-2	-6	-8	6	6	5	5				
GALEAO TO LORING AFB																			4394 N.M.I.			
53,000	-9	-9	-2	-6	-6	-11	-14	7	8	2	5	5	1	-2	8	7	5	6				
40,000	-11	-9	-5	-8	-8	-14	-18	7	5	4	6	5	-1	-4	10	10	8	9				
30,000	-12	-9	-3	-6	-7	-13	-17	9	7	2	4	5	0	-3	9	9	7	8				
20,000	-5	-4	0	-2	-3	-7	-9	4	3	0	1	2	-2	-4	7	6	5	5				
GALEAO TO MAURIPUR AP																			7010 N.M.I.			
53,000	9	9	-13	3	4	-4	-11	-10	-9	12	-3	-5	-10	-12	6	5	5	4				
40,000	17	19	-3	14	14	5	-1	-19	-20	2	-15	-15	-21	-24	7	7	6	6				
30,000	10	12	0	11	9	3	0	-11	-13	-1	-11	-9	-14	-17	6	6	5	6				
20,000	1	2	-3	0	0	-3	-5	-1	-2	2	0	0	-3	-5	5	4	4	4				
GALEAO TO MCCORD AFB																			5978 N.M.I.			
53,000	-15	-14	-2	-10	-10	-15	-18	14	13	2	10	10	4	2	7	6	5	5				
40,000	-25	-22	-11	-17	-18	-25	-29	22	19	9	15	16	10	7	9	9	7	8				
30,000	-20	-18	-8	-14	-15	-21	-24	18	16	7	13	13	8	5	8	8	6	7				
20,000	-10	-8	-2	-5	-6	-10	-13	9	8	1	5	5	1	-1	6	6	4	5				
GALEAO TO MCGUIRE AFB																			4158 N.M.I.			
53,000	-11	-11	-1	-6	-7	-12	-15	9	10	1	5	6	1	-1	8	7	5	6				
40,000	-16	-13	-6	-9	-10	-17	-21	13	9	4	7	8	2	-1	10	10	7	8				
30,000	-15	-12	-4	-7	-9	-15	-19	12	10	3	6	7	2	-1	9	8	6	7				
20,000	-5	-5	0	0	-2	-6	-9	4	4	-1	-1	1	-2	-4	6	6	5	5				
GALEAO TO MIDWAY NAS																			8311 N.M.I.			
53,000	-13	-13	-2	-7	-9	-14	-16	13	13	2	7	8	4	1	7	5	4	4				
40,000	-26	-24	-9	-14	-18	-25	-29	24	23	9	13	17	10	7	8	7	6	6				
30,000	-16	-16	-9	-10	-13	-17	-20	15	15	8	10	12	7	5	7	6	5	6				
20,000	-2	-2	0	1	-1	-4	-6	1	2	0	-1	1	-2	-4	5	4	4	4				
GALEAO TO MILOENHALL AP																			5057 N.M.I.			
53,000	5	7	3	3	4	1	-1	-7	-9	-4	-3	-5	-10	-12	7	6	5	5				
40,000	8	10	8	7	8	3	0	-11	-12	-9	-9	-10	-16	-19	9	9	7	8				
30,000	1	7	7	5	5	0	-3	-3	-9	-8	-7	-7	-12	-15	9	8	7	8				
20,000	1	1	1	2	1	-3	-5	-2	-2	-1	-3	-2	-6	-8	6	6	5	5				
GALEAO TO MINOT AFB																			5279 N.M.I.			
53,000	-15	-13	-3	-9	-10	-15	-18	13	12	2	8	9	4	1	7	6	5	5				
40,000	-25	-20	-12	-15	-17	-24	-28	21	17	10	13	15	9	6	9	9	7	8				
30,000	-21	-17	-9	-13	-14	-21	-24	18	15	8	11	13	7	4	8	8	6	8				
20,000	-10	-8	-2	-5	-6	-10	-13	9	7	2	4	5	1	-1	6	6	5	5				
GALEAO TO MOSCOW INTERNATIONAL																			6226 N.M.I.			
53,000	10	10	6	6	8	4	2	-12	-11	-7	-7	-9	-13	-15	7	6	5	5				
40,000	13	17	11	13	13	8	5	-16	-19	-12	-15	-15	-21	-24	9	8	7	8				
30,000	8	13	10	11	10	5	2	-10	-14	-11	-12	-12	-17	-20	9	8	7	8				
20,000	4	6	4	5	5	1	-1	-5	-6	-5	-5	-5	-9	-11	6	6	5	5				

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEADWINDS*								STANDARD DEVIATION					
	D I R E C T								R E T U R N													
	JAN	APR	JUL	DCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT				
GALEAO TO MYRTLE BEACH AFB																			3956 N.MI.			
53,000	-9	-11	-1	-5	-6	-11	-14	8	10	0	5	5	1	-2	7	7	5	5				
40,000	-16	-15	-6	-9	-11	-18	-21	14	12	4	7	9	3	0	9	9	7	8				
30,000	-13	-12	-4	-7	-9	-15	-18	12	11	3	6	8	2	0	8	8	6	7				
20,000	-4	-4	2	1	-1	-5	-7	3	3	-2	-1	0	-3	-5	6	5	5	5				
GALEAO TO NOUASSEUR AB																			3940 N.MI.			
53,000	9	10	3	4	6	2	-1	-10	-11	-3	-5	-7	-12	-14	7	7	6	5				
40,000	14	16	5	9	11	5	1	-16	-19	-6	-11	-13	-19	-23	9	9	7	8				
30,000	6	11	5	7	7	2	-1	-8	-13	-6	-8	-8	-14	-16	8	7	6	7				
20,000	2	3	-1	1	1	-2	-4	-3	-3	1	-1	-2	-5	-7	6	5	5	5				
GALEAO TO ORLY AP																			4939 N.MI.			
53,000	7	9	4	3	5	2	0	-8	-10	-5	-4	-6	-11	-13	7	6	5	5				
40,000	9	13	8	9	10	4	1	-12	-15	-9	-10	-12	-17	-21	9	9	7	8				
30,000	2	9	8	7	7	1	-2	-4	-10	-9	-8	-8	-13	-16	8	8	6	7				
20,000	1	2	1	3	2	-2	-4	-2	-3	-2	-3	-2	-6	-8	6	5	5	5				
GALEAO TO PALAM AP																			7589 N.MI.			
53,000	15	13	-10	6	9	-1	-9	-16	-14	10	-7	-9	-15	-18	6	5	5	5				
40,000	25	23	-2	16	18	7	-1	-27	-24	1	-17	-19	-26	-30	7	7	6	7				
30,000	15	16	0	12	12	5	1	-16	-17	-1	-13	-13	-18	-21	7	6	5	6				
20,000	5	5	-3	1	2	-2	-3	-5	-5	2	-1	-2	-6	-8	5	4	4	4				
GALEAO TO PATRICK AFB																			3750 N.MI.			
53,000	-7	-9	0	-5	-5	-10	-12	6	8	0	4	4	0	-2	8	6	5	5				
40,000	-14	-13	-6	-7	-10	-16	-20	12	11	4	6	8	2	-1	9	9	7	8				
30,000	-10	-11	-4	-6	-7	-13	-16	9	10	3	5	7	2	-1	8	7	6	7				
20,000	-2	-2	2	2	0	-4	-6	1	2	-3	-2	-1	-4	-6	6	5	5	4				
GALEAO TO PIARCO AP																			2269 N.MI.			
53,000	-1	-4	-2	-4	-3	-8	-11	1	4	2	4	3	-2	-5	9	7	7	6				
40,000	-5	-5	-7	-5	-6	-12	-16	4	3	6	4	4	-2	-6	11	11	9	8				
30,000	-5	-5	-5	-6	-5	-11	-14	4	4	4	5	4	-1	-5	9	9	8	8				
20,000	2	1	0	1	1	-3	-5	-2	-1	-1	-1	-1	-5	-8	7	6	7	5				
GALEAO TO POPE AFB																			4030 N.MI.			
53,000	-10	-11	-1	-6	-6	-12	-15	8	10	0	5	6	1	-2	7	7	5	5				
40,000	-17	-15	-6	-9	-11	-18	-22	14	12	5	8	9	3	0	9	9	7	8				
30,000	-14	-13	-4	-8	-9	-15	-18	12	11	3	6	8	3	0	8	8	6	7				
20,000	-4	-4	1	1	-1	-5	-8	3	4	-2	-1	1	-3	-5	6	5	5	5				
GALEAO TO PRESTWICK AB																			5097 N.MI.			
53,000	5	6	3	2	4	0	-2	-6	-7	-3	-3	-5	-9	-11	7	6	5	5				
40,000	7	8	7	5	7	1	-2	-10	-10	-8	-7	-9	-15	-18	9	9	8	8				
30,000	1	5	6	4	4	-1	-5	-3	-7	-7	-6	-6	-11	-14	9	8	7	8				
20,000	1	1	0	2	1	-3	-5	-2	-1	-1	-2	-2	-6	-8	7	6	5	6				
GALEAO TO RAMEY AFB																			2848 N.MI.			
53,000	-3	-6	-1	-4	-3	-8	-10	2	5	0	4	3	-2	-4	8	7	6	5				
40,000	-8	-7	-5	-6	-6	-12	-16	6	5	4	4	5	-1	-4	10	10	8	8				
30,000	-7	-6	-3	-5	-5	-11	-14	6	6	2	4	5	-1	-3	8	8	7	7				
20,000	1	0	2	1	1	-3	-5	-1	0	-2	-2	-1	-5	-7	6	5	6	5				
GALEAO TO RHEIN MAIN AB																			5163 N.MI.			
53,000	8	9	5	4	6	2	0	-9	-10	-5	-5	-7	-11	-14	7	6	5	5				
40,000	10	14	8	10	11	5	2	-13	-16	-10	-12	-13	-18	-22	9	8	7	8				
30,000	3	10	8	8	8	2	-1	-6	-12	-9	-9	-9	-14	-17	9	8	6	7				
20,000	2	4	2	3	3	-1	-3	-3	-4	-3	-4	-3	-7	-9	6	5	5	5				
GALEAO TO SEOUL AB																			9783 N.MI.			
53,000	12	12	6	9	9	6	4	-14	-13	-7	-10	-10	-15	-17	7	5	4	5				
40,000	16	17	12	17	15	10	7	-19	-19	-14	-19	-17	-23	-26	9	8	7	8				
30,000	10	15	11	13	12	7	4	-13	-17	-12	-15	-14	-20	-23	9	8	7	8				
20,000	8	9	6	9	8	4	2	-9	-10	-6	-10	-9	-13	-15	7	6	5	6				
GALEAO TO STEVENSON FIELD																			5220 N.MI.			
53,000	-14	-13	-3	-9	-9	-15	-17	13	12	3	8	8	4	1	7	6	5	5				
40,000	-24	-19	-11	-14	-17	-24	-27	20	15	10	12	14	8	5	9	9	7	8				
30,000	-21	-17	-9	-13	-14	-21	-24	18	15	8	11	12	7	4	8	8	6	8				
20,000	-10	-8	-3	-4	-6	-10	-13	9	7	2	3	5	1	-1	6	6	5	5				

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEADWINDS*								STANDARD DEVIATION			
	O I R E C T								R E T U R N								JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85						
GALEAO TO SUNG SHAN																				
53,000	21	17	-19	1	8	-9	-18	-22	-18	18	-2	-9	-20	-23	6	6	5	5		
40,000	28	25	-7	12	17	2	-6	-29	-26	6	-13	-18	-28	-31	7	7	6	7		
30,000	21	18	-1	11	14	5	0	-22	-19	0	-12	-14	-21	-23	6	6	5	6		
20,000	8	6	-2	2	3	-1	-2	-9	-6	2	-2	-4	-8	-10	4	4	4	4		
GALEAO TO TACHIKAWA AB																				
53,000	-8	-5	-2	-6	-5	-9	-11	6	3	1	5	3	0	-2	7	5	4	5		
40,000	-4	-5	-5	-7	-5	-10	-13	0	2	3	5	3	-2	-5	8	8	7	7		
30,000	-4	-5	-4	-5	-4	-10	-12	1	3	2	2	2	-3	-6	8	8	7	7		
20,000	-1	-2	-2	-3	-2	-6	-8	-1	1	1	2	1	-3	-5	7	6	5	6		
GALEAO TO TAN SAN NHUT																				
53,000	1	14	11	5	8	3	0	-2	-15	-12	-6	-9	-14	-17	6	6	6	5		
40,000	12	25	26	23	22	15	12	-13	-26	-27	-24	-23	-29	-32	8	7	7	7		
30,000	9	19	26	19	18	12	8	-9	-19	-27	-20	-19	-25	-29	6	7	8	7		
20,000	3	7	11	9	8	4	2	-3	-7	-11	-10	-8	-12	-14	5	5	5	5		
GALEAO TO THULE AB																				
53,000	0	-2	0	-2	-1	-5	-7	-2	1	-1	1	0	-4	-6	7	6	5	5		
40,000	1	0	-2	-3	-1	-7	-10	-4	-3	0	1	-1	-7	-10	9	9	7	8		
30,000	-1	-2	0	-1	-1	-7	-10	-2	0	-1	-1	-1	-7	-10	9	8	7	8		
20,000	1	0	0	-1	0	-4	-6	-2	-1	-1	0	-1	-5	-8	7	7	5	6		
GALEAO TO TORBAY AP																				
53,000	-3	-4	0	-3	-2	-7	-9	1	2	-1	3	1	-3	-5	8	7	5	6		
40,000	-4	-2	-3	-5	-3	-10	-13	0	-2	1	3	1	-5	-9	10	10	8	9		
30,000	-6	-4	-1	-3	-3	-9	-12	3	2	-1	1	1	-4	-7	9	9	7	8		
20,000	-2	-1	0	-2	-1	-6	-8	1	0	-1	2	1	-4	-6	7	6	5	5		
GALEAO TO TORREJON AFB																				
53,000	8	10	4	4	6	2	0	-9	-11	-4	-5	-7	-11	-14	7	6	5	5		
40,000	12	15	7	9	10	5	2	-15	-18	-8	-11	-12	-19	-22	9	9	7	8		
30,000	4	10	6	7	7	2	-1	-6	-12	-7	-8	-8	-13	-16	8	7	6	7		
20,000	2	3	0	2	2	-2	-4	-2	-4	-1	-2	-2	-6	-8	6	5	5	5		
GALEAO TO TRAVIS AFB																				
53,000	-12	-12	1	-7	-8	-13	-16	11	12	-1	7	7	2	-1	7	6	5	5		
40,000	-22	-21	-8	-13	-16	-22	-26	20	19	7	12	14	8	5	9	8	7	7		
30,000	-16	-17	-5	-10	-12	-18	-21	15	15	4	9	10	2	2	8	7	6	6		
20,000	-5	-5	2	-1	-2	-6	-8	4	5	-2	0	2	-2	-4	6	5	4	4		
GALEAO TO WAKE AP																				
53,000	-8	-13	-6	-8	-9	-13	-15	8	13	6	7	8	5	3	6	5	5	4		
40,000	-22	-25	-19	-18	-21	-26	-29	21	24	18	17	20	15	13	7	7	7	6		
30,000	-12	-16	-15	-14	-14	-19	-21	12	16	14	14	14	10	8	6	6	5	5		
20,000	-3	0	-3	0	-2	-5	-6	3	0	3	-1	1	-2	-3	5	4	4	4		
GALEAO TO WESTOVER AFB																				
53,000	-11	-11	-2	-6	-7	-12	-15	9	9	1	5	6	1	-1	8	7	5	6		
40,000	-15	-12	-6	-9	-10	-17	-20	11	8	4	7	7	1	-2	10	10	8	9		
30,000	-14	-12	-4	-7	-9	-15	-18	12	10	2	5	7	1	-2	9	8	6	7		
20,000	-6	-5	0	-1	-2	-7	-9	4	4	-1	0	2	-2	-4	7	6	5	5		
GALEAO TO WHEELUS AP																				
53,000	13	12	1	6	8	3	0	-14	-12	-1	-7	-8	-14	-17	7	6	5	5		
40,000	22	24	4	15	16	8	4	-25	-25	-5	-16	-18	-26	-30	9	8	7	7		
30,000	16	16	4	10	11	6	3	-18	-18	-5	-11	-13	-19	-22	8	7	6	7		
20,000	6	6	-2	1	3	-1	-3	-7	-7	1	-2	-3	-7	-10	6	5	5	4		
GEORGE AFB TO GOOSE AB																				
53,000	26	17	14	19	18	12	9	-27	-18	-14	-20	-19	-26	-30	10	8	7	8		
40,000	38	25	34	33	32	22	17	-41	-27	-36	-36	-35	-45	-50	15	13	13	15		
30,000	35	24	29	28	29	19	13	-38	-27	-31	-31	-32	-42	-48	17	16	12	16		
20,000	24	15	19	20	19	12	8	-25	-16	-20	-21	-21	-28	-32	12	11	8	11		
GEORGE AFB TO HICKAM AFB																				
53,000	-21	-22	-8	-14	-16	-24	-29	20	21	8	13	15	7	4	12	11	8	9		
40,000	-37	-34	-25	-26	-30	-40	-46	34	31	24	25	28	18	13	16	15	12	14		
30,000	-28	-25	-16	-18	-21	-30	-36	25	23	15	17	19	11	6	16	14	10	12		
20,000	-15	-11	-5	-7	-9	-16	-20	14	11	4	7	8	2	-1	12	10	7	8		

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION							
	DIRECT							RETURN							JAN	APR	JUL	OCT				
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85								
GEORGE AFB TO INCIRLIK AB																			6245 N.MI.			
53,000	15	8	4	10	9	4	2	-17	-9	-4	-11	-9	-15	-18	7	6	4	5				
40,000	14	13	10	12	12	6	3	-17	-14	-12	-15	-14	-21	-24	9	8	8	10				
30,000	13	12	10	10	11	4	0	-16	-15	-12	-13	-14	-21	-25	11	10	9	11				
20,000	7	9	6	7	7	2	-1	-9	-10	-7	-8	-8	-14	-17	9	8	6	8				
GEORGE AFB TO IWD JIMA																			5085 N.MI.			
53,000	-44	-33	-7	-24	-28	-38	-43	42	31	6	23	27	14	8	10	8	7	8				
40,000	-68	-55	-24	-48	-50	-63	-69	64	52	22	45	47	32	24	12	12	10	12				
30,000	-62	-51	-21	-44	-46	-58	-64	59	49	20	41	43	28	21	13	12	9	12				
20,000	-42	-35	-17	-29	-31	-40	-44	41	33	17	28	30	21	17	10	8	6	8				
GEORGE AFB TO JOHNSTON AFB																			2979 N.MI.			
53,000	-19	-22	-7	-11	-14	-22	-26	18	21	6	11	13	6	3	10	9	7	8				
40,000	-37	-35	-23	-26	-29	-39	-44	34	33	22	24	28	19	14	14	14	10	12				
30,000	-27	-26	-15	-17	-20	-29	-34	25	24	14	16	19	11	7	14	12	8	10				
20,000	-13	-10	-3	-5	-7	-13	-17	12	10	3	5	7	1	-1	10	8	6	7				
GEORGE AFB TO KAOENA AB																			5600 N.MI.			
53,000	-44	-31	-8	-30	-30	-38	-43	42	29	8	29	28	16	9	9	7	6	8				
40,000	-58	-50	-31	-53	-49	-59	-64	54	46	28	49	45	34	29	12	11	11	12				
30,000	-54	-47	-26	-48	-44	-55	-60	50	44	24	45	41	30	25	12	12	10	12				
20,000	-36	-29	-17	-30	-28	-36	-40	34	28	17	29	27	19	16	10	9	7	8				
GEORGE AFB TO KEFLAVIK AP																			3679 N.MI.			
53,000	16	9	7	11	10	6	3	-18	-10	-7	-12	-11	-17	-20	9	7	5	7				
40,000	17	15	17	17	16	9	5	-21	-17	-19	-19	-19	-26	-30	11	10	10	12				
30,000	16	14	14	14	15	6	2	-19	-17	-16	-17	-17	-26	-30	13	12	11	13				
20,000	9	9	9	9	9	3	0	-11	-11	-10	-11	-11	-17	-20	10	10	7	9				
GEORGE AFB TO KINOLEY AFB																			2612 N.MI.			
53,000	45	34	5	23	28	13	6	-46	-35	-6	-24	-29	-41	-46	10	10	7	9				
40,000	66	51	23	42	45	29	22	-69	-53	-24	-44	-47	-63	-71	16	16	12	15				
30,000	57	44	17	33	36	22	16	-59	-46	-17	-35	-38	-54	-63	17	16	10	15				
20,000	37	29	12	19	23	13	10	-38	-30	-12	-20	-24	-35	-41	12	11	7	11				
GEORGE AFB TO KWAJALEIN NAS																			4359 N.MI.			
53,000	-17	-18	-5	-6	-11	-18	-22	15	17	4	6	10	4	1	8	8	6	7				
40,000	-33	-32	-16	-20	-25	-34	-39	31	30	14	19	23	15	11	11	11	9	10				
30,000	-24	-24	-10	-13	-17	-25	-30	22	22	9	12	15	9	5	11	10	7	8				
20,000	-11	-9	-1	-3	-5	-11	-14	10	8	0	3	5	0	-2	8	6	5	6				
GEORGE AFB TO LADD AFB																			2118 N.MI.			
53,000	-20	-8	-2	-10	-9	-17	-21	18	7	2	9	8	1	-2	11	9	7	8				
40,000	-26	-14	-10	-15	-16	-27	-33	22	12	7	11	13	2	-3	16	15	14	16				
30,000	-24	-13	-8	-13	-14	-27	-33	20	9	6	9	11	-1	-7	18	18	15	18				
20,000	-15	-5	-6	-6	-8	-16	-21	12	3	5	5	6	-2	-7	15	13	10	12				
GEORGE AFB TO LAJES AP																			4164 N.MI.			
53,000	31	21	14	23	22	15	12	-32	-22	-14	-24	-22	-29	-33	9	7	6	7				
40,000	48	34	37	41	39	30	26	-51	-36	-38	-43	-42	-51	-56	13	12	11	13				
30,000	44	32	31	36	35	26	22	-47	-35	-33	-39	-38	-48	-53	15	14	10	13				
20,000	31	21	21	25	24	17	14	-33	-22	-22	-26	-25	-32	-36	11	10	7	10				
GEORGE AFB TO LE BOURGET AP																			4850 N.MI.			
53,000	21	11	9	14	13	8	6	-22	-12	-9	-15	-14	-19	-23	8	6	5	6				
40,000	26	17	22	23	22	15	11	-29	-19	-24	-25	-24	-32	-36	11	10	10	12				
30,000	24	17	20	20	20	12	8	-28	-20	-22	-23	-23	-32	-36	13	12	11	13				
20,000	16	12	12	13	13	7	4	-18	-13	-13	-15	-14	-21	-24	10	9	7	9				
GEORGE AFB TO LONDON INTERNATIONAL																			4667 N.MI.			
53,000	20	11	9	14	13	8	6	-22	-12	-9	-15	-13	-19	-23	8	6	5	6				
40,000	25	17	21	22	21	14	10	-29	-19	-23	-25	-24	-31	-35	11	10	10	12				
30,000	23	17	19	20	20	11	7	-27	-20	-21	-23	-23	-31	-36	13	13	11	13				
20,000	15	11	12	13	13	7	3	-17	-13	-13	-14	-14	-20	-24	10	9	7	9				
GEORGE AFB TO LORING AFB																			2326 N.MI.			
53,000	32	23	13	22	22	15	11	-34	-24	-14	-23	-23	-31	-36	11	9	7	9				
40,000	52	36	38	38	41	30	24	-55	-38	-40	-41	-43	-55	-61	17	15	14	17				
30,000	47	32	32	33	35	24	18	-50	-35	-33	-36	-38	-50	-57	19	17	12	17				
20,000	31	21	21	22	23	15	11	-32	-23	-21	-23	-24	-33	-38	14	13	8	12				

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEADWINDS*							STANDARD DEVIATION						
	D I R E C T								R E T U R N							JAN	APR	JUL	OCT			
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85								
GEORGE AFB TO MAURIPUR AP																			7223 N.MI.			
53,000	-7	-4	-2	-3	-4	-8	-10	5	2	2	2	3	-1	-3	7	5	4	5				
40,000	-10	-6	-1	-4	-5	-11	-14	7	4	0	2	3	-3	-5	8	7	7	8				
30,000	-8	-4	-1	-3	-4	-10	-13	5	2	-1	0	2	-4	-7	9	9	8	8				
20,000	-5	-3	-1	-2	-3	-7	-9	4	1	0	1	1	-3	-5	7	7	6	6				
GEORGE AFB TO MCCORD AFB																			788 N.MI.			
53,000	-17	-7	2	-7	-6	-16	-22	14	6	-3	6	5	-4	-9	16	13	10	12				
40,000	-24	-17	-1	-15	-14	-31	-40	18	13	-2	10	9	-7	-15	25	23	20	25				
30,000	-22	-17	-2	-15	-13	-31	-40	16	12	0	11	9	-8	-16	28	26	20	25				
20,000	-14	-8	-1	-6	-7	-19	-26	11	6	0	5	5	-7	-13	21	19	12	18				
GEORGE AFB TO MCGUIRE AFB																			2049 N.MI.			
53,000	40	30	10	24	26	15	10	-41	-31	-10	-25	-26	-37	-43	12	10	8	10				
40,000	65	45	34	42	45	32	26	-68	-48	-35	-44	-47	-62	-71	19	17	15	18				
30,000	56	41	26	36	38	25	19	-59	-43	-27	-38	-40	-55	-64	20	18	12	18				
20,000	37	26	18	23	25	16	12	-39	-28	-18	-24	-26	-36	-43	14	13	8	13				
GEORGE AFB TO MIDWAY NAS																			3053 N.MI.			
53,000	-29	-24	-9	-16	-19	-28	-33	27	23	9	15	18	10	6	12	10	7	9				
40,000	-52	-39	-18	-33	-35	-48	-55	49	37	16	32	33	21	15	15	14	11	13				
30,000	-43	-36	-14	-27	-29	-41	-48	40	34	13	25	27	16	11	16	13	10	13				
20,000	-28	-22	-7	-17	-18	-26	-31	26	21	6	16	17	9	5	12	9	7	9				
GEORGE AFB TO MILDENHALL AP																			4657 N.MI.			
53,000	20	11	8	13	12	8	5	-22	-11	-8	-14	-13	-19	-22	8	6	5	6				
40,000	24	17	20	21	20	13	9	-27	-19	-22	-24	-23	-30	-34	11	10	10	11				
30,000	22	17	18	18	19	11	6	-26	-20	-20	-22	-22	-30	-35	13	12	11	13				
20,000	14	11	11	12	12	6	3	-16	-13	-12	-14	-13	-20	-23	10	9	7	9				
GEORGE AFB TO MINOT AFB																			1090 N.MI.			
53,000	16	15	12	12	13	6	2	-18	-16	-13	-13	-15	-23	-27	14	12	9	11				
40,000	23	20	31	22	24	10	2	-28	-23	-34	-26	-28	-42	-50	22	20	18	22				
30,000	21	18	24	16	20	6	-3	-26	-22	-26	-20	-24	-38	-46	25	23	16	22				
20,000	13	11	15	11	13	3	-3	-16	-13	-16	-13	-15	-24	-30	17	16	11	15				
GEORGE AFB TO MOSCOW INTERNATIONAL																			5231 N.MI.			
53,000	8	8	2	8	6	2	0	-10	-8	-3	-9	-7	-11	-14	7	6	4	5				
40,000	6	7	6	7	6	1	-2	-8	-9	-8	-9	-9	-14	-17	9	8	8	9				
30,000	4	7	6	4	5	-2	-5	-7	-9	-7	-7	-8	-15	-18	11	10	9	10				
20,000	2	5	3	2	3	-2	-5	-4	-7	-4	-3	-4	-9	-12	8	8	6	8				
GEORGE AFB TO MYRTLE BEACH AFB																			1899 N.MI.			
53,000	44	34	5	23	27	12	6	-45	-35	-5	-24	-28	-40	-46	12	11	8	10				
40,000	67	51	23	43	45	29	21	-69	-54	-24	-45	-47	-64	-73	19	18	14	17				
30,000	56	44	16	34	36	21	14	-59	-46	-17	-36	-38	-55	-64	19	18	11	17				
20,000	36	29	11	19	22	12	8	-38	-30	-11	-20	-23	-35	-42	14	13	7	12				
GEORGE AFB TO NOUASSEUR AB																			5127 N.MI.			
53,000	27	18	15	20	19	14	12	-28	-19	-15	-21	-20	-26	-29	8	6	5	7				
40,000	40	28	34	37	35	26	22	-43	-30	-35	-40	-37	-45	-50	12	11	10	12				
30,000	37	26	29	33	31	23	19	-41	-29	-30	-36	-33	-42	-47	13	12	9	12				
20,000	26	17	20	23	21	15	12	-28	-18	-21	-24	-22	-29	-32	10	9	6	9				
GEORGE AFB TO ORLY AP																			4858 N.MI.			
53,000	21	11	9	14	13	8	6	-22	-12	-9	-15	-14	-19	-23	8	6	5	6				
40,000	26	17	22	23	22	15	11	-30	-19	-24	-26	-24	-32	-36	11	10	10	12				
30,000	24	17	20	20	20	12	8	-28	-20	-22	-24	-23	-32	-36	13	12	11	13				
20,000	16	12	12	13	13	7	4	-18	-13	-13	-15	-15	-21	-24	10	9	7	9				
GEORGE AFB TO PALAM AP																			6923 N.MI.			
53,000	-12	-7	-4	-7	-7	-11	-14	10	6	3	5	6	2	0	7	5	4	5				
40,000	-13	-8	-6	-9	-9	-14	-18	10	5	4	6	6	1	-2	9	8	7	8				
30,000	-11	-7	-5	-6	-7	-13	-17	8	4	3	4	5	-1	-4	9	7	8	9				
20,000	-7	-4	-5	-4	-5	-9	-12	6	3	4	3	4	-1	-3	7	7	6	7				
GEORGE AFB TO PATRICK AFB																			1911 N.MI.			
53,000	41	33	0	20	25	8	1	-43	-34	-1	-20	-26	-39	-44	11	11	7	10				
40,000	61	53	14	40	42	24	15	-64	-55	-15	-41	-45	-62	-70	18	17	13	16				
30,000	50	43	10	31	33	17	10	-53	-45	-11	-32	-35	-51	-59	18	17	11	15				
20,000	32	27	4	15	19	8	4	-33	-28	-5	-16	-19	-32	-38	13	12	7	11				

*HEADWINDS—COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.THE BOEING COMPANY
TRANSPORT DIVISION

NO. D6-9175

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION							
	O I R E C T							R E T U R N							JAN	APR	JUL	OCT				
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85								
GEORGE AFB TO PIARCO AP																			3372 N.MI.			
53,000	27	24	-6	10	15	1	-5	-28	-25	6	-10	-16	-26	-31	8	8	5	7				
40,000	42	40	4	22	28	12	5	-45	-43	-5	-24	-30	-44	-50	12	12	8	11				
30,000	33	31	2	16	21	8	3	-36	-32	-3	-17	-22	-34	-40	11	10	7	9				
20,000	16	15	-4	5	8	0	-4	-17	-16	3	-5	-9	-17	-21	8	7	4	6				
GEORGE AFB TO POPE AFB																			1877 N.MI.			
53,000	43	33	6	23	27	13	7	-44	-34	-6	-24	-28	-40	-46	12	11	8	10				
40,000	67	50	25	43	45	30	22	-69	-52	-26	-45	-47	-64	-73	19	18	14	18				
30,000	57	43	18	34	37	22	15	-59	-45	-19	-36	-38	-55	-64	20	18	11	18				
20,000	37	28	12	20	23	13	9	-38	-29	-12	-21	-24	-36	-42	14	13	8	13				
GEORGE AFB TO PRESTWICK AB																			4399 N.MI.			
53,000	19	10	8	13	12	7	5	-21	-11	-8	-14	-13	-19	-22	8	6	5	6				
40,000	23	17	20	20	20	12	9	-26	-19	-21	-23	-22	-30	-34	11	10	10	12				
30,000	21	17	18	18	18	10	5	-25	-19	-20	-21	-21	-29	-34	13	12	11	13				
20,000	13	11	11	11	11	5	2	-15	-13	-12	-13	-13	-19	-22	10	9	7	9				
GEORGE AFB TO RAMEY AFB																			2832 N.MI.			
53,000	34	29	-4	14	20	3	-2	-36	-30	3	-14	-21	-33	-38	9	9	6	8				
40,000	52	48	8	30	36	18	9	-55	-51	-9	-31	-38	-53	-60	14	14	10	13				
30,000	41	38	6	22	27	13	6	-43	-39	-6	-23	-28	-42	-48	13	12	8	11				
20,000	23	21	-1	9	12	3	-1	-24	-22	0	-9	-13	-23	-28	10	9	5	8				
GEORGE AFB TO RHEIN MAIN AB																			4971 N.MI.			
53,000	19	10	7	13	11	7	5	-21	-11	-7	-14	-12	-18	-22	8	6	4	6				
40,000	22	16	18	19	19	12	8	-25	-18	-20	-22	-21	-28	-32	11	10	9	11				
30,000	20	16	16	17	17	9	5	-24	-19	-18	-20	-20	-28	-33	13	12	10	12				
20,000	13	11	10	11	11	5	2	-15	-12	-11	-13	-12	-18	-22	10	9	7	9				
GEORGE AFB TO SEOUL AB																			5184 N.MI.			
53,000	-30	-20	-9	-25	-21	-28	-32	28	19	8	24	20	12	9	9	7	6	7				
40,000	-37	-31	-25	-38	-33	-41	-45	33	29	23	35	30	22	18	11	11	11	11				
30,000	-32	-29	-21	-32	-28	-37	-41	29	27	19	29	26	17	13	12	12	10	12				
20,000	-23	-18	-13	-21	-19	-25	-29	21	17	12	19	17	11	8	10	9	7	9				
GEORGE AFB TO STEVENSON FIELD																			1275 N.MI.			
53,000	17	15	12	12	14	7	3	-19	-16	-13	-14	-15	-23	-27	13	11	9	11				
40,000	25	21	32	23	25	12	4	-30	-24	-34	-27	-29	-42	-49	21	19	17	21				
30,000	23	19	25	18	21	8	0	-28	-22	-27	-21	-25	-38	-46	23	21	16	21				
20,000	14	12	16	12	14	4	-1	-17	-13	-17	-13	-15	-25	-29	16	15	10	14				
GEORGE AFB TO SUNG SHAN																			5898 N.MI.			
53,000	-42	-29	-8	-28	-28	-36	-41	40	27	7	27	26	15	8	9	7	6	7				
40,000	-52	-44	-29	-48	-44	-53	-57	48	41	26	44	40	31	26	11	11	10	12				
30,000	-48	-41	-24	-42	-39	-49	-54	43	38	22	39	36	26	21	12	11	10	12				
20,000	-32	-26	-16	-27	-25	-32	-36	30	24	15	26	23	17	13	9	8	7	8				
GEORGE AFB TO TACHIKAWA AB																			4784 N.MI.			
53,000	-37	-28	-11	-30	-27	-35	-39	36	27	10	29	26	17	12	10	7	6	8				
40,000	-52	-46	-32	-52	-46	-56	-61	49	43	30	50	43	33	28	12	12	11	13				
30,000	-48	-44	-27	-47	-42	-52	-58	45	41	26	45	39	29	23	13	13	11	13				
20,000	-33	-28	-18	-31	-27	-35	-39	31	27	17	30	26	18	15	11	10	7	9				
GEORGE AFB TO TAN SAN NHUT																			7101 N.MI.			
53,000	-39	-25	-1	-22	-23	-32	-38	37	24	0	20	22	9	1	8	7	6	7				
40,000	-48	-39	-20	-40	-38	-47	-51	44	36	19	37	35	25	19	10	10	9	10				
30,000	-43	-35	-18	-35	-33	-43	-47	40	32	17	33	31	21	17	10	10	8	10				
20,000	-28	-22	-13	-22	-21	-28	-31	26	21	12	21	20	14	11	8	8	6	7				
GEORGE AFB TO THULE AB																			2835 N.MI.			
53,000	1	3	4	4	3	-2	-4	-4	-4	-4	-5	-4	-9	-11	9	7	5	7				
40,000	0	4	8	4	4	-4	-8	-3	-6	-10	-7	-7	-15	-19	12	11	11	12				
30,000	-1	3	6	2	3	-6	-11	-3	-6	-8	-5	-6	-14	-19	13	13	11	13				
20,000	-2	2	3	1	1	-5	-9	0	-3	-4	-2	-3	-9	-12	10	10	8	9				
GEORGE AFB TO TORBAY AP																			2936 N.MI.			
53,000	31	21	14	23	22	15	12	-33	-22	-14	-24	-22	-30	-34	10	8	7	8				
40,000	49	33	39	40	40	30	25	-52	-35	-41	-43	-43	-53	-59	15	14	13	15				
30,000	45	31	33	35	36	25	20	-48	-34	-35	-38	-38	-49	-55	17	16	12	15				
20,000	30	20	22	24	23	16	12	-32	-21	-22	-25	-25	-32	-37	12	12	8	11				

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	D I R E C T							R E T U R N							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
GEORGE AFB TO TORREJON AFB															5005 N.MI.			
53,000	24	14	14	18	17	12	10	-25	-15	-14	-19	-18	-23	-26	8	6	5	6
40,000	34	21	30	33	29	21	17	-37	-23	-32	-35	-32	-40	-44	11	10	10	12
30,000	33	22	27	30	28	19	15	-37	-24	-29	-33	-30	-39	-44	13	12	10	13
20,000	22	14	18	20	18	12	9	-24	-15	-19	-22	-20	-26	-30	10	9	7	9
GEORGE AFB TO TRAVIS AFB															312 N.MI.			
53,000	-28	-19	-2	-14	-15	-27	-34	26	17	1	13	13	2	-3	18	16	12	14
40,000	-41	-33	-13	-25	-27	-47	-57	37	30	9	22	24	6	-4	28	27	22	26
30,000	-35	-31	-11	-21	-23	-43	-53	32	28	9	19	20	3	-7	31	28	21	26
20,000	-23	-17	-6	-11	-13	-27	-35	21	15	5	10	12	-1	-7	23	21	13	18
GEORGE AFB TO WAKE AP															4075 N.MI.			
53,000	-27	-21	-4	-10	-15	-24	-29	25	20	4	9	14	6	3	10	9	6	8
40,000	-49	-38	-13	-25	-31	-44	-50	46	35	12	24	28	16	11	13	12	10	11
30,000	-40	-32	-10	-20	-24	-37	-42	37	30	9	19	23	12	8	13	11	8	10
20,000	-25	-18	-4	-11	-14	-22	-26	24	17	4	10	13	6	3	10	8	5	7
GEORGE AFB TO WESTOVER AFB															2132 N.MI.			
53,000	38	28	11	24	25	15	11	-39	-29	-12	-24	-25	-35	-41	11	10	7	9
40,000	62	43	36	41	44	32	26	-65	-45	-38	-44	-47	-60	-67	18	17	14	17
30,000	54	38	28	35	37	25	20	-57	-41	-30	-38	-39	-54	-62	20	18	12	17
20,000	35	25	19	23	24	16	12	-37	-26	-19	-24	-25	-35	-41	14	13	8	13
GEORGE AFB TO WHEELUS AP															5890 N.MI.			
53,000	22	13	11	16	15	10	8	-24	-14	-12	-17	-16	-21	-24	7	6	5	6
40,000	30	19	25	27	25	18	14	-33	-21	-27	-30	-28	-35	-39	11	10	9	11
30,000	29	19	22	25	24	16	12	-32	-22	-24	-28	-26	-34	-39	12	12	10	12
20,000	19	13	15	16	16	10	7	-21	-14	-16	-18	-17	-23	-26	9	9	7	8
GOOSE AB TO HICKAM AFB															4642 N.MI.			
53,000	-18	-14	-12	-17	-15	-20	-23	16	13	12	16	14	9	7	8	7	5	7
40,000	-31	-23	-23	-29	-26	-34	-38	27	20	22	26	24	16	13	11	10	10	11
30,000	-29	-22	-21	-27	-24	-32	-37	26	20	19	24	22	14	11	12	12	9	12
20,000	-19	-15	-12	-18	-15	-21	-25	18	13	11	17	14	9	6	9	8	6	8
GOOSE AB TO INCIRLIK AB															3856 N.MI.			
53,000	27	14	11	17	16	10	8	-28	-14	-11	-18	-17	-23	-28	9	7	6	7
40,000	34	21	23	29	26	18	13	-36	-23	-25	-31	-28	-38	-42	13	12	11	13
30,000	32	21	23	27	26	16	10	-35	-24	-25	-30	-28	-39	-44	16	15	13	15
20,000	22	14	15	18	17	10	6	-23	-16	-16	-19	-18	-26	-30	12	11	9	11
GOOSE AB TO IWO JIMA															5979 N.MI.			
53,000	-18	-8	-1	-10	-8	-15	-18	15	6	1	8	7	2	-1	8	6	5	6
40,000	-13	-11	-8	-15	-12	-18	-21	8	8	6	11	8	2	-1	8	8	8	9
30,000	-10	-10	-8	-12	-10	-16	-19	5	7	6	9	7	1	-3	9	9	9	9
20,000	-5	-6	-6	-8	-6	-11	-14	3	5	5	7	5	0	-3	8	7	6	7
GOOSE AB TO JOHNSTON AFB															5251 N.MI.			
53,000	-17	-13	-11	-15	-13	-18	-21	15	12	10	14	12	8	6	8	6	5	6
40,000	-31	-24	-18	-29	-25	-33	-37	27	21	17	27	23	15	12	10	10	9	10
30,000	-28	-24	-18	-27	-24	-32	-36	25	21	17	25	21	14	10	11	11	9	11
20,000	-19	-15	-11	-18	-15	-21	-24	18	14	10	16	14	9	6	9	8	6	8
GOOSE AB TO KAOENA AB															6001 N.MI.			
53,000	-7	-2	0	-4	-3	-7	-10	3	0	-1	2	1	-3	-5	8	6	4	6
40,000	4	-1	-4	0	0	-6	-9	-8	-1	2	-3	-2	-8	-11	8	8	7	8
30,000	3	-1	-2	1	0	-6	-9	-7	-2	1	-3	-3	-9	-12	9	9	8	9
20,000	4	1	-1	1	1	-3	-6	-6	-3	0	-2	-2	-7	-10	7	7	6	7
GOOSE AB TO KEFLAVIK AP															1315 N.MI.			
53,000	29	12	9	20	16	8	3	-31	-13	-10	-21	-17	-27	-34	15	12	9	12
40,000	36	22	19	31	26	14	7	-37	-23	-20	-33	-28	-41	-49	19	18	16	19
30,000	33	22	18	29	25	10	2	-36	-24	-20	-31	-27	-43	-52	23	22	20	23
20,000	21	14	10	16	15	5	-3	-22	-16	-10	-18	-16	-28	-35	18	18	14	17
GOOSE AB TO KINDLEY AFB															1271 N.MI.			
53,000	-11	-4	0	-8	-5	-14	-19	7	1	0	5	3	-5	-10	15	13	9	13
40,000	-21	-13	-6	-18	-14	-29	-37	12	7	2	11	8	-6	-14	23	21	18	22
30,000	-18	-13	-6	-17	-13	-28	-36	10	7	3	11	7	-7	-14	24	23	16	21
20,000	-12	-9	-5	-11	-9	-19	-25	7	6	4	8	6	-4	-10	18	17	11	16

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	DIRECT							RETURN							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85				
GOOSE AB TO KWAJALEIN NAS																		
53,000	-19	-9	-4	-10	-10	-16	-19	17	8	3	9	9	4	2	8	6	5	6
40,000	-28	-23	-13	-21	-21	-28	-32	24	20	11	18	18	11	8	9	9	8	9
30,000	-25	-21	-13	-20	-19	-26	-30	21	18	12	18	17	10	7	10	10	8	10
20,000	-17	-14	-10	-14	-13	-19	-21	16	13	9	13	12	8	5	8	7	6	7
GOOSE AB TO LADD AFB																		
53,000	-22	-9	-6	-14	-11	-18	-22	20	8	6	13	11	5	3	10	7	5	7
40,000	-18	-14	-16	-22	-17	-25	-29	17	13	15	20	16	9	5	11	10	11	11
30,000	-17	-16	-16	-21	-18	-26	-31	15	14	15	20	16	8	3	12	13	12	12
20,000	-12	-10	-11	-14	-12	-18	-22	10	9	11	13	11	5	1	10	10	8	9
GOOSE AB TO LAJES AP																		
53,000	19	12	14	20	16	8	4	-21	-13	-15	-21	-17	-25	-30	14	11	10	12
40,000	27	19	30	35	28	15	7	-32	-22	-32	-39	-31	-45	-52	20	19	17	20
30,000	27	19	25	32	26	12	4	-32	-23	-27	-36	-30	-44	-52	22	22	18	22
20,000	20	11	18	22	18	7	2	-23	-13	-19	-24	-20	-31	-36	18	17	12	16
GOOSE AB TO LE BOURGET AP																		
53,000	27	13	13	20	17	11	7	-28	-14	-13	-21	-18	-26	-30	12	9	7	9
40,000	38	21	28	36	31	19	13	-40	-23	-30	-39	-33	-45	-51	17	15	14	18
30,000	39	23	28	35	31	17	10	-42	-25	-30	-38	-33	-47	-55	21	19	17	20
20,000	26	16	17	22	20	10	5	-28	-17	-19	-24	-22	-32	-38	16	15	12	15
GOOSE AB TO LONDON INTERNATIONAL																		
53,000	28	13	12	21	17	10	7	-29	-14	-13	-21	-18	-26	-31	12	9	8	10
40,000	39	22	28	37	31	19	13	-41	-23	-30	-39	-33	-45	-52	17	16	15	18
30,000	39	23	28	35	31	17	10	-43	-26	-30	-38	-34	-48	-56	22	20	18	21
20,000	27	16	17	22	20	10	5	-29	-18	-18	-24	-22	-32	-38	17	16	12	15
GOOSE AB TO LORING AFB																		
53,000	-28	-13	-11	-22	-18	-29	-35	26	12	10	21	16	6	0	18	15	12	15
40,000	-43	-22	-25	-41	-32	-51	-60	39	19	20	36	28	10	1	27	24	24	27
30,000	-40	-22	-23	-37	-30	-50	-60	35	19	19	33	26	7	-3	30	30	24	29
20,000	-26	-14	-15	-22	-18	-33	-40	23	12	13	19	16	3	-4	22	22	16	21
GOOSE AB TO MAURIPUR AP																		
53,000	26	11	18	14	7	4	4	-28	-13	-5	-19	-15	-23	-28	9	7	5	6
40,000	28	18	14	22	20	12	9	-32	-20	-15	-24	-22	-31	-35	11	10	9	10
30,000	25	18	14	19	19	11	7	-29	-21	-16	-22	-21	-30	-34	12	11	10	11
20,000	16	12	8	13	12	6	3	-18	-14	-8	-14	-13	-19	-23	9	9	7	8
GOOSE AB TO MCCHORD AFB																		
53,000	-24	-14	-14	-21	-18	-24	-28	23	13	14	20	17	11	8	10	8	7	8
40,000	-33	-21	-30	-33	-29	-39	-44	30	20	29	31	27	18	13	13	12	13	15
30,000	-34	-22	-29	-32	-29	-40	-46	31	21	28	30	27	17	11	15	15	14	16
20,000	-23	-14	-19	-22	-20	-27	-31	21	13	18	21	19	11	7	12	11	9	12
GOOSE AB TO MCGUIRE AFB																		
53,000	-29	-14	-8	-22	-17	-28	-34	27	12	8	20	16	6	2	15	13	10	13
40,000	-46	-25	-24	-40	-33	-50	-59	39	21	20	35	28	12	4	24	22	21	24
30,000	-43	-25	-23	-36	-31	-49	-58	37	20	19	31	26	10	1	27	26	19	25
20,000	-29	-16	-15	-23	-20	-32	-39	26	13	13	20	17	6	0	20	19	13	18
GOOSE AB TO MIDWAY NAS																		
53,000	-21	-12	-7	-15	-13	-19	-23	19	11	7	14	12	7	5	9	7	5	7
40,000	-32	-24	-17	-29	-25	-33	-37	28	22	15	26	23	15	11	10	10	9	11
30,000	-31	-24	-18	-28	-25	-33	-37	27	21	16	25	22	14	10	11	11	10	11
20,000	-22	-18	-13	-20	-18	-24	-27	20	17	12	18	17	11	8	9	8	7	8
GOOSE AB TO MILDENHALL AP																		
53,000	28	13	12	21	17	10	7	-29	-14	-12	-21	-18	-26	-31	12	9	8	10
40,000	39	22	27	36	31	19	13	-41	-24	-29	-38	-33	-45	-52	17	16	15	18
30,000	39	23	27	34	31	17	9	-42	-26	-29	-37	-33	-48	-56	21	20	18	21
20,000	26	16	16	22	20	10	4	-28	-18	-18	-23	-21	-32	-38	17	16	12	15
GOOSE AB TO MINOT AFB																		
53,000	-28	-14	-15	-22	-19	-27	-31	27	14	14	21	18	11	8	12	9	8	10
40,000	-40	-23	-35	-38	-34	-46	-52	38	22	33	35	32	20	14	16	15	16	18
30,000	-38	-25	-33	-34	-33	-45	-52	36	23	31	32	30	18	11	19	19	16	19
20,000	-27	-15	-21	-24	-22	-31	-36	25	14	21	23	21	11	6	14	14	11	14

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	D I R E C T							R E T U R N							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
GOOSE AB TO MOSCOW INTERNATIONAL																		
53,000	29	13	7	19	16	8	5	-30	-13	-7	-20	-16	-25	-30	11	8	5	8
40,000	31	22	16	26	23	14	10	-33	-23	-17	-27	-25	-34	-39	13	12	11	13
30,000	30	23	15	22	22	11	5	-33	-25	-17	-24	-25	-36	-42	16	16	14	16
20,000	19	15	8	14	14	6	2	-20	-17	-9	-16	-15	-24	-28	13	12	10	12
GOOSE AB TO MYRTLE BEACH AFB																		
53,000	-29	-15	-5	-20	-17	-27	-33	26	13	5	18	15	6	1	13	12	9	12
40,000	-45	-27	-20	-39	-32	-47	-56	37	22	16	33	27	12	5	21	20	18	21
30,000	-42	-26	-19	-34	-29	-45	-53	34	20	16	29	24	10	3	23	22	16	21
20,000	-29	-16	-13	-21	-19	-30	-37	26	14	11	19	17	7	1	17	16	11	16
GOOSE AB TO NOUASSEUR AB																		
53,000	21	14	15	18	16	10	7	-23	-14	-15	-19	-17	-24	-27	11	8	7	9
40,000	30	21	27	33	28	17	12	-34	-23	-29	-36	-30	-41	-47	16	15	13	16
30,000	30	21	24	30	26	15	9	-34	-23	-25	-33	-29	-40	-46	17	16	13	16
20,000	22	13	17	21	18	10	5	-24	-15	-18	-23	-20	-28	-33	14	13	10	12
GOOSE AB TO ORLY AP																		
53,000	27	13	13	20	17	11	7	-28	-14	-13	-21	-18	-26	-30	12	9	7	9
40,000	38	21	28	37	31	19	13	-40	-23	-30	-39	-33	-45	-51	17	15	14	18
30,000	39	22	28	35	31	17	10	-42	-25	-30	-38	-33	-47	-55	21	19	17	20
20,000	26	16	18	22	20	10	5	-28	-17	-19	-24	-22	-32	-38	16	15	12	15
GOOSE AB TO PALAM AP																		
53,000	24	11	5	17	13	7	4	-26	-12	-6	-18	-15	-22	-26	8	6	5	6
40,000	21	16	13	20	17	11	7	-24	-18	-14	-23	-19	-26	-30	10	9	8	10
30,000	19	17	12	18	17	9	6	-22	-19	-14	-21	-19	-26	-30	11	11	9	11
20,000	12	12	6	12	10	5	2	-14	-13	-7	-13	-11	-17	-20	8	8	7	8
GOOSE AB TO PATRICK AFB																		
53,000	-27	-14	-3	-17	-15	-25	-30	23	11	3	16	12	4	0	12	11	8	11
40,000	-41	-27	-14	-34	-29	-43	-50	33	21	11	29	23	10	3	19	18	16	19
30,000	-38	-23	-14	-30	-25	-40	-47	30	18	12	25	20	8	1	20	20	14	19
20,000	-26	-15	-11	-19	-17	-27	-33	22	13	10	17	15	6	1	15	15	9	14
GOOSE AB TO PIARCO AP																		
53,000	1	3	1	1	1	-5	-8	-4	-5	-1	-2	-3	-9	-12	11	10	6	9
40,000	-7	-7	-2	-3	-4	-14	-19	-1	1	-1	-1	0	-9	-14	15	14	11	14
30,000	-3	-4	-2	-4	-3	-11	-16	-3	-1	0	1	0	-9	-13	15	14	9	12
20,000	0	-2	-3	-4	-3	-9	-12	-2	0	2	3	1	-5	-9	11	10	7	9
GOOSE AB TO POPE AFB																		
53,000	-30	-15	-6	-21	-17	-28	-34	27	13	6	19	16	6	2	14	12	9	12
40,000	-46	-27	-21	-40	-33	-49	-57	39	22	17	35	28	13	5	21	20	18	21
30,000	-43	-26	-20	-35	-30	-46	-55	36	21	17	31	25	11	3	23	23	17	22
20,000	-30	-16	-14	-22	-20	-31	-38	26	14	12	20	17	7	1	17	17	11	16
GOOSE AB TO PRESTWICK AB																		
53,000	29	13	12	21	18	10	6	-30	-14	-12	-22	-18	-27	-32	13	10	8	10
40,000	40	23	27	35	31	18	12	-42	-24	-28	-38	-32	-45	-52	18	16	15	19
30,000	39	24	26	33	30	16	8	-42	-27	-29	-36	-33	-48	-56	22	21	19	22
20,000	26	17	15	21	19	9	3	-28	-18	-16	-23	-21	-32	-38	17	16	13	16
GOOSE AB TO RAMEY AFB																		
53,000	-7	-1	1	-4	-2	-9	-13	2	-2	-2	2	0	-6	-10	12	11	7	10
40,000	-14	-11	-3	-11	-9	-20	-26	6	4	1	6	4	-7	-12	17	16	13	16
30,000	-10	-9	-4	-10	-8	-18	-24	4	3	1	6	3	-6	-12	17	16	11	15
20,000	-6	-6	-5	-9	-6	-13	-18	2	4	4	7	4	-3	-7	13	12	8	11
GOOSE AB TO RHEIN MAIN AB																		
53,000	28	13	12	20	17	10	7	-29	-14	-12	-20	-17	-25	-30	11	8	7	9
40,000	38	21	26	35	30	19	13	-40	-23	-28	-37	-31	-43	-49	16	14	14	17
30,000	37	22	26	33	29	16	10	-41	-25	-28	-36	-32	-46	-53	20	19	17	20
20,000	26	16	16	21	19	10	5	-28	-17	-17	-22	-21	-31	-36	15	14	11	14
GOOSE AB TO SEOUL AB																		
53,000	-3	-1	-1	-2	-2	-5	-7	0	0	0	1	1	-3	-5	8	5	4	6
40,000	6	0	-2	1	1	-4	-7	-9	-2	0	-4	-3	-9	-12	8	8	7	8
30,000	6	1	-1	2	2	-4	-7	-8	-3	-1	-4	-4	-10	-13	9	9	9	9
20,000	6	2	0	2	2	-3	-5	-7	-3	0	-3	-3	-8	-11	8	7	6	7

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.THE BDEING COMPANY
TRANSPORT DIVISION

ND. D6-9175

EQUIVALENT HEADWINDS AND STANOARD OEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANOARD OEVIATION			
	O I R E C T							R E T U R N							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
GOOSE AB TO STEVENSON FIELD																		
53,000	-29	-14	-15	-23	-19	-28	-32	28	14	14	22	19	11	7	13	10	9	11
40,000	-40	-23	-35	-38	-34	-46	-53	38	21	33	36	32	20	13	17	16	16	19
30,000	-38	-25	-33	-35	-33	-46	-53	36	23	31	33	30	17	10	19	20	17	20
20,000	-27	-15	-21	-25	-22	-31	-37	25	13	21	23	21	11	6	15	15	11	15
GOOSE AB TO SUNG SHAN																		
53,000	-2	0	1	0	0	-4	-6	-1	-2	-2	-1	-2	-5	-7	7	6	4	6
40,000	7	2	-2	5	3	-3	-6	-11	-5	0	-7	-6	-11	-15	8	7	7	8
30,000	6	3	-1	4	3	-3	-6	-10	-6	0	-6	-6	-12	-15	9	9	8	9
20,000	6	3	0	4	3	-1	-4	-8	-5	-1	-5	-4	-9	-12	7	7	6	7
GOOSE AB TO TACHIKAWA AB																		
53,000	-12	-5	-2	-8	-6	-11	-14	10	4	2	7	5	1	-1	8	5	4	6
40,000	-5	-7	-7	-10	-7	-12	-15	2	5	5	7	5	-1	-4	8	8	8	8
30,000	-3	-6	-6	-7	-5	-11	-15	0	4	4	4	3	-3	-6	9	9	9	9
20,000	0	-4	-4	-5	-3	-8	-11	-2	2	3	3	2	-3	-6	8	8	7	7
GOOSE AB TO TAN SAN NHUT																		
53,000	7	4	3	6	5	1	-1	-10	-5	-4	-7	-6	-11	-13	7	6	4	6
40,000	9	11	2	10	8	2	-1	-13	-14	-4	-12	-10	-16	-19	8	7	7	8
30,000	10	12	2	9	8	2	-1	-14	-14	-3	-11	-11	-17	-20	9	9	7	8
20,000	8	8	2	6	6	1	-1	-10	-9	-2	-7	-7	-12	-14	7	7	6	6
GOOSE AB TO THULE AB																		
53,000	5	2	0	2	2	-5	-8	-7	-2	0	-3	-3	-10	-14	13	11	7	10
40,000	10	2	1	4	4	-6	-11	-12	-4	-2	-7	-6	-16	-21	15	14	13	15
30,000	9	2	1	5	4	-8	-14	-11	-4	-3	-7	-7	-18	-25	18	17	17	18
20,000	7	3	3	3	4	-6	-11	-8	-4	-3	-4	-5	-14	-19	15	14	12	14
GOOSE AB TO TORBAY AP																		
53,000	10	8	8	13	10	-1	-7	-13	-9	-9	-15	-11	-22	-28	19	15	13	16
40,000	15	11	26	23	19	1	-9	-22	-15	-30	-31	-24	-42	-52	27	25	24	28
30,000	14	11	20	20	16	-4	-15	-22	-15	-24	-27	-22	-42	-53	32	31	26	30
20,000	13	4	13	15	11	-3	-12	-16	-6	-15	-18	-14	-28	-36	24	23	17	22
GOOSE AB TO TORREJON AFB																		
53,000	24	13	15	19	17	11	8	-25	-14	-15	-19	-18	-25	-29	11	8	8	9
40,000	34	20	29	36	30	19	13	-37	-22	-31	-39	-32	-44	-50	16	15	14	17
30,000	36	21	27	34	29	17	11	-39	-24	-29	-37	-32	-45	-52	19	18	15	18
20,000	24	15	19	23	20	11	6	-26	-16	-20	-25	-22	-31	-36	15	14	10	13
GOOSE AB TO TRAVIS AFB																		
53,000	-26	-16	-15	-20	-19	-25	-29	25	15	15	20	18	12	9	10	8	6	8
40,000	-37	-24	-36	-35	-33	-43	-48	35	22	34	32	31	21	16	14	13	13	15
30,000	-36	-25	-31	-31	-31	-41	-47	33	22	30	28	28	18	13	16	15	13	16
20,000	-24	-15	-20	-22	-20	-28	-32	22	14	20	20	19	12	8	12	11	8	11
GOOSE AB TO WAKE AP																		
53,000	-22	-11	-3	-12	-11	-18	-22	19	9	3	11	10	4	2	8	6	5	6
40,000	-31	-23	-14	-23	-23	-30	-34	26	20	13	20	19	12	9	10	9	9	10
30,000	-28	-22	-15	-23	-22	-29	-33	24	19	13	20	19	12	8	10	10	9	10
20,000	-20	-14	-12	-15	-15	-20	-23	17	13	11	14	14	9	6	8	7	6	7
GOOSE AB TO WESTOVER AFB																		
53,000	-29	-14	-9	-22	-17	-28	-34	26	12	8	20	16	6	1	16	13	11	13
40,000	-46	-24	-25	-40	-33	-51	-60	40	20	21	35	29	12	3	25	22	22	25
30,000	-43	-24	-23	-36	-31	-50	-60	37	20	20	32	26	9	0	29	27	21	26
20,000	-28	-15	-15	-23	-20	-33	-40	25	13	13	20	17	5	-1	21	20	14	19
GOOSE AB TO WHEELUS AP																		
53,000	25	15	13	18	17	11	9	-26	-16	-14	-18	-18	-24	-27	9	7	7	7
40,000	35	21	27	33	29	19	14	-37	-23	-29	-35	-31	-41	-46	14	13	12	14
30,000	34	22	24	32	28	17	12	-37	-25	-26	-34	-30	-41	-47	16	15	12	15
20,000	23	15	18	21	19	12	8	-25	-16	-19	-22	-20	-28	-32	13	11	9	11
HICKAM AFB TO HILL AFB																		
53,000	18	19	11	14	15	9	5	-20	-20	-11	-15	-16	-23	-27	11	10	7	9
40,000	33	28	24	26	27	18	13	-36	-31	-25	-28	-30	-40	-45	16	15	12	14
30,000	26	23	16	19	20	12	7	-29	-25	-17	-21	-22	-32	-37	16	14	10	13
20,000	15	12	7	10	10	4	1	-17	-13	-7	-11	-11	-18	-22	12	10	7	9

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.

MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEADWINDS*								STANDARD DEVIATION			
	O I R E C T				R E T U R N				JAN APR JUL OCT				JAN APR JUL OCT				JAN APR JUL OCT			
	JAN	APR	JUL	OCT	**A50	A75	A85		JAN	APR	JUL	OCT	A50	A75	A85		JAN	APR	JUL	OCT
HICKAM AFB TO INCIRLIK AB																				
53,000	-7	-5	-3	-5	-5	-9	-11		5	4	3	4	4	0	-2		8	5	4	6
40,000	-6	-10	-8	-10	-8	-14	-17		2	7	7	7	6	0	-3		9	8	8	8
30,000	-6	-8	-6	-8	-7	-13	-16		3	5	4	5	4	-2	-5		9	9	8	9
20,000	-3	-4	-5	-5	-4	-9	-11		1	2	4	4	3	-2	-4		8	7	6	7
HICKAM AFB TO IWO JIMA																				
53,000	-41	-29	6	-3	-15	-35	-41		40	28	-7	3	15	-3	-7		10	9	6	8
40,000	-65	-55	-7	-21	-37	-60	-67		63	53	6	20	35	12	6		13	14	10	11
30,000	-57	-42	-6	-17	-29	-49	-57		55	41	6	16	28	10	5		12	11	7	10
20,000	-32	-22	-3	-7	-14	-27	-32		31	21	3	6	13	4	1		9	7	5	7
HICKAM AFB TO JOHNSTON AFB																				
53,000	-11	-20	1	-3	-7	-17	-24		10	19	-1	2	6	-3	-7		14	14	9	11
40,000	-33	-43	-21	-22	-29	-44	-52		31	40	20	21	27	13	6		20	24	18	18
30,000	-23	-27	-12	-13	-18	-30	-37		21	26	12	12	17	6	0		20	19	13	15
20,000	-5	-4	3	3	0	-8	-12		4	4	-3	-3	0	-7	-11		14	10	8	9
HICKAM AFB TO KADENA AB																				
53,000	-52	-38	4	-11	-24	-45	-51		51	36	-4	10	23	2	-3		10	9	7	8
40,000	-76	-62	-11	-34	-48	-70	-77		75	61	10	32	46	20	12		12	13	10	11
30,000	-68	-50	-9	-27	-38	-58	-67		66	48	9	26	37	16	10		11	11	8	10
20,000	-42	-28	-6	-13	-20	-35	-41		41	28	6	12	20	9	5		8	7	5	7
HICKAM AFB TO KEFLAVIK AP																				
53,000	7	5	4	8	6	2	0		-10	-7	-4	-9	-7	-12	-14		8	6	5	6
40,000	8	11	6	14	10	3	0		-12	-13	-8	-17	-12	-19	-22		10	9	8	9
30,000	7	11	6	13	9	2	-1		-10	-14	-8	-16	-12	-19	-23		11	10	9	10
20,000	5	9	4	8	6	1	-2		-7	-10	-5	-9	-8	-13	-16		9	8	6	8
HICKAM AFB TO KINDLEY AFB																				
53,000	32	27	7	19	22	12	8		-34	-28	-8	-19	-23	-31	-35		8	8	5	7
40,000	50	41	24	34	36	27	22		-53	-43	-25	-35	-38	-50	-55		12	12	9	11
30,000	42	34	17	26	28	19	15		-44	-36	-17	-28	-30	-41	-47		12	11	7	10
20,000	26	20	9	14	16	10	7		-27	-21	-9	-15	-17	-25	-29		9	8	5	7
HICKAM AFB TO KWAJALEIN NAS																				
53,000	-5	-14	2	3	-3	-10	-15		4	13	-2	-3	2	-5	-8		9	10	7	8
40,000	-22	-32	-13	-11	-19	-29	-35		21	30	12	10	18	8	4		12	14	11	11
30,000	-11	-20	-6	-4	-9	-18	-22		10	19	5	4	9	2	-2		12	11	8	9
20,000	1	-1	5	5	3	-2	-4		-2	0	-6	-5	-3	-8	-10		8	6	6	5
HICKAM AFB TO LADD AFB																				
53,000	-2	1	4	2	2	-5	-8		-1	-3	-4	-4	-3	-9	-13		12	9	7	9
40,000	3	3	2	8	4	-5	-10		-9	-8	-4	-12	-8	-18	-23		15	14	12	14
30,000	3	4	4	8	5	-5	-10		-9	-8	-6	-12	-9	-18	-24		16	15	12	15
20,000	5	6	4	5	5	-2	-6		-8	-8	-5	-7	-7	-14	-18		13	10	9	11
HICKAM AFB TO LAJES AP																				
53,000	17	13	13	17	15	10	8		-19	-14	-13	-18	-16	-20	-23		8	6	5	6
40,000	28	20	24	29	25	18	14		-31	-23	-26	-32	-28	-35	-39		11	10	9	11
30,000	26	20	21	26	23	16	12		-30	-23	-23	-29	-26	-34	-38		12	11	9	11
20,000	18	13	13	18	15	10	7		-20	-14	-14	-20	-17	-22	-26		9	8	6	8
HICKAM AFB TO LE BOURGET AP																				
53,000	7	5	3	7	5	1	-1		-10	-6	-3	-8	-6	-11	-14		8	6	4	6
40,000	8	9	5	11	8	2	-1		-11	-11	-7	-14	-11	-17	-20		9	8	8	9
30,000	7	9	5	10	8	1	-3		-11	-12	-7	-13	-10	-18	-21		11	10	9	10
20,000	5	7	4	5	5	0	-3		-7	-8	-5	-7	-6	-12	-14		9	8	6	7
HICKAM AFB TO LONDON INTERNATIONAL																				
53,000	8	5	3	7	5	1	-1		-10	-6	-3	-8	-6	-11	-14		8	6	4	6
40,000	8	9	5	12	8	2	-1		-12	-12	-7	-14	-11	-17	-21		9	8	8	9
30,000	7	9	6	10	8	1	-3		-10	-12	-8	-13	-11	-18	-22		11	10	9	10
20,000	4	7	4	6	5	0	-3		-6	-9	-5	-7	-7	-12	-15		9	8	6	7
HICKAM AFB TO LORING AFB																				
53,000	21	17	13	18	17	12	10		-23	-18	-14	-19	-18	-23	-26		8	7	6	7
40,000	36	27	29	31	30	23	18		-40	-29	-30	-33	-33	-41	-45		12	11	10	12
30,000	33	25	24	26	27	19	15		-36	-27	-25	-29	-29	-37	-42		13	12	9	12
20,000	22	16	14	17	17	11	8		-23	-17	-14	-18	-18	-24	-27		10	9	6	8

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.THE BOEING COMPANY
TRANSPORT DIVISION

NO. D6-9175

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	DIRECT							RETURN							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85				
HICKAM AFB TO MAURIPUR AP																		6988 N.MI.
53,000	-42	-32	-12	-31	-30	-38	-42	40	31	11	29	29	19	13	9	7	6	7
40,000	-53	-43	-26	-41	-41	-50	-55	48	40	24	39	38	29	24	10	10	9	10
30,000	-41	-38	-20	-33	-33	-41	-46	38	34	18	31	30	22	18	10	10	7	9
20,000	-27	-22	-10	-20	-20	-26	-29	25	21	10	19	19	13	10	7	7	5	6
HICKAM AFB TO MCCHORD AFB																		2309 N.MI.
53,000	10	14	11	12	12	5	1	-12	-16	-11	-13	-13	-20	-24	12	10	8	10
40,000	26	22	17	23	22	11	6	-31	-26	-18	-26	-25	-35	-42	17	15	13	15
30,000	22	20	12	19	18	8	3	-26	-23	-14	-21	-20	-31	-37	18	15	11	15
20,000	14	13	4	12	10	3	-1	-16	-15	-5	-13	-12	-20	-24	13	11	8	10
HICKAM AFB TO MCGUIRE AFB																		4293 N.MI.
53,000	27	23	11	18	19	13	10	-28	-24	-12	-19	-20	-27	-31	9	8	6	7
40,000	45	34	30	33	35	27	22	-49	-37	-31	-35	-37	-46	-52	13	12	10	12
30,000	39	29	22	27	28	20	16	-41	-31	-23	-28	-30	-39	-45	13	12	8	12
20,000	24	18	12	16	17	11	8	-26	-19	-12	-17	-18	-24	-29	10	9	6	8
HICKAM AFB TO MIDWAY NAS																		1135 N.MI.
53,000	-28	-25	-1	-6	-13	-27	-34	27	24	1	5	12	2	-3	15	14	9	12
40,000	-51	-45	-15	-26	-33	-51	-60	49	43	14	25	31	16	9	21	22	15	17
30,000	-40	-35	-9	-17	-23	-39	-48	38	34	9	16	22	9	3	20	18	12	15
20,000	-19	-12	-1	-3	-7	-16	-22	18	11	1	2	7	-1	-5	15	11	8	10
HICKAM AFB TO MILDENHALL AP																		6236 N.MI.
53,000	7	5	2	7	5	1	-1	-9	-6	-3	-8	-6	-11	-13	8	6	4	6
40,000	7	9	5	11	8	2	-1	-11	-11	-7	-14	-11	-17	-20	9	8	8	9
30,000	6	9	5	10	8	1	-3	-10	-12	-7	-13	-10	-17	-21	11	10	9	10
20,000	4	7	4	5	5	0	-3	-6	-8	-5	-7	-6	-11	-14	9	8	6	7
HICKAM AFB TO MINOT AFB																		3134 N.MI.
53,000	16	17	12	15	15	9	6	-18	-18	-13	-16	-16	-22	-25	10	9	7	8
40,000	31	25	23	26	26	17	13	-35	-28	-25	-28	-29	-38	-43	14	13	11	13
30,000	27	22	18	22	22	13	9	-31	-24	-19	-24	-24	-33	-39	15	14	10	13
20,000	17	14	9	14	13	7	4	-19	-15	-10	-15	-14	-21	-25	11	9	7	9
HICKAM AFB TO MOSCOW INTERNATIONAL																		6107 N.MI.
53,000	-6	-3	-1	-3	-3	-7	-10	4	2	1	2	2	-1	-3	8	5	4	6
40,000	-5	-7	-6	-7	-6	-12	-15	1	4	4	4	3	-2	-5	9	8	8	8
30,000	-6	-6	-4	-6	-5	-12	-15	3	3	2	3	3	-3	-7	10	9	8	9
20,000	-2	-2	-4	-5	-3	-8	-11	0	1	3	3	2	-3	-6	8	7	6	7
HICKAM AFB TO MYRTLE BEACH AFB																		4172 N.MI.
53,000	31	27	6	18	21	11	7	-32	-28	-7	-18	-22	-30	-34	9	8	6	7
40,000	49	41	23	33	36	26	21	-51	-43	-24	-35	-38	-49	-55	13	12	9	11
30,000	39	33	15	25	27	18	14	-42	-34	-16	-26	-29	-39	-45	13	12	8	11
20,000	24	19	7	12	15	8	5	-25	-20	-8	-13	-15	-23	-27	9	8	5	7
HICKAM AFB TO NOUASSEUR AB																		7105 N.MI.
53,000	13	9	8	11	10	6	4	-15	-10	-9	-12	-11	-16	-18	7	6	5	6
40,000	19	15	12	20	16	10	6	-23	-17	-14	-23	-19	-26	-30	10	9	8	10
30,000	18	16	12	19	16	9	5	-21	-18	-14	-22	-19	-26	-30	11	10	9	10
20,000	12	11	8	13	11	6	3	-14	-13	-8	-14	-12	-18	-21	9	8	6	8
HICKAM AFB TO ORLY AP																		6466 N.MI.
53,000	8	5	3	7	5	1	-1	-10	-6	-3	-8	-6	-11	-14	8	6	4	6
40,000	8	9	5	11	8	2	-1	-11	-11	-7	-14	-11	-17	-20	9	8	8	9
30,000	7	9	5	10	8	1	-3	-11	-12	-7	-13	-11	-18	-21	11	10	9	10
20,000	5	7	4	5	5	0	-3	-7	-8	-5	-7	-6	-12	-14	9	8	6	7
HICKAM AFB TO PALAM AP																		6428 N.MI.
53,000	-47	-35	-12	-33	-33	-42	-47	44	34	11	32	32	20	13	10	7	6	7
40,000	-59	-47	-28	-45	-45	-55	-60	55	44	26	42	42	32	26	11	10	9	10
30,000	-48	-41	-21	-35	-36	-46	-51	44	38	20	33	34	24	20	10	10	8	9
20,000	-31	-24	-11	-22	-22	-29	-33	30	23	11	21	21	14	11	8	7	5	6
HICKAM AFB TO PATRICK AFB																		4163 N.MI.
53,000	31	28	1	15	20	7	2	-32	-29	-1	-16	-21	-30	-35	9	8	6	7
40,000	47	44	16	31	35	23	17	-50	-46	-17	-32	-36	-49	-54	12	12	9	10
30,000	38	34	10	22	25	15	10	-40	-35	-11	-23	-27	-38	-43	12	11	7	9
20,000	22	18	2	9	12	5	2	-22	-19	-3	-10	-12	-21	-25	9	8	5	7

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.

MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION							
	D I R E C T								R E T U R N								JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85						
HICKAM AFB TO PIARCO AP																				
53,000	20	20	-9	.5	10	-2	-8	-21	-21	9	-6	-11	-21	-25	7	7	4	5		
40,000	33	34	3	14	21	8	3	-35	-36	-3	-15	-22	-35	-40	9	9	6	8		
30,000	24	22	2	7	13	4	1	-26	-22	-2	-8	-13	-24	-28	8	7	5	6		
20,000	8	8	-4	0	2	-3	-5	-9	-8	4	0	-2	-8	-11	6	5	3	4		
HICKAM AFB TO POPE AFB																				
53,000	30	26	7	18	20	12	8	-31	-27	-8	-18	-21	-30	-34	9	8	6	7		
40,000	48	39	25	33	35	26	22	-51	-41	-26	-35	-37	-48	-54	13	12	10	11		
30,000	39	32	17	25	27	18	14	-42	-34	-18	-27	-29	-39	-45	13	12	8	11		
20,000	24	18	8	13	15	9	6	-25	-19	-9	-14	-16	-23	-28	10	8	5	8		
HICKAM AFB TO PRESTWICK AB																				
53,000	7	5	3	7	5	1	-1	-10	-6	-3	-8	-6	-11	-14	8	6	4	6		
40,000	8	9	5	12	8	2	-1	-11	-12	-7	-15	-11	-17	-21	9	8	8	9		
30,000	6	10	6	11	8	1	-2	-10	-12	-8	-13	-11	-18	-22	11	10	9	10		
20,000	4	7	4	6	5	0	-3	-6	-9	-5	-8	-7	-12	-15	9	8	6	7		
HICKAM AFB TO RAMEY AFB																				
53,000	27	25	-5	10	16	2	-4	-28	-26	4	-11	-17	-27	-31	8	7	5	6		
40,000	42	43	9	23	29	15	9	-44	-44	-10	-24	-31	-44	-49	10	10	7	9		
30,000	32	30	6	15	20	10	6	-33	-31	-6	-16	-21	-32	-37	10	8	6	7		
20,000	15	14	-1	4	7	1	-2	-15	-14	1	-4	-7	-15	-18	7	6	4	5		
HICKAM AFB TO RHEIN MAIN AB																				
53,000	5	4	2	6	4	0	-2	-8	-5	-2	-7	-5	-10	-12	8	6	4	6		
40,000	5	7	3	8	6	0	-3	-9	-9	-5	-11	-8	-14	-17	9	8	8	9		
30,000	5	6	4	7	5	-1	-5	-8	-9	-6	-10	-8	-15	-19	11	10	9	10		
20,000	3	5	3	3	4	-1	-4	-5	-7	-4	-5	-5	-10	-13	9	8	6	7		
HICKAM AFB TO SEOUL AB																				
53,000	-54	-42	-9	-29	-35	-48	-54	52	41	9	28	34	17	10	11	9	7	9		
40,000	-78	-60	-28	-50	-54	-70	-78	75	58	26	48	52	35	27	13	13	11	13		
30,000	-68	-52	-21	-41	-46	-61	-68	64	50	20	39	44	28	21	13	12	9	11		
20,000	-42	-31	-12	-24	-27	-37	-42	41	30	12	23	26	16	12	9	8	6	8		
HICKAM AFB TO STEVENSON FIELD																				
53,000	16	16	12	15	15	9	6	-18	-17	-13	-16	-16	-21	-25	10	8	6	8		
40,000	30	24	23	26	26	17	12	-34	-27	-25	-28	-28	-37	-42	14	13	11	13		
30,000	27	21	19	22	22	13	9	-31	-24	-20	-24	-24	-33	-38	15	13	10	13		
20,000	17	14	9	14	13	7	4	-19	-15	-10	-15	-14	-21	-25	11	9	7	9		
HICKAM AFB TO SUNG SHAN																				
53,000	-54	-38	5	-11	-24	-46	-53	53	37	-6	10	23	1	-5	10	9	7	8		
40,000	-77	-63	-10	-34	-48	-70	-77	75	61	9	32	46	20	11	12	12	9	11		
30,000	-69	-50	-9	-27	-39	-59	-67	67	49	8	26	37	16	9	11	10	7	10		
20,000	-43	-29	-6	-13	-21	-35	-41	42	28	6	13	20	9	6	8	7	5	6		
HICKAM AFB TO TACHIKAWA AB																				
53,000	-53	-41	-6	-21	-30	-46	-53	51	40	6	21	29	12	6	12	10	8	9		
40,000	-82	-63	-23	-46	-54	-73	-82	80	61	22	44	52	32	23	14	14	11	14		
30,000	-70	-53	-18	-38	-45	-62	-70	67	51	18	36	43	26	18	14	13	9	12		
20,000	-44	-31	-11	-21	-25	-37	-43	43	30	11	20	25	14	10	10	8	6	8		
HICKAM AFB TO TAN SAN NHUT																				
53,000	-28	-15	20	7	-3	-21	-27	27	14	-20	-7	2	-14	-19	7	7	5	6		
40,000	-43	-38	5	-10	-22	-40	-45	42	36	-6	9	21	1	-4	8	9	7	8		
30,000	-38	-27	1	-8	-17	-33	-38	37	26	-1	7	16	2	-1	8	8	5	6		
20,000	-17	-12	0	-2	-7	-14	-18	16	12	0	1	6	1	-2	6	5	4	5		
HICKAM AFB TO THULE AB																				
53,000	5	5	4	7	5	0	-2	-7	-6	-5	-8	-6	-11	-14	9	7	5	7		
40,000	6	9	6	14	9	2	-2	-11	-12	-7	-17	-12	-19	-23	11	10	9	10		
30,000	6	9	6	13	8	1	-3	-9	-12	-8	-16	-11	-19	-23	12	11	10	11		
20,000	5	8	4	8	6	1	-2	-7	-9	-5	-9	-8	-13	-16	10	8	7	8		
HICKAM AFB TO TORBAY AP																				
53,000	19	15	13	18	16	11	9	-21	-16	-14	-19	-17	-22	-25	8	7	5	7		
40,000	32	23	27	30	28	20	16	-36	-25	-28	-33	-30	-38	-42	11	10	10	11		
30,000	30	22	23	27	25	18	14	-33	-25	-24	-30	-28	-36	-40	12	12	9	11		
20,000	21	14	14	18	16	11	8	-22	-16	-14	-19	-17	-23	-27	9	8	6	8		

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION							
	D I R E C T							R E T U R N							JAN	APR	JUL	OCT				
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85								
HICKAM AFB TO TORREJON AFB																			6826 N.M.I.			
53,000	11	7	5	9	7	3	1	-13	-8	-5	-10	-8	-13	-16	7	6	4	6				
40,000	13	12	8	16	12	6	3	-17	-15	-10	-18	-15	-21	-25	10	9	8	9				
30,000	12	13	8	15	12	5	1	-15	-16	-10	-18	-15	-22	-26	11	10	9	10				
20,000	8	10	5	9	8	3	0	-10	-11	-6	-11	-9	-15	-18	9	8	6	8				
HICKAM AFB TO TRAVIS AFB																			2113 N.M.I.			
53,000	16	19	10	13	14	7	3	-18	-20	-10	-13	-15	-23	-27	13	11	8	10				
40,000	31	28	22	24	26	16	10	-35	-31	-23	-26	-28	-39	-45	17	16	13	15				
30,000	24	21	14	17	18	9	4	-27	-23	-15	-19	-20	-30	-36	17	15	10	13				
20,000	13	11	4	8	8	2	-1	-15	-12	-4	-9	-9	-17	-21	13	10	7	9				
HICKAM AFB TO WAKE AP																			1993 N.M.I.			
53,000	-19	-19	5	2	-6	-19	-25	19	19	-5	-3	6	-4	-8	10	10	7	9				
40,000	-41	-43	-11	-14	-26	-42	-50	39	41	10	13	24	11	5	14	16	12	13				
30,000	-30	-28	-6	-8	-16	-29	-36	29	27	5	7	15	5	1	14	13	9	11				
20,000	-13	-7	4	2	-2	-10	-14	12	6	-4	-3	2	-4	-7	10	8	6	7				
HICKAM AFB TO WESTOVER AFB																			4353 N.M.I.			
53,000	25	21	12	18	19	13	10	-27	-22	-13	-19	-20	-26	-30	9	8	6	7				
40,000	43	32	31	33	34	26	22	-46	-35	-32	-35	-36	-45	-50	13	12	10	12				
30,000	38	28	24	27	28	20	16	-40	-30	-25	-29	-30	-39	-44	14	12	9	12				
20,000	24	17	13	17	17	11	9	-25	-18	-14	-18	-18	-25	-28	10	9	6	8				
HICKAM AFB TO WHEELUS AP																			7507 N.M.I.			
53,000	6	4	1	6	4	0	-2	-8	-6	-2	-7	-5	-10	-12	7	6	4	6				
40,000	7	7	3	8	6	0	-3	-11	-9	-5	-11	-9	-15	-18	9	8	7	9				
30,000	6	6	4	7	6	-1	-4	-10	-9	-6	-10	-8	-15	-19	11	10	9	10				
20,000	5	5	3	3	4	-1	-3	-7	-7	-4	-5	-5	-10	-13	8	7	6	7				
HILL AFB TO TACHIKAWA AB																			4748 N.M.I.			
53,000	-33	-22	-10	-27	-23	-31	-35	31	21	9	26	22	14	10	9	7	6	7				
40,000	-43	-35	-27	-45	-37	-47	-51	40	32	25	42	35	25	21	12	11	11	12				
30,000	-40	-33	-25	-39	-34	-43	-48	36	30	23	36	31	22	17	13	13	11	13				
20,000	-28	-21	-15	-26	-22	-29	-33	25	19	14	24	20	13	10	11	10	8	10				
INCIRLIK AB TO JOHNSTON AFB																			7281 N.M.I.			
53,000	11	12	8	11	10	6	4	-13	-13	-8	-12	-11	-15	-18	8	5	4	6				
40,000	12	15	15	18	15	9	6	-16	-18	-17	-20	-18	-24	-27	9	9	8	9				
30,000	10	14	10	13	12	6	2	-13	-16	-11	-16	-14	-20	-24	10	9	8	9				
20,000	7	9	6	8	8	3	0	-9	-10	-7	-10	-9	-14	-16	8	7	6	7				
INCIRLIK AB TO IWO JIMA																			5215 N.M.I.			
53,000	41	33	20	33	32	24	20	-44	-34	-20	-34	-33	-41	-45	9	7	6	7				
40,000	48	42	30	43	41	33	28	-51	-44	-32	-45	-43	-51	-55	10	9	10	10				
30,000	43	38	22	29	33	24	20	-46	-40	-23	-31	-35	-44	-49	10	10	9	10				
20,000	28	22	11	21	21	14	11	-29	-23	-12	-21	-22	-28	-31	7	7	6	6				
INCIRLIK AB TO KAOENA AB																			4574 N.M.I.			
53,000	43	33	18	34	32	24	19	-46	-34	-19	-35	-34	-42	-46	10	8	7	8				
40,000	51	44	28	42	42	32	27	-54	-46	-29	-44	-44	-52	-57	11	9	10	11				
30,000	44	39	22	29	33	24	20	-47	-41	-23	-30	-35	-45	-50	11	10	8	9				
20,000	27	22	10	19	20	13	10	-28	-23	-11	-19	-20	-27	-30	7	7	6	6				
INCIRLIK AB TO KEFLAVIK AP																			2605 N.M.I.			
53,000	-27	-13	-7	-14	-14	-22	-27	25	12	6	13	13	6	4	11	8	6	8				
40,000	-29	-21	-17	-22	-22	-32	-38	27	19	14	20	20	10	5	15	13	12	15				
30,000	-29	-21	-17	-20	-22	-33	-39	26	19	15	17	19	8	2	18	16	15	17				
20,000	-18	-14	-11	-14	-14	-22	-27	16	13	10	12	13	5	0	14	12	10	12				
INCIRLIK AB TO KINDLEY AFB																			4695 N.M.I.			
53,000	-28	-20	-13	-16	-18	-24	-28	26	19	13	15	17	12	9	9	7	6	7				
40,000	-37	-30	-27	-33	-32	-40	-45	35	28	26	31	30	22	18	12	11	10	12				
30,000	-35	-29	-25	-31	-29	-38	-43	33	27	23	29	27	19	15	13	12	10	12				
20,000	-26	-20	-20	-22	-22	-28	-31	25	19	19	20	20	15	11	10	9	7	9				
INCIRLIK AB TO KWAJALEIN NAS																			6967 N.M.I.			
53,000	29	26	13	22	23	16	13	-32	-28	-14	-23	-24	-31	-34	8	7	6	6				
40,000	37	34	24	32	32	25	21	-40	-37	-25	-34	-34	-41	-45	9	9	9	9				
30,000	34	30	16	24	26	19	15	-37	-32	-18	-26	-28	-36	-40	9	9	8	8				
20,000	18	19	8	16	15	10	7	-20	-20	-9	-17	-16	-22	-24	7	6	5	5				

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*							STANDARD DEVIATION			
	DIRECT							RETURN			
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT
INCIRLIK AB TO LADD AFB											
53,000	-3	-2	2	-3	-1	-5	-8	1	1	-2	2
40,000	-1	-1	3	-1	0	-6	-9	-1	-1	-5	-1
30,000	1	-1	2	0	0	-6	-10	-3	-1	-3	-2
20,000	0	-1	1	0	0	-5	-8	-1	0	-1	-1
INCIRLIK AB TO LAJES AP											
53,000	-25	-22	-17	-14	-19	-25	-29	24	21	17	13
40,000	-30	-29	-31	-30	-30	-39	-43	28	27	30	28
30,000	-26	-25	-27	-27	-26	-35	-40	24	24	26	25
20,000	-18	-17	-20	-18	-18	-25	-28	17	16	19	17
INCIRLIK AB TO LE BOURGET AP											
53,000	-27	-19	-15	-15	-18	-26	-31	26	18	14	14
40,000	-31	-26	-30	-29	-29	-40	-47	29	24	28	27
30,000	-28	-24	-27	-26	-26	-38	-45	25	22	25	23
20,000	-18	-15	-19	-17	-17	-26	-31	17	14	18	16
INCIRLIK AB TO LONDON INTERNATIONAL											
53,000	-27	-17	-13	-14	-17	-25	-29	26	17	13	13
40,000	-31	-24	-28	-28	-27	-39	-45	29	22	25	25
30,000	-28	-22	-26	-25	-25	-38	-45	25	20	24	23
20,000	-19	-14	-18	-17	-17	-26	-31	17	13	17	16
INCIRLIK AB TO LORING AFB											
53,000	-29	-15	-13	-19	-18	-25	-29	28	15	12	19
40,000	-39	-25	-30	-36	-32	-41	-46	37	23	27	34
30,000	-39	-26	-29	-34	-32	-42	-47	36	23	27	32
20,000	-26	-17	-19	-22	-21	-28	-32	25	16	18	21
INCIRLIK AB TO MAURIPUR AP											
53,000	46	32	1	23	27	11	3	-48	-34	-2	-25
40,000	65	51	13	34	40	21	13	-69	-54	-15	-37
30,000	53	41	16	28	32	19	14	-56	-44	-17	-30
20,000	31	26	11	15	19	11	8	-32	-27	-11	-15
INCIRLIK AB TO MCCHORD AFB											
53,000	-12	-6	-1	-9	-7	-12	-15	10	5	1	8
40,000	-10	-10	-4	-10	-8	-14	-17	7	8	2	8
30,000	-9	-10	-6	-9	-9	-15	-19	6	8	4	6
20,000	-5	-7	-3	-5	-5	-10	-13	3	6	3	3
INCIRLIK AB TO MCGUIRE AFB											
53,000	-30	-17	-13	-20	-19	-26	-30	29	16	13	20
40,000	-43	-28	-32	-39	-35	-44	-49	40	26	30	37
30,000	-43	-28	-31	-37	-34	-44	-50	39	25	28	34
20,000	-29	-19	-20	-24	-23	-30	-34	27	17	19	23
INCIRLIK AB TO MIDWAY NAS											
53,000	12	12	9	12	11	7	5	-14	-13	-9	-14
40,000	13	15	17	19	16	10	7	-17	-18	-18	-22
30,000	10	14	12	15	13	6	3	-14	-17	-13	-18
20,000	8	10	7	9	9	4	1	-10	-12	-8	-11
INCIRLIK AB TO MILDENHALL AP											
53,000	-27	-17	-13	-14	-17	-24	-29	26	16	12	13
40,000	-31	-23	-26	-27	-27	-38	-44	28	21	24	25
30,000	-28	-22	-25	-25	-25	-37	-44	25	20	23	23
20,000	-19	-14	-17	-16	-17	-25	-30	17	13	16	15
INCIRLIK AB TO MINOT AFB											
53,000	-22	-10	-5	-13	-11	-18	-21	20	9	4	12
40,000	-22	-17	-12	-18	-17	-24	-28	20	15	10	15
30,000	-21	-17	-13	-16	-17	-24	-29	18	15	10	13
20,000	-13	-12	-8	-11	-10	-16	-19	11	10	7	9
INCIRLIK AB TO MOSCOW INTERNATIONAL											
53,000	-6	1	5	0	1	-8	-13	3	-2	-6	-2
40,000	-6	0	7	-1	1	-12	-19	2	-4	-11	-2
30,000	-5	-2	0	-3	-2	-16	-23	2	-1	-2	0
20,000	-3	-1	0	-2	-1	-11	-17	1	-1	-1	0

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**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.THE BOEING COMPANY
TRANSPORT DIVISION

NO. D6-9175

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION			
	DIRECT						RETURN						JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A5D	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85		
INCIRLIK AB TO MYRTLE BEACH AFB																
53,000	-31	-18	-13	-20	-19	-26	-31	30	17	12	19	18	13	10	5195 N.MI.	
40,000	-44	-30	-31	-40	-36	-45	-50	41	28	29	37	33	25	21	8	7
30,000	-44	-30	-29	-37	-34	-44	-49	40	27	27	34	32	23	18	12	11
20,000	-31	-20	-20	-25	-24	-31	-35	29	19	19	23	22	16	12	14	13
INCIRLIK AB TO NOUASSEUR AB																
53,000	-33	-30	-20	-20	-25	-33	-37	32	30	20	19	24	18	14	2103 N.MI.	
40,000	-39	-41	-35	-34	-37	-47	-52	36	39	34	33	35	26	20	11	9
30,000	-31	-37	-28	-28	-31	-41	-47	29	35	27	26	29	19	14	17	15
20,000	-22	-23	-19	-18	-20	-27	-31	21	23	19	17	20	13	9	18	14
INCIRLIK AB TO ORLY AP																
53,000	-27	-19	-15	-15	-18	-26	-31	26	19	14	14	17	10	6	1598 N.MI.	
40,000	-31	-26	-30	-29	-29	-41	-47	29	25	28	27	27	16	10	13	10
30,000	-28	-24	-27	-26	-26	-39	-45	25	22	26	24	24	12	5	19	16
20,000	-19	-15	-19	-17	-17	-26	-31	17	14	18	16	16	8	3	21	19
INCIRLIK AB TO PALAM AP																
53,000	50	36	10	32	33	19	11	-51	-38	-10	-33	-34	-46	-52	2145 N.MI.	
40,000	63	49	26	37	43	29	23	-66	-52	-27	-39	-45	-60	-68	12	10
30,000	48	41	24	32	35	25	20	-51	-44	-25	-34	-37	-49	-56	17	14
20,000	29	25	11	17	20	12	9	-30	-26	-11	-17	-20	-29	-33	17	14
INCIRLIK AB TO PATRICK AFB																
53,000	-31	-19	-12	-19	-19	-26	-30	29	18	11	18	18	13	10	5482 N.MI.	
40,000	-43	-32	-28	-38	-35	-44	-48	40	29	26	35	32	24	20	8	7
30,000	-42	-30	-27	-35	-33	-42	-47	39	28	25	32	30	22	18	12	11
20,000	-30	-21	-20	-24	-23	-30	-34	28	20	19	23	22	16	13	13	12
INCIRLIK AB TO PIARCO AP																
53,000	-23	-23	-9	-11	-15	-23	-26	22	22	8	10	15	9	6	5339 N.MI.	
40,000	-33	-34	-23	-20	-27	-35	-39	30	32	22	19	25	19	15	7	6
30,000	-21	-27	-18	-15	-20	-26	-30	20	25	17	14	19	13	10	10	10
20,000	-11	-13	-10	-9	-11	-15	-18	10	13	10	9	10	6	4	7	7
INCIRLIK AB TO POPE AFB																
53,000	-31	-18	-13	-20	-19	-26	-30	30	17	12	20	18	13	10	5137 N.MI.	
40,000	-44	-29	-31	-40	-36	-45	-50	41	27	29	37	33	25	21	8	6
30,000	-44	-29	-30	-37	-34	-44	-49	40	27	28	34	32	23	18	12	11
20,000	-31	-20	-20	-25	-23	-30	-34	29	18	19	23	22	15	12	14	13
INCIRLIK AB TO PRESTWICK AB																
53,000	-27	-15	-11	-14	-15	-23	-28	25	15	10	13	15	8	5	1956 N.MI.	
40,000	-30	-22	-24	-26	-25	-36	-42	28	20	21	24	23	12	7	12	9
30,000	-28	-21	-23	-25	-24	-37	-43	26	18	21	22	22	9	3	17	15
20,000	-19	-14	-16	-16	-16	-25	-30	18	12	15	15	15	6	1	20	18
INCIRLIK AB TO RAMEY AFB																
53,000	-23	-21	-10	-11	-15	-22	-26	21	20	10	10	15	9	7	5310 N.MI.	
40,000	-31	-32	-22	-23	-26	-34	-38	28	30	20	21	25	17	14	8	7
30,000	-24	-26	-18	-20	-22	-29	-33	22	24	17	18	20	14	10	11	10
20,000	-15	-16	-13	-13	-14	-19	-22	13	15	13	13	13	9	6	11	10
INCIRLIK AB TO RHEIN MAIN AB																
53,000	-27	-18	-13	-14	-17	-26	-31	26	17	13	13	16	9	5	1394 N.MI.	
40,000	-31	-25	-27	-26	-27	-39	-46	28	23	24	24	25	13	6	14	11
30,000	-27	-23	-25	-24	-25	-38	-45	25	21	24	21	23	10	2	19	17
20,000	-18	-14	-18	-16	-16	-26	-31	16	13	17	15	15	6	1	22	20
INCIRLIK AB TO SEOUL AB																
53,000	36	28	23	33	30	24	21	-38	-29	-24	-34	-31	-37	-41	4171 N.MI.	
40,000	40	36	34	40	37	30	26	-42	-37	-35	-42	-39	-46	-50	10	7
30,000	35	33	25	28	30	22	18	-36	-34	-26	-30	-31	-39	-43	11	10
20,000	24	20	13	22	20	14	11	-25	-21	-14	-23	-20	-26	-29	11	11
INCIRLIK AB TO STEVENSON FIELD																
53,000	-23	-10	-5	-13	-12	-18	-22	21	9	4	12	11	5	3	5015 N.MI.	
40,000	-24	-17	-13	-19	-18	-25	-29	21	16	11	16	16	9	5	8	6
30,000	-22	-18	-13	-17	-17	-25	-30	19	16	11	14	15	7	3	10	9
20,000	-14	-12	-8	-11	-11	-17	-20	12	11	7	10	10	4	1	12	11

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*						STANDARD DEVIATION				
	DIRECT							RETURN										
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
INCIRLIK AB TO SUNG SHAN																		
53,000	45	33	14	31	31	21	16	-48	-35	-15	-32	-33	-42	-47	10	8	7	8
40,000	53	44	25	38	40	30	25	-56	-46	-27	-40	-42	-52	-58	11	10	10	11
30,000	45	39	21	28	32	23	19	-47	-40	-22	-29	-34	-44	-50	11	10	8	9
20,000	27	22	8	17	18	12	9	-28	-23	-9	-17	-19	-26	-29	7	7	6	6
INCIRLIK AB TO TACHIKAWA AB																		
53,000	34	27	20	29	27	21	18	-36	-28	-21	-30	-28	-35	-39	9	7	6	7
40,000	39	34	30	37	35	28	24	-42	-35	-32	-39	-37	-44	-48	11	9	10	10
30,000	33	31	21	29	28	21	17	-36	-33	-23	-30	-30	-38	-42	11	11	9	10
20,000	24	20	12	23	20	14	11	-25	-21	-13	-23	-21	-27	-30	8	8	6	8
INCIRLIK AB TO TAN SAN NHUT																		
53,000	40	28	-12	11	19	-1	-10	-42	-29	11	-12	-21	-35	-42	9	8	7	8
40,000	47	39	4	20	28	11	5	-51	-42	-5	-22	-31	-46	-52	11	10	7	9
30,000	38	32	8	20	24	13	9	-40	-34	-8	-21	-25	-37	-42	10	10	6	7
20,000	24	19	4	9	13	6	4	-25	-19	-4	-10	-14	-22	-26	7	6	5	5
INCIRLIK AB TO THULE AB																		
53,000	-18	-8	-1	-11	-9	-16	-19	16	7	1	10	8	2	-1	10	8	5	7
40,000	-16	-13	-4	-12	-11	-19	-23	13	11	2	10	9	1	-3	11	10	9	11
30,000	-15	-13	-8	-10	-11	-20	-25	12	10	6	8	9	0	-5	14	13	12	13
20,000	-8	-9	-4	-5	-7	-13	-17	7	8	3	4	5	-1	-5	11	10	8	10
INCIRLIK AB TO TORBAY AP																		
53,000	-28	-16	-15	-18	-18	-24	-28	27	16	14	18	18	12	10	9	7	6	7
40,000	-39	-25	-32	-36	-33	-42	-47	36	24	30	34	31	22	17	14	12	11	14
30,000	-39	-26	-30	-34	-32	-43	-48	36	24	28	32	30	20	14	16	15	13	15
20,000	-27	-18	-21	-23	-22	-30	-34	26	16	20	22	21	14	10	12	11	9	11
INCIRLIK AB TO TORREJON AFB																		
53,000	-30	-26	-20	-17	-22	-30	-35	29	25	19	16	22	14	11	12	10	9	9
40,000	-35	-34	-36	-32	-34	-45	-51	32	33	35	30	33	22	16	18	16	14	16
30,000	-28	-30	-31	-27	-29	-40	-46	25	29	30	26	28	17	10	19	17	13	16
20,000	-19	-20	-22	-18	-20	-27	-32	18	19	21	17	19	11	7	14	12	9	11
INCIRLIK AB TO TRAVIS AFB																		
53,000	-14	-7	-3	-10	-8	-13	-16	12	6	2	9	7	3	1	7	6	4	5
40,000	-12	-11	-7	-12	-11	-17	-20	10	9	5	9	8	2	-1	9	8	8	9
30,000	-12	-12	-9	-10	-11	-18	-21	9	9	7	8	8	1	-2	11	10	9	10
20,000	-6	-8	-5	-6	-6	-11	-14	5	7	4	5	5	0	-3	8	8	6	8
INCIRLIK AB TO WAKE AP																		
53,000	30	25	14	21	22	16	13	-33	-26	-14	-22	-23	-30	-34	8	7	5	6
40,000	39	33	22	30	31	24	20	-43	-36	-24	-33	-34	-42	-46	10	9	9	10
30,000	33	29	16	25	26	18	14	-36	-32	-18	-28	-28	-36	-41	10	10	8	9
20,000	23	19	9	18	17	11	8	-25	-20	-10	-19	-19	-25	-28	8	7	6	7
INCIRLIK AB TO WESTOVER AFB																		
53,000	-30	-16	-13	-20	-19	-25	-30	29	16	13	19	18	13	10	9	7	6	7
40,000	-42	-27	-32	-39	-34	-44	-48	40	25	29	36	32	24	19	13	11	11	13
30,000	-42	-27	-30	-36	-34	-44	-49	38	25	28	33	31	21	16	15	14	12	14
20,000	-29	-18	-20	-24	-22	-30	-34	27	17	19	22	21	14	10	11	10	8	10
INCIRLIK AB TO WHEELUS AP																		
53,000	-38	-35	-21	-25	-29	-39	-44	37	34	20	24	28	19	15	15	13	11	11
40,000	-49	-50	-38	-39	-44	-57	-64	47	49	37	37	42	29	22	23	19	16	18
30,000	-42	-44	-28	-29	-35	-49	-57	39	42	27	28	33	20	14	24	20	14	18
20,000	-27	-27	-15	-19	-21	-31	-37	26	26	14	19	20	11	7	16	14	10	12
IWO JIMA TO JOHNSTON AFB																		
53,000	32	24	-10	-1	11	-6	-11	-33	-25	10	1	-11	-29	-35	10	10	7	8
40,000	51	48	4	12	28	7	1	-53	-50	-5	-13	-29	-51	-58	12	14	10	11
30,000	45	35	3	10	22	6	2	-46	-36	-3	-11	-23	-41	-47	11	11	7	9
20,000	19	16	-1	2	8	0	-3	-20	-16	1	-2	-8	-18	-22	9	7	6	7
IWO JIMA TO KADENA AB																		
53,000	-65	-41	14	-13	-27	-53	-65	63	40	-15	12	25	-3	-14	17	18	15	17
40,000	-75	-65	-3	-31	-45	-71	-82	73	63	1	29	44	15	2	20	22	19	21
30,000	-71	-55	-3	-27	-41	-64	-73	69	53	2	25	39	11	2	17	18	14	20
20,000	-45	-32	-3	-12	-22	-38	-46	44	32	3	11	21	7	1	13	12	10	12

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.THE BOEING COMPANY
TRANSPORT DIVISION

NO. 06-9175

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	D I R E C T							R E T U R N							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85				
IWO JIMA TO KEFLAVIK AP																		
53,000	-8	-6	-4	-6	-5	-10	-12	3	3	3	4	4	0	-3	8	6	5	6
40,000	-15	-10	-4	-11	-10	-16	-19	10	6	3	8	6	1	-2	9	8	8	9
30,000	-15	-10	-3	-10	-10	-16	-20	10	7	2	7	6	0	-3	9	9	9	9
20,000	-10	-7	-3	-7	-6	-12	-15	8	5	2	5	5	0	-3	8	8	6	7
IWO JIMA TO KINDLEY AFB																		
53,000	27	14	4	16	14	8	4	-30	-16	-5	-17	-16	-24	-29	8	6	5	6
40,000	26	18	13	24	20	13	10	-31	-22	-16	-28	-24	-32	-36	9	9	9	10
30,000	24	18	14	21	19	12	9	-29	-22	-16	-25	-23	-30	-34	10	10	9	10
20,000	17	12	10	14	13	8	5	-19	-14	-11	-16	-15	-20	-23	8	7	6	7
IWO JIMA TO KWAJALEIN NAS																		
53,000	2	12	-12	-4	-1	-9	-14	-4	-13	11	4	0	-9	-14	10	11	9	8
40,000	9	22	0	4	8	-1	-5	-11	-24	-1	-5	-9	-19	-25	10	12	11	12
30,000	14	16	0	3	7	0	-3	-16	-17	0	-4	-8	-17	-22	10	10	7	9
20,000	-10	7	-6	-5	-4	-10	-13	9	-7	5	4	3	-3	-7	8	7	7	7
IWO JIMA TO LADD AFB																		
53,000	31	17	1	19	17	7	2	-35	-20	-1	-21	-19	-29	-35	11	8	7	8
40,000	31	23	11	30	24	14	8	-39	-28	-13	-34	-29	-39	-45	12	12	12	13
30,000	28	20	12	25	21	12	7	-34	-25	-14	-29	-26	-36	-41	13	13	12	13
20,000	19	13	8	16	14	7	3	-23	-15	-9	-18	-16	-23	-28	11	10	8	10
IWO JIMA TO LAJES AP																		
53,000	-9	-7	-4	-7	-7	-11	-13	6	5	4	5	5	1	-1	8	6	4	6
40,000	-17	-12	-7	-13	-12	-19	-22	12	8	5	10	9	3	0	9	8	8	9
30,000	-18	-13	-6	-13	-12	-19	-23	13	10	4	9	9	2	-2	10	10	9	10
20,000	-12	-8	-4	-9	-8	-14	-17	10	7	3	7	7	1	-1	8	8	6	7
IWO JIMA TO LE BOURGET AP																		
53,000	-20	-17	-9	-14	-14	-20	-23	16	15	8	13	13	8	6	8	6	5	6
40,000	-28	-24	-16	-26	-23	-31	-34	23	21	14	23	20	14	10	10	9	9	10
30,000	-24	-24	-13	-22	-21	-28	-32	20	21	11	19	18	10	6	10	11	9	11
20,000	-18	-17	-9	-16	-15	-20	-23	15	15	8	14	13	8	5	8	8	6	8
IWO JIMA TO LONDON INTERNATIONAL																		
53,000	-18	-15	-8	-13	-13	-18	-21	14	13	7	12	11	7	5	8	6	5	6
40,000	-27	-22	-14	-25	-22	-29	-33	22	19	12	22	19	12	8	10	9	8	10
30,000	-23	-23	-11	-21	-20	-27	-31	19	20	10	19	17	9	5	10	10	9	10
20,000	-17	-16	-8	-15	-14	-19	-22	15	14	7	13	12	7	4	8	8	6	8
IWO JIMA TO LORING AFB																		
53,000	23	10	3	13	11	5	2	-26	-12	-3	-15	-13	-20	-25	8	6	5	6
40,000	18	14	11	21	16	10	6	-24	-18	-13	-24	-20	-26	-30	9	8	9	9
30,000	16	14	13	18	15	9	5	-21	-17	-15	-21	-19	-25	-29	9	10	9	10
20,000	12	9	9	12	10	6	3	-14	-11	-10	-14	-12	-17	-20	8	7	6	7
IWO JIMA TO MAURIPUR AP																		
53,000	-72	-48	13	-24	-36	-60	-69	70	46	-14	23	34	3	-12	10	10	8	10
40,000	-79	-61	-2	-31	-46	-69	-78	77	59	1	29	45	13	3	11	11	9	12
30,000	-68	-50	0	-26	-38	-58	-66	66	48	-1	25	36	10	1	11	10	7	9
20,000	-41	-28	-1	-13	-20	-34	-40	40	28	1	13	20	7	2	7	6	5	6
IWO JIMA TO MCCHORD AFB																		
53,000	38	27	7	25	25	14	8	-40	-29	-7	-26	-26	-35	-40	10	8	7	8
40,000	54	45	24	46	43	31	25	-59	-49	-27	-49	-47	-58	-63	12	12	11	13
30,000	51	41	23	44	40	28	22	-55	-45	-25	-47	-43	-55	-60	13	13	10	13
20,000	36	27	18	29	27	20	16	-38	-29	-19	-30	-29	-37	-41	10	9	7	9
IWO JIMA TO MCGUIRE																		
53,000	29	15	5	19	16	9	5	-32	-17	-5	-20	-18	-26	-31	8	6	5	6
40,000	31	21	15	28	24	16	12	-36	-24	-17	-31	-27	-35	-40	9	9	9	10
30,000	29	20	15	25	22	14	11	-34	-23	-17	-28	-25	-34	-38	10	10	9	11
20,000	20	14	11	17	15	10	7	-23	-15	-12	-18	-17	-22	-26	8	8	6	8
IWO JIMA TO MIDWAY NAS																		
53,000	52	34	-8	5	19	-2	-8	-53	-35	8	-6	-20	-44	-53	13	12	9	11
40,000	78	61	2	24	41	12	3	-80	-63	-4	-26	-43	-72	-81	15	16	12	15
30,000	71	49	6	22	35	13	6	-72	-50	-6	-24	-36	-61	-71	14	14	9	13
20,000	45	31	7	13	22	10	5	-46	-32	-7	-14	-22	-39	-46	11	10	7	9

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	D I R E C T							R E T U R N							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85				
IWO JIMA TO MILDENHALL AP																		
53,000	-18	-15	-8	-13	-13	-18	-21	14	13	7	12	11	7	5	8	6	5	6
40,000	-27	-22	-14	-25	-22	-29	-33	22	19	12	22	19	12	8	10	9	8	10
30,000	-24	-23	-11	-21	-20	-27	-31	19	20	10	19	17	9	5	10	10	9	10
20,000	-17	-16	-8	-15	-14	-20	-23	15	14	7	13	12	7	4	8	8	6	8
IWO JIMA TO MINOT AFB																		
53,000	34	20	5	23	21	11	7	-36	-22	-6	-24	-22	-31	-35	9	7	6	7
40,000	42	29	18	36	31	22	17	-46	-33	-20	-39	-35	-45	-50	11	10	10	11
30,000	39	27	17	33	29	19	15	-43	-31	-19	-36	-32	-42	-48	12	11	10	12
20,000	27	18	12	22	19	13	10	-30	-19	-13	-23	-21	-28	-32	9	8	7	8
IWO JIMA TO MOSCOW INTERNATIONAL																		
53,000	-29	-24	-12	-21	-21	-28	-32	25	23	11	20	19	13	10	9	7	6	7
40,000	-38	-34	-20	-34	-32	-40	-44	34	31	19	31	29	21	16	11	10	10	10
30,000	-33	-32	-13	-27	-26	-35	-40	29	29	12	24	24	15	10	11	11	10	11
20,000	-24	-21	-9	-20	-19	-25	-29	22	19	8	19	17	11	7	9	8	8	8
IWO JIMA TO MYRTLE BEACH AFB																		
53,000	32	19	6	21	20	11	7	-35	-21	-7	-23	-21	-29	-34	8	6	5	6
40,000	40	28	19	33	30	21	17	-46	-32	-21	-37	-34	-43	-48	10	10	10	11
30,000	37	26	17	30	28	19	15	-42	-30	-19	-34	-31	-41	-46	11	11	9	11
20,000	26	18	12	21	19	13	10	-29	-19	-13	-22	-20	-27	-31	9	8	6	8
IWO JIMA TO NOUASSEUR AB																		
53,000	-20	-17	-10	-14	-15	-20	-23	16	15	9	12	13	9	6	8	6	5	6
40,000	-26	-24	-18	-26	-23	-30	-33	21	21	16	23	20	14	10	10	9	8	10
30,000	-22	-23	-15	-22	-20	-27	-31	18	20	13	19	17	10	7	10	10	9	10
20,000	-16	-16	-10	-15	-14	-20	-22	14	15	9	14	13	8	5	8	8	6	7
IWO JIMA TO ORLY AP																		
53,000	-20	-17	-9	-14	-14	-20	-23	16	15	8	13	13	8	6	8	6	5	6
40,000	-28	-24	-16	-26	-24	-31	-34	23	21	14	23	20	14	10	10	9	9	10
30,000	-24	-24	-13	-22	-21	-28	-32	20	21	11	19	18	10	6	10	11	9	11
20,000	-18	-17	-9	-16	-15	-20	-23	15	15	8	14	13	8	5	8	8	6	8
IWO JIMA TO PALAM AP																		
53,000	-72	-47	10	-25	-36	-60	-70	70	46	-11	24	34	5	-9	11	11	9	10
40,000	-78	-62	-5	-33	-49	-70	-78	76	60	4	32	47	16	6	12	12	10	13
30,000	-70	-52	-2	-27	-39	-60	-68	68	50	1	26	38	12	3	12	10	7	10
20,000	-41	-29	-3	-14	-21	-35	-40	41	29	2	14	21	8	3	8	7	6	6
IWO JIMA TO PATRICK AFB																		
53,000	34	23	6	22	22	12	8	-37	-24	-7	-24	-24	-31	-36	8	7	5	7
40,000	46	35	21	38	35	26	21	-52	-39	-24	-42	-39	-49	-54	11	10	10	11
30,000	43	32	19	35	32	22	18	-47	-35	-21	-38	-36	-46	-51	11	11	9	11
20,000	30	21	14	23	22	15	12	-32	-22	-15	-25	-23	-30	-34	9	8	6	8
IWO JIMA TO PIARCO AP																		
53,000	30	19	4	18	18	10	5	-32	-21	-5	-20	-20	-27	-31	7	6	5	6
40,000	38	27	16	29	27	19	14	-43	-31	-18	-32	-31	-40	-44	9	9	9	10
30,000	35	25	14	26	25	16	13	-39	-28	-16	-29	-28	-37	-41	10	10	8	10
20,000	23	16	9	16	16	10	7	-25	-17	-10	-17	-17	-23	-27	8	7	5	7
IWO JIMA TO POPE AFB																		
53,000	32	19	6	21	19	11	7	-35	-20	-6	-22	-21	-29	-33	8	6	5	6
40,000	39	27	19	32	29	21	16	-44	-30	-21	-36	-33	-42	-47	10	10	10	11
30,000	36	25	17	30	27	18	14	-41	-29	-19	-33	-30	-40	-45	11	11	9	11
20,000	26	17	12	20	18	12	9	-28	-19	-13	-22	-20	-26	-30	9	8	6	8
IWO JIMA TO PRESTWICK AB																		
53,000	-16	-13	-7	-12	-11	-16	-19	11	11	6	10	9	5	3	8	6	5	6
40,000	-24	-19	-11	-22	-19	-26	-30	19	16	10	19	16	9	6	10	9	8	9
30,000	-22	-21	-10	-20	-18	-25	-29	18	17	8	17	15	8	4	10	10	9	10
20,000	-16	-14	-6	-13	-12	-18	-21	13	12	6	12	11	5	2	8	8	6	7
IWO JIMA TO RAMEY AFB																		
53,000	31	20	5	20	19	10	6	-34	-22	-6	-21	-21	-29	-33	8	6	5	6
40,000	40	29	18	31	29	21	16	-45	-33	-20	-35	-33	-42	-47	10	9	9	10
30,000	37	27	16	28	27	18	14	-41	-30	-18	-31	-30	-39	-44	10	10	8	10
20,000	25	17	10	18	17	11	8	-27	-19	-11	-19	-19	-25	-29	8	7	6	7

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.THE BOEING COMPANY
TRANSPORT DIVISION

NO. D6-9175

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION			
	D I R E C T						R E T U R N						JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85		
IWO JIMA TO RHEIN MAIN AB																5657 N.MI.
53,000	-22	-18	-9	-16	-16	-22	-25	18	17	9	14	14	9	7	9	6
40,000	-30	-26	-17	-28	-25	-33	-36	26	23	15	25	22	15	12	10	9
30,000	-26	-25	-14	-23	-22	-30	-34	21	22	12	20	19	11	7	11	10
20,000	-19	-18	-9	-16	-15	-21	-24	17	16	9	15	14	8	6	8	7
IWO JIMA TO SEOUL AB																1060 N.MI.
53,000	-49	-42	-8	-24	-30	-47	-55	39	37	7	21	26	11	4	18	15
40,000	-66	-54	-15	-44	-46	-64	-74	56	48	13	39	40	21	11	21	20
30,000	-63	-47	-8	-32	-38	-58	-67	54	42	7	28	33	14	5	19	17
20,000	-39	-29	-6	-18	-22	-35	-41	35	26	5	17	20	9	4	14	10
IWO JIMA TO STEVENSON FIELD																5347 N.MI.
53,000	33	18	4	22	19	10	6	-35	-20	-5	-23	-21	-29	-34	9	7
40,000	37	25	16	32	28	19	14	-42	-29	-18	-36	-31	-41	-46	10	10
30,000	35	24	15	29	26	17	12	-39	-27	-17	-33	-29	-38	-43	11	11
20,000	25	16	11	20	17	11	8	-27	-17	-12	-21	-19	-26	-29	9	8
IWO JIMA TO SUNG SHAN																1075 N.MI.
53,000	-64	-39	20	-10	-24	-52	-63	63	38	-21	9	23	-7	-19	15	16
40,000	-74	-62	1	-28	-44	-69	-79	73	61	-2	27	42	11	-1	17	19
30,000	-70	-53	0	-25	-40	-61	-71	69	52	0	23	38	9	0	15	15
20,000	-44	-32	-3	-11	-21	-37	-44	43	31	2	10	21	6	1	11	10
IWO JIMA TO TACHIKAWA AB																662 N.MI.
53,000	-5	-14	-9	-8	-9	-22	-29	-9	6	8	5	3	-11	-18	20	20
40,000	-22	-19	-7	-14	-15	-32	-42	0	4	4	4	3	-13	-22	24	25
30,000	-19	-15	-2	-6	-11	-26	-34	1	4	0	-2	1	-13	-21	21	22
20,000	-11	-7	2	-1	-4	-14	-20	4	2	-3	-2	0	-10	-15	16	15
IWO JIMA TO TAN SAN NHUT																2142 N.MI.
53,000	-31	-10	34	12	2	-20	-28	30	9	-35	-13	-3	-23	-33	10	9
40,000	-37	-28	17	-8	-17	-32	-39	36	27	-17	8	16	-5	-15	11	11
30,000	-34	-23	7	-8	-15	-28	-34	33	22	-8	7	14	-1	-7	9	10
20,000	-17	-11	0	-3	-7	-14	-18	17	11	-1	2	7	1	-2	7	7
IWO JIMA TO THULE AB																4621 N.MI.
53,000	10	3	-1	5	4	-1	-3	-14	-5	0	-7	-6	-12	-16	9	6
40,000	1	3	2	5	3	-3	-7	-7	-7	-4	-9	-7	-13	-16	9	9
30,000	0	2	2	3	2	-4	-8	-5	-6	-4	-6	-5	-12	-15	9	10
20,000	-1	1	3	2	1	-4	-7	-1	-3	-4	-4	-3	-8	-11	8	8
IWO JIMA TO TORBAY AP																6390 N.MI.
53,000	9	4	0	6	4	0	-2	-13	-5	-1	-7	-6	-11	-14	8	6
40,000	1	4	3	6	4	-2	-5	-7	-8	-5	-10	-7	-13	-16	8	8
30,000	0	3	3	4	3	-4	-7	-5	-7	-5	-7	-6	-12	-15	9	9
20,000	-1	2	3	4	2	-3	-6	-2	-4	-4	-5	-4	-9	-11	8	7
IWO JIMA TO TORREJON AFB																6419 N.MI.
53,000	-20	-17	-9	-14	-14	-19	-23	16	15	9	13	13	8	6	8	6
40,000	-27	-23	-17	-26	-23	-30	-34	22	21	15	23	20	13	10	10	9
30,000	-22	-23	-14	-22	-20	-28	-31	18	20	12	19	17	10	6	10	10
20,000	-17	-16	-10	-16	-14	-20	-23	15	15	9	14	13	8	5	8	8
IWO JIMA TO TRAVIS AFB																4792 N.MI.
53,000	42	31	7	24	27	15	8	-44	-33	-8	-25	-28	-38	-43	10	8
40,000	63	53	24	47	48	33	25	-67	-56	-26	-50	-51	-64	-70	13	12
30,000	59	49	22	44	45	30	23	-63	-52	-23	-46	-47	-60	-66	13	12
20,000	41	34	18	30	31	22	18	-43	-35	-19	-31	-32	-41	-45	10	9
IWO JIMA TO WAKE AP																1445 N.MI.
53,000	35	24	-14	-1	10	-8	-14	-36	-25	13	1	-11	-31	-38	13	13
40,000	48	46	0	10	25	4	-3	-50	-48	0	-11	-26	-49	-57	14	17
30,000	46	35	1	11	22	5	0	-48	-36	-2	-12	-23	-42	-50	13	13
20,000	8	18	-1	2	6	-1	-5	-10	-18	0	-3	-7	-16	-20	11	9
IWO JIMA TO WESTOVER AFB																6364 N.MI.
53,000	28	14	4	17	15	8	4	-31	-15	-4	-18	-17	-25	-29	8	6
40,000	27	19	14	26	21	14	10	-32	-22	-16	-30	-25	-33	-37	9	9
30,000	25	18	14	23	20	13	9	-29	-21	-16	-26	-23	-31	-35	10	10
20,000	17	12	11	15	14	9	6	-20	-14	-11	-17	-15	-21	-24	8	8

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION					
	D I R E C T							R E T U R N					JAN	APR	JUL	OCT		
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50					A75	A85
IWO JIMA TO WHEELUS AP																		
53,000	-35	-27	-16	-25	-25	-32	-36	31	26	16	24	24	18	15	8	7	6	6
40,000	-39	-35	-26	-35	-34	-41	-45	35	33	25	33	32	25	21	10	9	9	10
30,000	-35	-33	-17	-26	-28	-36	-40	32	30	16	24	25	17	13	10	10	8	10
20,000	-24	-20	-11	-20	-19	-24	-27	23	19	10	19	17	12	9	8	7	6	7
JOHNSTON AFB TO KADENA AB																		
53,000	-43	-31	9	-4	-17	-37	-43	42	30	-10	4	16	-4	-9	9	9	7	8
40,000	-63	-56	-6	-21	-37	-60	-66	62	54	5	20	36	12	5	11	13	10	11
30,000	-56	-43	-5	-18	-30	-49	-56	55	42	4	17	29	9	4	10	10	7	9
20,000	-31	-22	-2	-7	-14	-26	-31	30	22	1	6	14	4	1	8	7	5	6
JOHNSTON AFB TO KEFLAVIK AP																		
53,000	7	4	2	7	5	1	-2	-9	-6	-3	-8	-6	-10	-13	8	6	4	6
40,000	7	8	5	10	7	2	-2	-11	-11	-6	-13	-10	-16	-20	9	9	8	9
30,000	6	8	6	9	7	1	-3	-9	-11	-8	-12	-10	-17	-20	11	10	9	10
20,000	4	7	4	5	5	0	-3	-6	-8	-5	-6	-6	-11	-14	9	7	6	7
JOHNSTON AFB TO KINDLEY AFB																		
53,000	29	25	8	17	20	11	8	-30	-26	-8	-18	-21	-29	-32	8	7	5	7
40,000	48	39	23	32	35	26	21	-51	-41	-25	-34	-37	-48	-53	12	11	9	10
30,000	39	32	17	25	27	19	15	-42	-34	-17	-27	-29	-39	-45	12	11	7	10
20,000	24	19	8	13	15	9	6	-25	-20	-8	-14	-16	-23	-27	9	8	5	7
JOHNSTON AFB TO KWAJALEIN NAS																		
53,000	0	-12	2	6	0	-8	-13	-1	11	-3	-6	-1	-8	-11	10	11	8	10
40,000	-14	-26	-9	-6	-13	-24	-30	14	25	8	5	12	3	-3	13	14	13	13
30,000	-4	-15	-3	0	-5	-13	-18	4	14	3	-1	4	-3	-7	12	12	8	9
20,000	6	2	7	6	5	0	-2	-6	-2	-7	-6	-6	-10	-13	9	7	6	6
JOHNSTON AFB TO LADD AFB																		
53,000	2	3	3	3	3	-3	-6	-5	-4	-3	-5	-4	-10	-13	11	9	6	9
40,000	10	7	3	8	7	-2	-7	-16	-12	-5	-13	-11	-21	-25	14	13	11	13
30,000	9	7	6	9	7	-1	-6	-14	-11	-8	-12	-11	-20	-25	15	13	11	13
20,000	9	8	4	5	6	0	-3	-11	-10	-5	-7	-8	-15	-19	12	9	8	9
JOHNSTON AFB TO LAJES AP																		
53,000	14	10	9	13	12	7	5	-16	-11	-10	-14	-13	-17	-20	8	6	5	6
40,000	23	18	16	26	21	14	10	-27	-21	-18	-29	-24	-31	-35	10	9	9	10
30,000	22	18	16	24	20	12	9	-26	-21	-17	-27	-23	-30	-34	11	11	9	11
20,000	16	12	10	16	13	8	5	-18	-14	-11	-17	-15	-20	-23	9	8	6	8
JOHNSTON AFB TO LE BOURGET AP																		
53,000	5	3	0	4	3	-1	-3	-7	-4	-1	-5	-4	-8	-11	8	6	4	6
40,000	4	3	1	2	3	-3	-6	-8	-6	-3	-5	-6	-12	-15	9	8	8	9
30,000	3	3	2	2	3	-4	-7	-7	-6	-4	-5	-6	-12	-16	11	10	9	10
20,000	3	4	2	0	2	-3	-6	-5	-5	-3	-1	-4	-9	-11	9	7	6	7
JOHNSTON AFB TO LONDON INTERNATIONAL																		
53,000	5	3	1	4	3	-1	-3	-7	-4	-1	-5	-4	-8	-11	8	6	4	6
40,000	5	4	2	4	4	-2	-5	-9	-7	-4	-7	-6	-12	-16	9	8	8	9
30,000	4	4	3	3	3	-3	-7	-7	-7	-5	-6	-6	-13	-16	10	10	9	10
20,000	3	4	3	1	3	-2	-5	-5	-6	-4	-2	-4	-9	-12	9	7	6	7
JOHNSTON AFB TO LORING AFB																		
53,000	19	16	12	16	16	11	9	-21	-17	-13	-17	-16	-22	-24	8	7	5	7
40,000	35	26	24	30	28	21	17	-39	-29	-26	-32	-31	-39	-43	11	11	9	11
30,000	32	25	21	26	26	18	14	-35	-28	-22	-28	-28	-36	-40	12	11	9	11
20,000	21	16	12	17	16	11	8	-23	-17	-13	-18	-17	-23	-26	9	8	6	8
JOHNSTON AFB TO MAURIPUR AP																		
53,000	-55	-43	-8	-34	-38	-49	-55	53	42	7	33	37	19	9	9	8	6	7
40,000	-73	-56	-22	-41	-49	-64	-72	70	54	20	39	46	29	22	11	10	9	10
30,000	-61	-47	-15	-33	-40	-54	-60	58	45	15	31	38	22	16	10	10	7	8
20,000	-39	-27	-8	-18	-22	-33	-37	37	26	8	17	21	12	8	7	6	5	6
JOHNSTON AFB TO MCCORD AFB																		
53,000	12	15	9	10	11	5	2	-14	-16	-10	-11	-12	-19	-22	11	9	7	9
40,000	30	25	15	25	23	14	9	-34	-29	-16	-27	-26	-37	-42	15	14	11	13
30,000	24	23	12	20	19	10	6	-28	-26	-13	-22	-22	-32	-38	16	14	10	13
20,000	16	14	4	11	11	4	1	-17	-15	-5	-12	-12	-19	-23	11	9	7	9

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**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES																
HEIGHT IN FEET	EQUIVALENT HEADWINDS*								STANDARD DEVIATION							
	D I R E C T				R E T U R N				JAN APR JUL OCT				JAN APR JUL OCT			
	JAN	APR	JUL	OCT	**A50	A75	A85		JAN	APR	JUL	OCT	A50	A75	A85	
JOHNSTON AFB TO MCGUIRE AFB																
53,000	24	21	11	16	18	12	9	-26	-22	-11	-17	-19	-25	-28		4979 N.MI.
40,000	43	34	27	32	33	25	21	-46	-36	-29	-34	-36	-45	-50		8 7 5 7
30,000	37	29	21	26	27	19	16	-40	-31	-22	-27	-29	-38	-43		12 11 9 11
20,000	23	17	10	15	15	10	7	-24	-18	-11	-16	-16	-23	-27		13 11 8 11
JOHNSTON AFB TO MIOWAY NAS																
53,000	-20	-20	-1	-6	-10	-22	-29	19	19	0	5	9	0	-5		814 N.MI.
40,000	-33	-33	-12	-15	-22	-38	-46	29	29	11	13	19	5	-2		15 15 9 13
30,000	-28	-24	-6	-10	-15	-30	-38	25	22	6	9	14	2	-4		21 23 17 19
20,000	-14	-8	-2	-3	-6	-14	-19	13	8	1	3	5	-2	-6		21 20 13 16
JOHNSTON AFB TO MILOENHALL AP																
53,000	5	3	1	4	3	-1	-3	-7	-4	-1	-5	-4	-8	-11		6621 N.MI.
40,000	4	4	2	3	3	-3	-6	-8	-7	-3	-6	-6	-12	-15		8 6 4 6
30,000	3	3	3	2	3	-4	-7	-7	-7	-5	-5	-6	-12	-16		9 8 8 9
20,000	2	4	3	0	2	-3	-5	-4	-5	-4	-2	-4	-9	-11		10 10 9 10
JOHNSTON AFB TO MINOT AFB																
53,000	16	16	11	13	14	8	6	-18	-17	-11	-14	-15	-20	-23		3791 N.MI.
40,000	32	26	20	27	26	18	13	-36	-29	-21	-29	-29	-38	-43		9 8 6 8
30,000	28	24	17	22	22	14	10	-31	-26	-18	-24	-24	-33	-38		13 12 10 12
20,000	18	15	8	13	13	7	4	-19	-16	-8	-14	-14	-20	-24		14 12 9 12
JOHNSTON AFB TO MOSCOW INTERNATIONAL																
53,000	-9	-8	-5	-8	-7	-11	-13	7	7	4	7	6	2	0		6239 N.MI.
40,000	-9	-13	-12	-16	-12	-18	-21	5	10	10	13	9	3	0		8 5 4 6
30,000	-7	-11	-9	-12	-10	-16	-19	4	8	8	9	7	1	-2		9 9 8 9
20,000	-5	-6	-7	-7	-6	-11	-14	3	5	6	6	5	0	-2		9 9 8 9
JOHNSTON AFB TO MYRTLE BEACH AFB																
53,000	28	25	6	16	19	10	6	-29	-26	-7	-16	-20	-28	-32		4877 N.MI.
40,000	46	39	22	32	34	25	20	-49	-42	-24	-33	-36	-47	-52		8 7 5 7
30,000	37	31	15	23	26	17	13	-40	-33	-16	-25	-27	-38	-43		12 12 9 10
20,000	22	17	6	11	13	7	4	-23	-18	-6	-11	-14	-21	-25		12 11 7 10
JOHNSTON AFB TO NOUASSEUR AB																
53,000	10	6	4	8	7	3	1	-12	-7	-5	-9	-8	-12	-15		7620 N.MI.
40,000	13	11	7	14	11	5	2	-17	-14	-9	-17	-14	-20	-24		7 6 4 6
30,000	11	12	8	13	11	4	1	-15	-15	-10	-16	-14	-20	-24		9 9 8 9
20,000	8	9	5	8	7	2	0	-10	-10	-6	-9	-9	-14	-17		11 10 8 10
JOHNSTON AFB TO ORLY AP																
53,000	5	3	0	4	3	-1	-3	-7	-4	-1	-5	-4	-8	-11		6848 N.MI.
40,000	5	3	1	3	3	-3	-6	-8	-7	-3	-6	-6	-12	-15		8 6 4 6
30,000	3	3	2	2	3	-4	-7	-7	-6	-4	-5	-6	-12	-16		9 8 8 9
20,000	3	4	2	0	2	-3	-6	-5	-5	-3	-2	-4	-9	-11		11 10 9 10
JOHNSTON AFB TO PALAM AP																
53,000	-56	-43	-7	-32	-37	-50	-56	54	42	6	31	36	18	8		6078 N.MI.
40,000	-74	-58	-22	-42	-50	-66	-73	71	56	21	40	48	30	22		9 8 6 8
30,000	-63	-49	-16	-33	-40	-56	-63	61	46	15	32	39	23	16		11 10 9 11
20,000	-40	-28	-9	-18	-23	-33	-39	39	27	8	18	22	13	9		10 10 7 9
JOHNSTON AFB TO PATRICK AFB																
53,000	28	27	1	13	18	6	2	-29	-28	-1	-14	-19	-28	-32		4875 N.MI.
40,000	45	43	17	30	34	22	17	-47	-45	-18	-31	-35	-47	-52		8 7 5 7
30,000	35	32	11	21	24	14	10	-37	-34	-11	-22	-25	-36	-41		11 11 8 10
20,000	19	16	2	8	10	4	1	-20	-17	-2	-8	-11	-19	-22		11 10 7 9
JOHNSTON AFB TO PIARCO AP																
53,000	18	20	-9	4	9	-3	-8	-19	-21	9	-5	-10	-20	-23		6235 N.MI.
40,000	32	35	3	13	21	7	3	-34	-36	-4	-14	-22	-35	-39		7 6 4 5
30,000	23	20	3	6	12	4	1	-24	-21	-3	-7	-12	-23	-27		9 9 6 7
20,000	6	6	-5	-1	1	-3	-5	-6	-6	5	1	-1	-6	-9		8 7 5 6
JOHNSTON AFB TO POPE AFB																
53,000	27	25	7	16	18	11	7	-28	-26	-8	-16	-19	-27	-31		4851 N.MI.
40,000	46	38	24	31	34	25	21	-49	-40	-25	-33	-36	-46	-52		8 7 5 7
30,000	37	31	16	24	26	18	14	-39	-33	-17	-25	-28	-38	-43		12 12 9 11
20,000	22	17	7	12	13	8	5	-23	-18	-7	-12	-14	-21	-25		12 11 7 10

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	DIRECT							RETURN										
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
JOHNSTON AFB TO PRESTWICK AB																		
53,000	5	3	1	5	3	-1	-3	-8	-5	-1	-6	-4	-9	-12	8	6	4	6
40,000	5	5	3	5	4	-1	-4	-9	-8	-4	-8	-7	-13	-16	9	8	8	9
30,000	4	5	4	4	4	-2	-6	-7	-8	-6	-7	-7	-14	-17	10	10	9	10
20,000	3	4	3	1	3	-2	-5	-5	-6	-4	-3	-4	-9	-12	9	7	6	7
JOHNSTON AFB TO RAMEY AFB																		
53,000	25	24	-5	9	15	1	-4	-26	-25	5	-9	-15	-25	-29	7	7	4	6
40,000	40	43	10	22	29	15	10	-42	-44	-11	-23	-30	-43	-48	10	10	7	8
30,000	30	29	6	14	19	10	6	-31	-30	-7	-15	-20	-31	-35	9	8	6	7
20,000	13	12	-2	3	6	0	-2	-14	-13	1	-3	-6	-13	-16	6	6	4	5
JOHNSTON AFB TO RHEIN MAIN AB																		
53,000	1	2	0	1	1	-3	-5	-3	-3	0	-2	-2	-6	-8	8	6	4	6
40,000	2	0	-1	-2	0	-6	-9	-6	-3	0	-1	-3	-8	-12	9	8	8	9
30,000	0	0	0	-2	-1	-7	-11	-4	-3	-1	-1	-2	-9	-12	10	10	9	9
20,000	1	2	1	-2	0	-5	-7	-3	-4	-1	1	-2	-7	-10	8	7	6	7
JOHNSTON AFB TO SEOUL AB																		
53,000	-53	-42	-6	-22	-31	-47	-53	51	40	5	21	30	12	6	11	10	8	9
40,000	-77	-61	-23	-42	-51	-69	-77	74	58	21	40	48	30	22	13	13	11	13
30,000	-68	-51	-17	-35	-42	-59	-67	65	49	16	33	40	24	17	12	12	9	11
20,000	-43	-29	-9	-19	-24	-36	-42	41	28	8	18	23	13	9	9	8	6	7
JOHNSTON AFB TO STEVENSON FIELD																		
53,000	15	16	11	13	14	9	6	-17	-17	-11	-14	-15	-20	-23	9	8	6	7
40,000	32	25	20	27	25	17	13	-36	-28	-21	-29	-28	-37	-42	13	12	10	12
30,000	28	23	17	23	22	14	10	-31	-26	-18	-25	-25	-33	-38	14	12	9	12
20,000	18	15	8	14	13	7	5	-20	-16	-9	-15	-14	-21	-24	10	8	6	8
JOHNSTON AFB TO SUNG SHAN																		
53,000	-44	-31	11	-4	-17	-38	-44	43	30	-12	3	16	-5	-11	9	9	7	8
40,000	-62	-55	-4	-20	-36	-59	-65	61	54	3	19	35	10	4	10	12	9	10
30,000	-56	-42	-3	-17	-29	-49	-56	55	41	3	16	28	8	3	10	9	7	9
20,000	-30	-22	-1	-6	-14	-26	-30	29	22	1	6	14	3	0	7	6	5	6
JOHNSTON AFB TO TACHIKAWA AB																		
53,000	-48	-38	-2	-15	-26	-43	-50	46	37	2	14	25	7	2	11	10	8	9
40,000	-75	-61	-19	-36	-48	-68	-77	72	58	17	34	45	25	17	14	15	12	14
30,000	-66	-49	-14	-30	-39	-57	-66	63	47	13	29	37	20	14	13	13	9	11
20,000	-41	-28	-7	-15	-21	-34	-40	40	27	7	15	20	10	6	10	8	6	8
JOHNSTON AFB TO TAN SAN NHUT																		
53,000	-13	-5	23	14	5	-9	-13	12	5	-24	-14	-6	-19	-23	6	6	5	5
40,000	-19	-24	9	0	-9	-21	-26	18	23	-9	-1	8	-5	-9	7	8	7	7
30,000	-18	-16	4	0	-6	-17	-20	17	15	-5	-1	6	-3	-6	7	7	5	5
20,000	-2	-3	3	3	1	-3	-5	1	3	-4	-3	-1	-5	-6	5	5	4	4
JOHNSTON AFB TO THULE AB																		
53,000	6	4	3	6	5	0	-2	-8	-6	-3	-7	-6	-11	-13	9	7	5	7
40,000	8	8	5	11	8	2	-2	-13	-12	-7	-14	-11	-18	-22	10	10	9	10
30,000	7	8	7	11	8	1	-3	-11	-12	-9	-14	-11	-18	-22	11	10	9	10
20,000	6	8	5	6	6	1	-2	-8	-9	-6	-8	-7	-13	-16	9	8	7	7
JOHNSTON AFB TO TORBAY AP																		
53,000	17	13	11	15	14	10	7	-19	-14	-12	-16	-15	-20	-22	8	6	5	6
40,000	30	22	21	29	25	18	14	-34	-25	-23	-32	-28	-36	-40	11	10	9	10
30,000	28	22	20	27	24	17	13	-31	-25	-21	-29	-26	-34	-38	12	11	9	11
20,000	20	15	12	18	16	10	8	-21	-16	-13	-19	-17	-22	-26	9	8	6	8
JOHNSTON AFB TO TORREJON AFB																		
53,000	7	5	2	6	5	1	-1	-10	-6	-2	-7	-6	-10	-13	7	6	4	6
40,000	8	7	5	8	7	1	-2	-12	-11	-6	-11	-10	-16	-19	9	8	8	9
30,000	7	7	6	8	7	0	-3	-11	-10	-8	-11	-10	-17	-20	11	10	9	10
20,000	5	6	4	4	5	0	-3	-7	-7	-5	-5	-6	-11	-14	9	8	6	7
JOHNSTON AFB TO TRAVIS AFB																		
53,000	15	19	8	10	13	6	3	-17	-20	-9	-11	-14	-21	-25	11	10	7	9
40,000	32	30	19	24	26	17	12	-36	-33	-20	-26	-28	-38	-44	15	14	11	13
30,000	25	23	13	17	19	10	6	-28	-25	-14	-18	-20	-30	-35	15	13	9	11
20,000	13	11	2	6	7	2	-1	-14	-11	-3	-7	-8	-15	-19	11	8	6	8

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEAD WINDS*							STANDARD DEVIATION						
	D I R E C T								R E T U R N							JAN	APR	JUL	OCT			
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85								
JOHNSTON AFB TO WAKE AP																			1367 N.MI.			
53,000	-17	-18	6	5	-4	-17	-23	16	17	-7	-6	4	-6	-11	11	12	8	10				
40,000	-33	-39	-9	-8	-21	-36	-45	32	38	8	7	20	6	0	15	18	14	14				
30,000	-25	-25	-3	-4	-12	-25	-32	24	24	3	3	12	1	-3	15	13	10	11				
20,000	-8	-4	5	4	0	-7	-11	7	4	-5	-5	-1	-7	-10	11	9	7	7				
JOHNSTON AFB TO WESTOVER AFB																			5030 N.MI.			
53,000	23	19	12	17	17	12	9	-24	-20	-12	-17	-18	-24	-27	8	7	5	7				
40,000	41	32	28	32	32	25	21	-44	-34	-29	-34	-35	-43	-48	12	11	10	11				
30,000	36	28	22	26	27	20	16	-39	-30	-23	-28	-29	-38	-43	13	11	8	11				
20,000	23	17	12	16	16	11	8	-24	-18	-12	-17	-17	-23	-27	9	8	6	8				
JOHNSTON AFB TO WHEELUS AP																			7818 N.MI.			
53,000	-2	-1	-2	-2	-2	-5	-7	0	-1	1	1	1	-3	-5	7	6	4	5				
40,000	1	-4	-4	-5	-3	-9	-12	-5	1	2	2	0	-6	-9	9	8	7	9				
30,000	-1	-3	-3	-5	-3	-10	-13	-2	0	1	2	0	-6	-10	10	10	9	9				
20,000	0	0	-2	-4	-2	-6	-9	-2	-2	1	2	0	-5	-7	8	7	6	7				
KAONA AB TO KEFLAVIK AP																			5203 N.MI.			
53,000	-13	-11	-5	-10	-10	-14	-17	9	9	5	9	8	3	1	8	6	5	6				
40,000	-21	-17	-6	-20	-16	-23	-27	17	14	4	17	13	6	3	9	8	8	9				
30,000	-21	-18	-4	-17	-15	-23	-27	17	16	3	15	13	5	1	10	10	9	9				
20,000	-14	-13	-4	-11	-10	-16	-19	12	11	3	10	9	4	1	8	8	6	7				
KAONA AB TO KINOLEY AFB																			7207 N.MI.			
53,000	12	6	2	7	6	2	0	-16	-8	-3	-9	-8	-13	-17	8	6	4	6				
40,000	4	6	9	6	6	1	-2	-9	-9	-11	-10	-10	-15	-18	8	8	8	8				
30,000	3	6	8	5	5	0	-4	-8	-9	-10	-8	-9	-15	-18	9	9	8	9				
20,000	1	3	6	4	3	-1	-4	-3	-5	-6	-5	-5	-9	-12	7	7	6	7				
KAONA AB TO KWAJALEIN NAS																			2505 N.MI.			
53,000	12	16	-14	-2	3	-8	-14	-14	-16	14	1	-4	-15	-20	9	10	8	8				
40,000	19	28	-1	7	13	3	-3	-21	-30	0	-8	-15	-25	-31	9	11	9	10				
30,000	21	21	-1	5	11	2	-2	-23	-22	1	-6	-12	-23	-27	9	9	6	8				
20,000	1	10	-4	-2	1	-5	-8	-2	-10	4	2	-1	-7	-11	7	6	6	6				
KAONA AB TO LAO0 AFB																			3843 N.MI.			
53,000	28	14	1	20	15	6	2	-32	-16	-2	-21	-18	-27	-32	10	8	7	8				
40,000	21	18	13	22	18	11	7	-27	-21	-15	-26	-22	-30	-35	11	10	11	11				
30,000	18	15	11	17	15	7	3	-23	-18	-13	-20	-18	-27	-31	12	12	11	12				
20,000	11	8	6	10	9	3	0	-14	-10	-7	-12	-11	-17	-20	10	9	8	9				
KAONA AB TO LAJES AP																			6647 N.MI.			
53,000	-17	-12	-7	-13	-12	-17	-20	14	11	7	11	10	6	4	8	6	5	6				
40,000	-25	-21	-12	-24	-21	-27	-31	21	19	10	21	18	11	7	10	8	8	9				
30,000	-24	-23	-10	-20	-19	-27	-31	20	20	8	17	16	9	5	10	10	9	10				
20,000	-17	-15	-8	-15	-13	-19	-22	15	14	7	14	12	7	4	8	8	6	7				
KADENA AB TO LE BOURGET AP																			5419 N.MI.			
53,000	-25	-19	-11	-18	-18	-24	-27	21	18	10	17	16	11	8	9	7	5	6				
40,000	-31	-28	-18	-30	-27	-34	-38	27	26	17	28	24	17	13	11	9	9	10				
30,000	-27	-27	-14	-23	-23	-31	-36	24	25	13	21	20	12	8	11	11	10	11				
20,000	-19	-18	-11	-18	-17	-22	-25	18	17	10	17	15	9	6	8	8	7	8				
KAONA AB TO LONDON INTERNATIONAL																			5394 N.MI.			
53,000	-24	-18	-10	-18	-17	-23	-26	20	17	9	16	15	10	8	9	7	5	6				
40,000	-30	-27	-17	-29	-26	-33	-37	26	25	15	27	23	16	12	11	9	9	10				
30,000	-27	-27	-13	-22	-22	-31	-35	23	25	12	20	20	12	8	11	11	10	11				
20,000	-19	-18	-10	-18	-16	-22	-25	17	17	9	16	15	9	6	9	8	7	8				
KADENA AB TO LORING AFB																			6321 N.MI.			
53,000	11	4	2	7	5	1	-1	-14	-6	-2	-8	-7	-12	-15	8	6	4	6				
40,000	2	5	8	5	5	-1	-4	-6	-7	-10	-9	-8	-13	-16	8	8	8	8				
30,000	1	4	7	4	4	-2	-5	-5	-7	-9	-7	-7	-13	-16	8	9	8	8				
20,000	-1	2	5	3	2	-2	-5	-1	-3	-6	-5	-4	-8	-11	7	7	6	7				
KADENA AB TO MAURIPUR AP																			3260 N.MI.			
53,000	-72	-48	17	-22	-35	-60	-69	70	46	-18	21	33	-1	-16	11	11	9	11				
40,000	-79	-58	3	-27	-43	-68	-77	77	56	-4	26	42	8	-1	12	12	9	12				
30,000	-65	-47	3	-24	-35	-56	-64	64	46	-3	23	34	8	-1	12	10	7	9				
20,000	-39	-27	0	-12	-19	-33	-38	38	26	-1	12	18	5	0	8	7	5	6				

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION					
	D I R E C T								R E T U R N									
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
KADENA AB TO MCCHORD AFB																		
53,000	36	22	6	25	23	13	8	-38	-24	-7	-27	-24	-33	-38	9	7	6	7
40,000	40	32	23	39	34	25	20	-45	-36	-25	-43	-37	-46	-51	11	11	11	12
30,000	37	29	21	33	30	21	16	-41	-33	-23	-37	-33	-42	-47	12	12	11	12
20,000	25	18	13	22	19	12	9	-27	-20	-14	-23	-21	-28	-32	10	9	7	9
KADENA AB TO MCGUIRE AFB																		
53,000	20	8	4	13	10	5	3	-23	-10	-4	-14	-12	-19	-23	8	6	5	6
40,000	13	11	13	14	13	7	4	-18	-14	-15	-18	-16	-22	-25	8	8	8	9
30,000	12	11	13	13	12	6	3	-16	-14	-15	-16	-15	-21	-24	9	9	8	9
20,000	7	7	9	8	8	3	1	-10	-8	-10	-9	-9	-14	-16	7	7	6	7
KADENA AB TO MIDWAY NAS																		
53,000	63	43	-5	14	28	4	-4	-64	-44	4	-15	-29	-54	-63	12	11	9	10
40,000	88	69	10	38	54	23	12	-90	-71	-12	-40	-55	-81	-90	14	15	12	14
30,000	80	56	10	33	44	20	11	-82	-58	-11	-34	-46	-70	-80	13	12	9	12
20,000	53	36	10	19	27	14	9	-54	-37	-10	-20	-28	-45	-53	10	9	7	8
KADENA AB TO MILOENHALL AP																		
53,000	-24	-18	-10	-18	-17	-23	-26	20	17	9	16	15	10	7	9	7	5	6
40,000	-30	-28	-16	-29	-26	-33	-37	26	25	15	27	23	16	12	11	9	9	10
30,000	-27	-28	-13	-22	-22	-31	-35	23	25	11	20	20	12	7	11	11	10	11
20,000	-19	-18	-10	-18	-16	-22	-25	18	17	9	16	15	9	6	8	8	7	8
KADENA AB TO MINDT AFB																		
53,000	29	14	3	21	17	8	4	-32	-16	-4	-22	-18	-27	-32	8	6	5	7
40,000	26	18	14	24	20	13	10	-30	-21	-16	-27	-24	-31	-35	10	9	10	10
30,000	23	16	13	20	18	11	7	-28	-19	-15	-23	-21	-29	-33	10	10	10	11
20,000	16	10	8	14	12	6	3	-18	-12	-9	-15	-13	-19	-22	9	8	7	8
KADENA AB TO MOSCOW INTERNATIONAL																		
53,000	-31	-24	-13	-24	-23	-30	-34	27	23	12	23	21	14	11	9	8	6	7
40,000	-38	-35	-20	-34	-32	-40	-45	34	32	18	32	30	21	16	11	10	10	11
30,000	-34	-33	-13	-25	-26	-36	-41	31	30	11	23	24	15	10	11	12	10	11
20,000	-23	-20	-10	-20	-18	-25	-28	22	19	9	19	17	11	7	8	8	7	8
KADENA AB TO MYRTLE BEACH AFB																		
53,000	25	11	4	17	13	7	4	-28	-13	-5	-18	-15	-23	-27	8	6	5	6
40,000	21	15	15	19	17	11	8	-26	-18	-17	-23	-21	-27	-31	9	8	9	9
30,000	19	14	13	16	16	9	6	-24	-17	-15	-19	-19	-26	-29	9	10	9	10
20,000	13	9	9	11	10	6	3	-15	-11	-10	-12	-12	-17	-20	8	7	6	7
KADENA AB TO NDUASSEUR AB																		
53,000	-25	-20	-13	-19	-19	-24	-28	22	19	13	18	18	13	10	8	6	5	6
40,000	-29	-28	-22	-30	-27	-34	-37	25	26	20	27	25	18	15	10	9	9	10
30,000	-26	-26	-16	-23	-23	-30	-34	23	24	15	21	21	13	10	11	10	9	10
20,000	-18	-16	-12	-18	-16	-21	-24	17	15	11	17	15	10	7	8	7	6	7
KADENA AB TO ORLY AP																		
53,000	-25	-19	-11	-18	-18	-24	-27	21	18	10	17	16	11	9	8	7	5	6
40,000	-31	-28	-18	-30	-27	-34	-38	27	26	17	28	24	17	13	11	9	9	10
30,000	-27	-27	-14	-23	-23	-31	-36	24	25	13	21	20	13	8	11	11	10	11
20,000	-19	-18	-11	-18	-17	-22	-25	18	17	10	17	15	9	6	8	8	7	8
KADENA AB TO PALAM AP																		
53,000	-73	-47	15	-23	-35	-60	-71	71	46	-17	22	33	1	-14	12	13	9	12
40,000	-78	-59	-1	-29	-45	-68	-77	76	58	0	27	43	11	2	14	12	10	14
30,000	-68	-50	1	-24	-37	-58	-67	66	48	-1	24	35	9	1	13	11	8	10
20,000	-40	-28	-1	-13	-20	-34	-39	39	27	0	13	20	7	1	8	7	6	6
KADENA AB TO PATRICK AFB																		
53,000	27	14	4	19	16	8	5	-31	-16	-5	-20	-18	-25	-30	8	6	5	6
40,000	25	18	15	22	20	13	10	-31	-22	-17	-26	-24	-31	-35	9	9	9	9
30,000	23	17	13	19	18	11	7	-28	-20	-15	-22	-21	-28	-32	10	10	9	10
20,000	16	11	8	13	12	7	4	-18	-12	-9	-14	-13	-19	-22	8	7	6	7
KADENA AB TO PIARCO AP																		
53,000	15	8	3	9	8	3	1	-18	-10	-3	-10	-10	-15	-19	7	6	4	6
40,000	9	8	9	10	9	4	1	-14	-12	-11	-13	-12	-18	-21	8	8	7	8
30,000	8	8	9	8	8	3	0	-13	-12	-10	-11	-11	-17	-20	9	9	7	8
20,000	4	5	5	4	5	1	-2	-6	-6	-6	-6	-6	-10	-12	7	7	5	6

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEADWINDS*								STANDARD DEVIATION					
	DIRECT								RETURN													
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT				
KAOENA AB TO POPE AFB																			6808 N.MI.			
53,000	24	11	4	16	13	7	4	-28	-13	-5	-18	-15	-23	-27	8	6	5	6				
40,000	20	14	15	19	17	11	8	-25	-18	-17	-22	-20	-27	-30	9	8	9	9				
30,000	19	14	13	16	15	9	6	-23	-17	-15	-19	-18	-25	-29	9	10	9	10				
20,000	12	9	9	11	10	6	3	-15	-11	-10	-12	-12	-17	-19	8	7	6	7				
KADENA AB TO PRESTWICK AB																			5318 N.MI.			
53,000	-21	-16	-9	-16	-15	-21	-24	17	15	8	15	13	8	6	9	7	5	6				
40,000	-28	-26	-14	-27	-24	-31	-35	24	23	12	25	21	14	10	10	9	8	10				
30,000	-26	-27	-11	-21	-21	-30	-34	22	24	10	19	19	11	6	11	11	9	11				
20,000	-19	-18	-8	-17	-15	-21	-24	17	16	8	15	14	8	5	8	8	7	8				
KAOENA AB TO RAMEY AFB																			7972 N.MI.			
53,000	20	10	4	12	11	6	3	-23	-12	-4	-14	-13	-19	-23	7	6	4	6				
40,000	16	13	12	15	14	8	5	-22	-16	-14	-18	-17	-23	-27	8	8	8	9				
30,000	15	12	12	13	13	7	4	-19	-16	-13	-15	-16	-22	-25	9	9	8	9				
20,000	9	8	8	7	8	3	1	-11	-9	-8	-8	-9	-14	-16	7	7	5	6				
KADENA AB TO RHEIN MAIN AB																			5196 N.MI.			
53,000	-26	-21	-11	-20	-19	-25	-28	22	19	11	18	17	12	9	9	7	5	6				
40,000	-32	-30	-19	-31	-28	-35	-39	28	27	17	29	25	18	14	11	9	9	10				
30,000	-29	-28	-14	-24	-24	-32	-36	25	26	13	21	21	13	9	11	11	10	11				
20,000	-20	-18	-10	-18	-17	-23	-26	18	17	10	17	16	10	7	8	8	7	8				
KAOENA AB TO SEOUL AB																			671 N.MI.			
53,000	1	-11	-11	-2	-6	-19	-26	-16	3	10	-2	-1	-15	-23	20	20	17	18				
40,000	-18	-15	7	-16	-11	-27	-35	1	4	-9	8	1	-15	-23	23	21	22	23				
30,000	-17	-14	7	-8	-8	-23	-31	2	5	-9	3	0	-14	-21	21	20	18	22				
20,000	-10	-10	2	-6	-6	-15	-20	4	6	-3	5	3	-6	-11	15	13	11	12				
KAOENA AB TO STEVENSON FIELD																			5636 N.MI.			
53,000	28	12	3	19	15	7	3	-31	-14	-4	-20	-17	-25	-30	8	6	5	6				
40,000	22	16	13	21	18	11	8	-27	-18	-15	-24	-21	-28	-31	9	9	9	9				
30,000	21	14	12	17	16	9	5	-25	-17	-14	-20	-19	-26	-30	10	10	9	10				
20,000	14	9	8	12	10	5	3	-16	-10	-8	-13	-12	-17	-20	8	7	6	7				
KAOENA AB TO SUNG SHAN																			345 N.MI.			
53,000	-69	-39	25	-11	-24	-54	-68	68	37	-26	10	23	-10	-24	18	20	16	20				
40,000	-76	-60	5	-29	-44	-69	-80	74	59	-7	28	42	10	-5	20	21	20	22				
30,000	-73	-51	3	-25	-38	-62	-73	72	50	-3	24	37	8	-3	19	18	15	20				
20,000	-43	-31	-4	-11	-21	-37	-44	42	30	3	11	20	7	1	14	12	11	12				
KAOENA AB TO TACHIKAWA AB																			819 N.MI.			
53,000	65	34	-7	24	28	6	-5	-71	-38	6	-26	-32	-56	-69	19	19	16	18				
40,000	61	49	19	36	42	23	13	-71	-56	-21	-42	-48	-68	-78	23	22	22	24				
30,000	59	42	16	34	37	20	11	-68	-48	-17	-38	-42	-62	-72	20	20	18	22				
20,000	35	25	11	17	21	11	6	-39	-27	-11	-19	-23	-35	-42	14	13	11	13				
KADENA AB TO TAN SAN NHUT																			1516 N.MI.			
53,000	-34	-12	36	11	0	-22	-31	32	11	-37	-12	-1	-24	-34	12	10	10	10				
40,000	-40	-25	18	-11	-17	-32	-40	38	23	-19	10	15	-5	-16	13	13	10	11				
30,000	-35	-21	8	-9	-14	-29	-36	34	20	-8	8	13	-2	-7	11	12	8	10				
20,000	-17	-11	0	-4	-7	-15	-18	16	11	0	4	7	1	-2	8	8	7	7				
KAOENA AB TO THULE AB																			4597 N.MI.			
53,000	4	1	-1	3	1	-3	-5	-9	-3	1	-4	-3	-8	-11	8	6	5	6				
40,000	-8	-2	2	-3	-3	-9	-12	3	-1	-4	0	0	-6	-9	9	8	8	8				
30,000	-7	-3	1	-3	-3	-9	-13	3	0	-3	1	0	-6	-9	9	9	9	9				
20,000	-6	-3	1	-3	-3	-8	-11	4	2	-2	1	1	-4	-6	8	7	6	7				
KAOENA AB TO TORBAY AP																			6362 N.MI.			
53,000	-4	-3	-2	-2	-2	-6	-8	0	1	2	0	1	-3	-5	8	6	4	6				
40,000	-13	-6	-1	-8	-7	-13	-16	9	3	-1	5	4	-2	-5	8	8	7	8				
30,000	-12	-6	-1	-8	-7	-13	-17	8	4	0	5	4	-2	-6	9	9	9	9				
20,000	-9	-6	-2	-5	-5	-10	-13	7	4	1	4	4	-1	-4	8	7	6	7				
KADENA AB TO TORREJON AFB																			5956 N.MI.			
53,000	-25	-20	-12	-19	-18	-24	-27	21	18	11	17	17	12	9	8	6	5	6				
40,000	-29	-28	-20	-30	-27	-34	-37	26	25	18	27	24	17	14	10	9	9	10				
30,000	-26	-26	-16	-23	-23	-30	-34	23	24	14	21	20	13	9	11	11	9	11				
20,000	-19	-17	-11	-18	-16	-22	-24	17	16	11	17	15	10	7	8	8	7	8				

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION					
	D I R E C T							R E T U R N					JAN	APR	JUL	OCT		
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50					A75	A85
KADENA AB TO TRAVIS AFB																	5294 N.MI.	
53,000	41	29	8	29	28	16	10	-44	-30	-9	-30	-29	-38	-43	10	7	6	8
40,000	53	46	29	49	45	34	29	-57	-49	-31	-53	-48	-58	-63	12	11	11	12
30,000	49	43	25	45	41	30	24	-53	-46	-27	-48	-44	-54	-60	12	12	10	13
20,000	33	27	17	29	26	19	16	-35	-29	-18	-31	-28	-36	-40	10	9	7	9
KADENA AB TO WAKE AP																	2183 N.MI.	
53,000	45	30	-14	4	16	-6	-13	-47	-31	13	-4	-17	-39	-46	11	12	9	10
40,000	57	53	0	18	33	8	1	-60	-54	-1	-19	-35	-57	-64	13	15	11	13
30,000	55	42	2	16	29	8	2	-57	-43	-2	-17	-30	-50	-57	12	12	8	12
20,000	21	23	1	6	12	3	-1	-23	-24	-1	-6	-13	-23	-28	9	8	7	8
KADENA AB TO WESTOVER AFB																	6536 N.MI.	
53,000	17	7	3	10	9	4	2	-20	-9	-4	-12	-10	-17	-20	8	6	5	6
40,000	10	9	12	12	11	5	2	-14	-12	-14	-16	-14	-19	-22	8	8	8	8
30,000	8	9	12	11	10	4	1	-13	-12	-13	-13	-13	-19	-22	9	9	8	9
20,000	5	5	8	7	6	2	-1	-7	-7	-9	-8	-8	-12	-15	7	7	6	7
KADENA AB TO WHEELUS AP																	5643 N.MI.	
53,000	-38	-29	-19	-29	-29	-35	-39	36	28	18	28	27	21	18	9	7	6	7
40,000	-43	-39	-28	-38	-37	-45	-48	40	37	27	36	35	28	24	10	9	9	10
30,000	-38	-36	-20	-27	-30	-38	-43	36	34	19	25	28	20	16	10	10	8	9
20,000	-24	-20	-11	-19	-19	-24	-27	23	20	10	18	18	12	9	7	7	6	6
KEFLAVIK AP TO KINDLEY AFB																	2453 N.MI.	
53,000	-27	-13	-8	-17	-15	-24	-29	24	12	7	16	14	6	3	12	10	7	10
40,000	-40	-28	-20	-33	-29	-41	-48	35	24	17	29	26	15	9	17	16	13	16
30,000	-39	-28	-20	-31	-29	-42	-49	34	24	17	27	25	13	7	19	18	14	17
20,000	-27	-19	-13	-20	-19	-29	-34	24	17	12	18	17	8	4	15	14	10	13
KEFLAVIK AP TO KWAJALEIN NAS																	6413 N.MI.	
53,000	-9	-3	3	-2	-2	-7	-10	6	1	-3	1	1	-3	-5	8	6	4	6
40,000	-8	-6	1	-3	-4	-10	-13	3	2	-2	0	1	-5	-8	8	8	7	8
30,000	-5	-5	-1	-3	-3	-9	-12	1	2	-1	0	0	-5	-9	9	9	8	9
20,000	-4	-2	-3	-2	-3	-7	-10	1	0	2	0	1	-4	-6	8	7	6	7
KEFLAVIK AP TO LADD AFB																	2704 N.MI.	
53,000	-12	-6	-1	-10	-6	-13	-16	10	5	1	9	6	1	-2	10	8	5	7
40,000	-3	-8	-6	-9	-7	-13	-16	1	7	5	8	6	-1	-4	10	9	9	9
30,000	-2	-8	-7	-8	-6	-15	-19	0	7	6	6	5	-3	-8	12	11	12	12
20,000	1	-5	-4	-3	-3	-9	-13	-2	4	4	2	2	-5	-8	11	10	8	9
KEFLAVIK AP TO LAJES AP																	1522 N.MI.	
53,000	-6	-3	-1	-3	-3	-10	-14	3	2	1	1	2	-5	-9	13	10	8	11
40,000	-12	-8	-6	-7	-8	-21	-28	6	5	3	2	4	-8	-15	20	18	17	20
30,000	-15	-8	-4	-7	-8	-23	-31	9	4	1	2	4	-10	-18	23	22	18	22
20,000	-12	-6	-3	-7	-7	-18	-24	8	3	2	4	4	-7	-12	19	17	13	16
KEFLAVIK AP TO LE BOURGET AP																	1209 N.MI.	
53,000	22	10	4	11	10	3	-1	-23	-11	-4	-12	-11	-20	-26	15	11	8	11
40,000	26	15	13	17	17	4	-4	-29	-17	-15	-20	-20	-34	-42	22	19	18	22
30,000	24	15	13	16	17	0	-9	-29	-19	-16	-20	-20	-38	-47	27	25	22	27
20,000	15	11	7	9	10	-2	-8	-17	-13	-8	-11	-12	-24	-31	20	19	15	18
KEFLAVIK AP TO LONDON INTERNATIONAL																	1023 N.MI.	
53,000	21	10	3	11	10	2	-2	-23	-11	-3	-12	-11	-20	-27	16	12	8	11
40,000	26	16	13	16	17	3	-5	-29	-18	-15	-19	-20	-35	-43	23	20	19	23
30,000	23	16	13	15	17	-1	-11	-28	-19	-16	-19	-20	-39	-48	28	26	23	28
20,000	14	11	7	9	10	-3	-10	-17	-13	-8	-11	-12	-25	-33	22	20	16	20
KEFLAVIK AP TO LORING AFB																	1791 N.MI.	
53,000	-30	-13	-11	-22	-18	-27	-33	29	13	10	21	17	9	5	13	10	8	11
40,000	-40	-23	-23	-36	-30	-43	-50	38	22	21	34	28	16	10	17	16	15	18
30,000	-38	-24	-22	-34	-29	-44	-51	35	22	19	31	27	13	5	21	20	18	20
20,000	-24	-16	-12	-20	-17	-28	-34	22	14	11	18	16	6	1	16	16	12	15
KEFLAVIK AP TO MAURIPUR AP																	4054 N.MI.	
53,000	25	11	3	17	13	6	3	-28	-13	-4	-18	-15	-23	-27	10	7	5	7
40,000	25	16	12	19	18	10	6	-30	-20	-14	-22	-21	-29	-34	12	11	10	11
30,000	22	17	13	16	17	8	4	-26	-20	-15	-18	-19	-28	-33	13	12	10	12
20,000	15	12	7	12	11	5	2	-17	-13	-8	-13	-12	-19	-22	10	9	7	9

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION					
	D I R E C T							R E T U R N							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85				
KEFLAVIK AP TO MCCHORD AFB																	3155 N.MI.	
53,000	-16	-8	-4	-12	-9	-15	-19	14	7	4	12	9	4	1	9	7	5	7
40,000	-14	-13	-10	-16	-13	-20	-24	11	12	9	14	11	4	1	11	10	10	11
30,000	-13	-15	-11	-16	-14	-22	-27	11	13	9	13	12	3	-1	13	12	12	13
20,000	-8	-10	-6	-10	-8	-15	-18	6	9	6	8	7	1	-2	10	10	8	10
KEFLAVIK AP TO MCGUIRE AFB																	2298 N.MI.	
53,000	-31	-14	-10	-22	-18	-27	-32	29	13	9	21	17	9	6	12	9	7	10
40,000	-43	-25	-23	-37	-32	-44	-50	39	22	21	34	29	17	11	16	15	14	16
30,000	-41	-25	-22	-34	-30	-43	-51	36	22	19	31	27	14	8	19	18	15	18
20,000	-26	-16	-13	-21	-19	-28	-34	24	15	12	19	17	8	3	15	14	10	14
KEFLAVIK AP TO MIOWAY NAS																	5142 N.MI.	
53,000	-10	-5	-1	-7	-5	-10	-13	8	4	0	6	4	0	-2	8	6	4	6
40,000	-11	-10	-6	-7	-8	-14	-18	7	7	4	4	6	0	-3	9	9	8	9
30,000	-9	-10	-7	-7	-8	-15	-19	6	7	5	4	5	-1	-5	11	10	10	10
20,000	-5	-6	-6	-3	-5	-10	-13	3	4	5	2	4	-2	-5	9	8	7	8
KEFLAVIK AP TO MILOENHALL AP																	999 N.MI.	
53,000	23	11	3	12	11	2	-2	-24	-11	-3	-13	-11	-21	-28	16	12	8	11
40,000	27	17	13	17	18	4	-4	-30	-19	-15	-20	-21	-36	-44	23	20	19	24
30,000	25	17	13	16	17	-1	-10	-29	-20	-16	-20	-21	-39	-49	28	26	24	28
20,000	15	12	7	10	11	-2	-9	-18	-14	-8	-12	-12	-26	-33	22	20	16	20
KEFLAVIK AP TO MINOT AFB																	2597 N.MI.	
53,000	-21	-9	-6	-14	-11	-18	-22	19	8	6	13	10	5	2	10	8	6	8
40,000	-22	-16	-15	-20	-18	-26	-31	20	15	14	17	16	8	4	12	11	11	13
30,000	-20	-17	-14	-18	-17	-27	-32	17	15	12	16	15	6	1	14	14	13	15
20,000	-13	-11	-8	-12	-11	-18	-22	11	10	7	10	10	2	-1	12	11	9	11
KEFLAVIK AP TO MOSCOW INTERNATIONAL																	1804 N.MI.	
53,000	29	13	5	19	15	7	3	-30	-14	-6	-19	-15	-25	-31	14	10	6	9
40,000	29	22	15	22	22	11	5	-31	-24	-16	-24	-23	-35	-41	17	15	14	17
30,000	28	24	14	17	20	7	-1	-31	-27	-16	-20	-23	-37	-45	21	20	18	21
20,000	18	16	8	14	14	4	-2	-19	-18	-9	-15	-15	-25	-31	16	15	12	15
KEFLAVIK AP TO MYRTLE BEACH AFB																	2731 N.MI.	
53,000	-31	-15	-8	-21	-18	-27	-32	29	13	7	20	16	9	5	11	9	7	9
40,000	-43	-26	-21	-37	-32	-43	-50	38	23	19	34	28	17	12	15	14	13	15
30,000	-41	-26	-20	-34	-30	-42	-49	36	22	18	30	26	15	9	17	17	14	17
20,000	-27	-17	-12	-21	-19	-28	-33	25	15	11	19	17	8	4	13	13	9	13
KEFLAVIK AP TO NOUASSEUR AB																	1919 N.MI.	
53,000	10	5	2	5	5	-1	-4	-12	-6	-2	-6	-6	-13	-17	11	9	7	9
40,000	14	6	3	6	7	-4	-10	-18	-9	-6	-9	-10	-22	-28	18	16	14	17
30,000	11	6	4	6	7	-5	-12	-16	-10	-7	-10	-10	-23	-30	20	18	15	19
20,000	7	4	2	5	4	-5	-10	-9	-6	-3	-5	-6	-15	-20	16	14	11	14
KEFLAVIK AP TO ORLY AP																	1220 N.MI.	
53,000	21	10	4	11	10	2	-1	-23	-11	-4	-12	-11	-20	-26	15	11	8	11
40,000	26	15	13	17	17	4	-4	-29	-17	-15	-20	-20	-34	-42	22	19	18	22
30,000	24	15	13	16	17	0	-9	-28	-18	-16	-20	-20	-38	-47	27	25	22	26
20,000	15	11	7	9	10	-2	-8	-17	-12	-8	-11	-12	-24	-31	20	19	15	18
KEFLAVIK AP TO PALAM AP																	4117 N.MI.	
53,000	25	12	6	18	14	7	5	-27	-13	-6	-20	-16	-24	-28	9	7	5	7
40,000	21	17	15	20	18	11	7	-24	-19	-16	-22	-20	-28	-32	11	10	9	11
30,000	20	19	14	17	17	10	5	-23	-21	-16	-20	-20	-28	-32	13	12	10	12
20,000	12	12	7	12	11	5	2	-14	-13	-8	-13	-12	-18	-21	9	9	7	8
KEFLAVIK AP TO PATRICK AFB																	3057 N.MI.	
53,000	-30	-15	-7	-20	-17	-26	-31	28	13	6	19	15	8	4	10	9	6	9
40,000	-42	-27	-19	-36	-31	-42	-48	37	24	16	32	27	16	11	14	14	12	14
30,000	-40	-26	-18	-32	-28	-40	-47	35	22	16	29	25	14	8	16	16	12	15
20,000	-27	-17	-12	-20	-18	-27	-32	24	15	11	18	16	9	5	12	12	8	12
KEFLAVIK AP TO PIARCO AP																	3595 N.MI.	
53,000	-14	-8	-3	-7	-7	-14	-17	12	7	3	5	6	1	-2	10	8	6	8
40,000	-25	-22	-11	-14	-18	-27	-32	21	18	9	11	14	6	1	13	13	10	13
30,000	-23	-17	-11	-14	-16	-25	-30	19	14	9	11	13	5	0	14	13	10	12
20,000	-14	-12	-7	-9	-10	-17	-21	12	10	7	8	9	3	0	11	10	7	9

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*								STANDARD DEVIATION									
	D I R E C T								R E T U R N									
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
KEFLAVIK AP TO POPE AFB																		
53,000	-31	-15	-8	-21	-18	-27	-32	29	13	8	20	16	9	5	11	9	7	9
40,000	-43	-26	-22	-37	-31	-43	-50	38	23	19	34	28	17	12	15	14	13	15
30,000	-41	-26	-21	-34	-30	-42	-49	36	22	18	31	26	14	9	18	17	14	17
20,000	-27	-16	-13	-20	-18	-28	-33	24	15	11	19	17	8	4	13	13	9	13
KEFLAVIK AP TO PRESTWICK AB																		
53,000	22	11	2	12	10	1	-3	-24	-11	-3	-13	-11	-22	-28	17	13	9	13
40,000	26	16	12	15	17	2	-7	-29	-19	-14	-19	-20	-36	-44	25	21	20	25
30,000	23	17	13	14	17	-3	-13	-27	-21	-16	-18	-20	-40	-51	31	28	26	30
20,000	13	12	7	8	10	-4	-12	-16	-14	-8	-11	-12	-26	-34	24	22	17	21
KEFLAVIK AP TO RAMEY AFB																		
53,000	-20	-10	-5	-11	-11	-18	-22	17	8	4	10	9	3	0	11	9	6	9
40,000	-31	-21	-14	-22	-22	-33	-38	26	21	11	19	19	9	5	14	14	11	14
30,000	-30	-21	-14	-22	-21	-32	-37	25	19	12	18	18	8	4	16	14	11	14
20,000	-19	-16	-10	-14	-14	-22	-26	16	14	9	13	13	6	2	12	11	8	10
KEFLAVIK AP TO RHEIN MAIN AB																		
53,000	24	11	4	13	12	4	0	-26	-12	-5	-14	-13	-22	-28	14	11	8	10
40,000	29	18	15	20	20	7	-1	-31	-19	-17	-23	-22	-36	-43	21	18	17	22
30,000	27	18	14	18	19	2	-6	-31	-21	-17	-22	-22	-39	-48	26	24	22	26
20,000	18	13	8	11	12	0	-6	-20	-14	-9	-13	-14	-26	-33	20	18	14	18
KEFLAVIK AP TO SEOL AB																		
53,000	10	7	4	9	7	3	1	-12	-9	-4	-10	-8	-13	-16	8	6	4	6
40,000	16	13	5	16	13	6	3	-19	-14	-7	-18	-14	-21	-25	9	8	8	9
30,000	17	14	4	15	13	5	1	-19	-16	-6	-17	-14	-22	-26	10	10	9	10
20,000	12	11	4	10	9	3	0	-13	-12	-4	-11	-10	-16	-19	8	8	7	8
KEFLAVIK AP TO STEVENSON FIELD																		
53,000	-22	-9	-6	-14	-11	-19	-23	20	8	6	14	11	5	2	11	8	6	8
40,000	-23	-16	-15	-20	-18	-27	-32	21	15	13	18	17	8	4	12	12	11	13
30,000	-20	-18	-14	-19	-18	-27	-33	18	16	12	16	15	5	0	15	15	14	15
20,000	-13	-11	-8	-12	-11	-19	-23	12	10	7	11	10	2	-2	12	12	9	12
KEFLAVIK AP TO SUNG SHAN																		
53,000	11	12	5	11	10	5	3	-15	-14	-6	-13	-12	-17	-20	8	6	5	6
40,000	18	17	6	19	15	8	4	-22	-20	-7	-21	-18	-25	-29	9	8	8	9
30,000	19	19	4	15	15	7	2	-22	-22	-5	-17	-17	-25	-29	10	10	9	9
20,000	13	13	3	11	10	4	1	-14	-14	-4	-12	-11	-17	-20	8	8	6	7
KEFLAVIK AP TO TACHIKAWA AB																		
53,000	5	3	2	4	4	0	-2	-8	-5	-3	-6	-5	-9	-12	8	6	4	6
40,000	11	7	3	9	7	1	-2	-14	-9	-4	-11	-10	-16	-19	9	8	8	8
30,000	12	8	2	9	8	1	-3	-14	-10	-4	-11	-10	-17	-20	10	10	9	9
20,000	9	6	3	7	6	1	-2	-11	-7	-3	-8	-7	-12	-15	8	8	7	8
KEFLAVIK AP TO TAN SAN NHUT																		
53,000	16	9	3	9	9	4	1	-20	-11	-4	-11	-11	-17	-20	8	7	5	6
40,000	15	19	7	13	13	7	3	-19	-21	-9	-15	-16	-23	-26	9	8	8	9
30,000	17	20	6	13	14	7	3	-20	-22	-7	-15	-16	-23	-27	10	10	8	9
20,000	12	12	3	9	9	4	1	-13	-13	-4	-10	-10	-15	-18	7	7	6	6
KEFLAVIK AP TO THULE AB																		
53,000	-9	-5	1	-7	-4	-13	-17	7	4	-1	7	3	-4	-7	14	12	7	11
40,000	-3	-7	-3	-6	-5	-14	-19	1	6	3	4	3	-6	-12	16	14	12	15
30,000	-2	-8	-5	-4	-5	-17	-24	0	6	3	2	3	-10	-17	20	17	18	20
20,000	3	-5	-2	1	-1	-11	-17	-4	3	2	-2	0	-11	-16	17	16	12	15
KEFLAVIK AP TO TORBAY AP																		
53,000	-29	-13	-11	-20	-17	-27	-33	28	12	10	19	16	7	3	16	12	10	12
40,000	-41	-25	-23	-35	-31	-45	-53	39	23	21	31	28	15	8	20	19	17	21
30,000	-43	-26	-23	-34	-31	-48	-57	39	23	20	30	27	11	3	25	24	21	24
20,000	-28	-18	-13	-20	-20	-32	-39	26	17	12	18	18	6	-1	19	19	14	18
KEFLAVIK AP TO TORREJON AFB																		
53,000	14	7	3	7	7	0	-3	-16	-8	-3	-8	-8	-16	-20	13	10	8	10
40,000	19	9	8	10	11	-1	-8	-22	-12	-11	-14	-14	-27	-34	20	17	16	20
30,000	16	9	8	11	11	-3	-11	-21	-13	-11	-15	-14	-29	-37	23	21	18	23
20,000	9	7	5	5	6	-4	-10	-12	-9	-6	-7	-8	-19	-25	18	16	13	16

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	DIRECT							RETURN							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85				
KEFLAVIK AP TO TRAVIS AFB																		
53,000	-16	-9	-7	-12	-10	-16	-19	15	8	6	11	10	5	3	9	7	5	7
40,000	-17	-15	-16	-17	-16	-23	-27	14	13	14	15	14	7	3	11	10	10	11
30,000	-17	-15	-14	-16	-16	-24	-28	14	13	13	13	13	5	0	13	12	11	13
20,000	-9	-10	-9	-10	-10	-16	-19	8	9	8	9	8	2	-1	10	10	8	9
KEFLAVIK AP TO WAKE AP																		
53,000	-8	-3	3	-2	-2	-7	-10	5	2	-3	1	1	-4	-6	8	6	4	6
40,000	-8	-5	1	-3	-4	-10	-13	3	1	-3	0	0	-6	-9	9	8	8	9
30,000	-6	-5	0	-3	-3	-10	-13	1	1	-2	0	0	-6	-9	10	9	9	9
20,000	-3	-2	-3	-2	-2	-7	-10	1	0	2	1	1	-4	-7	8	8	6	7
KEFLAVIK AP TO WESTOVER AFB																		
53,000	-31	-14	-10	-22	-18	-27	-32	29	13	9	21	17	9	6	12	10	8	10
40,000	-42	-24	-23	-37	-31	-44	-50	39	22	21	34	29	17	11	16	15	14	17
30,000	-40	-25	-22	-35	-30	-44	-51	36	22	20	31	27	14	7	20	19	16	19
20,000	-26	-16	-13	-20	-18	-28	-34	24	15	12	19	17	7	2	15	15	11	14
KEFLAVIK AP TO WHEELUS AP																		
53,000	19	11	4	10	10	4	1	-21	-12	-5	-11	-11	-18	-23	11	9	7	8
40,000	26	14	12	16	17	6	1	-29	-17	-15	-19	-19	-30	-36	17	14	13	16
30,000	23	14	11	15	15	4	-3	-26	-17	-13	-19	-18	-31	-37	19	17	15	18
20,000	15	9	7	9	10	2	-3	-17	-11	-9	-10	-11	-20	-25	14	13	10	12
KINDLEY AFB TO KWAJALEIN NAS																		
53,000	-27	-21	-8	-14	-17	-24	-28	25	20	7	13	16	9	7	8	7	5	6
40,000	-46	-36	-20	-30	-32	-42	-47	43	33	19	27	30	21	17	10	10	8	10
30,000	-39	-31	-16	-25	-27	-36	-41	36	29	15	23	25	17	13	11	10	7	10
20,000	-24	-19	-9	-15	-16	-23	-26	23	18	8	14	15	9	7	8	7	5	7
KINDLEY AFB TO LADD AFB																		
53,000	-28	-15	-9	-18	-16	-23	-28	26	14	9	17	15	10	7	9	7	5	7
40,000	-32	-21	-21	-26	-25	-33	-38	28	19	19	23	22	14	10	12	11	10	12
30,000	-31	-23	-20	-25	-24	-33	-38	27	20	18	22	22	13	9	13	13	10	12
20,000	-21	-16	-15	-16	-17	-23	-26	19	14	14	15	15	9	6	10	9	7	9
KINDLEY AFB TO LAJES AP																		
53,000	30	24	7	16	18	9	5	-31	-25	-8	-17	-19	-30	-36	13	12	8	12
40,000	39	38	14	28	29	16	9	-42	-41	-16	-30	-31	-46	-53	19	18	14	18
30,000	34	35	14	25	26	14	8	-36	-37	-14	-27	-27	-41	-48	19	17	12	16
20,000	27	24	13	18	19	11	7	-28	-25	-13	-19	-20	-30	-35	15	14	9	12
KINDLEY AFB TO LE BOURGET AP																		
53,000	26	17	11	16	17	10	8	-28	-18	-12	-17	-18	-25	-30	10	8	7	9
40,000	39	28	24	33	31	21	16	-42	-31	-26	-36	-33	-44	-49	15	14	12	15
30,000	38	28	23	32	30	19	14	-42	-31	-25	-34	-32	-43	-49	16	15	12	15
20,000	30	21	19	24	23	15	12	-32	-23	-20	-25	-24	-32	-37	13	12	8	11
KINDLEY AFB TO LONDON INTERNATIONAL																		
53,000	27	17	11	17	17	10	7	-29	-18	-11	-18	-18	-25	-30	11	9	7	9
40,000	40	29	25	34	32	21	16	-43	-31	-27	-37	-34	-45	-51	16	14	13	16
30,000	41	29	24	32	31	20	15	-44	-32	-26	-35	-33	-45	-51	17	16	13	16
20,000	31	22	20	24	24	16	12	-33	-24	-20	-26	-25	-34	-39	14	12	9	12
KINDLEY AFB TO LORING AFB																		
53,000	-10	-10	-6	-4	-7	-16	-22	4	7	5	2	4	-5	-10	17	15	10	14
40,000	-12	-10	-8	-5	-9	-24	-33	0	3	5	-2	2	-14	-23	25	24	20	24
30,000	-12	-10	-7	-3	-8	-23	-32	2	3	4	-3	1	-14	-22	27	25	17	23
20,000	-6	-5	-3	-1	-3	-14	-21	1	1	1	-2	0	-11	-17	20	19	11	17
KINDLEY AFB TO MAURIPUR AP																		
53,000	28	16	8	17	17	11	8	-30	-18	-9	-19	-18	-25	-29	8	6	5	6
40,000	37	26	20	29	27	20	16	-41	-29	-22	-32	-30	-39	-44	11	10	9	11
30,000	34	24	21	27	26	18	14	-38	-27	-23	-30	-29	-38	-42	12	11	9	11
20,000	25	18	15	19	19	13	10	-27	-19	-16	-20	-20	-26	-30	9	8	6	8
KINDLEY AFB TO MCCORD AFB																		
53,000	-37	-25	-12	-24	-24	-33	-38	36	24	12	23	23	15	11	10	9	6	8
40,000	-56	-39	-34	-40	-41	-53	-59	52	37	32	37	39	28	23	15	14	13	16
30,000	-53	-37	-28	-37	-38	-50	-57	50	34	27	34	35	24	19	16	16	11	16
20,000	-36	-25	-19	-24	-25	-34	-39	35	24	18	23	24	16	13	12	12	7	11

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HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	D I R E C T							R E T U R N							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85				
KINDLEY AFB TO MCGUIRE AFB																		
53,000	-38	-29	-8	-19	-22	-37	-44	35	28	7	17	20	8	3	664 N.MI.			
40,000	-52	-42	-19	-30	-34	-54	-64	45	36	17	25	30	13	4	17	17	10	16
30,000	-48	-38	-15	-24	-29	-48	-59	42	33	14	21	25	9	1	26	26	20	25
20,000	-32	-25	-10	-14	-19	-32	-41	28	23	10	12	17	6	0	27	26	16	24
KINDLEY AFB TO MIDWAY NAS																		
53,000	-30	-23	-11	-21	-21	-28	-32	29	22	11	20	20	13	10	5519 N.MI.			
40,000	-53	-39	-26	-39	-39	-49	-55	50	36	25	37	36	27	22	8	7	5	7
30,000	-50	-39	-23	-35	-36	-47	-53	46	36	22	33	33	24	19	12	11	10	12
20,000	-34	-27	-16	-25	-25	-33	-37	33	26	15	24	24	17	14	13	12	9	12
KINDLEY AFB TO MILDENHALL AP																		
53,000	27	17	11	17	17	10	7	-29	-18	-11	-18	-18	-25	-30	3010 N.MI.			
40,000	40	29	25	34	32	21	16	-44	-31	-27	-37	-34	-45	-51	11	8	7	9
30,000	41	29	24	33	31	20	15	-44	-32	-26	-35	-34	-45	-52	16	14	13	16
20,000	31	22	19	24	24	16	12	-34	-24	-20	-26	-25	-34	-39	17	16	13	16
KINDLEY AFB TO MINOT AFB																		
53,000	-38	-26	-12	-23	-24	-34	-40	36	25	11	22	23	14	10	1903 N.MI.			
40,000	-57	-40	-33	-39	-42	-55	-62	53	37	32	35	39	26	20	12	11	8	10
30,000	-54	-38	-28	-35	-37	-52	-60	50	35	26	31	34	22	16	18	17	15	18
20,000	-37	-27	-18	-23	-25	-35	-41	35	25	18	21	24	15	10	19	19	13	18
KINDLEY AFB TO MOSCOW INTERNATIONAL																		
53,000	26	14	9	18	16	10	7	-28	-15	-9	-19	-17	-24	-29	4203 N.MI.			
40,000	35	26	21	30	28	19	14	-39	-28	-23	-33	-30	-40	-45	9	7	5	7
30,000	36	26	22	28	27	17	12	-39	-29	-24	-31	-30	-41	-47	13	12	11	13
20,000	26	19	15	20	19	12	9	-28	-21	-16	-21	-21	-29	-33	15	14	12	15
KINDLEY AFB TO MYRTLE BEACH AFB																		
53,000	-50	-37	-2	-23	-28	-45	-53	49	36	1	22	27	8	1	722 N.MI.			
40,000	-66	-57	-14	-40	-44	-66	-77	64	55	13	38	42	20	11	16	17	10	16
30,000	-57	-48	-11	-33	-36	-57	-67	55	47	11	31	34	16	8	24	25	18	23
20,000	-38	-32	-9	-19	-23	-38	-46	37	31	9	18	22	10	5	24	23	14	22
KINDLEY AFB TO NOUASSEUR AB																		
53,000	28	24	8	14	18	10	6	-29	-25	-8	-15	-19	-28	-32	2840 N.MI.			
40,000	36	37	16	26	28	18	12	-38	-39	-17	-28	-30	-41	-47	10	9	7	9
30,000	29	33	13	23	24	14	10	-31	-34	-14	-24	-25	-36	-42	15	14	11	13
20,000	22	20	11	15	16	10	7	-23	-21	-12	-16	-17	-25	-29	14	13	9	12
KINDLEY AFB TO ORLY AP																		
53,000	26	17	11	16	17	10	8	-28	-18	-12	-17	-18	-25	-30	3103 N.MI.			
40,000	39	28	24	33	31	21	16	-42	-31	-26	-36	-33	-44	-49	10	8	7	9
30,000	38	28	23	32	30	19	14	-41	-31	-24	-34	-32	-43	-49	15	14	12	15
20,000	30	21	19	23	23	15	11	-32	-23	-20	-25	-24	-32	-37	16	15	12	15
KINDLEY AFB TO PALAM AP																		
53,000	26	13	8	19	16	10	7	-28	-15	-9	-21	-17	-25	-28	6545 N.MI.			
40,000	30	21	20	27	24	17	13	-33	-24	-22	-30	-27	-35	-39	8	6	5	6
30,000	29	22	19	25	24	16	12	-33	-25	-21	-27	-26	-34	-39	11	10	9	11
20,000	21	16	12	17	16	10	7	-22	-17	-13	-18	-17	-23	-27	12	11	10	11
KINDLEY AFB TO PATRICK AFB																		
53,000	-44	-33	2	-18	-24	-40	-47	42	31	-5	17	22	5	-5	160 N.MI.			
40,000	-58	-56	-6	-34	-38	-60	-70	55	53	5	32	36	15	5	15	15	9	16
30,000	-47	-42	-5	-27	-29	-48	-57	44	40	5	26	28	11	5	22	23	16	21
20,000	-30	-28	-6	-16	-18	-31	-38	28	27	6	16	18	7	5	21	20	14	19
KINDLEY AFB TO PIARCO AP																		
53,000	10	10	0	5	6	-2	-6	-12	-12	0	-6	-7	-15	-20	1319 N.MI.			
40,000	8	2	-1	6	4	-6	-12	-14	-8	0	-8	-7	-18	-24	15	13	8	10
30,000	11	7	-1	4	4	-4	-8	-14	-10	1	-5	-6	-15	-21	17	17	11	15
20,000	7	4	-3	-2	0	-6	-9	-8	-5	3	2	-1	-8	-12	16	14	9	11
KINDLEY AFB TO POPE AFB																		
53,000	-50	-37	-3	-24	-28	-45	-53	49	36	3	23	27	10	3	735 N.MI.			
40,000	-67	-56	-16	-40	-44	-66	-77	65	53	15	38	42	21	11	16	17	10	16
30,000	-58	-48	-13	-33	-37	-58	-68	56	46	12	31	35	16	8	25	26	18	24
20,000	-40	-32	-10	-19	-23	-39	-47	38	31	10	18	22	10	5	24	24	14	22

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**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.

MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEADWINDS*								STANDARD DEVIATION					
	D I R E C T								R E T U R N								JAN	APR	JUL	OCT		
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT				
KINDLEY AFB TO PRESTWICK AB																			2831 N.MI.			
53,000	27	16	10	18		17	10	7	-29	-17	-11	-19	-18	-26	-31	11	9	7	9			
40,000	41	29	25	34	32	21	16		-45	-32	-27	-38	-35	-46	-52	16	15	13	16			
30,000	42	29	25	33	32	20	14		-46	-32	-27	-36	-35	-47	-54	18	17	13	17			
20,000	32	23	19	24	24	15	11		-34	-24	-20	-25	-25	-34	-40	15	13	9	12			
KINDLEY AFB TO RAMEY AFB																			842 N.MI.			
53,000	1	3	4	2	3	-6	-11		-4	-6	-4	-3	-4	-13	-18	16	15	9	13			
40,000	-3	-8	0	1	-2	-15	-22		-4	1	-1	-3	-2	-14	-21	21	21	14	20			
30,000	2	-3	1	0	0	-10	-16		-6	-1	-1	-2	-2	-13	-19	20	17	11	15			
20,000	4	-2	-4	-5	-2	-9	-13		-5	0	3	4	1	-6	-11	14	13	8	10			
KINDLEY AFB TO RHEIN MAIN AB																			3329 N.MI.			
53,000	26	17	11	16	17	11	8		-28	-18	-12	-17	-17	-25	-29	10	8	6	8			
40,000	39	27	25	33	31	21	16		-42	-30	-26	-36	-33	-44	-49	15	14	12	15			
30,000	39	27	24	32	30	19	14		-42	-30	-26	-35	-32	-44	-50	16	15	12	15			
20,000	30	21	19	24	23	15	12		-32	-22	-20	-25	-24	-32	-37	13	12	8	11			
KINDLEY AFB TO SEOUL AB																			6558 N.MI.			
53,000	-10	-5	-3	-6	-6	-10	-12		7	4	3	4	4	1	-1	8	5	4	6			
40,000	-3	-6	-8	-6	-6	-11	-14		-1	3	6	2	3	-3	-6	8	8	8	8			
30,000	-2	-5	-7	-4	-5	-11	-14		-1	3	5	2	2	-4	-7	9	9	8	9			
20,000	1	-3	-5	-3	-3	-7	-10		-3	1	4	2	1	-4	-7	7	7	6	7			
KINDLEY AFB TO STEVENSON FIELD																			1787 N.MI.			
53,000	-36	-24	-12	-22	-22	-32	-38		33	23	11	21	21	13	9	12	11	8	10			
40,000	-53	-38	-32	-36	-39	-53	-60		48	34	30	32	36	23	17	18	18	15	19			
30,000	-51	-36	-27	-33	-35	-50	-58		46	33	25	29	32	20	14	20	19	13	19			
20,000	-35	-25	-18	-21	-24	-34	-40		32	23	17	19	22	13	9	15	14	9	14			
KINDLEY AFB TO SUNG SHAN																			7337 N.MI.			
53,000	-9	-4	-1	-4	-4	-8	-11		5	3	0	2	2	-2	-3	7	6	4	6			
40,000	0	-4	-6	-2	-3	-8	-11		-5	0	4	-2	0	-6	-9	8	8	7	8			
30,000	-1	-3	-5	-1	-2	-8	-11		-4	-1	3	-1	-1	-7	-10	9	9	8	8			
20,000	1	-1	-3	-1	-1	-5	-8		-4	-1	2	-1	-1	-5	-8	7	7	6	7			
KINDLEY AFB TO TACHIKAWA AB																			6499 N.MI.			
53,000	-22	-11	-5	-14	-12	-18	-22		19	10	5	12	11	6	4	8	6	4	6			
40,000	-20	-15	-15	-21	-18	-24	-27		15	13	13	17	15	9	5	9	8	8	9			
30,000	-17	-15	-15	-17	-16	-22	-26		13	12	13	14	13	7	4	10	10	9	9			
20,000	-11	-9	-10	-11	-10	-15	-18		9	8	9	10	9	4	1	8	7	6	7			
KINDLEY AFB TO TAN SAN NHUT																			8163 N.MI.			
53,000	10	5	3	7	6	2	0		-13	-7	-4	-9	-8	-12	-15	7	6	4	6			
40,000	12	13	4	12	10	4	1		-16	-16	-6	-15	-13	-19	-23	9	8	7	8			
30,000	13	13	3	11	10	4	0		-17	-16	-5	-14	-13	-20	-23	9	9	7	8			
20,000	9	9	3	7	7	2	0		-11	-11	-3	-9	-8	-13	-16	7	7	5	7			
KINDLEY AFB TO THULE AB																			2653 N.MI.			
53,000	3	-1	-2	2	0	-5	-8		-6	0	1	-3	-2	-8	-11	10	9	6	8			
40,000	5	0	-2	3	1	-7	-12		-11	-4	0	-8	-5	-15	-20	14	13	12	13			
30,000	4	0	-1	4	2	-8	-13		-10	-4	-1	-8	-6	-15	-21	15	15	12	14			
20,000	4	1	1	2	2	-5	-9		-7	-4	-2	-5	-4	-11	-15	12	12	9	11			
KINDLEY AFB TO TORBAY AP																			1065 N.MI.			
53,000	20	12	3	12	10	1	-4		-24	-14	-4	-14	-13	-24	-30	17	14	10	14			
40,000	31	25	12	25	23	7	-1		-38	-31	-15	-30	-28	-44	-53	24	23	18	23			
30,000	28	24	13	24	22	7	0		-35	-29	-16	-28	-26	-42	-50	25	23	16	21			
20,000	21	19	12	17	16	6	0		-25	-21	-13	-19	-19	-30	-37	19	18	11	16			
KINDLEY AFB TO TORREJON AFB																			2936 N.MI.			
53,000	26	20	11	14	17	10	7		-27	-21	-11	-15	-18	-25	-30	10	9	7	9			
40,000	35	32	19	29	28	18	13		-37	-34	-20	-31	-30	-41	-47	15	14	11	14			
30,000	32	29	17	27	26	16	12		-34	-31	-16	-29	-27	-36	-44	15	14	10	14			
20,000	25	21	16	19	20	13	9		-27	-22	-16	-20	-21	-28	-32	12	11	7	10			
KINDLEY AFB TO TRAVIS AFB																			2782 N.MI.			
53,000	-42	-31	-9	-24	-27	-37	-43		41	30	9	23	26	14	10	10	9	6	9			
40,000	-65	-48	-30	-43	-45	-59	-67		62	45	29	40	43	31	24	16	15	12	15			
30,000	-56	-43	-23	-36	-38	-52	-60		54	40	22	33	36	24	18	16	16	10	15			
20,000	-37	-28	-15	-22	-24	-34	-40		36	27	15	21	23	15	11	12	11	7	11			

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEADWINDS*							STANDARD DEVIATION			
	D I R E C T								R E T U R N										
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT	
KINDLEY AFB TO WAKE AP																			
53,000	-29	-20	-8	-17	-18	-25	-29	27	19	8	16	17	10	7	8	7	5	6	
40,000	-51	-39	-22	-35	-37	-47	-52	47	36	21	32	34	24	19	11	10	9	11	
30,000	-48	-37	-21	-32	-34	-44	-50	44	34	19	30	31	22	17	12	11	8	11	
20,000	-34	-26	-16	-23	-24	-31	-35	32	24	15	22	22	16	13	9	8	6	8	
KINDLEY AFB TO WESTOVER AFB																			
53,000	-29	-23	-8	-14	-17	-30	-37	25	21	8	12	15	5	0	17	16	10	15	
40,000	-40	-31	-17	-22	-27	-45	-54	31	25	14	16	21	4	-4	27	26	20	25	
30,000	-38	-29	-14	-18	-23	-41	-51	29	23	12	13	18	2	-6	28	26	17	24	
20,000	-23	-19	-9	-10	-14	-27	-34	19	16	8	7	11	1	-5	20	19	11	18	
KINDLEY AFB TO WHEELUS AP																			
53,000	28	23	11	15	19	12	9	-29	-24	-12	-16	-19	-27	-31	9	8	6	7	
40,000	36	34	20	28	29	20	16	-38	-36	-21	-30	-31	-40	-45	13	12	9	12	
30,000	30	31	17	25	25	17	13	-32	-33	-18	-27	-27	-36	-41	13	12	9	11	
20,000	24	21	15	17	18	13	10	-25	-22	-15	-18	-19	-26	-30	10	9	6	8	
KWAJALEIN NAS TO LADD AFB																			
53,000	13	5	-1	4	4	-1	-4	-16	-6	1	-5	-6	-13	-17	10	8	6	8	
40,000	21	17	6	9	13	4	0	-27	-21	-7	-12	-17	-26	-31	12	11	10	11	
30,000	17	15	7	10	12	4	0	-22	-18	-9	-13	-15	-24	-28	12	11	9	11	
20,000	13	9	7	7	9	3	0	-16	-11	-8	-9	-10	-16	-20	10	8	7	8	
KWAJALEIN NAS TO LAJES AP																			
53,000	11	4	1	6	5	1	-1	-13	-5	-2	-7	-6	-11	-14	7	6	4	6	
40,000	10	10	6	8	8	3	0	-15	-13	-8	-12	-12	-18	-21	9	8	8	9	
30,000	8	9	7	9	8	2	-1	-12	-12	-9	-12	-11	-17	-21	10	9	8	9	
20,000	6	5	6	6	6	1	-2	-8	-7	-7	-7	-7	-12	-14	8	7	6	7	
KWAJALEIN NAS TO LE BOURGET AP																			
53,000	-6	-7	-5	-5	-6	-9	-11	3	5	4	4	4	0	-2	7	6	4	6	
40,000	-9	-10	-10	-11	-10	-15	-18	4	6	9	7	7	1	-2	8	8	7	9	
30,000	-9	-10	-9	-10	-9	-15	-18	5	7	7	7	6	1	-2	9	9	8	9	
20,000	-6	-6	-4	-6	-5	-10	-12	3	4	3	4	4	-1	-3	7	7	6	7	
KWAJALEIN NAS TO LONDON INTERNATIONAL																			
53,000	-4	-6	-4	-5	-5	-8	-11	1	3	4	3	3	-1	-3	7	5	4	6	
40,000	-6	-7	-9	-9	-8	-13	-16	1	4	8	5	5	-1	-4	8	8	7	9	
30,000	-7	-8	-8	-8	-8	-13	-16	3	5	6	5	5	-1	-4	9	9	8	9	
20,000	-4	-4	-3	-4	-4	-8	-11	2	3	3	3	2	-2	-4	7	7	6	7	
KWAJALEIN NAS TO LORING AFB																			
53,000	19	12	7	12	12	7	5	-21	-13	-7	-13	-13	-18	-22	8	6	5	6	
40,000	32	24	16	25	24	17	13	-36	-27	-17	-27	-27	-35	-39	10	9	9	10	
30,000	29	24	16	24	23	16	12	-33	-26	-17	-26	-25	-33	-37	11	10	8	10	
20,000	21	17	11	17	16	11	8	-23	-18	-12	-18	-17	-23	-26	8	7	6	7	
KWAJALEIN NAS TO MAURIPUR AP																			
53,000	-42	-31	19	-7	-18	-37	-42	41	30	-20	6	17	-8	-19	8	8	6	7	
40,000	-50	-42	6	-15	-28	-46	-51	48	40	-6	14	27	2	-5	8	8	7	9	
30,000	-43	-33	4	-12	-22	-38	-43	41	32	-4	12	21	3	-3	8	7	5	6	
20,000	-21	-17	3	-4	-10	-19	-22	20	17	-3	4	10	0	-3	6	5	4	5	
KWAJALEIN NAS TO MCCORD AFB																			
53,000	15	13	5	7	9	4	1	-17	-14	-5	-8	-10	-17	-20	9	8	6	7	
40,000	33	26	10	21	22	13	8	-36	-30	-11	-23	-25	-35	-40	12	11	10	11	
30,000	26	25	9	18	19	10	6	-29	-28	-10	-20	-21	-31	-36	12	11	8	10	
20,000	18	15	5	12	12	6	3	-19	-16	-5	-12	-13	-19	-23	9	8	6	7	
KWAJALEIN NAS TO MCGUIRE AFB																			
53,000	22	16	8	13	14	9	6	-23	-17	-8	-14	-15	-21	-25	8	7	5	6	
40,000	40	29	20	27	28	20	16	-43	-32	-21	-29	-31	-40	-45	10	10	9	10	
30,000	34	28	17	24	25	17	13	-37	-30	-18	-26	-27	-36	-41	11	10	8	10	
20,000	23	17	10	16	16	10	8	-24	-18	-11	-17	-17	-23	-27	8	7	5	7	
KWAJALEIN NAS TO MIDWAY NAS																			
53,000	10	1	-7	-7	-2	-10	-13	-11	-2	7	7	1	-8	-13	12	11	8	10	
40,000	14	15	-3	-3	5	-6	-11	-17	-18	2	2	-8	-20	-26	14	15	13	14	
30,000	4	8	-3	-4	1	-7	-11	-7	-10	3	3	-2	-11	-16	14	12	9	11	
20,000	2	0	-4	-4	-2	-7	-10	-3	-1	3	4	1	-5	-8	10	9	7	8	

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.

MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEADWINDS*								STANDARD DEVIATION			
	D I R E C T								R E T U R N								JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85						
KWAJALEIN NAS TO MILDENHALL AP																				
53,000	-5	-6	-4	-5	-5	-9	-11	2	4	4	3	3	0	-3	7	6	7077 N.MI.			
40,000	-7	-8	-9	-9	-8	-14	-16	2	4	8	6	5	-1	-4	8	8	7	9	6	9
30,000	-8	-8	-8	-8	-8	-14	-17	3	5	6	6	5	-1	-4	9	9	8	9	9	9
20,000	-4	-4	-4	-4	-4	-9	-11	2	3	3	3	3	-2	-4	7	7	6	7	7	7
KWAJALEIN NAS TO MINOT AFB																				
53,000	17	13	6	10	11	6	4	-19	-14	-7	-11	-12	-18	-21	8	7	5049 N.MI.			
40,000	34	26	13	23	24	15	11	-37	-29	-15	-26	-26	-35	-40	11	10	9	11	7	7
30,000	29	25	12	21	21	13	9	-32	-28	-13	-23	-23	-32	-37	12	11	8	10	11	11
20,000	20	16	8	14	14	8	6	-21	-17	-8	-15	-15	-21	-24	9	7	6	7	10	10
KWAJALEIN NAS TO MOSCOW INTERNATIONAL																				
53,000	-17	-17	-7	-12	-13	-18	-21	14	15	7	11	11	7	4	8	6	6209 N.MI.			
40,000	-27	-24	-15	-22	-22	-29	-32	22	21	13	19	19	13	9	9	9	8	9	6	6
30,000	-24	-22	-11	-19	-19	-26	-29	20	19	9	16	16	9	6	9	9	8	9	9	9
20,000	-14	-15	-5	-11	-11	-17	-20	12	14	5	10	10	5	2	7	7	6	7	9	9
KWAJALEIN NAS TO MYRTLE BEACH AFB																				
53,000	24	20	6	11	15	8	5	-25	-21	-6	-12	-16	-24	-27	8	7	6239 N.MI.			
40,000	42	34	17	26	29	20	16	-45	-36	-18	-28	-31	-42	-47	11	10	8	10	6	6
30,000	33	28	12	20	23	14	11	-35	-30	-13	-22	-24	-34	-39	11	10	7	9	9	9
20,000	19	15	5	10	12	6	4	-21	-16	-5	-11	-13	-19	-23	8	7	5	6	9	9
KWAJALEIN NAS TO NOUASSEUR AB																				
53,000	-2	-3	-4	-3	-3	-7	-9	-1	1	3	2	2	-2	-4	7	5	8260 N.MI.			
40,000	-2	-5	-8	-7	-5	-11	-14	-3	2	6	3	2	-4	-7	8	8	7	8	5	5
30,000	-3	-5	-6	-6	-5	-11	-14	-1	2	5	3	2	-4	-7	9	9	8	9	8	8
20,000	-2	-3	-3	-3	-3	-7	-10	0	1	2	2	1	-3	-6	7	7	6	7	9	9
KWAJALEIN NAS TO ORLY AP																				
53,000	-6	-7	-5	-5	-6	-9	-11	3	5	4	4	4	0	-2	7	6	7267 N.MI.			
40,000	-9	-10	-10	-11	-10	-15	-18	4	6	9	7	7	1	-2	8	8	7	9	6	6
30,000	-9	-10	-9	-10	-9	-15	-18	5	7	7	7	6	1	-2	9	9	8	9	9	9
20,000	-6	-6	-4	-6	-5	-10	-12	3	4	3	4	4	-1	-3	7	7	6	7	9	9
KWAJALEIN NAS TO PALAM AP																				
53,000	-42	-31	16	-9	-19	-37	-42	41	30	-17	8	18	-5	-16	8	8	5183 N.MI.			
40,000	-48	-43	1	-17	-30	-46	-50	46	42	-2	16	29	6	-1	8	9	7	9	7	7
30,000	-44	-35	2	-14	-24	-39	-44	42	34	-2	13	23	4	-1	8	7	5	7	9	9
20,000	-20	-18	2	-5	-11	-19	-22	20	18	-3	5	10	1	-2	6	5	4	5	5	5
KWAJALEIN NAS TO PATRICK AFB																				
53,000	23	23	2	10	14	5	2	-24	-24	-3	-10	-15	-24	-28	7	7	6268 N.MI.			
40,000	40	37	14	25	29	19	14	-42	-40	-15	-26	-31	-42	-46	10	10	8	9	6	6
30,000	30	29	9	17	21	12	8	-32	-30	-10	-18	-22	-32	-36	10	9	6	8	9	9
20,000	16	14	1	6	9	3	0	-17	-14	-1	-7	-9	-16	-19	7	6	4	6	8	8
KWAJALEIN NAS TO PIARCO AP																				
53,000	14	18	-8	2	7	-3	-7	-15	-19	8	-2	-7	-17	-20	6	6	7649 N.MI.			
40,000	28	33	3	11	18	7	3	-30	-34	-4	-12	-19	-32	-36	8	8	6	7	5	5
30,000	19	19	3	4	10	3	1	-20	-20	-3	-5	-11	-20	-23	7	7	5	5	4	4
20,000	3	4	-5	-2	-1	-4	-6	-4	-4	5	2	0	-4	-6	5	4	3	4	4	4
KWAJALEIN NAS TO POPE AFB																				
53,000	24	19	7	12	15	8	6	-25	-20	-7	-12	-16	-23	-27	8	7	6204 N.MI.			
40,000	42	33	18	26	29	20	16	-45	-35	-19	-28	-31	-41	-46	11	10	9	10	6	6
30,000	33	28	13	21	23	15	11	-36	-30	-14	-22	-25	-34	-39	11	10	7	9	9	9
20,000	20	16	6	11	13	7	5	-21	-16	-6	-12	-13	-20	-23	8	7	5	7	9	9
KWAJALEIN NAS TO PRESTWICK AB																				
53,000	-3	-3	-4	-4	-3	-7	-9	0	1	4	2	2	-2	-4	7	5	6928 N.MI.			
40,000	-3	-5	-7	-6	-6	-11	-14	-2	2	6	3	2	-3	-7	8	8	7	8	6	6
30,000	-5	-5	-6	-6	-5	-11	-14	1	2	4	3	3	-3	-6	9	9	8	9	8	8
20,000	-3	-2	-2	-3	-3	-7	-9	0	1	2	2	1	-3	-6	7	7	6	7	9	9
KWAJALEIN NAS TO RAMEY AFB																				
53,000	21	22	-3	7	12	1	-2	-22	-23	3	-7	-13	-22	-26	7	6	7166 N.MI.			
40,000	36	39	10	20	26	15	10	-38	-41	-11	-21	-28	-39	-44	9	9	7	8	6	6
30,000	26	27	6	12	17	9	5	-28	-28	-6	-13	-18	-28	-32	9	8	5	7	8	8
20,000	11	10	-2	2	5	-1	-3	-12	-11	2	-2	-5	-11	-14	6	5	4	4	7	7

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*							STANDARD DEVIATION			
	DIRECT							RETURN			
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT
KWAJALEIN NAS TO RHEIN MAIN AB											
53,000	-8	-9	-5	-6	-7	-11	-13	5	7	5	5
40,000	-13	-13	-12	-13	-13	-18	-21	8	9	10	10
30,000	-12	-13	-10	-12	-12	-18	-21	8	10	8	10
20,000	-8	-8	-5	-7	-7	-11	-14	5	7	4	5
KWAJALEIN NAS TO SEOUL AB											
53,000	-29	-29	0	-12	-18	-29	-35	24	28	-1	11
40,000	-42	-42	-12	-27	-32	-43	-49	38	38	10	25
30,000	-43	-34	-7	-21	-27	-39	-45	39	32	6	19
20,000	-13	-20	-1	-8	-10	-17	-21	11	18	1	7
KWAJALEIN NAS TO STEVENSON FIELD											
53,000	17	13	6	10	11	6	4	-19	-14	-7	-11
40,000	33	26	13	24	24	15	11	-36	-28	-14	-26
30,000	29	25	13	22	22	14	10	-32	-27	-14	-24
20,000	20	16	8	15	15	9	6	-22	-17	-9	-16
KWAJALEIN NAS TO SUNG SHAN											
53,000	-14	-14	17	2	-4	-14	-18	12	14	-18	-2
40,000	-20	-28	3	-7	-13	-24	-29	19	26	-4	6
30,000	-22	-21	3	-3	-10	-21	-25	20	20	-3	3
20,000	-3	-9	4	2	-1	-7	-9	2	8	-5	-3
KWAJALEIN NAS TO TACHIKAWA AB											
53,000	-20	-25	0	-7	-12	-23	-28	15	22	-1	6
40,000	-36	-37	-10	-21	-26	-38	-44	30	32	9	18
30,000	-37	-29	-6	-16	-22	-34	-39	32	26	6	14
20,000	-8	-16	1	-4	-6	-13	-18	5	15	-1	3
KWAJALEIN NAS TO TAN SAN NHUT											
53,000	17	8	28	20	19	12	9	-18	-9	-29	-21
40,000	4	-1	18	10	7	1	-2	-5	1	-18	-10
30,000	4	-3	11	7	5	0	-3	-4	3	-11	-7
20,000	8	5	8	9	7	4	2	-8	-5	-8	-9
KWAJALEIN NAS TO THULE AB											
53,000	12	4	-1	4	4	-1	-3	-15	-5	1	-5
40,000	11	9	2	6	7	1	-2	-16	-13	-4	-9
30,000	8	8	4	6	7	0	-3	-13	-11	-6	-9
20,000	7	4	5	4	5	0	-2	-9	-5	-6	-6
KWAJALEIN NAS TO TORBAY AP											
53,000	17	9	4	10	9	4	2	-19	-10	-4	-11
40,000	25	20	13	20	19	13	9	-29	-23	-15	-23
30,000	22	18	13	19	18	11	8	-26	-21	-14	-22
20,000	16	13	10	14	13	8	6	-18	-14	-10	-15
KWAJALEIN NAS TO TORREJON AFB											
53,000	-4	-5	-4	-4	-4	-8	-10	1	3	4	3
40,000	-5	-7	-9	-9	-7	-13	-16	0	4	8	5
30,000	-6	-7	-8	-8	-7	-13	-16	2	4	6	5
20,000	-4	-4	-4	-4	-4	-8	-11	1	3	3	3
KWAJALEIN NAS TO TRAVIS AFB											
53,000	16	15	5	6	10	4	1	-17	-16	-5	-6
40,000	32	28	12	18	22	13	9	-34	-31	-13	-20
30,000	23	22	8	13	16	8	5	-25	-24	-9	-14
20,000	12	10	1	5	6	1	-1	-13	-11	-1	-5
KWAJALEIN NAS TO WAKE AP											
53,000	11	-7	-1	-2	0	-9	-13	-12	6	1	1
40,000	4	-2	-4	-4	-1	-11	-17	-5	-1	3	3
30,000	-8	-2	-1	-4	-3	-11	-15	7	1	1	3
20,000	5	-4	4	2	2	-5	-8	-5	3	-4	-2
KWAJALEIN NAS TO WESTOVER AFB											
53,000	21	15	8	13	13	9	6	-22	-16	-8	-14
40,000	38	28	19	27	27	20	16	-41	-31	-20	-29
30,000	33	27	17	24	25	17	13	-36	-29	-18	-26
20,000	23	18	11	17	16	11	9	-24	-19	-12	-18

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.

MINUS SIGNS DENOTE HEADWINDS.

THE BOEING COMPANY
TRANSPORT DIVISION

NO. D6-9175

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	D I R E C T							R E T U R N										
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
KWAJALEIN NAS TO WHEELUS AP																		
53,000	-19	-17	-9	-14	-14	-19	-22	16	16	9	12	13	8	6	8	6	5	6
40,000	-27	-25	-18	-23	-23	-29	-33	22	22	16	20	20	14	11	9	9	8	9
30,000	-24	-22	-12	-19	-19	-26	-30	20	19	11	17	16	10	7	9	9	8	9
20,000	-14	-15	-7	-12	-12	-17	-20	12	13	6	11	10	6	3	7	7	6	7
LADO AFB TO LAJES AP																		
53,000	12	5	5	10	8	3	1	-14	-6	-6	-11	-9	-14	-17	8	7	5	7
40,000	7	8	10	14	10	3	-1	-10	-10	-12	-16	-12	-19	-22	10	10	9	10
30,000	5	10	10	13	9	2	-3	-9	-12	-12	-16	-12	-20	-24	12	11	11	12
20,000	3	6	6	8	6	0	-4	-5	-8	-8	-10	-7	-14	-17	10	9	8	9
LADD AFB TO LE BOURGET AP																		
53,000	10	6	0	8	5	0	-2	-12	-6	0	-8	-6	-12	-15	8	7	4	6
40,000	5	7	4	6	6	0	-4	-7	-9	-5	-8	-7	-13	-17	10	9	8	10
30,000	4	6	4	4	5	-3	-7	-7	-8	-6	-7	-7	-14	-19	12	11	11	12
20,000	1	3	3	1	2	-4	-7	-3	-5	-3	-2	-3	-9	-12	10	9	8	9
LADO AFB TO LONDON INTERNATIONAL																		
53,000	10	6	0	8	5	0	-2	-12	-6	0	-9	-6	-12	-15	9	7	4	6
40,000	5	7	4	6	6	-1	-4	-7	-9	-5	-8	-7	-13	-16	10	9	8	10
30,000	3	6	4	4	5	-3	-8	-6	-8	-6	-7	-7	-14	-19	12	11	11	12
20,000	0	3	3	1	2	-4	-8	-2	-5	-4	-2	-3	-9	-12	10	9	8	9
LADO AFB TO LORING AFB																		
53,000	24	11	8	16	14	8	5	-26	-11	-9	-17	-14	-22	-26	9	7	5	7
40,000	23	16	20	25	21	13	9	-25	-17	-21	-27	-22	-30	-35	11	10	11	12
30,000	23	17	20	23	21	12	8	-25	-19	-21	-25	-23	-31	-36	13	13	12	13
20,000	16	12	15	16	15	9	5	-18	-13	-16	-17	-16	-22	-25	10	10	8	9
LADD AFB TO MAURIPUR AP																		
53,000	-10	-9	-6	-7	-8	-12	-14	8	7	5	6	6	3	1	7	5	4	6
40,000	-12	-9	-5	-8	-9	-14	-18	9	7	4	6	6	1	-2	9	8	8	8
30,000	-9	-7	-3	-5	-6	-12	-15	6	4	2	3	4	-2	-6	9	9	8	9
20,000	-5	-4	-3	-3	-4	-8	-11	4	3	2	2	3	-2	-4	7	7	6	7
LADD AFB TO MCCHORD AFB																		
53,000	19	6	3	11	9	2	-2	-20	-7	-4	-12	-10	-18	-23	13	11	8	10
40,000	23	9	10	11	13	1	-5	-26	-11	-12	-14	-15	-27	-34	17	16	16	18
30,000	21	6	8	8	10	-4	-11	-24	-9	-10	-11	-13	-28	-35	21	20	19	21
20,000	12	2	6	5	6	-4	-9	-14	-3	-7	-7	-7	-17	-23	17	15	12	14
LADD AFB TO MCGUIRE AFB																		
53,000	27	12	9	18	15	9	7	-28	-13	-10	-19	-16	-24	-28	9	7	6	7
40,000	29	18	20	25	23	14	10	-32	-19	-22	-27	-25	-34	-38	12	11	11	13
30,000	29	19	19	24	23	14	9	-32	-21	-21	-26	-25	-34	-39	13	13	12	14
20,000	20	14	15	17	16	10	7	-22	-15	-16	-18	-18	-24	-28	10	10	8	10
LADO AFB TO MIDWAY NAS																		
53,000	-13	-8	-3	-9	-8	-15	-19	10	6	2	8	6	0	-4	13	10	7	10
40,000	-28	-21	-10	-17	-19	-30	-35	22	16	8	11	14	4	-1	15	14	13	15
30,000	-25	-19	-12	-18	-18	-29	-35	20	15	10	13	14	4	-2	17	15	13	16
20,000	-19	-15	-9	-12	-13	-21	-26	16	13	8	9	11	3	-1	14	11	9	11
LAOD AFB TO MILDENHALL AP																		
53,000	10	6	0	8	5	0	-2	-12	-6	0	-9	-6	-12	-15	9	7	4	6
40,000	4	7	4	6	5	-1	-4	-6	-8	-5	-8	-7	-13	-16	10	9	8	9
30,000	3	6	4	4	4	-4	-8	-6	-8	-6	-6	-6	-14	-18	12	11	11	12
20,000	0	3	3	0	2	-4	-8	-2	-5	-4	-1	-3	-9	-12	10	9	8	9
LADO AFB TO MINOT AFB																		
53,000	27	11	7	18	15	7	4	-28	-11	-7	-19	-15	-24	-29	11	9	7	9
40,000	28	12	12	19	18	8	2	-29	-14	-14	-21	-19	-30	-35	14	13	14	15
30,000	28	14	12	20	18	7	1	-30	-16	-14	-22	-20	-32	-38	16	16	15	17
20,000	20	11	10	16	14	6	2	-21	-12	-11	-17	-15	-23	-27	12	11	9	11
LADD AFB TO MOSCOW INTERNATIONAL																		
53,000	0	1	-1	2	0	-4	-6	-2	-2	1	-3	-1	-5	-8	9	6	4	6
40,000	-3	-1	-3	-1	-2	-8	-11	1	0	3	-1	1	-5	-8	9	8	8	9
30,000	-5	-1	-4	-3	-3	-10	-14	4	-1	3	2	2	-5	-9	11	11	10	10
20,000	-3	-1	-2	-2	-2	-7	-10	2	-1	1	1	1	-5	-8	9	9	7	8

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**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION							
	D I R E C T							R E T U R N							JAN	APR	JUL	OCT				
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85								
LADD AFB TO MYRTLE BEACH AFB																			3055 N.MI.			
53,000	27	13	9	18	15	9	6	-29	-14	-9	-19	-16	-24	-28	9	7	5	7				
40,000	30	18	19	23	22	14	9	-34	-20	-21	-26	-25	-34	-39	12	11	11	13				
30,000	30	19	17	22	21	12	8	-34	-21	-18	-25	-24	-34	-39	13	13	11	14				
20,000	21	14	13	16	16	9	6	-23	-16	-13	-17	-17	-24	-28	10	10	7	10				
LADD AFB TO NDUASSEUR AB																			4617 N.MI.			
53,000	11	6	2	8	6	2	0	-13	-7	-3	-9	-7	-12	-15	8	6	4	6				
40,000	8	8	6	9	7	1	-2	-10	-9	-7	-11	-9	-15	-19	10	9	8	9				
30,000	6	8	6	8	7	0	-4	-9	-10	-8	-10	-9	-17	-20	12	11	10	11				
20,000	2	5	4	4	4	-2	-5	-4	-6	-5	-5	-5	-11	-14	10	9	7	8				
LADD AFB TO ORLY AP																			3844 N.MI.			
53,000	10	6	0	8	5	0	-2	-12	-6	0	-9	-6	-12	-15	8	7	4	6				
40,000	5	7	4	6	6	0	-4	-7	-9	-5	-8	-7	-13	-17	10	9	8	10				
30,000	4	6	4	4	5	-3	-7	-7	-8	-6	-7	-7	-14	-19	12	11	11	12				
20,000	1	3	3	1	2	-4	-7	-3	-5	-3	-2	-3	-9	-12	10	9	8	9				
LADD AFB TO PALAM AP																			4821 N.MI.			
53,000	-12	-9	-6	-8	-9	-13	-15	10	8	6	7	7	3	1	8	5	5	6				
40,000	-11	-8	-9	-9	-9	-15	-18	8	6	7	7	7	2	-1	9	8	8	9				
30,000	-8	-8	-6	-7	-7	-13	-16	6	5	5	5	5	-1	-4	9	9	9	9				
20,000	-6	-4	-6	-5	-5	-10	-12	4	3	5	4	4	-1	-3	7	7	6	7				
LADD AFB TO PATRICK AFB																			3296 N.MI.			
53,000	26	13	7	17	15	9	6	-28	-15	-8	-18	-16	-24	-28	9	7	5	7				
40,000	29	18	16	22	21	13	8	-34	-21	-18	-25	-24	-33	-38	12	11	11	13				
30,000	28	18	14	20	20	11	7	-33	-21	-16	-23	-23	-32	-38	13	13	10	13				
20,000	20	13	10	15	14	8	5	-22	-15	-11	-17	-16	-23	-26	10	9	7	9				
LADD AFB TO PIARCO AP																			4731 N.MI.			
53,000	23	14	5	14	14	8	5	-25	-15	-6	-15	-15	-22	-25	7	7	5	6				
40,000	28	19	13	19	19	12	9	-32	-22	-15	-22	-22	-30	-35	10	10	8	10				
30,000	27	19	12	17	18	11	8	-31	-21	-13	-19	-21	-29	-33	10	10	8	10				
20,000	17	13	8	10	11	6	4	-19	-14	-8	-11	-12	-18	-21	8	7	5	7				
LADD AFB TO POPE AFB																			2976 N.MI.			
53,000	27	13	9	18	15	9	6	-28	-13	-9	-19	-16	-24	-28	9	7	5	7				
40,000	30	18	19	23	22	14	9	-34	-20	-21	-26	-25	-34	-39	12	11	11	13				
30,000	30	19	17	22	22	13	8	-34	-21	-19	-25	-24	-34	-39	13	13	11	14				
20,000	22	14	13	16	16	10	6	-24	-16	-14	-18	-17	-24	-28	10	10	7	10				
LADD AFB TO PRESTWICK AB																			3384 N.MI.			
53,000	10	6	0	8	5	0	-2	-12	-6	0	-9	-6	-12	-15	9	7	4	7				
40,000	3	7	4	6	5	-1	-4	-5	-8	-5	-8	-7	-13	-16	10	9	8	9				
30,000	2	6	5	4	4	-4	-8	-4	-8	-6	-6	-6	-14	-18	12	11	12	12				
20,000	-1	3	3	0	2	-5	-8	-1	-4	-4	-1	-3	-9	-12	10	10	8	9				
LADD AFB TO RAMEY AFB																			4157 N.MI.			
53,000	25	15	7	15	15	9	6	-27	-16	-7	-16	-16	-23	-27	8	7	5	7				
40,000	30	20	16	20	21	14	10	-35	-23	-17	-23	-24	-33	-37	11	10	9	11				
30,000	29	20	14	19	20	12	8	-33	-23	-15	-21	-22	-31	-36	11	11	9	11				
20,000	19	14	9	11	13	8	5	-21	-15	-10	-13	-14	-20	-24	9	8	6	8				
LADD AFB TO RHEIN MAIN AB																			3819 N.MI.			
53,000	9	5	0	7	5	0	-2	-11	-6	0	-8	-6	-11	-14	8	6	4	6				
40,000	5	7	2	5	5	-1	-5	-7	-8	-4	-7	-6	-12	-15	10	8	8	9				
30,000	3	5	2	3	3	-4	-8	-6	-7	-4	-5	-6	-13	-17	12	11	11	11				
20,000	1	4	2	0	2	-4	-8	-2	-5	-3	-1	-3	-9	-12	10	9	8	8				
LADD AFB TO SEOUL AB																			3281 N.MI.			
53,000	-22	-11	-5	-20	-14	-22	-26	20	10	4	18	12	6	2	11	7	6	8				
40,000	-17	-14	-14	-20	-16	-24	-28	14	12	12	17	14	6	2	11	11	11	11				
30,000	-13	-12	-12	-14	-13	-21	-25	10	10	10	11	10	2	-2	12	12	11	12				
20,000	-7	-6	-6	-9	-7	-13	-17	5	4	5	7	5	-1	-4	10	9	8	9				
LADD AFB TO STEVENSON FIELD																			1794 N.MI.			
53,000	28	11	7	19	15	8	5	-29	-11	-8	-20	-16	-25	-30	11	9	6	8				
40,000	28	13	14	21	19	9	4	-29	-15	-15	-23	-20	-30	-36	13	12	13	14				
30,000	28	15	14	21	19	8	3	-30	-17	-15	-23	-21	-32	-38	15	15	14	16				
20,000	20	12	11	16	15	7	3	-21	-13	-12	-17	-15	-23	-28	12	11	9	11				

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	O I R E C T							R E T U R N							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85				
LADD AFB TO SUNG SHAN																		4068 N.MI.
53,000	-30	-15	-1	-20	-17	-26	-30	26	13	1	19	14	6	1	10	8	6	8
40,000	-24	-19	-14	-22	-20	-27	-31	18	15	12	18	16	9	5	10	10	10	10
30,000	-20	-16	-12	-16	-16	-23	-27	15	12	10	13	13	5	1	11	11	10	11
20,000	-11	-8	-6	-9	-9	-14	-18	9	6	6	8	7	2	-1	9	8	7	8
LADD AFB TO TACHIKAWA AB																		3060 N.MI.
53,000	-29	-16	-4	-22	-17	-26	-31	27	14	3	21	16	7	3	12	8	7	8
40,000	-26	-20	-15	-31	-23	-32	-37	22	18	12	27	20	11	6	12	12	13	12
30,000	-22	-18	-14	-23	-19	-29	-34	18	15	12	20	16	7	2	13	13	13	13
20,000	-15	-11	-7	-15	-12	-19	-23	12	9	6	13	10	3	-1	12	11	9	11
LA00 AFB TO TAN SAN NHUT																		5205 N.MI.
53,000	-26	-13	3	-14	-13	-21	-25	23	11	-5	12	11	2	-3	9	7	6	7
40,000	-22	-15	-9	-16	-15	-22	-25	17	12	7	13	12	6	2	9	9	8	9
30,000	-18	-12	-8	-11	-12	-19	-22	14	9	7	9	10	3	0	9	9	8	9
20,000	-8	-5	-5	-6	-6	-11	-13	6	4	5	5	5	1	-2	7	7	6	7
LADD AFB TO THULE AB																		1556 N.MI.
53,000	13	7	3	11	7	2	-1	-15	-7	-3	-12	-8	-15	-20	12	9	5	9
40,000	3	9	8	12	8	0	-4	-4	-10	-9	-12	-9	-16	-20	12	10	11	11
30,000	1	9	8	11	7	-2	-7	-2	-10	-9	-12	-8	-18	-23	14	14	14	13
20,000	-1	5	5	5	4	-4	-8	0	-5	-6	-6	-5	-12	-16	12	11	10	10
LADD AFB TO TORBAY AP																		2994 N.MI.
53,000	18	8	6	12	10	5	3	-20	-9	-6	-13	-11	-17	-21	9	7	5	7
40,000	16	12	16	20	16	8	5	-18	-14	-17	-22	-18	-25	-29	11	10	10	11
30,000	14	13	15	19	15	7	2	-17	-15	-16	-22	-18	-26	-31	12	13	12	12
20,000	10	8	10	13	10	4	1	-12	-9	-11	-14	-12	-18	-21	10	10	8	9
LADD AFB TO TORREJON AFB																		4261 N.MI.
53,000	11	6	1	8	6	1	-1	-13	-7	-1	-8	-7	-12	-15	8	6	4	6
40,000	7	7	5	7	7	1	-3	-9	-9	-7	-9	-8	-15	-18	10	9	8	10
30,000	5	7	5	7	6	-1	-6	-8	-9	-7	-9	-8	-16	-20	12	11	11	12
20,000	1	4	3	2	3	-3	-6	-3	-5	-4	-3	-4	-10	-13	10	9	7	9
LA00 AFB TO TRAVIS AFB																		1832 N.MI.
53,000	17	6	2	8	7	1	-3	-19	-7	-2	-9	-8	-16	-21	12	10	7	9
40,000	21	10	9	9	12	1	-5	-25	-13	-12	-13	-15	-27	-33	17	15	15	17
30,000	19	8	7	6	10	-3	-10	-23	-11	-9	-11	-13	-26	-34	20	19	16	19
20,000	11	2	6	3	5	-4	-9	-14	-4	-7	-5	-7	-16	-22	16	14	11	13
LA00 AFB TO WAKE AP																		3277 N.MI.
53,000	-20	-10	0	-9	-9	-17	-22	16	8	-1	7	7	0	-3	11	9	6	8
40,000	-35	-26	-10	-19	-22	-33	-39	27	20	8	14	17	8	3	13	13	11	13
30,000	-31	-23	-12	-20	-21	-31	-36	25	18	10	16	17	8	3	14	13	11	13
20,000	-22	-14	-11	-13	-14	-21	-26	19	12	10	11	13	6	3	11	10	8	9
LA00 AFB TO WESTOVER AFB																		2787 N.MI.
53,000	26	12	9	18	15	9	7	-28	-12	-10	-19	-16	-23	-28	9	7	5	7
40,000	27	17	20	25	22	14	10	-30	-19	-22	-27	-24	-33	-37	12	11	11	13
30,000	27	19	20	24	22	13	9	-30	-21	-21	-26	-25	-34	-39	13	13	12	13
20,000	19	14	15	17	16	10	6	-21	-15	-16	-18	-17	-24	-27	10	10	8	10
LA00 AFB TO WHEELUS AP																		4868 N.MI.
53,000	9	5	0	7	5	0	-2	-11	-6	0	-8	-6	-11	-14	8	6	4	5
40,000	7	6	2	5	5	-1	-4	-10	-8	-4	-7	-7	-13	-16	9	8	8	9
30,000	6	5	2	4	4	-3	-7	-8	-7	-4	-6	-6	-13	-17	11	10	10	11
20,000	3	4	2	0	2	-3	-6	-5	-5	-3	-2	-3	-9	-12	9	8	7	8
LAJES AP TO LE BOURGET AP																		1405 N.MI.
53,000	15	13	11	8	12	5	1	-17	-13	-12	-9	-12	-19	-23	12	10	9	10
40,000	19	16	21	24	20	8	1	-21	-18	-23	-26	-22	-34	-41	19	18	16	19
30,000	18	14	19	22	18	6	-2	-21	-16	-20	-25	-21	-34	-41	21	20	16	20
20,000	15	10	16	17	15	5	-1	-16	-11	-17	-19	-16	-26	-31	17	15	11	15
LAJES AP TO LONDON INTERNATIONAL																		1350 N.MI.
53,000	14	11	9	8	10	3	0	-15	-12	-10	-8	-11	-18	-22	13	10	9	10
40,000	18	14	20	22	18	6	-1	-21	-16	-21	-25	-21	-34	-41	20	18	17	20
30,000	18	13	16	21	17	3	-4	-21	-15	-18	-24	-19	-33	-41	22	21	17	22
20,000	15	9	15	17	14	4	-2	-17	-10	-16	-18	-15	-26	-32	18	16	12	16

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HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	O I R E C T							R E T U R N										
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
LAJES AP TO LORING AFB																		
53,000	-29	-19	-15	-24	-21	-30	-35	28	18	15	23	20	13	9	13	11	9	11
40,000	-44	-33	-36	-46	-40	-53	-59	41	31	35	43	37	24	18	19	18	16	20
30,000	-43	-33	-33	-42	-37	-51	-58	39	30	31	39	35	22	15	21	20	15	20
20,000	-33	-21	-23	-29	-26	-36	-42	30	20	22	27	24	15	10	17	16	11	14
LAJES AP TO MAURIPUR AP																		
53,000	30	23	11	16	19	13	10	-31	-24	-11	-17	-20	-28	-32	8	7	6	7
40,000	38	32	23	29	30	22	18	-41	-34	-25	-31	-32	-41	-45	12	11	9	11
30,000	32	27	22	25	26	19	15	-34	-29	-23	-27	-28	-36	-40	12	11	8	10
20,000	20	17	15	16	17	12	9	-22	-19	-16	-17	-18	-23	-26	9	8	6	7
LAJES AP TO MCCORD AFB																		
53,000	-24	-14	-15	-21	-18	-24	-27	22	13	14	20	17	12	9	9	7	6	7
40,000	-33	-22	-32	-36	-31	-40	-44	30	20	30	33	29	20	15	12	11	11	13
30,000	-34	-23	-29	-35	-30	-39	-44	31	21	27	31	28	18	14	13	13	11	14
20,000	-24	-15	-20	-24	-20	-27	-31	22	13	19	22	19	12	9	10	10	8	10
LAJES AP TO MCGUIRE AFB																		
53,000	-35	-24	-13	-24	-23	-33	-38	34	24	13	23	23	14	10	12	10	8	11
40,000	-51	-40	-31	-44	-41	-54	-61	48	38	30	42	39	27	21	18	17	14	18
30,000	-49	-40	-28	-40	-38	-52	-59	47	38	27	38	36	25	19	19	18	13	17
20,000	-37	-28	-21	-28	-27	-37	-43	36	26	20	26	26	18	13	15	14	9	13
LAJES AP TO MIDWAY NAS																		
53,000	-15	-8	-6	-12	-10	-15	-18	13	7	5	11	8	4	2	8	6	5	6
40,000	-20	-17	-13	-21	-18	-24	-28	16	14	11	17	14	8	5	10	9	8	10
30,000	-19	-17	-13	-20	-17	-25	-28	15	14	11	17	14	7	4	11	10	9	10
20,000	-13	-13	-9	-13	-12	-17	-20	11	11	8	12	10	5	2	9	8	7	8
LAJES AP TO MILOENHALL AP																		
53,000	14	11	9	8	10	3	0	-15	-11	-9	-8	-11	-18	-22	12	10	8	10
40,000	18	14	19	22	18	6	-1	-21	-16	-21	-24	-21	-33	-40	20	18	17	20
30,000	17	12	16	20	17	3	-4	-21	-15	-18	-23	-19	-33	-40	22	20	17	22
20,000	15	9	15	17	14	4	-2	-17	-10	-16	-18	-15	-26	-31	18	16	12	16
LAJES AP TO MINOT AFB																		
53,000	-28	-16	-16	-23	-20	-27	-31	26	16	15	23	19	13	10	10	8	7	8
40,000	-41	-27	-37	-42	-37	-47	-52	38	25	35	40	34	25	19	14	13	12	15
30,000	-40	-28	-33	-39	-35	-45	-51	36	25	31	36	32	22	17	16	15	12	15
20,000	-29	-17	-23	-27	-24	-32	-36	27	16	22	25	23	15	11	12	12	8	11
LAJES AP TO MOSCOW INTERNATIONAL																		
53,000	17	11	9	11	12	7	4	-19	-12	-10	-11	-12	-18	-22	10	8	6	8
40,000	19	15	21	23	19	10	4	-22	-16	-23	-25	-22	-31	-37	15	13	13	15
30,000	18	13	19	21	18	7	1	-21	-16	-21	-24	-21	-32	-38	17	16	14	17
20,000	15	10	15	17	14	6	2	-17	-12	-16	-18	-16	-24	-28	14	12	10	12
LAJES AP TO MYRTLE BEACH AFB																		
53,000	-38	-27	-9	-22	-23	-34	-39	36	26	8	21	22	12	8	11	10	7	10
40,000	-51	-44	-22	-40	-39	-52	-59	49	42	21	38	37	24	18	17	16	12	16
30,000	-48	-42	-20	-35	-35	-49	-56	45	40	19	33	33	21	16	17	16	11	15
20,000	-36	-29	-17	-24	-25	-35	-41	35	28	16	23	24	16	12	13	13	8	11
LAJES AP TO NOUASSEUR AB																		
53,000	23	20	12	13	17	9	5	-24	-21	-13	-13	-17	-26	-30	13	11	9	11
40,000	29	29	21	26	26	13	7	-30	-30	-22	-27	-27	-40	-47	21	19	15	18
30,000	24	25	16	23	21	10	4	-26	-26	-17	-24	-23	-35	-42	20	18	14	18
20,000	17	15	12	15	15	6	1	-18	-15	-13	-16	-15	-24	-29	16	15	10	13
LAJES AP TO ORLY AP																		
53,000	15	13	11	8	12	5	1	-17	-13	-12	-9	-12	-20	-24	12	10	9	10
40,000	19	16	21	24	20	8	1	-21	-18	-23	-27	-22	-34	-41	19	18	16	19
30,000	18	14	19	23	18	6	-1	-21	-16	-20	-25	-21	-34	-41	21	20	16	20
20,000	14	10	16	17	15	5	-1	-16	-11	-17	-19	-16	-26	-31	17	15	11	15
LAJES AP TO PALAM AP																		
53,000	27	18	12	19	18	13	10	-28	-19	-13	-20	-19	-25	-29	8	6	5	7
40,000	28	21	23	27	25	18	14	-31	-24	-25	-29	-27	-34	-38	11	10	9	11
30,000	24	20	22	24	22	15	12	-26	-22	-23	-26	-24	-32	-35	12	11	9	11
20,000	16	13	13	16	15	9	7	-18	-14	-14	-17	-16	-21	-24	9	8	6	8

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*															STANDARD DEVIATION						
	D I R E C T							R E T U R N								JAN	APR	JUL	OCT			
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85								
LAJES AP TO PATRICK AFB																			2711 N.MI.			
53,000	-36	-27	-5	-18	-21	-32	-38	34	26	5	17	20	9	5	11	10	7	10				
40,000	-48	-45	-15	-34	-35	-49	-56	45	42	13	32	33	19	13	16	15	11	15				
30,000	-41	-39	-13	-29	-30	-43	-49	39	37	13	27	28	16	11	15	15	10	13				
20,000	-31	-27	-13	-20	-21	-31	-36	29	25	12	19	20	13	9	12	11	7	10				
LAJES AP TO PIARCO AP																			2492 N.MI.			
53,000	-13	-16	-1	-3	-7	-15	-19	11	14	1	3	6	0	-3	10	9	6	8				
40,000	-26	-29	-9	-8	-17	-28	-34	22	26	8	6	15	5	0	14	13	9	12				
30,000	-14	-19	-7	-5	-10	-19	-23	12	16	7	4	9	2	-2	12	12	8	10				
20,000	-4	-7	-3	-2	-4	-9	-12	3	6	3	2	3	-2	-5	9	9	7	7				
LAJES AP TO POPE AFB																			2466 N.MI.			
53,000	-38	-27	-10	-23	-24	-34	-39	37	26	10	22	23	13	9	12	10	7	10				
40,000	-52	-43	-25	-42	-40	-53	-60	50	41	24	40	38	26	19	17	16	13	16				
30,000	-49	-42	-22	-37	-37	-50	-57	47	40	22	35	35	23	17	17	17	11	16				
20,000	-38	-29	-18	-25	-26	-36	-42	36	28	18	24	25	17	13	14	13	8	11				
LAJES AP TO PRESTWICK AB																			1349 N.MI.			
53,000	12	8	7	7	8	1	-3	-14	-9	-7	-8	-9	-16	-20	13	10	8	11				
40,000	17	12	16	18	16	2	-5	-21	-14	-18	-21	-18	-32	-39	21	18	17	21				
30,000	17	11	14	17	15	0	-8	-21	-14	-16	-21	-18	-32	-40	23	22	18	23				
20,000	15	8	13	15	13	2	-4	-18	-10	-14	-17	-15	-26	-31	19	17	12	16				
LAJES AP TO RAMEY AFB																			2407 N.MI.			
53,000	-20	-20	-1	-7	-11	-21	-25	18	18	1	7	10	2	-1	11	10	7	9				
40,000	-32	-36	-10	-14	-22	-35	-42	29	33	9	12	20	8	3	15	15	10	14				
30,000	-22	-27	-8	-11	-16	-26	-32	19	25	7	10	14	6	1	14	13	9	12				
20,000	-10	-15	-5	-8	-9	-16	-19	9	14	5	7	8	2	-1	11	10	6	8				
LAJES AP TO RHEIN MAIN AB																			1652 N.MI.			
53,000	16	13	11	9	12	5	2	-17	-13	-12	-9	-12	-19	-23	12	9	8	10				
40,000	19	15	22	24	20	8	2	-22	-17	-23	-27	-22	-34	-40	18	17	15	19				
30,000	18	14	20	23	19	6	-1	-21	-16	-21	-26	-21	-33	-40	20	19	15	20				
20,000	14	10	16	18	15	5	0	-16	-11	-17	-19	-16	-25	-30	16	15	11	14				
LAJES AP TO SEOUL AB																			6004 N.MI.			
53,000	12	10	5	10	9	5	3	-15	-11	-6	-11	-10	-15	-17	8	6	4	6				
40,000	19	16	10	18	15	9	6	-22	-17	-12	-21	-18	-24	-28	10	8	8	9				
30,000	19	17	8	17	15	8	4	-22	-19	-10	-19	-17	-25	-29	11	10	9	10				
20,000	14	12	6	13	11	5	3	-15	-13	-7	-14	-12	-18	-21	9	8	6	8				
LAJES AP TO STEVENSON FIELD																			2970 N.MI.			
53,000	-27	-16	-16	-23	-20	-27	-30	26	15	15	22	19	13	10	10	8	7	8				
40,000	-40	-26	-36	-42	-36	-46	-52	37	24	35	39	34	24	18	14	13	13	15				
30,000	-39	-27	-33	-39	-34	-45	-51	35	25	31	36	32	21	16	16	16	13	16				
20,000	-28	-17	-23	-27	-24	-31	-36	26	15	22	25	22	14	10	13	12	9	11				
LAJES AP TO SUNG SHAN																			6585 N.MI.			
53,000	17	13	7	13	12	8	5	-20	-15	-8	-15	-14	-19	-22	8	6	5	6				
40,000	23	22	13	23	20	13	10	-27	-24	-15	-25	-23	-30	-33	10	9	8	10				
30,000	21	22	10	18	18	10	6	-25	-25	-12	-20	-21	-28	-33	11	10	9	10				
20,000	16	14	8	15	13	8	5	-18	-16	-9	-16	-15	-20	-23	8	8	6	8				
LAJES AP TO TACHIKAWA AB																			6271 N.MI.			
53,000	7	4	3	5	5	1	-1	-9	-6	-4	-7	-6	-10	-13	8	6	4	6				
40,000	12	8	5	10	9	3	0	-16	-10	-7	-13	-11	-17	-21	9	8	8	9				
30,000	13	9	4	10	9	2	-1	-17	-12	-6	-13	-12	-19	-23	10	10	9	10				
20,000	10	7	4	8	7	2	-1	-12	-8	-5	-9	-8	-14	-17	8	8	6	8				
LAJES AP TO TAN SAN NHUT																			6860 N.MI.			
53,000	23	14	4	12	13	7	4	-26	-15	-5	-13	-14	-21	-25	8	6	5	6				
40,000	21	19	14	19	18	12	9	-25	-21	-16	-21	-21	-27	-31	10	9	8	9				
30,000	20	17	14	19	17	11	8	-23	-20	-15	-21	-19	-26	-30	10	10	8	9				
20,000	15	11	8	13	11	7	4	-16	-12	-9	-13	-12	-17	-20	7	7	6	7				
LAJES AP TO THULE AB																			2514 N.MI.			
53,000	-3	-2	-3	-5	-3	-9	-12	1	1	2	4	2	-4	-7	11	9	6	9				
40,000	0	-2	-6	-6	-4	-12	-17	-4	0	3	3	1	-8	-13	14	13	12	14				
30,000	0	-4	-6	-6	-4	-15	-20	-4	1	3	2	1	-10	-16	17	16	14	16				
20,000	3	-2	-4	-2	-1	-10	-14	-6	0	3	0	0	-9	-14	14	13	10	12				

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	DIRECT							RETURN										
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
LAJES AP TO TORBAY AP																		
53,000	-24	-17	-15	-21	-19	-28	-33	22	16	15	21	18	9	5	15	13	10	13
40,000	-36	-28	-32	-41	-34	-49	-57	32	25	30	38	31	17	9	22	21	19	23
30,000	-35	-28	-28	-37	-32	-47	-55	31	25	26	34	29	14	6	25	23	18	23
20,000	-28	-18	-21	-26	-23	-34	-41	25	16	20	25	21	10	4	20	18	13	16
LAJES AP TO TORREJON AFB																		
53,000	19	17	15	10	15	7	3	-20	-18	-15	-10	-16	-23	-28	13	11	9	11
40,000	23	23	23	27	24	11	5	-25	-25	-24	-28	-26	-38	-45	21	19	16	19
30,000	21	19	20	24	21	9	2	-23	-21	-21	-26	-23	-35	-42	20	20	15	19
20,000	16	13	16	17	16	6	1	-17	-14	-17	-18	-17	-26	-31	17	15	11	14
LAJES AP TO TRAVIS AFB																		
53,000	-28	-18	-16	-23	-21	-27	-30	27	17	15	22	20	15	12	8	7	6	7
40,000	-43	-29	-38	-41	-38	-47	-51	40	27	37	38	35	27	22	13	12	11	13
30,000	-41	-29	-33	-37	-35	-44	-49	37	27	32	34	32	24	19	14	14	11	14
20,000	-29	-18	-23	-25	-24	-30	-34	27	17	22	24	22	16	12	11	10	7	10
LAJES AP TO WAKE AP																		
53,000	-12	-6	-1	-7	-6	-11	-14	10	4	0	5	4	0	-2	8	6	4	6
40,000	-13	-10	-5	-11	-10	-16	-19	8	7	3	7	6	0	-3	9	9	8	9
30,000	-11	-10	-7	-10	-9	-16	-19	6	7	5	6	6	-1	-4	10	10	9	10
20,000	-6	-6	-6	-6	-6	-11	-14	4	4	5	5	4	-1	-3	8	8	6	7
LAJES AP TO WESTOVER AFB																		
53,000	-34	-23	-14	-24	-23	-32	-37	33	22	14	23	22	14	10	13	10	8	11
40,000	-50	-39	-34	-45	-41	-54	-61	47	37	32	43	39	27	21	19	18	15	18
30,000	-48	-38	-31	-41	-39	-52	-58	45	36	29	39	36	24	18	20	19	14	18
20,000	-36	-26	-22	-28	-27	-37	-43	35	24	21	27	26	17	12	16	15	10	13
LAJES AP TO WHEELUS AP																		
53,000	26	24	14	15	19	12	9	-27	-24	-15	-15	-20	-27	-31	11	9	8	8
40,000	32	31	24	28	29	19	14	-34	-33	-25	-30	-30	-40	-46	17	15	12	15
30,000	26	28	20	25	24	15	10	-28	-29	-21	-26	-26	-36	-41	17	15	11	14
20,000	20	18	16	16	17	10	7	-21	-19	-16	-17	-18	-25	-29	13	11	8	10
LE BOURGET AP TO LONDON INTERNATIONAL																		
53,000	-23	-10	-8	-11	-12	-22	-28	22	10	7	11	11	2	-3	18	14	11	14
40,000	-29	-14	-17	-23	-20	-39	-49	27	12	15	20	18	0	-10	27	25	24	31
30,000	-31	-15	-17	-24	-21	-43	-55	28	12	14	20	18	-3	-15	34	32	27	34
20,000	-20	-10	-9	-13	-12	-28	-36	18	8	8	11	11	-4	-12	25	23	18	23
LE BOURGET AP TO LORING AFB																		
53,000	-30	-15	-15	-23	-20	-27	-31	29	15	14	22	19	13	9	11	8	7	9
40,000	-45	-26	-35	-44	-37	-49	-55	43	24	33	42	35	24	18	16	14	14	17
30,000	-47	-28	-33	-42	-37	-50	-57	43	25	31	39	34	22	15	19	18	15	18
20,000	-32	-19	-22	-28	-25	-34	-40	30	17	21	26	23	14	9	15	14	10	13
LE BOURGET AP TO MAURIPUR AP																		
53,000	31	20	8	18	19	11	8	-33	-22	-9	-19	-20	-28	-33	10	8	7	8
40,000	38	28	19	26	27	18	14	-43	-31	-21	-29	-30	-40	-46	13	12	10	13
30,000	32	24	20	23	24	16	12	-35	-27	-22	-26	-27	-36	-41	14	13	10	12
20,000	20	16	13	14	15	9	7	-22	-17	-13	-15	-16	-23	-26	10	9	7	8
LE BOURGET AP TO MCCORD AFB																		
53,000	-18	-9	-5	-13	-10	-16	-20	17	8	4	12	10	5	3	8	6	4	6
40,000	-19	-15	-12	-18	-16	-23	-27	17	13	11	16	14	7	4	10	9	9	11
30,000	-19	-16	-13	-18	-16	-25	-29	15	14	11	15	14	6	1	12	12	11	13
20,000	-11	-11	-8	-11	-10	-16	-20	9	10	7	9	9	3	-1	10	9	7	9
LE BOURGET AP TO MCGUIRE AFB																		
53,000	-32	-17	-14	-23	-21	-28	-33	30	16	14	23	20	13	10	10	8	7	8
40,000	-49	-30	-36	-46	-40	-51	-57	47	28	34	44	38	27	21	15	14	13	16
30,000	-51	-31	-34	-44	-39	-52	-58	47	28	32	41	36	25	19	18	17	14	17
20,000	-36	-22	-23	-30	-27	-36	-41	34	20	22	28	25	17	13	14	13	9	12
LE BOURGET AP TO MIDWAY NAS																		
53,000	-5	-3	1	-1	-1	-6	-8	3	2	-1	0	0	-3	-5	8	6	4	6
40,000	-9	-3	0	0	-3	-9	-12	5	0	-2	-3	0	-6	-9	9	8	8	9
30,000	-6	-3	-1	0	-2	-9	-13	2	0	-2	-4	-1	-8	-11	11	10	9	10
20,000	-3	-4	-1	1	-2	-7	-10	1	2	0	-3	0	-5	-8	9	8	7	7

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEADWINDS*								STANDARD DEVIATION			
	D I R E C T				R E T U R N															
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT		
LE BOURGET AP TO MILDENHALL AP																				
53,000	-19	-7	-4	-9	-9	-19	-25	17	7	4	8	8	-1	-6	18	13	11	13		
40,000	-25	-11	-11	-17	-15	-34	-44	22	9	8	13	13	-5	-15	27	25	24	30		
30,000	-27	-12	-10	-17	-16	-38	-50	24	9	7	13	13	-9	-20	34	32	27	34		
20,000	-17	-7	-4	-8	-9	-24	-32	15	5	3	6	7	-8	-16	25	23	18	23		
LE BOURGET AP TO MINOT AFB																				
53,000	-24	-11	-9	-16	-14	-20	-24	22	10	8	15	13	8	5	9	7	5	7		
40,000	-30	-18	-21	-26	-24	-32	-37	28	17	19	23	22	13	9	12	11	10	13		
30,000	-29	-20	-21	-25	-23	-33	-38	26	17	19	22	21	11	6	14	14	12	14		
20,000	-19	-13	-12	-16	-15	-22	-26	17	12	11	14	13	6	3	11	11	8	10		
LE BOURGET AP TO MOSCOW INTERNATIONAL																				
53,000	17	11	11	12	12	6	2	-19	-12	-11	-13	-13	-20	-25	14	10	8	10		
40,000	16	13	23	22	19	6	-1	-19	-15	-24	-24	-21	-34	-41	20	18	17	20		
30,000	14	12	22	21	17	2	-7	-17	-15	-24	-24	-20	-35	-44	23	23	20	24		
20,000	12	10	16	16	14	3	-3	-14	-11	-17	-17	-15	-26	-32	18	17	13	17		
LE BOURGET AP TO MYRTLE BEACH AFB																				
53,000	-33	-19	-12	-23	-21	-28	-33	31	18	12	22	20	13	10	10	8	6	8		
40,000	-50	-33	-33	-45	-40	-51	-57	47	30	31	43	37	27	22	14	13	12	15		
30,000	-51	-33	-31	-42	-39	-50	-57	47	30	29	39	36	25	19	16	15	12	15		
20,000	-37	-23	-22	-29	-27	-36	-41	35	22	21	27	25	18	14	13	12	8	11		
LE BOURGET AP TO NOUASSEUR AB																				
53,000	-4	-7	-9	-2	-6	-13	-18	2	6	9	2	5	-3	-7	14	11	10	10		
40,000	0	-9	-15	-12	-10	-23	-30	-4	6	13	9	7	-7	-15	22	19	16	20		
30,000	2	-8	-16	-11	-9	-22	-29	-5	5	14	8	6	-8	-16	23	20	16	21		
20,000	0	-6	-11	-7	-6	-16	-21	-2	5	10	6	5	-5	-11	17	15	11	14		
LE BOURGET AP TO ORLY AP																				
53,000	7	0	-2	2	1	-9	-14	-9	-1	2	-3	-2	-12	-18	18	14	12	14		
40,000	10	2	-5	-1	1	-18	-28	-14	-4	2	-3	-4	-23	-34	29	26	24	31		
30,000	13	1	-7	-1	1	-20	-32	-17	-4	3	-3	-5	-27	-39	35	32	27	34		
20,000	6	0	-6	-4	-1	-16	-24	-9	-1	4	2	0	-16	-25	26	23	18	23		
LE BOURGET AP TO PALAM AP																				
53,000	30	17	12	23	20	13	10	-32	-19	-13	-24	-21	-29	-33	10	7	6	8		
40,000	30	21	22	27	25	16	12	-33	-23	-24	-29	-27	-36	-40	13	11	11	12		
30,000	24	20	22	24	23	15	10	-27	-22	-23	-26	-25	-33	-37	13	12	10	12		
20,000	17	13	12	16	14	8	5	-18	-14	-12	-16	-15	-21	-24	9	9	7	9		
LE BOURGET AP TO PATRICK AFB																				
53,000	-32	-20	-11	-20	-20	-28	-32	31	18	10	19	19	12	9	9	8	6	8		
40,000	-48	-34	-28	-42	-37	-48	-54	45	32	26	39	35	25	20	14	13	11	14		
30,000	-48	-33	-26	-39	-36	-47	-53	44	30	25	36	33	23	18	15	14	11	14		
20,000	-35	-24	-20	-27	-26	-34	-38	33	22	19	26	24	17	13	12	11	7	10		
LE BOURGET AP TO PIARCO AP																				
53,000	-14	-15	-5	-5	-9	-15	-19	13	14	5	5	8	3	1	8	7	5	7		
40,000	-24	-25	-14	-15	-19	-27	-32	21	22	13	13	17	9	5	12	11	9	11		
30,000	-17	-18	-12	-12	-14	-22	-26	15	16	11	11	13	6	2	12	11	8	10		
20,000	-9	-9	-8	-8	-9	-14	-16	8	8	8	8	8	3	0	9	8	6	7		
LE BOURGET AP TO POPE AFB																				
53,000	-33	-18	-13	-23	-21	-29	-33	31	17	13	22	20	13	10	10	8	6	8		
40,000	-50	-32	-34	-46	-40	-51	-57	47	30	32	43	38	27	22	15	13	12	15		
30,000	-51	-33	-32	-43	-39	-51	-57	47	30	30	40	36	25	20	17	16	13	16		
20,000	-37	-23	-22	-29	-27	-36	-41	35	21	21	28	25	17	13	13	12	8	12		
LE BOURGET AP TO PRESTWICK AB																				
53,000	-22	-10	-6	-11	-11	-21	-26	21	9	5	10	10	1	-3	17	13	10	13		
40,000	-29	-15	-16	-22	-20	-37	-47	27	13	13	19	17	1	-8	26	23	22	28		
30,000	-30	-15	-15	-23	-20	-42	-53	27	12	12	18	17	-4	-15	32	30	27	33		
20,000	-20	-10	-8	-12	-12	-27	-35	18	8	7	10	10	-4	-12	24	22	17	22		
LE BOURGET AP TO RAMEY AFB																				
53,000	-20	-16	-6	-9	-12	-19	-23	18	15	6	8	11	5	2	9	8	6	8		
40,000	-31	-29	-16	-21	-24	-33	-38	28	26	15	19	22	13	9	13	12	10	13		
30,000	-26	-24	-14	-20	-21	-29	-34	23	22	13	18	18	10	6	13	12	9	12		
20,000	-17	-15	-12	-15	-15	-21	-24	16	14	12	14	14	8	5	10	9	7	8		

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEAD WINDS*						STANDARD DEVIATION				
	DIRECT							RETURN						JAN	APR	JUL	OCT	
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75					A85
LE BOURGET AP TO RHEIN MAIN AB																		
53,000	16	13	13	10	13	4	-1	-18	-13	-13	-11	-13	-23	-28	17	13	11	13
40,000	19	12	26	26	21	3	-7	-22	-14	-27	-29	-23	-41	-50	27	25	23	30
30,000	15	12	25	26	20	-1	-13	-19	-15	-27	-29	-22	-43	-55	33	31	26	33
20,000	14	10	19	18	15	1	-7	-16	-12	-19	-20	-17	-31	-39	25	22	17	22
LE BOURGET AP TO SEOUL AB																		
53,000	18	15	9	15	14	9	7	-20	-16	-10	-16	-15	-20	-23	9	6	5	6
40,000	23	22	17	25	22	15	11	-26	-23	-19	-27	-24	-31	-35	11	9	9	10
30,000	19	22	14	20	18	11	7	-21	-24	-15	-22	-21	-29	-33	11	11	10	12
20,000	15	16	10	16	14	9	6	-17	-17	-11	-18	-15	-22	-25	9	9	7	9
LE BOURGET AP TO STEVENSON FIELD																		
53,000	-24	-11	-9	-16	-14	-21	-25	23	10	8	15	13	8	5	9	7	5	7
40,000	-31	-18	-21	-27	-24	-33	-38	29	17	19	24	22	14	9	12	11	11	13
30,000	-30	-20	-21	-25	-24	-34	-39	26	18	19	23	21	12	6	15	14	13	15
20,000	-19	-13	-12	-16	-15	-22	-27	17	12	11	15	14	7	3	12	11	9	11
LE BOURGET AP TO SUNG SHAN																		
53,000	23	18	10	18	17	12	9	-26	-20	-11	-19	-18	-25	-28	8	7	5	6
40,000	27	26	18	27	24	17	13	-30	-29	-19	-29	-27	-34	-38	10	9	9	10
30,000	25	25	13	21	21	13	9	-28	-27	-14	-23	-23	-31	-36	11	11	9	11
20,000	17	16	10	17	15	9	6	-19	-17	-10	-18	-16	-22	-25	8	8	7	8
LE BOURGET AP TO TACHIKAWA AB																		
53,000	14	12	7	11	11	6	4	-17	-13	-8	-13	-12	-17	-20	8	6	5	6
40,000	20	17	13	21	18	11	8	-23	-19	-15	-23	-20	-27	-31	10	9	9	10
30,000	17	18	11	19	16	9	5	-19	-21	-13	-21	-18	-26	-30	11	11	10	11
20,000	13	14	8	14	12	7	4	-15	-15	-9	-15	-13	-19	-22	9	8	7	8
LE BOURGET AP TO TAN SAN NHUT																		
53,000	26	14	3	13	13	6	3	-29	-16	-4	-14	-15	-23	-28	8	7	6	7
40,000	23	21	13	19	19	12	8	-27	-23	-14	-20	-21	-28	-32	10	9	8	9
30,000	21	19	13	18	18	11	8	-24	-21	-14	-20	-19	-26	-30	10	10	8	9
20,000	15	11	6	11	11	6	4	-16	-12	-7	-12	-12	-17	-19	7	7	6	6
LE BOURGET AP TO THULE AB																		
53,000	-16	-8	0	-9	-7	-15	-19	14	7	0	9	6	0	-3	11	9	6	8
40,000	-15	-12	-7	-11	-11	-20	-25	13	10	5	9	9	0	-4	14	12	11	14
30,000	-14	-12	-7	-10	-11	-22	-28	11	10	5	7	8	-3	-9	18	16	15	17
20,000	-7	-8	-3	-4	-5	-14	-19	5	7	2	2	4	-4	-9	14	13	10	13
LE BOURGET AP TO TORBAY AP																		
53,000	-28	-15	-16	-21	-19	-27	-31	27	15	15	20	19	12	8	12	9	8	10
40,000	-44	-26	-35	-43	-37	-49	-56	42	24	33	41	35	22	16	18	16	15	19
30,000	-47	-28	-33	-42	-37	-51	-59	44	25	31	39	34	21	13	21	20	17	21
20,000	-34	-20	-24	-29	-26	-37	-43	32	18	23	27	25	15	9	17	15	11	15
LE BOURGET AP TO TORREJON AFB																		
53,000	-2	-5	-8	-2	-5	-13	-18	1	4	7	1	4	-5	-10	16	13	11	12
40,000	3	-6	-14	-12	-8	-24	-32	-6	4	12	8	5	-11	-21	25	23	20	25
30,000	3	-6	-17	-10	-8	-25	-34	-7	3	14	7	5	-12	-22	28	25	20	26
20,000	0	-5	-10	-8	-6	-18	-24	-2	3	9	7	5	-8	-15	21	18	14	18
LE BOURGET AP TO TRAVIS AFB																		
53,000	-20	-10	-8	-14	-12	-17	-21	18	10	7	13	11	7	5	8	6	4	6
40,000	-24	-17	-19	-21	-20	-27	-31	21	15	17	18	18	11	7	11	10	9	11
30,000	-23	-18	-18	-20	-20	-28	-32	20	15	16	17	17	9	4	13	12	11	13
20,000	-14	-12	-10	-13	-12	-18	-22	12	10	9	11	11	5	2	10	9	7	9
LE BOURGET AP TO WAKE AP																		
53,000	4	5	5	4	4	1	-2	-7	-6	-5	-5	-6	-10	-12	8	6	4	6
40,000	4	6	9	7	6	1	-2	-9	-9	-11	-11	-10	-16	-19	9	8	8	9
30,000	4	6	8	7	6	0	-3	-8	-10	-9	-10	-9	-15	-19	10	9	8	9
20,000	3	4	4	4	4	-1	-3	-6	-6	-5	-6	-6	-10	-13	8	7	6	7
LE BOURGET AP TO WESTOVER AFB																		
53,000	-31	-16	-15	-23	-20	-28	-32	30	16	14	23	20	13	10	10	8	7	8
40,000	-49	-29	-36	-46	-40	-51	-57	46	27	34	43	37	26	21	15	14	13	16
30,000	-50	-30	-34	-44	-39	-52	-58	46	28	32	41	36	24	18	18	17	14	17
20,000	-35	-21	-23	-29	-26	-36	-41	33	19	22	28	25	16	12	14	13	10	13

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION					
	DIRECT							RETURN										
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
LE BOURGET AP TO WHEELUS AP																		
53,000	17	11	4	9	10	2	-2	-18	-13	-5	-10	-11	-19	-24	14	11	10	10
40,000	25	13	11	14	15	2	-5	-28	-16	-14	-17	-18	-32	-39	22	19	16	20
30,000	21	13	8	15	13	0	-7	-24	-15	-10	-18	-16	-30	-38	23	20	16	21
20,000	15	8	8	8	9	0	-5	-17	-9	-9	-9	-11	-20	-26	17	15	11	14
LONDON INTERNATIONAL TO LORING AFB																		
53,000	-30	-15	-15	-23	-20	-28	-32	29	15	14	23	19	12	9	11	8	7	9
40,000	-46	-27	-34	-44	-37	-50	-56	44	25	32	42	35	24	18	16	15	14	17
30,000	-47	-29	-33	-42	-38	-51	-59	44	26	31	39	35	22	15	20	19	16	19
20,000	-33	-20	-21	-27	-25	-35	-40	31	18	20	26	23	14	9	15	14	11	14
LONDON INTERNATIONAL TO MAURIPUR AP																		
53,000	29	18	7	18	17	10	7	-32	-19	-8	-19	-19	-27	-32	10	8	6	8
40,000	36	24	17	25	25	16	12	-40	-28	-19	-28	-28	-38	-44	13	12	10	13
30,000	30	21	19	23	23	14	10	-33	-24	-21	-25	-25	-35	-40	14	13	10	12
20,000	19	14	12	14	15	9	6	-21	-16	-13	-15	-16	-22	-26	10	9	7	9
LONDON INTERNATIONAL TO MCCORD AFB																		
53,000	-18	-9	-5	-13	-10	-16	-20	16	8	4	12	9	5	2	8	6	4	6
40,000	-19	-15	-12	-18	-16	-23	-27	16	13	11	16	14	7	3	10	10	9	11
30,000	-18	-17	-13	-18	-16	-25	-29	15	14	11	15	14	6	1	13	12	11	13
20,000	-11	-11	-8	-11	-10	-16	-20	9	10	7	9	9	3	-1	10	9	8	9
LONDON INTERNATIONAL TO MCGUIRE AFB																		
53,000	-32	-17	-14	-24	-21	-28	-33	31	16	14	23	20	13	10	10	8	7	8
40,000	-50	-31	-35	-46	-40	-52	-58	47	28	33	44	38	27	21	16	14	13	16
30,000	-51	-32	-34	-44	-40	-52	-59	47	29	32	41	37	25	18	19	17	14	17
20,000	-36	-22	-22	-29	-27	-36	-41	34	20	21	28	25	16	12	14	13	10	13
LONDON INTERNATIONAL TO MIDWAY NAS																		
53,000	-6	-3	1	-2	-2	-7	-9	4	2	-1	1	1	-3	-5	8	6	4	6
40,000	-9	-5	-1	-1	-4	-10	-13	5	2	-1	-2	1	-5	-8	9	8	8	9
30,000	-6	-5	-2	-1	-3	-10	-14	2	1	0	-2	0	-7	-10	11	10	10	10
20,000	-4	-4	-2	0	-2	-7	-10	2	2	1	-2	1	-5	-8	9	8	7	7
LONDON INTERNATIONAL TO MILOENHALL AP																		
53,000	2	5	7	3	4	-5	-11	-4	-6	-7	-4	-5	-15	-20	19	14	11	14
40,000	-1	3	13	10	6	-13	-23	-3	-5	-15	-14	-9	-28	-38	29	26	25	31
30,000	-4	2	14	9	6	-17	-30	-1	-5	-17	-14	-10	-32	-45	35	34	29	36
20,000	1	4	12	10	7	-9	-18	-4	-6	-13	-12	-9	-25	-33	27	24	19	25
LONDON INTERNATIONAL TO MINOT AFB																		
53,000	-24	-11	-8	-16	-13	-20	-24	22	10	8	15	13	7	5	9	7	5	7
40,000	-30	-18	-20	-25	-23	-32	-36	27	17	19	23	21	13	9	12	11	11	13
30,000	-28	-20	-20	-24	-23	-33	-38	25	18	18	21	20	11	6	14	14	12	14
20,000	-18	-13	-12	-15	-14	-22	-26	16	12	11	14	13	6	2	11	11	9	11
LONDON INTERNATIONAL TO MOSCOW INTERNATIONAL																		
53,000	20	12	10	14	13	6	3	-22	-13	-10	-14	-14	-22	-26	14	10	8	10
40,000	19	15	23	24	20	7	0	-22	-17	-24	-26	-22	-35	-42	20	18	17	20
30,000	17	14	23	22	19	3	-5	-20	-16	-25	-25	-22	-37	-46	24	23	21	25
20,000	15	11	16	17	15	4	-2	-16	-13	-17	-18	-16	-27	-33	18	17	13	17
LONDON INTERNATIONAL TO MYRTLE BEACH AFB																		
53,000	-33	-18	-12	-23	-21	-29	-34	32	17	12	22	20	13	10	10	8	6	8
40,000	-51	-33	-32	-46	-40	-51	-57	47	31	30	43	37	27	21	15	14	12	15
30,000	-52	-34	-31	-43	-39	-51	-58	48	30	29	40	36	25	19	17	16	13	16
20,000	-37	-24	-21	-29	-27	-36	-41	35	22	20	27	25	17	13	13	12	9	12
LONDON INTERNATIONAL TO NOUASSEUR AB																		
53,000	0	-4	-6	0	-2	-10	-14	-2	2	5	-1	1	-6	-10	13	11	9	10
40,000	5	-5	-11	-8	-5	-18	-25	-8	2	8	5	2	-11	-19	21	19	16	20
30,000	6	-3	-11	-7	-4	-18	-25	-9	1	9	3	1	-13	-21	22	20	16	21
20,000	3	-3	-8	-5	-4	-14	-19	-5	2	7	3	2	-8	-14	17	15	11	14
LONDON INTERNATIONAL TO DRLY AP																		
53,000	21	9	7	10	11	2	-3	-22	-10	-7	-11	-12	-22	-28	18	14	11	14
40,000	26	11	14	19	17	-1	-11	-28	-13	-16	-22	-19	-38	-48	27	25	24	30
30,000	27	12	13	19	17	-4	-15	-30	-14	-16	-23	-20	-42	-54	34	32	27	34
20,000	18	8	7	10	10	-5	-13	-20	-9	-8	-12	-12	-27	-36	25	23	18	23

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*								STANDARD DEVIATION										
	DIRECT								RETURN										
	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT	
LONDON INTERNATIONAL TO PALAM AP																			
53,000	29	16	11	22	18	12	9	-31	-17	-12	-23	-20	-27	-32	3632 N.MI.				
40,000	27	18	21	26	23	15	11	-31	-21	-23	-28	-25	-34	-39	10	7	6	7	
30,000	23	18	21	24	21	13	9	-26	-21	-22	-26	-24	-32	-36	12	11	11	12	
20,000	16	12	11	15	14	8	5	-18	-13	-12	-16	-15	-21	-24	13	12	11	12	
LONDON INTERNATIONAL TO PATRICK AFB																			
53,000	-33	-19	-10	-21	-20	-28	-33	31	18	10	20	19	12	9	3741 N.MI.				
40,000	-49	-35	-28	-42	-38	-49	-55	45	32	26	40	35	25	20	9	8	6	8	
30,000	-49	-33	-27	-39	-36	-48	-54	45	30	25	37	33	23	18	14	13	12	14	
20,000	-35	-24	-20	-27	-26	-34	-39	33	22	19	26	24	17	13	16	15	11	15	
LONDON INTERNATIONAL TO PIARCO AP																			
53,000	-14	-13	-5	-6	-9	-15	-18	13	12	4	5	8	3	0	3828 N.MI.				
40,000	-25	-24	-14	-15	-19	-28	-32	22	21	13	13	17	9	5	8	7	5	7	
30,000	-19	-18	-12	-13	-15	-22	-27	16	16	11	11	13	6	2	12	11	9	12	
20,000	-11	-9	-9	-9	-9	-15	-18	9	8	8	8	8	3	0	12	12	8	11	
LONDON INTERNATIONAL TO POPE AFB																			
53,000	-33	-18	-13	-24	-21	-29	-34	32	17	12	23	20	13	10	3392 N.MI.				
40,000	-51	-33	-33	-46	-40	-52	-58	48	30	31	43	38	27	22	10	8	6	8	
30,000	-52	-33	-32	-43	-39	-52	-58	48	30	30	40	36	25	19	15	14	13	15	
20,000	-37	-23	-21	-29	-27	-36	-41	35	21	20	27	25	17	13	17	16	13	16	
LONDON INTERNATIONAL TO PRESTWICK AB																			
53,000	-21	-10	-4	-10	-10	-20	-26	20	9	4	10	9	0	-4	283 N.MI.				
40,000	-29	-15	-15	-21	-20	-38	-48	27	13	12	18	17	-1	-10	18	13	10	13	
30,000	-30	-15	-13	-22	-20	-42	-54	26	12	10	17	16	-6	-18	28	24	24	30	
20,000	-20	-10	-8	-12	-12	-28	-37	18	9	6	9	10	-5	-14	34	32	29	35	
LONDON INTERNATIONAL TO RAMEY AFB																			
53,000	-21	-15	-6	-10	-12	-19	-23	19	14	5	9	11	5	2	3671 N.MI.				
40,000	-33	-29	-17	-23	-25	-34	-40	29	26	16	20	22	13	9	9	8	6	8	
30,000	-29	-25	-15	-21	-22	-31	-36	25	22	14	19	20	11	7	13	13	10	13	
20,000	-20	-17	-13	-16	-16	-22	-26	18	15	13	15	15	9	6	14	13	10	12	
LONDON INTERNATIONAL TO RHEIN MAIN AB																			
53,000	23	14	12	13	15	6	1	-24	-14	-12	-14	-15	-25	-30	353 N.MI.				
40,000	28	15	25	29	24	7	-3	-30	-16	-27	-31	-26	-44	-53	17	13	11	13	
30,000	26	15	25	29	24	3	-9	-29	-17	-27	-32	-26	-47	-58	26	24	23	29	
20,000	20	12	17	19	17	2	-5	-22	-13	-18	-20	-18	-32	-40	33	31	27	33	
LONDON INTERNATIONAL TO SEOUL AB																			
53,000	17	14	8	14	13	8	6	-20	-15	-9	-15	-14	-19	-23	4790 N.MI.				
40,000	23	21	15	25	21	14	10	-25	-23	-17	-27	-23	-30	-34	9	6	5	6	
30,000	19	22	13	20	18	10	6	-22	-24	-14	-22	-20	-28	-33	11	9	9	10	
20,000	15	16	9	16	14	8	5	-17	-17	-10	-17	-15	-21	-24	11	11	10	11	
LONDON INTERNATIONAL TO STEVENSON FIELD																			
53,000	-24	-11	-8	-16	-14	-21	-25	23	10	8	15	13	7	5	3394 N.MI.				
40,000	-31	-19	-20	-26	-24	-32	-37	28	17	19	24	22	13	9	9	7	5	7	
30,000	-29	-20	-20	-25	-23	-33	-39	26	18	18	22	21	11	6	12	11	11	13	
20,000	-19	-13	-12	-16	-15	-22	-26	17	12	11	14	13	6	2	15	14	13	15	
LONDON INTERNATIONAL TO SUNG SHAN																			
53,000	22	17	9	17	16	11	8	-25	-19	-10	-18	-18	-24	-27	5289 N.MI.				
40,000	26	26	16	27	24	16	13	-30	-28	-18	-29	-26	-34	-37	8	7	5	6	
30,000	24	25	13	20	20	12	8	-28	-28	-14	-22	-23	-31	-36	10	9	9	10	
20,000	18	16	9	16	15	9	6	-19	-17	-10	-17	-16	-22	-25	11	11	10	11	
LONDON INTERNATIONAL TO TACHIKAWA AB																			
53,000	13	11	7	10	10	6	3	-15	-12	-7	-12	-11	-16	-19	5160 N.MI.				
40,000	19	16	12	19	16	10	6	-22	-18	-13	-22	-19	-26	-29	8	6	4	6	
30,000	16	17	10	18	15	8	4	-19	-20	-11	-21	-18	-25	-29	10	9	8	10	
20,000	13	13	8	13	11	6	3	-15	-14	-8	-14	-13	-18	-21	10	11	10	11	
LONDON INTERNATIONAL TO TAN SAN NHUT																			
53,000	25	14	3	13	13	6	3	-28	-16	-4	-14	-15	-22	-27	5514 N.MI.				
40,000	21	20	13	18	18	11	8	-26	-22	-14	-20	-20	-27	-31	8	7	6	6	
30,000	20	18	13	18	17	11	7	-23	-20	-14	-19	-19	-26	-30	10	9	8	9	
20,000	14	11	6	11	11	6	3	-16	-12	-7	-12	-12	-17	-19	10	10	8	9	

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEADWINDS*								STANDARD DEVIATION					
	D I R E C T								R E T U R N													
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT				
LONDON INTERNATIONAL TO THULE AB																			2128 N.M.I.			
53,000	-15	-7	0	-9	-7	-15	-19	14	7	-1	8	6	0	-3	11	9	6	9				
40,000	-14	-11	-6	-10	-10	-19	-24	12	10	5	8	8	-1	-5	14	13	11	14				
30,000	-13	-12	-7	-9	-10	-22	-28	10	9	5	6	7	-4	-10	18	16	16	18				
20,000	-6	-8	-3	-3	-5	-14	-19	4	6	2	2	3	-5	-10	15	14	11	13				
LONDON INTERNATIONAL TO TORBAY AP																			2005 N.M.I.			
53,000	-29	-15	-15	-22	-19	-27	-32	28	15	15	21	19	12	8	12	9	8	10				
40,000	-45	-27	-35	-44	-37	-50	-58	43	25	33	41	35	23	16	19	17	16	19				
30,000	-48	-29	-34	-42	-38	-53	-61	45	26	32	39	35	21	13	23	21	18	22				
20,000	-35	-21	-23	-29	-27	-38	-44	33	19	22	27	25	15	9	18	16	12	16				
LONDON INTERNATIONAL TO TORREJON AFB																			671 N.M.I.			
53,000	4	-1	-3	1	0	-8	-13	-6	0	2	-2	-1	-10	-15	15	12	11	12				
40,000	9	0	-7	-4	-1	-16	-25	-13	-2	4	0	-2	-18	-27	24	22	20	25				
30,000	10	-1	-9	-3	-1	-18	-27	-13	-2	6	-1	-2	-19	-29	27	25	20	26				
20,000	5	-1	-6	-4	-2	-14	-20	-7	0	5	2	0	-12	-19	21	19	14	18				
LONDON INTERNATIONAL TO TRAVIS AFB																			4606 N.M.I.			
53,000	-20	-10	-7	-14	-12	-17	-21	18	9	7	13	11	7	4	8	6	5	6				
40,000	-23	-17	-18	-21	-20	-27	-31	20	15	17	18	17	10	7	11	10	9	11				
30,000	-23	-18	-17	-19	-19	-27	-32	19	15	15	16	16	8	4	13	12	11	13				
20,000	-14	-12	-10	-12	-12	-18	-21	12	11	9	11	10	5	1	10	9	7	9				
LONDON INTERNATIONAL TO WAKE AP																			6501 N.M.I.			
53,000	3	3	4	4	3	0	-3	-6	-5	-5	-5	-5	-9	-11	8	6	4	6				
40,000	1	4	8	5	5	-1	-4	-7	-8	-9	-9	-8	-14	-17	9	8	7	9				
30,000	2	5	7	5	5	-2	-5	-7	-8	-8	-8	-8	-14	-17	10	9	8	9				
20,000	2	2	3	3	3	-2	-5	-5	-4	-4	-5	-4	-9	-12	8	7	6	7				
LONDON INTERNATIONAL TO WESTOVER AFB																			2888 N.M.I.			
53,000	-32	-16	-14	-24	-20	-28	-33	30	16	14	23	20	13	10	11	8	7	9				
40,000	-49	-29	-36	-46	-40	-52	-58	47	27	34	44	37	26	20	16	14	14	16				
30,000	-50	-31	-34	-44	-39	-52	-60	47	28	32	41	36	24	18	19	18	15	18				
20,000	-35	-21	-22	-29	-26	-36	-41	33	20	21	27	25	16	11	15	14	10	13				
LONDON INTERNATIONAL TO WHEELUS AP																			1266 N.M.I.			
53,000	17	11	4	9	10	3	-1	-19	-12	-6	-10	-11	-19	-24	13	11	9	10				
40,000	25	13	12	15	16	3	-3	-28	-16	-14	-18	-19	-32	-39	21	18	16	20				
30,000	22	13	9	16	14	1	-6	-25	-15	-11	-19	-17	-31	-38	22	20	16	21				
20,000	16	8	8	9	10	0	-5	-17	-9	-9	-10	-11	-20	-26	16	15	11	14				
LORING AFB TO MAURIPUR AP																			5844 N.M.I.			
53,000	27	12	5	18	15	8	5	-29	-13	-6	-20	-16	-24	-28	8	6	5	6				
40,000	30	18	15	24	21	14	10	-34	-21	-17	-27	-24	-33	-37	11	10	9	10				
30,000	27	19	15	21	20	12	8	-31	-21	-17	-24	-23	-31	-36	12	11	10	11				
20,000	18	13	9	14	13	7	4	-20	-14	-10	-16	-14	-21	-24	9	9	7	8				
LORING AFB TO MCCORD AFB																			2185 N.M.I.			
53,000	-30	-18	-16	-24	-21	-28	-32	29	17	16	24	21	14	11	10	8	7	8				
40,000	-43	-27	-37	-38	-36	-47	-53	41	26	35	36	34	24	18	15	14	14	17				
30,000	-44	-29	-34	-37	-36	-48	-54	41	27	33	35	34	22	16	17	17	14	18				
20,000	-30	-19	-23	-26	-24	-33	-37	29	18	23	25	23	15	11	13	12	9	12				
LORING AFB TO MCGUIRE AFB																			508 N.M.I.			
53,000	-31	-15	-6	-22	-17	-30	-37	28	13	5	20	16	5	-1	18	15	12	15				
40,000	-50	-29	-24	-40	-35	-55	-65	41	24	20	35	29	11	1	28	26	24	28				
30,000	-47	-28	-23	-35	-32	-53	-64	39	22	19	30	27	8	-2	33	30	21	28				
20,000	-33	-18	-15	-24	-21	-36	-44	29	15	13	21	19	6	-1	23	22	14	21				
LORING AFB TO MIDWAY NAS																			4902 N.M.I.			
53,000	-24	-16	-11	-19	-17	-23	-26	22	15	11	18	16	11	8	8	7	5	7				
40,000	-41	-29	-23	-36	-32	-41	-46	38	27	21	33	29	21	17	11	10	10	11				
30,000	-40	-31	-23	-35	-32	-41	-46	37	28	21	32	29	21	16	12	12	10	12				
20,000	-29	-23	-17	-25	-23	-30	-33	27	22	16	23	22	15	12	10	8	7	9				
LORING AFB TO MILOENHALL AP																			2575 N.M.I.			
53,000	29	14	14	23	19	12	9	-30	-15	-14	-23	-20	-28	-32	11	8	7	9				
40,000	43	25	32	41	35	23	17	-46	-26	-34	-44	-37	-49	-55	16	15	14	17				
30,000	44	26	31	39	34	21	14	-47	-28	-33	-42	-37	-51	-58	20	19	16	19				
20,000	30	18	20	25	23	13	8	-32	-19	-21	-27	-24	-34	-40	15	14	11	14				

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION							
	DIRECT							RETURN							JAN	APR	JUL	OCT				
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85								
LORING AFB TO MINOT AFB																			1343 N.MI.			
53,000	-34	-19	-16	-25	-23	-31	-37	33	19	16	25	22	14	11	13	10	9	11				
40,000	-51	-31	-42	-43	-41	-55	-62	49	30	40	40	40	26	20	19	18	17	21				
30,000	-49	-33	-38	-40	-40	-54	-62	47	31	37	37	38	24	16	22	21	17	21				
20,000	-34	-21	-26	-28	-27	-37	-43	33	20	25	26	26	16	11	16	15	11	15				
LORING AFB TO MOSCOW INTERNATIONAL																			3595 N.MI.			
53,000	29	13	8	20	16	9	6	-30	-14	-8	-20	-17	-25	-30	10	8	5	7				
40,000	33	22	18	28	25	16	11	-35	-23	-19	-30	-27	-36	-41	13	12	11	13				
30,000	32	23	16	24	24	13	8	-35	-26	-19	-27	-26	-37	-43	15	15	13	15				
20,000	20	15	10	16	15	7	3	-22	-17	-11	-17	-16	-24	-28	12	11	9	11				
LORING AFB TO MYRTLE BEACH AFB																			941 N.MI.			
53,000	-30	-16	-3	-19	-16	-28	-35	26	14	2	17	14	3	-2	15	14	10	13				
40,000	-47	-30	-17	-38	-32	-50	-59	36	24	13	32	26	10	1	24	24	20	24				
30,000	-43	-28	-17	-32	-29	-47	-56	34	22	14	28	23	8	0	26	25	17	24				
20,000	-31	-18	-12	-21	-19	-32	-40	27	15	11	19	17	6	0	19	19	11	18				
LORING AFB TO NDUASSEUR AB																			2808 N.MI.			
53,000	26	18	15	20	19	13	10	-27	-18	-16	-21	-20	-26	-30	10	8	7	9				
40,000	38	28	31	38	34	24	18	-40	-30	-32	-41	-36	-46	-51	15	14	13	15				
30,000	36	27	27	35	31	21	15	-39	-29	-28	-37	-33	-44	-49	16	15	12	15				
20,000	27	17	20	25	22	14	10	-29	-19	-20	-26	-23	-31	-36	13	12	9	11				
LORING AFB TO ORLY AP																			2728 N.MI.			
53,000	29	15	15	22	19	13	9	-30	-15	-15	-23	-20	-27	-31	11	8	7	9				
40,000	43	24	33	42	35	24	18	-45	-26	-35	-44	-37	-49	-55	16	14	14	17				
30,000	43	25	31	39	34	22	15	-47	-28	-33	-42	-37	-50	-57	19	18	15	18				
20,000	30	17	21	26	23	14	10	-32	-19	-22	-28	-25	-34	-40	15	14	10	13				
LORING AFB TO PALAM AP																			5889 N.MI.			
53,000	23	10	5	17	13	7	4	-26	-12	-6	-18	-15	-22	-26	8	6	5	6				
40,000	22	16	13	21	18	11	8	-25	-18	-15	-24	-20	-27	-31	10	9	8	9				
30,000	20	17	13	19	17	10	6	-23	-19	-14	-21	-19	-27	-31	11	10	9	10				
20,000	13	11	7	12	11	5	2	-14	-13	-7	-13	-12	-17	-20	8	8	6	8				
LORING AFB TO PATRICK AFB																			1271 N.MI.			
53,000	-27	-14	0	-15	-13	-25	-31	22	11	0	14	11	1	-3	13	13	9	13				
40,000	-40	-28	-11	-32	-27	-43	-52	30	21	8	26	21	6	-2	21	21	17	21				
30,000	-37	-23	-11	-27	-23	-39	-47	28	17	9	22	18	5	-2	22	22	14	21				
20,000	-26	-16	-9	-18	-16	-27	-34	22	13	8	16	14	4	-1	16	16	9	15				
LORING AFB TO PIARCO AP																			2207 N.MI.			
53,000	8	9	2	4	5	-1	-4	-11	-11	-3	-5	-7	-14	-18	11	10	7	9				
40,000	5	3	1	3	3	-6	-12	-13	-9	-3	-7	-7	-17	-23	16	15	11	14				
30,000	7	5	1	1	3	-5	-10	-13	-10	-2	-4	-6	-16	-21	16	14	9	12				
20,000	5	3	-2	-2	0	-6	-9	-7	-5	1	1	-2	-9	-13	11	10	6	9				
LORING AFB TO POPE AFB																			866 N.MI.			
53,000	-32	-17	-4	-21	-17	-30	-36	29	15	3	19	15	5	-1	16	14	10	13				
40,000	-50	-31	-20	-40	-35	-53	-62	40	26	16	34	29	12	3	25	24	21	25				
30,000	-47	-29	-19	-34	-31	-49	-59	38	24	16	30	26	10	1	27	26	18	25				
20,000	-33	-19	-13	-23	-21	-34	-42	29	16	12	20	18	7	1	20	19	12	19				
LORING AFB TO PRESTWICK AB																			2346 N.MI.			
53,000	30	14	13	23	19	12	8	-31	-15	-14	-24	-20	-28	-33	12	9	8	9				
40,000	44	25	30	40	34	23	17	-46	-27	-32	-43	-36	-49	-56	17	15	15	18				
30,000	43	26	29	38	34	20	13	-47	-29	-32	-41	-37	-51	-58	21	20	17	20				
20,000	30	18	18	24	22	12	7	-32	-20	-19	-26	-24	-34	-40	16	15	12	15				
LORING AFB TO RAMEY AFB																			1707 N.MI.			
53,000	1	5	3	0	3	-5	-9	-6	-8	-4	-2	-5	-12	-16	13	12	8	11				
40,000	-1	-1	1	-3	-1	-12	-19	-8	-6	-3	-2	-5	-16	-22	18	18	14	18				
30,000	0	0	1	-3	0	-11	-17	-8	-6	-2	0	-4	-14	-20	19	17	11	16				
20,000	0	0	-3	-6	-2	-10	-14	-3	-2	2	4	0	-7	-12	13	13	8	11				
LORING AFB TO RHEIN MAIN AB																			2909 N.MI.			
53,000	29	14	13	21	18	12	9	-30	-15	-14	-22	-19	-27	-31	10	8	7	8				
40,000	42	24	31	40	34	23	17	-44	-25	-33	-42	-36	-47	-53	15	14	13	16				
30,000	42	24	30	38	33	21	14	-45	-27	-32	-41	-36	-49	-56	19	18	15	18				
20,000	29	17	19	24	22	13	9	-31	-19	-20	-26	-24	-33	-38	14	13	10	13				

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HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION			
	DIRECT						RETURN						JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85		
LORING AFB TO SEOUL AB																5670 N.MI.
53,000	-9	-5	-3	-6	-5	-9	-12	7	4	2	4	4	0	-2	8	5 4 6
40,000	-1	-5	-7	-5	-5	-10	-13	-2	3	6	3	2	-3	-6	8	8 8 8
30,000	0	-4	-6	-4	-4	-10	-13	-2	2	5	2	2	-4	-8	8	9 9 9
20,000	2	-2	-5	-3	-2	-7	-10	-3	1	4	2	1	-4	-7	7	7 6 7
LORING AFB TO STEVENSON FIELD																1174 N.MI.
53,000	-33	-19	-17	-25	-23	-31	-37	32	18	16	25	22	14	10	13	10 9 11
40,000	-49	-30	-41	-42	-40	-54	-62	47	29	39	40	39	25	18	20	18 18 21
30,000	-48	-32	-38	-40	-39	-54	-62	45	30	36	37	37	23	15	23	22 18 22
20,000	-34	-21	-26	-27	-27	-37	-43	32	20	26	26	26	15	10	17	16 12 16
LORING AFB TO SUNG SHAN																6449 N.MI.
53,000	-9	-4	-1	-4	-4	-8	-11	6	2	0	3	2	-1	-3	8	5 4 6
40,000	0	-3	-6	-2	-3	-8	-11	-5	1	5	-1	0	-6	-9	8	7 7 8
30,000	0	-3	-5	-2	-2	-8	-11	-4	0	4	-1	0	-6	-9	8	9 8 8
20,000	2	-1	-4	-1	-1	-6	-8	-4	-1	3	0	0	-5	-8	7	7 6 7
LORING AFB TO TACHIKAWA AB																5628 N.MI.
53,000	-19	-9	-4	-13	-10	-16	-20	17	8	4	11	9	4	2	8	5 4 6
40,000	-14	-12	-13	-19	-14	-20	-23	11	10	11	16	12	6	3	8	8 8 8
30,000	-12	-12	-14	-15	-13	-19	-23	9	10	12	12	11	4	1	9	9 9 9
20,000	-7	-7	-9	-10	-8	-13	-16	5	6	8	9	7	2	-1	8	7 6 7
LORING AFB TO TAN SAN NHUT																7322 N.MI.
53,000	3	2	2	3	2	-1	-3	-6	-3	-3	-5	-4	-8	-10	7	6 4 5
40,000	6	7	0	7	5	0	-3	-10	-10	-2	-9	-8	-13	-16	8	7 7 8
30,000	7	8	0	6	5	-1	-4	-11	-11	-2	-8	-8	-14	-17	9	8 7 8
20,000	6	6	1	4	4	0	-3	-8	-7	-2	-5	-5	-10	-12	7	7 5 6
LORING AFB TO THULE AB																1775 N.MI.
53,000	6	1	0	3	2	-4	-7	-8	-2	0	-4	-3	-9	-13	12	9 7 9
40,000	9	1	-1	4	3	-7	-12	-12	-2	-1	-7	-5	-15	-20	14	13 13 14
30,000	8	1	-1	4	3	-8	-14	-11	-3	-1	-7	-6	-17	-23	17	16 15 16
20,000	6	2	0	2	2	-6	-11	-7	-3	-1	-3	-4	-12	-17	13	13 11 13
LORING AFB TO TORBAY AP																616 N.MI.
53,000	36	20	16	29	24	13	8	-37	-21	-17	-30	-25	-37	-43	18	15 12 15
40,000	55	35	43	54	47	29	19	-58	-37	-45	-56	-49	-67	-77	27	25 24 27
30,000	52	35	40	49	44	25	15	-55	-37	-41	-52	-46	-65	-76	31	29 23 28
20,000	37	22	26	32	29	15	8	-39	-23	-26	-34	-30	-44	-52	23	22 15 21
LORING AFB TO TORREJON AFB																2741 N.MI.
53,000	27	16	16	21	19	13	10	-28	-17	-17	-22	-20	-27	-31	10	8 7 9
40,000	41	26	34	42	35	25	19	-43	-28	-36	-44	-37	-48	-54	16	14 13 16
30,000	41	26	31	39	34	23	16	-44	-28	-33	-42	-36	-48	-54	18	17 13 17
20,000	29	18	22	27	24	15	11	-31	-19	-23	-29	-25	-34	-39	14	13 9 12
LORING AFB TO TRAVIS AFB																2394 N.MI.
53,000	-32	-21	-16	-23	-22	-30	-34	31	20	15	23	22	15	12	10	9 7 8
40,000	-49	-34	-42	-41	-41	-52	-58	47	32	40	38	39	28	22	16	15 14 17
30,000	-47	-33	-35	-36	-37	-49	-55	44	30	34	34	35	24	18	18	17 13 17
20,000	-31	-21	-23	-25	-25	-33	-37	29	20	22	23	23	16	12	13	12 8 12
LORING AFB TO WAKE AP																5857 N.MI.
53,000	-24	-14	-6	-16	-14	-21	-25	22	13	6	15	13	8	5	8	6 5 6
40,000	-40	-31	-19	-29	-30	-38	-43	35	28	17	27	27	19	15	10	10 9 10
30,000	-38	-29	-20	-30	-29	-37	-42	34	26	18	27	26	18	14	11	11 9 11
20,000	-27	-20	-16	-21	-20	-26	-30	25	19	15	19	19	14	11	9	8 6 8
LORING AFB TO WESTOVER AFB																348 N.MI.
53,000	-30	-15	-7	-22	-17	-30	-37	27	13	6	20	16	5	-1	18	16 12 15
40,000	-50	-28	-25	-41	-36	-56	-67	42	23	21	35	30	11	0	30	27 26 29
30,000	-48	-27	-24	-36	-32	-54	-65	39	22	20	31	27	7	-3	35	32 23 30
20,000	-32	-18	-15	-24	-21	-37	-45	28	15	14	21	19	5	-2	24	23 15 22
LORING AFB TO WHEELUS AP																3659 N.MI.
53,000	27	17	15	20	19	14	11	-28	-18	-16	-20	-20	-26	-29	9	7 6 7
40,000	40	26	32	38	34	24	20	-42	-28	-33	-40	-36	-45	-50	14	12 11 13
30,000	38	26	28	36	32	22	17	-40	-28	-30	-38	-34	-44	-49	15	14 11 14
20,000	27	17	21	24	22	15	11	-29	-19	-21	-25	-23	-31	-35	12	11 8 10

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.THE BOEING COMPANY
TRANSPORT DIVISIONNO. D6-9175
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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION					
	O I R E C T							R E T U R N										
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
MAURIPUR AP TO MCCHORO AFB																		
53,000	6	4	3	3	4	0	-2	-8	-5	-4	-4	-5	-9	-11	7	5	4	5
40,000	8	4	2	2	4	-1	-4	-11	-6	-3	-5	-6	-12	-15	8	7	7	8
30,000	6	2	0	0	2	-4	-7	-8	-4	-2	-2	-4	-10	-13	9	9	8	8
20,000	4	1	1	1	2	-3	-5	-5	-3	-2	-2	-3	-7	-10	7	7	6	6
MAURIPUR AP TO MCGUIRE AFB																		
53,000	-29	-14	-6	-20	-16	-24	-29	27	12	6	19	15	8	5	8	6	5	6
40,000	-36	-22	-18	-28	-26	-34	-39	32	19	16	25	23	15	11	11	10	9	10
30,000	-33	-22	-18	-25	-24	-33	-37	29	19	16	23	21	13	9	12	11	10	11
20,000	-21	-15	-10	-17	-15	-22	-25	19	13	10	15	14	8	5	9	9	7	8
MAURIPUR AP TO MIDWAY NAS																		
53,000	51	40	12	38	38	24	14	-54	-41	-13	-39	-40	-49	-53	10	8	6	8
40,000	65	50	25	43	46	33	26	-69	-52	-27	-45	-49	-61	-68	11	10	9	11
30,000	53	43	19	35	38	26	20	-56	-46	-20	-37	-40	-52	-57	10	10	8	9
20,000	35	27	10	21	23	15	11	-37	-28	-11	-22	-24	-33	-37	7	7	5	6
MAURIPUR AP TO MILDENHALL AP																		
53,000	-31	-19	-8	-19	-18	-27	-31	29	17	7	18	17	10	6	10	8	6	8
40,000	-39	-27	-19	-27	-27	-37	-43	35	24	17	24	24	15	11	13	12	11	13
30,000	-33	-24	-20	-25	-25	-34	-39	29	21	19	23	22	14	9	14	13	11	12
20,000	-21	-15	-12	-15	-15	-22	-25	19	14	11	14	14	8	5	10	9	7	9
MAURIPUR AP TO MINOT AFB																		
53,000	-8	-4	0	-7	-4	-9	-11	5	2	-1	5	3	-1	-3	7	5	4	5
40,000	-6	-5	-4	-6	-5	-10	-13	2	2	3	4	3	-2	-5	8	7	7	8
30,000	-5	-5	-5	-7	-6	-11	-14	2	3	3	5	3	-3	-6	9	9	8	9
20,000	-3	-4	-3	-3	-3	-8	-10	1	3	3	2	2	-2	-5	7	7	6	7
MAURIPUR AP TO MOSCOW INTERNATIONAL																		
53,000	-25	-11	-2	-17	-13	-22	-27	21	9	1	15	10	2	-1	13	9	8	10
40,000	-28	-15	-12	-19	-18	-28	-34	21	11	10	15	14	4	-1	15	14	12	14
30,000	-21	-13	-13	-17	-16	-25	-30	16	10	11	14	13	4	-1	15	14	11	13
20,000	-14	-9	-7	-11	-10	-17	-20	12	8	6	10	9	2	-1	11	10	8	10
MAURIPUR AP TO MYRTLE BEACH AFB																		
53,000	-30	-14	-6	-20	-17	-25	-29	27	13	5	19	15	8	5	8	6	5	6
40,000	-37	-24	-18	-30	-27	-36	-40	33	20	16	27	24	16	12	11	10	9	10
30,000	-34	-24	-19	-27	-25	-34	-38	30	20	17	24	22	14	10	12	11	9	11
20,000	-23	-16	-11	-17	-16	-22	-26	21	14	10	16	15	9	6	9	8	6	8
MAURIPUR AP TO NOUASSEUR AB																		
53,000	-43	-34	-10	-23	-28	-38	-43	42	33	10	22	27	16	11	8	8	6	7
40,000	-57	-51	-24	-37	-42	-54	-60	54	49	23	35	39	28	22	13	12	8	11
30,000	-46	-44	-21	-30	-34	-46	-51	44	42	20	28	32	23	19	13	11	8	10
20,000	-29	-27	-15	-17	-21	-28	-32	28	26	14	16	20	14	12	9	8	6	7
MAURIPUR AP TO ORLY AP																		
53,000	-33	-22	-9	-19	-20	-29	-33	31	20	8	18	19	11	8	10	8	7	8
40,000	-43	-32	-21	-29	-31	-41	-46	39	29	19	26	28	18	14	13	12	10	13
30,000	-36	-27	-22	-26	-27	-36	-41	32	25	20	24	25	16	12	14	13	10	12
20,000	-22	-17	-13	-15	-16	-23	-26	20	16	13	14	15	10	7	10	9	7	8
MAURIPUR AP TO PALAM AP																		
53,000	61	48	-7	36	39	11	-3	-63	-49	5	-37	-40	-59	-68	19	19	14	19
40,000	77	53	-8	23	37	3	-8	-80	-55	8	-25	-39	-67	-81	24	21	13	22
30,000	52	40	-5	25	29	7	-3	-54	-42	4	-26	-30	-49	-59	21	18	10	14
20,000	33	22	-4	7	13	0	-5	-34	-23	4	-7	-13	-29	-36	14	13	9	10
MAURIPUR AP TO PATRICK AFB																		
53,000	-30	-15	-6	-20	-17	-25	-30	28	13	6	19	15	9	6	8	6	5	6
40,000	-39	-26	-19	-31	-28	-37	-42	35	22	17	28	25	17	13	11	10	9	11
30,000	-36	-25	-19	-28	-26	-35	-40	32	21	17	25	23	15	11	12	11	9	11
20,000	-24	-17	-12	-18	-17	-24	-27	22	15	11	17	16	10	7	9	8	6	8
MAURIPUR AP TO PIARCO AP																		
53,000	-31	-27	-6	-15	-20	-29	-32	30	26	6	14	19	10	6	7	6	5	5
40,000	-44	-42	-20	-25	-32	-43	-48	41	39	19	24	30	21	17	10	9	7	8
30,000	-32	-33	-17	-19	-24	-33	-37	30	31	16	18	23	16	13	10	9	6	7
20,000	-17	-18	-10	-11	-13	-18	-21	16	17	9	10	13	8	6	7	6	5	5

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.

MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEADWINDS*							STANDARD DEVIATION			
	DIRECT								RETURN							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT	
MAURIPUR AP TO POPE AFB																			
53,000	-29	-14	-6	-20	-16	-24	-29	27	12	5	18	15	8	5	8	6	5	6	
40,000	-37	-23	-18	-29	-26	-35	-39	32	20	16	26	23	15	11	11	10	9	10	
30,000	-33	-23	-18	-26	-24	-33	-38	29	19	16	23	21	13	10	12	11	9	11	
20,000	-22	-15	-10	-17	-16	-22	-25	20	13	9	15	14	8	5	9	8	6	8	
MAURIPUR AP TO PRESTWICK AB																			
53,000	-30	-16	-6	-19	-17	-25	-30	28	15	6	17	15	8	5	10	7	6	7	
40,000	-37	-24	-17	-26	-26	-35	-40	32	21	15	23	22	14	9	13	12	11	13	
30,000	-31	-21	-19	-24	-23	-33	-38	27	18	17	22	21	12	8	14	13	11	13	
20,000	-20	-14	-11	-15	-15	-22	-25	19	13	11	14	14	8	4	10	9	7	9	
MAURIPUR AP TO RAMEY AFB																			
53,000	-27	-21	-8	-14	-17	-24	-27	25	19	7	13	16	9	7	7	6	5	6	
40,000	-37	-33	-19	-25	-28	-37	-41	33	30	18	23	26	18	14	10	10	8	10	
30,000	-30	-27	-18	-22	-24	-31	-35	27	25	17	20	22	15	12	11	10	7	9	
20,000	-18	-17	-13	-14	-15	-20	-23	17	16	12	13	14	10	7	8	7	5	6	
MAURIPUR AP TO RHEIN MAIN AB																			
53,000	-33	-21	-8	-20	-20	-28	-33	31	19	7	18	18	10	7	10	8	7	8	
40,000	-42	-31	-19	-28	-29	-40	-46	38	27	17	25	26	17	12	13	12	11	13	
30,000	-35	-26	-21	-25	-26	-35	-41	31	23	19	23	24	15	11	15	13	10	12	
20,000	-21	-16	-12	-15	-16	-22	-26	20	15	12	14	15	9	6	10	9	7	9	
MAURIPUR AP TO SEOUL AB																			
53,000	60	45	6	43	43	23	8	-62	-46	-7	-44	-44	-56	-62	12	11	9	10	
40,000	69	53	16	37	45	25	17	-72	-55	-17	-39	-47	-63	-71	14	12	10	13	
30,000	55	44	11	29	35	19	12	-57	-46	-12	-30	-36	-51	-58	13	12	8	10	
20,000	35	25	6	15	19	10	6	-35	-25	-6	-15	-20	-30	-35	8	7	6	6	
MAURIPUR AP TO STEVENSON FIELD																			
53,000	-11	-7	0	-9	-6	-11	-14	9	6	0	7	5	1	-2	7	6	4	5	
40,000	-9	-6	-5	-8	-7	-13	-15	5	4	4	6	5	-1	-3	8	7	7	8	
30,000	-7	-7	-6	-9	-7	-13	-16	4	5	5	6	5	-1	-4	9	9	8	9	
20,000	-4	-5	-4	-5	-5	-9	-12	3	4	3	4	3	-1	-3	7	7	6	7	
MAURIPUR AP TO SUNG SHAN																			
53,000	68	46	-22	14	30	-7	-20	-70	-48	21	-16	-31	-59	-68	11	12	9	11	
40,000	76	54	-9	22	38	4	-7	-78	-55	8	-23	-40	-66	-76	13	12	8	13	
30,000	61	43	-5	20	31	6	-3	-63	-45	4	-21	-32	-53	-62	12	10	6	9	
20,000	38	25	-2	10	17	4	-1	-38	-26	2	-11	-17	-32	-37	8	7	6	6	
MAURIPUR AP TO TACHIKAWA AB																			
53,000	62	47	7	44	44	25	10	-64	-48	-8	-45	-46	-58	-64	11	10	8	10	
40,000	72	55	19	42	48	29	20	-74	-57	-20	-44	-50	-65	-73	13	11	10	12	
30,000	59	46	13	33	38	22	14	-61	-48	-14	-34	-40	-55	-62	12	11	8	10	
20,000	37	27	7	18	22	12	8	-38	-27	-7	-18	-22	-33	-38	8	7	6	6	
MAURIPUR AP TO TAN SAN NHUT																			
53,000	29	20	-45	-8	5	-27	-43	-31	-21	44	7	-6	-26	-32	10	9	9	8	
40,000	34	29	-25	3	13	-12	-23	-38	-30	24	-3	-14	-34	-40	12	11	8	9	
30,000	27	21	-11	7	12	-3	-9	-28	-22	11	-8	-13	-25	-31	10	11	6	7	
20,000	16	10	-3	1	5	-1	-4	-17	-10	3	-2	-5*	-13	-17	8	7	6	5	
MAURIPUR AP TO THULE AB																			
53,000	-13	-7	0	-10	-7	-13	-16	10	6	-1	8	6	0	-2	8	6	5	6	
40,000	-10	-7	-5	-10	-8	-14	-17	5	4	4	8	5	-1	-4	10	8	8	9	
30,000	-8	-8	-7	-10	-8	-15	-18	5	5	5	8	6	0	-4	11	10	9	9	
20,000	-5	-6	-5	-5	-5	-10	-13	4	5	4	4	4	-1	-3	8	8	6	7	
MAURIPUR AP TO TORBAY AP																			
53,000	-30	-15	-8	-20	-17	-25	-29	28	14	8	19	16	10	7	9	6	5	6	
40,000	-39	-24	-22	-31	-28	-37	-42	35	22	20	28	25	17	13	11	10	9	11	
30,000	-36	-24	-23	-28	-27	-36	-41	32	21	21	26	25	16	12	13	12	10	12	
20,000	-24	-16	-14	-19	-18	-24	-28	23	15	13	17	17	10	7	10	9	7	9	
MAURIPUR AP TO TORREJON AFB																			
53,000	-38	-29	-11	-20	-24	-33	-38	36	27	10	20	23	14	10	9	8	7	7	
40,000	-50	-42	-26	-34	-37	-48	-54	47	40	24	31	35	25	21	13	12	9	12	
30,000	-40	-35	-24	-28	-31	-40	-46	37	33	23	26	29	21	17	14	12	9	11	
20,000	-25	-23	-17	-16	-20	-26	-29	23	22	16	16	19	13	10	9	8	6	7	

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

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MINUS SIGNS DENOTE HEADWINDS.THE BOEING COMPANY
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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES																		
HEIGHT IN FEET	EQUIVALENT HEADWINDS*								STANDARD DEVIATION									
	D I R E C T								R E T U R N									
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
MAURIPUR AP TO TRAVIS AFB																		
53,000	7	4	3	3	4	1	-1	-9	-5	-4	-5	-5	-9	-11	7	5	4	5
40,000	8	5	2	3	4	-1	-4	-12	-7	-3	-6	-7	-12	-16	9	7	7	8
30,000	6	2	1	1	2	-4	-7	-9	-5	-2	-3	-5	-11	-14	9	9	8	8
20,000	4	1	1	1	2	-2	-5	-6	-3	-2	-2	-3	-8	-10	7	7	6	6
MAURIPUR AP TO WAKE AP																		
53,000	61	44	-6	24	33	8	-4	-64	-45	5	-25	-35	-54	-62	9	9	7	8
40,000	73	59	7	32	46	18	8	-75	-61	-8	-34	-48	-68	-75	10	10	8	10
30,000	64	47	4	26	36	13	5	-66	-49	-5	-27	-38	-57	-64	10	9	6	8
20,000	35	27	3	13	19	8	4	-36	-28	-4	-13	-20	-32	-36	7	6	5	5
MAURIPUR AP TO WESTOVER AFB																		
53,000	-29	-13	-6	-20	-16	-24	-29	27	12	6	19	15	8	5	8	6	5	6
40,000	-36	-22	-18	-28	-25	-34	-38	31	19	16	25	22	15	11	11	10	9	10
30,000	-32	-22	-18	-25	-24	-33	-37	29	19	16	22	21	13	9	12	11	10	11
20,000	-21	-15	-10	-16	-15	-21	-25	19	13	9	15	14	8	5	9	9	7	8
MAURIPUR AP TO WHEELUS AP																		
53,000	-49	-37	-4	-24	-30	-43	-49	48	36	4	23	29	13	5	10	9	8	8
40,000	-67	-58	-17	-40	-46	-63	-70	65	56	16	38	44	25	17	15	14	9	12
30,000	-57	-49	-15	-31	-37	-52	-61	54	47	14	29	35	21	15	15	13	8	11
20,000	-34	-30	-10	-17	-21	-31	-36	33	29	10	16	21	13	9	10	9	6	7
MCCHORD AFB TO MCGUIRE AFB																		
53,000	33	21	14	25	23	15	12	-35	-22	-15	-25	-23	-31	-36	11	9	7	9
40,000	51	33	37	39	40	28	22	-53	-35	-39	-42	-42	-54	-60	16	15	15	18
30,000	49	32	33	37	37	25	19	-52	-35	-34	-39	-39	-52	-60	19	18	14	18
20,000	34	23	22	26	26	17	13	-36	-24	-22	-27	-27	-36	-41	14	13	9	13
MCCHORD AFB TO MIDWAY NAS																		
53,000	-23	-19	-11	-17	-17	-25	-29	21	18	10	16	16	9	5	12	10	8	10
40,000	-50	-38	-19	-39	-36	-49	-56	46	35	17	36	33	21	15	16	14	12	15
30,000	-46	-40	-18	-35	-34	-47	-54	42	37	16	32	31	19	13	17	15	12	15
20,000	-32	-29	-13	-26	-24	-34	-39	30	27	13	24	23	14	10	13	11	8	11
MCCHORD AFB TO MILDENHALL AP																		
53,000	16	8	4	12	9	4	2	-18	-9	-4	-13	-10	-16	-19	8	6	4	6
40,000	15	13	10	15	13	7	3	-18	-15	-11	-17	-15	-22	-26	10	9	9	11
30,000	14	14	10	14	13	5	1	-17	-16	-12	-17	-16	-24	-29	12	12	11	13
20,000	8	10	6	9	8	2	-1	-10	-11	-7	-10	-10	-16	-19	10	9	8	9
MCCHORD AFB TO MINOT AFB																		
53,000	27	18	15	24	20	12	8	-28	-18	-15	-24	-21	-30	-34	14	12	10	11
40,000	38	26	31	34	32	18	10	-40	-27	-33	-36	-34	-48	-56	21	20	20	23
30,000	40	25	30	34	32	16	8	-42	-28	-31	-37	-34	-50	-59	25	24	19	25
20,000	27	18	20	24	22	11	6	-29	-19	-20	-26	-23	-34	-40	18	17	13	17
MCCHORD AFB TO MOSCOW INTERNATIONAL																		
53,000	4	9	0	7	5	0	-2	-6	-10	-1	-8	-6	-11	-13	8	6	4	6
40,000	2	5	1	4	3	-3	-6	-4	-6	-2	-6	-4	-10	-13	9	8	7	9
30,000	1	4	1	3	2	-5	-8	-3	-6	-3	-5	-4	-11	-15	10	10	10	10
20,000	0	3	1	0	1	-4	-7	-2	-4	-2	-1	-2	-7	-10	8	8	7	8
MCCHORD AFB TO MYRTLE BEACH AFB																		
53,000	35	23	11	23	22	14	10	-37	-24	-11	-24	-23	-33	-38	11	10	7	9
40,000	53	36	31	38	39	27	21	-56	-38	-32	-41	-41	-54	-61	17	16	14	18
30,000	48	33	25	34	34	22	16	-52	-35	-27	-37	-36	-50	-58	18	18	13	18
20,000	33	23	17	24	23	15	11	-35	-24	-17	-25	-24	-34	-40	13	13	8	13
MCCHORD AFB TO NOUASSEUR AB																		
53,000	19	11	12	16	14	10	7	-21	-12	-12	-17	-15	-20	-23	8	6	5	6
40,000	25	16	22	26	22	15	11	-28	-18	-23	-29	-24	-32	-36	11	10	10	11
30,000	25	17	21	25	22	14	10	-29	-20	-22	-28	-25	-33	-37	12	12	10	12
20,000	17	12	14	18	15	9	6	-19	-13	-15	-19	-16	-22	-26	10	9	7	9
MCCHORD AFB TO ORLY AP																		
53,000	17	8	5	12	10	5	3	-18	-9	-5	-13	-10	-16	-20	8	6	4	6
40,000	17	13	11	16	14	7	4	-19	-15	-12	-18	-16	-23	-27	10	10	9	11
30,000	16	14	11	15	14	6	2	-19	-17	-13	-18	-17	-25	-29	12	12	11	13
20,000	9	10	7	9	9	3	0	-11	-11	-8	-11	-10	-16	-20	10	9	7	9

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES								STANDARD DEVIATION											
	D I R E C T								R E T U R N											
	JAN	APR	JUL	OCT	**A50	A75	A85		JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT	
MCCHORD AFB TO PALAM AP																				
53,000	-12	-7	-5	-7	-7	-11	-14		10	6	4	5	6	2	1			6135 N.M.I.		
40,000	-12	-7	-7	-8	-8	-14	-17		10	5	5	6	6	1	-2		7	5	4	5
30,000	-10	-6	-5	-6	-7	-13	-16		7	4	3	3	4	-2	-5		9	7	7	8
20,000	-6	-3	-5	-4	-5	-9	-12		5	2	5	3	4	-1	-3		9	9	8	9
																	7	7	6	7
MCCHORD AFB TO PATRICK AFB																				
53,000	34	24	7	21	21	12	7		-36	-25	-8	-22	-22	-32	-37		11	10	7	9
40,000	48	36	23	35	35	23	17		-53	-39	-25	-38	-38	-51	-59		17	16	13	16
30,000	42	32	19	31	30	18	13		-46	-35	-20	-33	-33	-46	-53		17	17	12	17
20,000	29	21	12	20	19	11	8		-31	-23	-13	-21	-21	-30	-36		13	12	8	12
MCCHORD AFB TO PIARCO AP																				
53,000	28	22	2	15	17	7	3		-29	-23	-3	-15	-18	-27	-31		8	8	5	7
40,000	42	33	14	26	28	18	13		-46	-36	-16	-28	-31	-43	-49		12	12	9	12
30,000	35	28	12	22	23	14	10		-38	-30	-13	-23	-25	-36	-41		12	11	8	11
20,000	21	16	5	11	13	6	4		-22	-17	-5	-12	-14	-21	-25		9	-8	5	7
MCCHORD AFB TO POPE AFB																				
53,000	35	23	12	23	23	14	10		-36	-24	-12	-24	-23	-32	-38		11	10	7	9
40,000	53	35	32	38	39	27	21		-56	-38	-34	-41	-42	-55	-61		17	16	15	18
30,000	49	33	27	35	35	23	17		-52	-35	-28	-38	-37	-51	-59		19	18	13	18
20,000	33	23	18	25	24	15	11		-35	-24	-19	-26	-25	-35	-40		14	13	9	13
MCCHORD AFB TO PRESTWICK AB																				
53,000	16	8	4	12	9	4	2		-18	-9	-4	-13	-10	-16	-19		8	7	5	6
40,000	15	13	10	15	13	6	2		-17	-15	-11	-17	-15	-22	-26		10	10	9	11
30,000	13	14	10	14	13	5	0		-17	-16	-12	-17	-15	-24	-28		13	12	11	13
20,000	8	10	6	9	8	2	-1		-10	-11	-7	-10	-9	-16	-19		10	10	8	9
MCCHORD AFB TO RAMEY AFB																				
53,000	32	24	5	18	20	10	5		-34	-25	-5	-18	-21	-30	-34		9	8	6	8
40,000	47	37	19	30	33	21	16		-51	-40	-20	-33	-36	-48	-54		14	13	11	13
30,000	40	31	15	26	27	17	12		-43	-34	-16	-28	-29	-41	-47		14	13	9	13
20,000	25	19	8	14	16	9	6		-27	-20	-9	-15	-17	-25	-30		10	10	6	9
MCCHORD AFB TO RHEIN MAIN AB																				
53,000	16	8	3	11	9	4	2		-17	-8	-4	-12	-10	-15	-19		8	6	4	6
40,000	15	13	9	14	12	6	2		-17	-14	-10	-16	-14	-21	-25		10	9	9	10
30,000	13	13	8	13	12	4	0		-16	-16	-10	-16	-14	-23	-27		12	12	11	12
20,000	8	10	5	8	7	2	-2		-10	-11	-6	-9	-9	-15	-18		10	9	7	9
MCCHORD AFB TO SEOUL AB																				
53,000	-27	-15	-7	-23	-18	-25	-29		25	14	6	22	16	9	6		10	7	6	7
40,000	-29	-23	-20	-30	-25	-33	-37		26	20	18	27	23	15	11		11	10	11	11
30,000	-25	-20	-17	-24	-21	-30	-34		22	18	15	21	19	11	6		12	12	11	12
20,000	-17	-11	-10	-16	-13	-20	-23		15	10	9	14	12	5	2		10	9	8	9
MCCHORD AFB TO STEVENSON FIELD																				
53,000	25	17	15	23	20	12	8		-27	-17	-15	-23	-20	-28	-33		13	11	9	11
40,000	36	24	31	32	31	17	10		-38	-25	-33	-34	-32	-46	-54		19	18	19	22
30,000	38	24	30	33	31	16	8		-41	-26	-31	-35	-33	-48	-56		23	22	18	24
20,000	26	17	20	23	21	11	6		-28	-18	-20	-24	-22	-33	-39		16	15	12	16
MCCHORD AFB TO SUNG SHAN																				
53,000	-36	-21	-5	-25	-23	-31	-36		33	20	5	24	-21	11	6		9	7	6	7
40,000	-38	-30	-22	-36	-32	-40	-44		34	27	20	33	29	21	16		11	10	11	11
30,000	-35	-27	-19	-30	-28	-36	-41		31	24	17	26	24	16	12		11	11	10	12
20,000	-23	-16	-11	-19	-17	-24	-27		21	14	11	17	15	9	6		10	9	7	8
MCCHORD AFB TO TACHIKAWA AB																				
53,000	-33	-22	-9	-27	-23	-31	-35		32	21	9	26	22	13	10		10	7	6	8
40,000	-42	-34	-27	-45	-37	-47	-52		39	32	25	42	34	25	20		12	11	12	13
30,000	-39	-32	-25	-39	-33	-43	-48		35	29	23	36	30	21	16		13	13	12	14
20,000	-27	-20	-15	-26	-21	-29	-33		25	18	14	24	20	13	9		11	10	8	10
MCCHORD AFB TO TAN SAN NHUT																				
53,000	-32	-18	2	-18	-18	-26	-31		30	16	-3	17	16	5	-1		8	6	6	7
40,000	-34	-24	-14	-27	-25	-33	-37		30	21	12	24	22	14	10		9	9	9	9
30,000	-30	-21	-13	-21	-21	-29	-33		26	18	11	19	18	11	8		10	10	9	10
20,000	-18	-12	-8	-13	-13	-18	-21		16	10	8	12	11	6	4		8	7	6	7

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEADWINDS*							STANDARD DEVIATION						
	D I R E C T								R E T U R N							JAN	APR	JUL	OCT			
	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85								
MCCHORD AFB TO THULE AB																			2174 N.MI.			
53,000	3	3	2	6	3	-2	-5	-5	-5	-4	-2	-7	-4	-10	-13	10	8	6	8			
40,000	0	5	3	6	3	-5	-9	-2	-2	-6	-4	-8	-5	-13	-17	12	11	11	12			
30,000	-1	5	3	6	3	-6	-11	-2	-2	-7	-4	-9	-5	-15	-20	13	14	13	14			
20,000	-1	4	2	3	2	-5	-9	0	-5	-3	-5	-3	-10	-14		11	11	9	10			
MCCHORD AFB TO TORBAY AP																			2733 N.MI.			
53,000	25	15	15	22	19	13	10	-27	-16	-15	-23	-20	-26	-30		10	7	6	8			
40,000	35	23	33	35	32	22	17	-38	-24	-35	-38	-34	-44	-49		13	12	13	15			
30,000	36	24	31	34	31	21	15	-39	-26	-33	-36	-33	-44	-49		15	15	13	16			
20,000	25	15	21	23	21	14	10	-27	-16	-22	-25	-22	-30	-34		12	11	9	11			
MCCHORD AFB TO TORREJON AFB																			4620 N.MI.			
53,000	18	9	9	14	12	7	5	-20	-10	-9	-15	-13	-18	-21		8	6	5	6			
40,000	22	14	17	21	18	11	7	-25	-16	-18	-24	-21	-28	-32		11	10	10	11			
30,000	22	15	16	21	18	10	6	-25	-18	-18	-24	-21	-29	-34		12	12	11	12			
20,000	13	11	11	14	12	6	3	-16	-12	-12	-15	-14	-20	-23		10	9	7	9			
MCCHORD AFB TO TRAVIS AFB																			534 N.MI.			
53,000	8	0	-5	0	0	-9	-14	-11	-2	5	-2	-2	-12	-17		17	14	11	13			
40,000	7	5	-6	2	2	-15	-24	-13	-9	2	-7	-6	-24	-34		27	25	22	27			
30,000	6	4	-5	3	2	-16	-26	-13	-9	2	-8	-6	-25	-35		30	28	22	28			
20,000	4	1	-1	-1	1	-12	-19	-8	-3	0	-2	-2	-16	-23		23	21	14	20			
MCCHORD AFB TO WAKE AP																			3786 N.MI.			
53,000	-24	-18	-5	-12	-14	-22	-27	22	16	4	11	13	6	3		10	9	6	8			
40,000	-50	-40	-15	-32	-34	-47	-53	46	37	13	29	31	19	13		13	13	11	13			
30,000	-46	-38	-14	-29	-31	-44	-50	42	35	13	27	29	17	12		14	13	10	12			
20,000	-32	-27	-12	-21	-23	-31	-35	30	25	12	20	21	14	10		11	9	7	9			
MCCHORD AFB TO WESTOVER AFB																			2114 N.MI.			
53,000	32	20	15	25	22	15	12	-33	-21	-15	-25	-23	-31	-35		11	9	7	9			
40,000	48	32	38	39	39	28	22	-51	-34	-39	-41	-41	-52	-59		16	15	15	17			
30,000	48	31	34	37	37	25	19	-51	-33	-35	-39	-39	-52	-59		19	18	14	18			
20,000	33	22	22	26	25	17	13	-34	-23	-23	-27	-26	-35	-40		14	13	9	13			
MCCHORD AFB TO WHEELUS AP																			5438 N.MI.			
53,000	17	9	5	12	10	6	4	-19	-10	-6	-13	-11	-17	-20		7	6	4	6			
40,000	19	14	12	16	15	9	5	-22	-16	-14	-19	-17	-24	-28		10	9	9	10			
30,000	18	14	12	16	15	7	3	-21	-17	-14	-19	-17	-25	-29		12	11	10	12			
20,000	11	10	8	10	10	4	1	-13	-11	-9	-11	-11	-17	-20		9	9	7	8			
MCGUIRE AFB TO MIDWAY NAS																			4867 N.MI.			
53,000	-28	-20	-12	-21	-20	-26	-30	26	19	12	20	19	13	10		9	7	6	7			
40,000	-50	-36	-27	-40	-38	-48	-53	47	34	25	37	35	26	22		12	11	10	12			
30,000	-48	-37	-25	-37	-36	-46	-52	45	34	23	34	33	24	19		13	12	9	13			
20,000	-34	-26	-17	-26	-25	-33	-37	32	25	17	25	24	17	14		10	9	6	9			
MCGUIRE AFB TO MILDENHALL AP																			3058 N.MI.			
53,000	31	16	13	23	20	13	10	-32	-17	-14	-24	-20	-28	-33		10	8	7	8			
40,000	47	28	33	43	37	26	21	-50	-30	-35	-46	-40	-51	-57		15	14	13	16			
30,000	47	28	31	40	36	24	18	-51	-31	-34	-43	-39	-52	-59		19	17	14	17			
20,000	33	20	21	27	25	16	11	-35	-22	-22	-29	-26	-36	-41		14	13	10	13			
MCGUIRE AFB TO MINOT AFB																			1243 N.MI.			
53,000	-36	-23	-15	-25	-24	-33	-39	35	22	14	24	23	14	10		13	12	9	11			
40,000	-58	-38	-42	-43	-45	-59	-67	54	36	40	40	42	28	21		21	19	18	22			
30,000	-56	-37	-35	-39	-41	-57	-65	52	35	34	37	39	24	17		23	22	16	23			
20,000	-38	-26	-23	-27	-28	-39	-45	36	25	23	26	27	16	11		17	17	11	16			
MCGUIRE AFB TO MOSCOW INTERNATIONAL																			4102 N.MI.			
53,000	29	13	7	20	16	9	6	-30	-14	-8	-21	-17	-25	-30		9	7	5	7			
40,000	35	22	18	29	26	17	13	-37	-24	-20	-32	-28	-37	-42		12	11	10	12			
30,000	33	23	17	25	24	14	9	-37	-26	-20	-28	-27	-37	-43		15	14	12	14			
20,000	21	15	10	17	15	8	5	-23	-17	-11	-18	-17	-25	-29		11	11	8	11			
MCGUIRE AFB TO MYRTLE BEACH AFB																			433 N.MI.			
53,000	-29	-17	1	-16	-14	-28	-35	24	14	-2	14	11	-1	-6		17	17	11	16			
40,000	-42	-30	-9	-34	-28	-48	-59	30	23	6	29	21	3	-7		27	28	21	27			
30,000	-38	-27	-10	-29	-24	-43	-54	28	21	8	24	19	2	-6		26	28	17	27			
20,000	-29	-17	-8	-18	-17	-31	-39	25	14	8	16	14	2	-4		21	21	12	20			

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HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	D I R E C T							R E T U R N							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85				
MCGUIRE AFB TO NOUASSEUR AB																		3172 N.MI.
53,000	31	22	13	20	21	14	11	-32	-23	-13	-21	-21	-29	-33	10	8	6	8
40,000	42	35	28	38	35	26	21	-45	-37	-29	-40	-37	-47	-53	15	14	12	14
30,000	40	33	24	34	32	23	18	-42	-35	-26	-36	-34	-44	-50	15	14	10	14
20,000	30	22	18	24	23	16	12	-32	-24	-19	-25	-24	-32	-36	12	11	7	10
MCGUIRE AFB TO ORLY AP																		3200 N.MI.
53,000	30	16	14	23	20	13	11	-32	-17	-14	-23	-21	-28	-33	10	8	7	8
40,000	47	28	34	44	38	27	21	-49	-30	-36	-46	-40	-51	-57	15	14	13	16
30,000	47	29	32	41	37	25	19	-51	-31	-34	-44	-39	-52	-58	18	17	14	17
20,000	34	20	22	28	25	17	13	-36	-22	-23	-30	-27	-36	-41	14	13	9	12
MCGUIRE AFB TO PALAM AP																		6393 N.MI.
53,000	23	10	5	16	13	7	4	-25	-11	-5	-18	-14	-21	-25	8	6	5	6
40,000	21	15	12	21	17	11	7	-25	-18	-14	-24	-20	-27	-30	10	9	8	9
30,000	19	16	12	19	16	9	6	-23	-19	-14	-21	-19	-26	-30	11	10	9	10
20,000	13	11	7	12	10	5	2	-14	-12	-7	-13	-12	-17	-20	8	8	6	8
MCGUIRE AFB TO PATRICK AFB																		766 N.MI.
53,000	-23	-12	3	-11	-10	-23	-29	18	9	-3	9	7	-3	-8	15	15	10	15
40,000	-33	-26	-2	-25	-21	-39	-49	22	18	0	20	14	-2	-10	24	25	18	24
30,000	-29	-19	-4	-21	-17	-33	-42	20	13	3	17	12	-2	-9	21	23	15	22
20,000	-21	-13	-6	-14	-12	-24	-31	17	10	5	12	10	0	-5	18	18	10	16
MCGUIRE AFB TO PIARCO AP																		1901 N.MI.
53,000	15	15	1	7	8	1	-2	-18	-17	-1	-8	-10	-19	-24	11	11	7	9
40,000	20	15	3	9	11	1	-4	-27	-21	-4	-12	-15	-27	-34	15	16	11	15
30,000	18	15	2	6	9	1	-4	-23	-18	-3	-8	-12	-23	-29	15	14	9	12
20,000	10	8	-2	-1	3	-4	-7	-12	-10	1	0	-4	-12	-16	11	10	6	8
MCGUIRE AFB TO POPE AFB																		359 N.MI.
53,000	-35	-20	0	-19	-17	-32	-40	30	17	0	17	15	2	-4	18	17	12	16
40,000	-50	-35	-13	-39	-34	-55	-65	39	29	10	34	27	8	-2	28	29	22	28
30,000	-46	-32	-13	-33	-29	-50	-61	37	26	12	29	24	7	-2	27	29	18	28
20,000	-34	-20	-11	-21	-20	-35	-44	30	17	10	19	17	5	-1	22	21	12	21
MCGUIRE AFB TO PRESTWICK AB																		2837 N.MI.
53,000	31	15	13	24	20	13	9	-33	-16	-13	-24	-20	-29	-34	11	8	7	9
40,000	47	28	31	42	37	25	20	-50	-30	-34	-45	-39	-51	-57	16	14	14	16
30,000	47	28	30	39	36	23	17	-51	-32	-33	-42	-39	-52	-59	19	18	15	18
20,000	32	20	19	26	24	15	10	-35	-22	-20	-28	-25	-35	-41	15	14	10	13
MCGUIRE AFB TO RAMEY AFB																		1347 N.MI.
53,000	13	14	3	6	8	0	-4	-17	-17	-3	-7	-10	-20	-25	13	13	8	12
40,000	18	14	6	7	11	-1	-8	-27	-22	-7	-11	-16	-29	-36	19	20	14	18
30,000	17	14	4	5	9	-1	-7	-23	-18	-5	-8	-12	-24	-32	19	17	11	16
20,000	9	8	-1	-3	2	-5	-9	-12	-10	1	1	-4	-13	-18	13	13	7	11
MCGUIRE AFB TO RHEIN MAIN AB																		3392 N.MI.
53,000	30	16	13	22	19	13	10	-31	-16	-14	-23	-20	-27	-32	10	7	6	8
40,000	45	27	32	42	36	26	20	-48	-29	-34	-45	-38	-50	-55	15	13	13	15
30,000	45	27	31	39	35	23	17	-49	-30	-33	-42	-38	-50	-57	18	16	14	17
20,000	32	19	20	26	24	16	11	-34	-21	-21	-28	-26	-35	-39	14	13	9	12
MCGUIRE AFB TO SEOUL AB																		6000 N.MI.
53,000	-17	-8	-5	-11	-9	-14	-18	15	7	5	9	8	4	2	8	5	4	6
40,000	-11	-10	-13	-14	-12	-17	-20	8	8	11	11	9	4	1	8	8	8	8
30,000	-10	-10	-13	-12	-11	-17	-20	7	8	11	10	9	3	0	9	9	8	9
20,000	-5	-6	-9	-8	-7	-12	-14	3	5	8	6	6	1	-2	7	7	6	7
MCGUIRE AFB TO STEVENSON FIELD																		1123 N.MI.
53,000	-34	-21	-14	-23	-22	-32	-37	32	20	14	22	21	13	8	14	12	10	12
40,000	-54	-35	-39	-40	-42	-56	-65	50	32	37	37	39	24	17	21	20	19	22
30,000	-52	-35	-34	-37	-39	-54	-64	48	32	32	34	36	21	14	24	23	17	23
20,000	-36	-25	-23	-25	-27	-38	-44	34	23	22	24	25	15	9	18	17	11	17
MCGUIRE AFB TO SUNG SHAN																		6792 N.MI.
53,000	-18	-8	-3	-10	-9	-15	-18	15	6	3	8	7	3	1	8	6	4	6
40,000	-11	-10	-12	-12	-11	-17	-20	7	7	11	8	8	3	0	8	8	8	8
30,000	-10	-9	-12	-10	-10	-16	-19	6	6	10	8	8	2	-1	9	9	8	8
20,000	-5	-5	-8	-6	-6	-11	-13	3	4	7	5	5	0	-2	7	7	6	7

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION							
	D I R E C T								R E T U R N											
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT		
MCGUIRE AFB TO TACHIKAWA A8																				
53,000	-26	-12	-6	-18	-14	-22	-26	24	11	5	16	13	7	5	8	6	5	6		
40,000	-24	-17	-16	-25	-20	-27	-30	20	15	14	22	18	11	8	9	8	9	9		
30,000	-22	-17	-16	-21	-19	-26	-29	18	14	15	19	16	10	6	10	10	9	10		
20,000	-15	-11	-11	-14	-13	-18	-20	13	10	10	12	11	6	4	8	8	6	7		
MCGUIRE AFB TO TAN SAN NHUT																				
53,000	-4	-2	1	-1	-1	-5	-8	1	1	-2	0	0	-4	-6	7	5	4	5		
40,000	-1	1	-3	0	-1	-6	-8	-4	-4	1	-3	-2	-7	-10	8	7	7	8		
30,000	1	1	-3	-1	0	-6	-9	-5	-4	2	-2	-2	-8	-11	8	9	7	8		
20,000	3	1	-2	0	0	-4	-6	-5	-2	1	-1	-2	-6	-8	7	6	5	6		
MCGUIRE AFB TO THULE AB																				
53,000	5	0	-1	3	1	-4	-7	-7	-1	1	-5	-3	-9	-12	11	8	6	8		
40,000	6	0	-2	3	1	-8	-12	-11	-2	-1	-6	-5	-14	-19	14	13	12	14		
30,000	5	0	-2	3	1	-9	-14	-10	-3	-1	-7	-5	-15	-21	16	15	14	15		
20,000	4	0	-1	2	1	-6	-11	-7	-2	-1	-4	-3	-11	-15	12	12	10	12		
MCGUIRE AFB TO TORBAY AP																				
53,000	39	22	12	28	24	13	8	-40	-23	-13	-29	-25	-37	-44	16	13	10	13		
40,000	59	39	36	51	46	30	21	-62	-42	-39	-54	-49	-66	-76	24	23	21	24		
30,000	56	38	34	46	43	26	18	-61	-41	-36	-49	-46	-63	-73	28	25	19	24		
20,000	40	26	22	31	29	17	11	-42	-28	-23	-33	-30	-44	-51	20	19	13	18		
MCGUIRE AFB TO TORREJON AFB																				
53,000	30	19	15	21	20	14	11	-31	-20	-15	-22	-21	-28	-33	10	8	7	8		
40,000	45	31	33	42	37	27	22	-47	-33	-34	-44	-39	-50	-56	15	14	13	15		
30,000	44	31	30	39	35	25	20	-47	-33	-32	-41	-38	-49	-55	16	15	12	15		
20,000	33	22	22	28	25	18	14	-34	-23	-23	-29	-27	-35	-40	13	12	8	11		
MCGUIRE AFB TO TRAVIS AFB																				
53,000	-38	-27	-13	-25	-25	-35	-40	37	27	13	24	24	16	12	11	10	7	9		
40,000	-62	-42	-40	-44	-46	-59	-66	59	40	38	41	44	32	26	18	16	14	17		
30,000	-56	-39	-31	-38	-40	-53	-61	53	37	30	36	38	26	20	19	18	12	18		
20,000	-37	-26	-20	-25	-26	-35	-41	35	24	20	24	25	16	12	14	13	8	13		
MCGUIRE AFB TO WAKE AP																				
53,000	-27	-18	-8	-17	-17	-24	-27	25	17	8	16	16	10	7	8	7	5	6		
40,000	-49	-37	-23	-35	-36	-46	-51	45	34	21	32	33	24	19	11	10	9	11		
30,000	-47	-35	-22	-33	-34	-44	-49	43	33	20	31	31	22	18	12	11	9	11		
20,000	-33	-25	-16	-24	-24	-31	-35	31	24	16	23	23	17	14	9	8	6	8		
MCGUIRE AFB TO WESTOVER AFB																				
53,000	28	14	3	20	15	3	-3	-32	-16	-4	-22	-18	-31	-39	19	17	13	16		
40,000	39	26	18	34	29	9	-2	-49	-32	-22	-40	-35	-56	-67	31	30	26	30		
30,000	37	24	18	30	26	6	-4	-47	-30	-20	-34	-32	-53	-65	34	32	22	31		
20,000	30	16	12	21	18	5	-3	-34	-19	-14	-23	-21	-37	-46	24	24	14	23		
MCGUIRE AFB TO WHEELUS AP																				
53,000	30	20	14	20	20	15	12	-31	-21	-15	-21	-21	-27	-31	9	7	6	7		
40,000	43	31	31	38	35	27	22	-45	-33	-32	-41	-37	-46	-51	13	12	11	13		
30,000	40	30	28	36	33	24	20	-43	-32	-29	-38	-35	-44	-50	14	13	10	13		
20,000	30	21	21	25	24	17	14	-32	-22	-21	-26	-25	-32	-36	11	10	7	9		
MIDWAY NAS TO MILDENHALL AP																				
53,000	3	2	-1	1	1	-3	-5	-6	-3	1	-2	-2	-6	-9	8	6	4	6		
40,000	5	1	-1	-2	0	-6	-9	-9	-4	0	-1	-3	-9	-13	9	8	8	9		
30,000	2	1	-1	-3	0	-7	-11	-6	-4	-1	0	-3	-10	-13	11	10	10	10		
20,000	1	2	0	-2	0	-5	-8	-3	-4	-1	1	-2	-7	-10	9	8	7	7		
MIDWAY NAS TO MINOT AFB																				
53,000	22	17	11	18	16	11	8	-24	-18	-11	-19	-18	-24	-28	10	8	6	8		
40,000	43	32	20	35	32	22	17	-46	-35	-21	-38	-35	-46	-52	13	12	11	13		
30,000	41	33	19	33	31	21	15	-44	-36	-21	-36	-34	-45	-51	15	14	11	14		
20,000	30	25	14	25	23	16	12	-32	-26	-15	-26	-24	-32	-37	12	10	7	10		
MIDWAY NAS TO MOSCOW INTERNATIONAL																				
53,000	-9	-9	-6	-9	-8	-12	-14	6	8	6	8	7	3	1	8	5	4	6		
40,000	-9	-12	-13	-17	-13	-19	-22	5	9	12	14	10	4	0	9	9	8	9		
30,000	-7	-12	-10	-13	-10	-17	-20	4	9	9	10	8	1	-2	10	10	8	10		
20,000	-5	-8	-8	-8	-7	-12	-15	3	7	7	7	6	1	-2	8	8	6	7		

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION					
	D I R E C T							R E T U R N							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85				
MIDWAY NAS TO MYRTLE BEACH AFB																		
53,000	29	23	10	19	20	13	10	-31	-24	-11	-20	-21	-29	-33	9	8	6	7
40,000	53	38	23	37	37	27	21	-56	-41	-24	-40	-40	-51	-57	12	12	10	12
30,000	46	36	19	32	32	22	17	-50	-39	-20	-34	-35	-47	-53	13	12	9	12
20,000	31	25	13	22	22	15	11	-33	-26	-13	-23	-23	-31	-36	10	9	6	9
MIDWAY NAS TO NOUASSEUR AB																		
53,000	8	4	0	5	4	0	-2	-10	-5	-1	-6	-5	-10	-13	8	6	4	6
40,000	8	6	3	3	5	-1	-4	-12	-9	-5	-7	-8	-14	-18	9	8	8	9
30,000	7	6	4	4	5	-2	-5	-11	-9	-6	-7	-8	-15	-19	11	10	9	10
20,000	4	4	3	1	3	-2	-5	-6	-6	-4	-3	-5	-10	-13	9	8	6	7
MIDWAY NAS TO ORLY AP																		
53,000	3	2	-1	0	0	-3	-5	-5	-3	1	-1	-1	-6	-8	8	6	4	6
40,000	5	0	-2	-3	0	-6	-9	-9	-3	0	0	-3	-9	-12	9	8	8	9
30,000	2	0	-2	-3	-1	-8	-11	-6	-3	-1	0	-2	-9	-13	11	10	9	10
20,000	1	2	0	-3	0	-5	-8	-3	-4	-1	1	-2	-7	-10	9	8	7	7
MIDWAY NAS TO PALAM AP																		
53,000	-57	-44	-13	-40	-41	-51	-56	54	42	12	39	40	25	14	10	8	7	8
40,000	-73	-55	-29	-48	-51	-65	-71	69	52	27	45	48	35	28	12	10	10	11
30,000	-61	-48	-21	-39	-42	-55	-61	58	45	20	37	40	27	21	11	11	8	10
20,000	-40	-29	-12	-23	-26	-35	-40	38	28	12	22	25	16	12	8	7	6	7
MIDWAY NAS TO PATRICK AFB																		
53,000	31	26	7	18	20	12	8	-33	-27	-8	-19	-22	-30	-34	9	8	6	7
40,000	53	41	18	36	37	24	18	-56	-43	-19	-38	-39	-51	-57	12	11	9	11
30,000	44	37	14	29	31	19	14	-48	-39	-15	-31	-33	-45	-51	13	11	8	11
20,000	29	24	8	18	19	11	8	-31	-25	-9	-19	-20	-29	-33	10	8	5	8
MIDWAY NAS TO PIARCO AP																		
53,000	27	24	1	12	17	6	1	-28	-25	-1	-13	-17	-26	-30	8	7	5	6
40,000	45	39	9	26	31	17	11	-48	-41	-11	-28	-33	-45	-50	10	10	8	9
30,000	36	32	7	20	24	13	8	-39	-34	-8	-21	-26	-36	-41	10	9	6	8
20,000	21	18	1	10	12	4	1	-22	-19	-1	-10	-13	-20	-24	8	6	4	6
MIDWAY NAS TO POPE AFB																		
53,000	29	22	11	20	20	13	10	-30	-23	-11	-20	-21	-28	-32	9	8	6	7
40,000	52	37	24	37	37	27	22	-55	-40	-25	-40	-39	-51	-57	12	12	10	12
30,000	46	36	20	32	33	23	18	-50	-39	-21	-35	-35	-47	-53	14	12	9	12
20,000	32	25	14	23	23	15	12	-33	-26	-14	-24	-24	-32	-36	10	9	6	9
MIDWAY NAS TO PRESTWICK AB																		
53,000	5	3	-1	2	2	-2	-4	-7	-4	1	-3	-3	-7	-10	8	6	4	6
40,000	5	3	0	-1	2	-4	-7	-9	-6	-2	-2	-5	-11	-14	9	8	8	9
30,000	2	3	1	-1	1	-5	-9	-6	-6	-3	-2	-5	-11	-15	11	10	10	10
20,000	1	2	2	-1	1	-4	-7	-4	-4	-3	0	-3	-8	-11	9	8	7	8
MIDWAY NAS TO RAMEY AFB																		
53,000	30	26	4	15	19	9	5	-32	-27	-5	-16	-20	-29	-33	8	7	5	7
40,000	50	42	14	31	35	21	15	-53	-44	-15	-33	-37	-50	-55	11	11	8	10
30,000	41	36	11	25	28	16	11	-44	-38	-12	-26	-30	-41	-47	11	10	7	9
20,000	25	22	5	14	16	8	5	-27	-23	-5	-14	-17	-25	-29	8	7	5	7
MIDWAY NAS TO RHEIN MAIN AB																		
53,000	-2	0	-3	-4	-2	-6	-8	0	-1	2	3	1	-3	-5	8	6	4	6
40,000	1	-3	-5	-7	-4	-10	-13	-5	0	4	4	1	-5	-9	9	8	8	9
30,000	-1	-3	-5	-7	-4	-11	-14	-3	0	3	4	1	-6	-9	10	10	9	10
20,000	-1	0	-4	-5	-3	-8	-10	-1	-1	3	3	1	-4	-7	9	8	7	7
MIDWAY NAS TO SEOUL AB																		
53,000	-64	-49	-11	-34	-41	-56	-64	62	48	11	33	39	21	12	13	11	9	11
40,000	-90	-67	-30	-56	-61	-80	-89	87	64	29	53	58	39	30	15	15	14	16
30,000	-80	-59	-23	-48	-53	-70	-79	76	57	22	46	50	32	24	15	14	11	14
20,000	-52	-38	-15	-29	-33	-45	-52	51	37	14	28	32	20	15	11	10	8	9
MIDWAY NAS TO STEVENSON FIELD																		
53,000	21	16	11	18	16	10	7	-23	-17	-11	-19	-17	-23	-27	10	8	6	8
40,000	41	31	19	35	31	21	16	-45	-34	-21	-37	-34	-44	-50	13	12	11	13
30,000	40	32	19	33	31	20	15	-43	-35	-21	-36	-33	-44	-50	14	13	11	14
20,000	29	24	15	25	23	16	12	-31	-26	-15	-26	-24	-32	-36	11	10	7	10

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	DIRECT							RETURN							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85				
MIDWAY NAS TO SUNG SHAN															3246 N.M.I.			
53,000	-65	-44	6	-15	-29	-55	-64	64	43	-7	14	28	3	-5	11	11	8	10
40,000	-89	-71	-11	-40	-55	-80	-89	88	69	9	38	53	22	12	13	14	11	13
30,000	-82	-57	-10	-34	-46	-69	-79	80	56	9	33	44	19	11	12	12	9	12
20,000	-53	-36	-10	-19	-27	-44	-52	52	36	9	19	27	14	9	9	8	6	8
MIDWAY NAS TO TACHIKAWA AB															2227 N.M.I.			
53,000	-64	-48	-8	-27	-36	-55	-64	62	47	7	26	35	16	8	15	13	10	12
40,000	-97	-72	-26	-53	-63	-85	-96	94	70	24	51	60	36	25	17	17	15	18
30,000	-85	-61	-22	-46	-53	-73	-84	82	59	21	44	51	31	22	17	16	12	15
20,000	-56	-40	-15	-27	-33	-48	-55	54	39	14	26	32	19	14	12	11	8	10
MIDWAY NAS TO TAN SAN NHUT															4358 N.M.I.			
53,000	-40	-20	22	4	-7	-30	-38	39	19	-22	-5	6	-14	-21	8	8	6	7
40,000	-56	-44	7	-15	-28	-50	-56	55	42	-8	14	27	2	-6	10	10	8	9
30,000	-51	-35	1	-14	-24	-43	-50	50	34	-2	13	23	5	-1	9	9	6	8
20,000	-30	-21	-3	-7	-14	-25	-30	29	20	3	7	13	5	2	7	6	5	5
MIDWAY NAS TO THULE AB															4008 N.M.I.			
53,000	11	6	2	8	6	1	-1	-13	-7	-2	-9	-7	-13	-16	9	7	5	7
40,000	12	11	7	8	9	3	-1	-17	-14	-8	-11	-12	-20	-23	11	10	9	10
30,000	10	10	8	9	9	2	-2	-14	-13	-10	-12	-12	-20	-24	12	11	10	11
20,000	8	7	6	5	7	1	-2	-10	-9	-7	-7	-8	-14	-17	10	9	7	8
MIDWAY NAS TO TORBAY AP															5361 N.M.I.			
53,000	19	11	8	15	13	8	5	-21	-12	-8	-16	-14	-20	-23	8	6	5	7
40,000	29	22	18	28	24	17	13	-33	-25	-20	-31	-27	-35	-39	10	10	9	11
30,000	28	22	18	26	23	16	12	-32	-25	-20	-29	-26	-34	-39	11	11	10	11
20,000	21	17	13	19	17	12	9	-23	-18	-14	-21	-19	-25	-28	9	8	7	8
MIDWAY NAS TO TORREJON AFB															6665 N.M.I.			
53,000	6	3	-1	3	2	-2	-3	-8	-4	0	-4	-3	-8	-11	8	6	4	6
40,000	7	4	1	0	3	-3	-6	-11	-7	-3	-4	-6	-12	-15	9	8	8	9
30,000	4	3	2	0	2	-4	-8	-8	-7	-4	-4	-6	-12	-16	11	10	9	10
20,000	3	2	2	-1	2	-4	-6	-5	-4	-3	-1	-3	-8	-11	9	8	7	7
MIDWAY NAS TO TRAVIS AFB															2805 N.M.I.			
53,000	25	22	10	16	17	10	6	-27	-23	-10	-17	-19	-27	-32	12	10	8	10
40,000	50	37	16	33	33	21	15	-53	-39	-18	-35	-36	-49	-56	16	14	12	14
30,000	42	35	13	27	28	16	11	-45	-37	-14	-29	-30	-43	-51	17	14	10	14
20,000	28	23	8	18	19	10	6	-29	-24	-8	-19	-20	-29	-34	12	10	7	10
MIDWAY NAS TO WAKE AP															1026 N.M.I.			
53,000	-23	-12	11	6	-2	-18	-26	21	11	-11	-7	1	-10	-15	15	14	9	11
40,000	-44	-37	1	-4	-19	-40	-51	40	33	-2	3	17	-1	-8	18	21	15	17
30,000	-36	-25	1	-3	-13	-30	-40	32	23	-1	2	11	-1	-7	18	17	11	14
20,000	-22	-11	-1	0	-7	-17	-23	21	10	1	-1	6	-2	-6	14	11	8	10
MIDWAY NAS TO WESTOVER AFB															4881 N.M.I.			
53,000	25	18	12	19	18	12	10	-26	-19	-12	-20	-19	-25	-28	9	7	6	7
40,000	44	32	24	36	34	25	21	-48	-35	-26	-39	-36	-46	-51	12	11	10	12
30,000	43	33	23	34	33	23	19	-46	-36	-25	-37	-35	-45	-51	13	12	10	12
20,000	31	24	17	25	24	17	14	-33	-26	-18	-27	-25	-32	-36	10	9	7	9
MIDWAY NAS TO WHEELUS AP															7084 N.M.I.			
53,000	-4	-4	-5	-5	-5	-8	-10	2	3	4	4	3	0	-2	8	5	4	6
40,000	-2	-6	-9	-10	-7	-13	-16	-2	3	8	7	4	-2	-6	9	8	8	9
30,000	-2	-6	-9	-9	-7	-13	-16	-1	3	7	6	4	-3	-7	10	10	8	9
20,000	-2	-4	-6	-6	-5	-9	-12	0	2	5	4	3	-2	-5	8	7	6	7
MILDENHALL AP TO MINOT AFB															3568 N.M.I.			
53,000	-24	-10	-8	-15	-13	-20	-24	22	10	7	15	12	7	5	9	7	5	7
40,000	-29	-18	-20	-24	-23	-31	-35	27	17	18	22	21	13	8	12	11	11	13
30,000	-27	-20	-19	-23	-22	-32	-37	24	17	17	20	20	10	5	14	14	12	14
20,000	-17	-13	-11	-15	-14	-21	-25	15	12	10	13	12	6	2	11	11	9	11
MILDENHALL AP TO MOSCOW INTERNATIONAL															1307 N.M.I.			
53,000	21	12	10	14	14	7	3	-23	-13	-10	-15	-14	-22	-27	14	11	8	10
40,000	20	16	23	24	21	8	1	-23	-17	-24	-26	-23	-36	-42	20	18	17	21
30,000	18	14	22	22	19	3	-5	-21	-17	-24	-25	-22	-38	-46	24	24	21	25
20,000	15	12	16	17	15	4	-2	-17	-13	-16	-19	-16	-27	-34	18	17	14	17

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION					
	DIRECT							RETURN							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85				
MILDENHALL AP TO MYRTLE BEACH AFB																		
53,000	-33	-18	-12	-23	-20	-29	-33	31	17	11	22	20	13	10	3469 N.MI.			
40,000	-51	-33	-32	-45	-40	-51	-57	47	30	30	43	37	26	21	10	8		
30,000	-51	-33	-31	-42	-39	-51	-57	47	30	29	39	36	24	19	15	14		
20,000	-37	-23	-21	-28	-26	-36	-41	34	21	20	27	25	17	13	17	16		
MILDENHALL AP TO NOUASSEUR AB																		
53,000	0	-4	-6	0	-3	-10	-14	-2	3	5	-1	2	-6	-10	1191 N.MI.			
40,000	4	-5	-11	-8	-5	-18	-25	-8	2	8	5	2	-11	-19	13	11		
30,000	5	-4	-11	-7	-5	-18	-25	-9	1	9	3	2	-13	-21	21	18		
20,000	3	-3	-9	-5	-4	-14	-19	-5	2	7	4	3	-7	-13	22	20		
MILDENHALL AP TO ORLY AP																		
53,000	17	6	3	8	8	-2	-6	-18	-7	-4	-8	-9	-19	-25	230 N.MI.			
40,000	21	9	7	12	12	-6	-15	-24	-11	-10	-16	-15	-33	-43	18	13		
30,000	24	9	6	12	12	-9	-21	-27	-11	-9	-17	-16	-37	-49	27	25		
20,000	15	5	2	5	6	-8	-16	-17	-7	-4	-7	-8	-23	-32	34	32		
MILDENHALL AP TO PALAM AP																		
53,000	29	15	10	22	18	11	8	-31	-17	-11	-23	-19	-27	-32	3589 N.MI.			
40,000	27	18	21	26	23	14	10	-30	-20	-22	-28	-25	-34	-38	10	7		
30,000	23	18	21	23	21	13	9	-26	-20	-22	-25	-23	-32	-36	13	11		
20,000	16	12	11	15	14	8	5	-17	-13	-12	-16	-14	-21	-24	13	12		
MILDENHALL AP TO PATRICK AFB																		
53,000	-33	-19	-10	-21	-20	-28	-33	31	17	10	20	19	12	8	3764 N.MI.			
40,000	-49	-34	-28	-42	-38	-49	-54	45	31	26	39	35	25	20	9	8		
30,000	-49	-33	-27	-39	-36	-48	-54	45	30	25	36	33	23	18	14	13		
20,000	-35	-24	-19	-27	-25	-34	-39	33	22	19	25	24	16	13	16	15		
MILDENHALL AP TO PIARCO AP																		
53,000	-14	-13	-5	-6	-9	-15	-18	13	12	4	5	8	3	0	3877 N.MI.			
40,000	-25	-24	-14	-15	-19	-28	-32	22	21	13	13	17	9	5	8	7		
30,000	-19	-18	-12	-13	-15	-23	-27	16	16	11	12	13	6	2	12	11		
20,000	-11	-9	-9	-10	-10	-15	-18	10	8	8	9	9	3	1	12	12		
MILDENHALL AP TO POPE AFB																		
53,000	-33	-18	-12	-24	-21	-29	-33	32	17	12	23	20	13	10	3410 N.MI.			
40,000	-51	-32	-33	-46	-40	-51	-57	47	30	31	43	37	27	21	10	8		
30,000	-51	-33	-32	-43	-39	-51	-58	47	29	30	39	36	24	19	15	14		
20,000	-36	-23	-21	-28	-26	-35	-41	34	21	20	27	25	16	12	17	16		
MILDENHALL AP TO PRESTWICK AB																		
53,000	-24	-12	-6	-12	-12	-23	-29	23	11	5	12	11	2	-3	259 N.MI.			
40,000	-33	-18	-19	-25	-23	-42	-52	30	16	17	22	21	3	-7	18	13		
30,000	-33	-18	-17	-26	-23	-46	-58	29	15	14	22	20	-3	-15	28	24		
20,000	-23	-13	-11	-15	-15	-31	-40	21	11	10	13	13	-2	-11	35	33		
MILDENHALL AP TO RAMEY AFB																		
53,000	-21	-15	-6	-10	-12	-19	-23	19	14	6	9	11	5	3	3711 N.MI.			
40,000	-33	-28	-17	-23	-25	-35	-40	30	25	16	20	22	14	9	9	8		
30,000	-29	-25	-15	-22	-22	-32	-37	26	22	14	20	20	11	7	13	13		
20,000	-20	-17	-14	-17	-16	-23	-27	19	16	13	15	15	9	6	14	13		
MILDENHALL AP TO RHEIN MAIN AB																		
53,000	24	13	10	13	14	5	1	-25	-14	-11	-14	-15	-25	-31	334 N.MI.			
40,000	30	15	23	28	24	6	-3	-32	-17	-25	-30	-26	-43	-53	17	13		
30,000	28	15	22	28	23	2	-9	-31	-18	-25	-31	-26	-47	-59	26	24		
20,000	21	12	15	18	16	2	-6	-23	-13	-16	-19	-17	-32	-40	33	31		
MILDENHALL AP TO SEOUL AB																		
53,000	17	14	8	14	13	8	6	-20	-15	-9	-16	-14	-20	-23	4727 N.MI.			
40,000	23	21	15	25	21	14	10	-26	-23	-17	-27	-23	-30	-34	9	6		
30,000	19	22	12	20	18	11	6	-22	-24	-14	-22	-21	-28	-33	11	9		
20,000	16	16	9	16	14	8	5	-17	-17	-10	-17	-15	-21	-24	11	11		
MILDENHALL AP TO STEVENSON FIELD																		
53,000	-24	-11	-8	-16	-13	-20	-25	23	10	7	15	13	7	5	3386 N.MI.			
40,000	-30	-18	-20	-25	-23	-32	-36	28	17	18	23	21	13	8	9	7		
30,000	-28	-20	-19	-24	-23	-33	-38	25	18	17	21	20	10	5	12	11		
20,000	-18	-13	-11	-15	-14	-22	-26	16	12	10	14	13	6	2	15	14		

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION			
	DIRECT						RETURN						JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85		
MILDENHALL AP TO SUNG SHAN																
53,000	22	17	9	17	16	10	8	-25	-19	-10	-18	-18	-24	-27	5228 N.MI.	
40,000	26	26	16	27	24	16	12	-30	-28	-17	-29	-26	-34	-38	9	7 5 6
30,000	24	25	12	20	20	12	8	-28	-28	-14	-22	-23	-31	-36	11	9 9 10
20,000	18	16	9	16	15	9	6	-19	-17	-10	-17	-16	-22	-25	11	11 9 11
															8	8 7 8
MILDENHALL AP TO TACHIKAWA AB																
53,000	13	11	7	11	10	6	3	-16	-12	-7	-12	-11	-16	-19	5096 N.MI.	
40,000	20	16	12	20	17	10	7	-23	-18	-13	-22	-19	-26	-29	8	6 4 6
30,000	17	18	10	18	16	8	4	-20	-20	-11	-21	-18	-25	-29	10	9 8 10
20,000	13	13	8	13	12	6	3	-15	-14	-8	-14	-13	-19	-22	10	11 10 11
															9	8 7 8
MILDENHALL AP TO TAN SAN NHUT																
53,000	25	14	3	13	13	6	3	-28	-16	-4	-14	-15	-22	-27	5463 N.MI.	
40,000	21	20	13	18	18	11	8	-25	-22	-14	-20	-20	-27	-31	8	7 6 6
30,000	20	18	13	18	17	10	7	-23	-20	-14	-19	-19	-26	-30	10	9 8 9
20,000	14	11	6	11	11	6	3	-16	-12	-7	-12	-12	-17	-19	10	10 8 9
															7	7 6 7
MILDENHALL AP TO THULE AB																
53,000	-16	-8	0	-9	-7	-15	-19	14	7	-1	9	6	0	-3	2091 N.MI.	
40,000	-14	-12	-6	-10	-10	-19	-24	12	10	5	8	8	0	-5	11	9 6 9
30,000	-13	-12	-7	-9	-10	-22	-28	10	10	5	6	7	-4	-10	14	13 11 14
20,000	-6	-8	-3	-3	-5	-14	-19	4	7	2	2	4	-5	-10	18	16 16 18
															15	14 11 13
MILDENHALL AP TO TORBAY AP																
53,000	-29	-15	-15	-22	-19	-27	-32	28	14	14	21	19	12	8	N.MI.	
40,000	-45	-27	-35	-43	-37	-50	-57	43	25	33	41	35	22	16	12	9 8 10
30,000	-48	-29	-34	-42	-38	-53	-61	45	26	32	39	35	21	13	19	17 16 19
20,000	-35	-21	-23	-29	-26	-37	-44	33	19	22	27	25	14	9	23	21 18 22
															18	16 12 16
MILDENHALL AP TO TORREJON AFB																
53,000	3	-1	-4	1	-1	-9	-13	-5	0	3	-2	-1	-9	-14	731 N.MI.	
40,000	8	-1	-8	-5	-2	-17	-25	-12	-1	5	1	-1	-17	-26	15	12 11 12
30,000	9	-1	-10	-4	-2	-19	-28	-13	-2	7	0	-1	-19	-28	24	21 19 24
20,000	4	-2	-7	-5	-3	-14	-21	-6	0	5	3	1	-11	-18	27	25 20 26
															20	18 14 18
MILDENHALL AP TO TRAVIS AFB																
53,000	-19	-10	-7	-13	-12	-17	-21	18	9	7	12	11	6	4	4590 N.MI.	
40,000	-22	-16	-17	-20	-19	-26	-30	19	15	16	17	17	10	6	8	6 4 6
30,000	-21	-17	-17	-18	-18	-27	-31	18	15	14	15	16	8	3	11	10 9 11
20,000	-13	-12	-10	-12	-11	-17	-21	11	10	9	10	10	4	1	13	12 11 13
															10	9 7 9
MILDENHALL AP TO WAKE AP																
53,000	3	3	4	4	4	0	-2	-6	-5	-5	-5	-5	-9	-11	6441 N.MI.	
40,000	2	4	8	6	5	-1	-4	-7	-8	-10	-9	-8	-14	-17	8	6 4 6
30,000	2	5	7	6	5	-1	-5	-7	-8	-8	-9	-8	-14	-17	9	8 7 9
20,000	2	3	3	3	3	-2	-4	-5	-4	-4	-5	-5	-9	-12	10	9 8 9
															8	7 6 7
MILDENHALL AP TO WESTOVER AFB																
53,000	-32	-16	-14	-24	-20	-28	-33	30	15	14	23	20	13	10	2904 N.MI.	
40,000	-49	-29	-35	-46	-39	-51	-57	46	27	33	43	37	26	20	11	8 7 9
30,000	-50	-31	-34	-43	-39	-52	-59	46	28	32	40	36	23	17	16	14 14 16
20,000	-35	-21	-22	-28	-26	-35	-41	32	19	21	27	24	15	11	19	18 15 18
															15	14 10 13
MILDENHALL AP TO WHEELUS AP																
53,000	17	10	4	9	9	2	-2	-18	-11	-5	-9	-10	-18	-23	1293 N.MI.	
40,000	24	12	10	14	15	2	-5	-27	-15	-13	-17	-18	-31	-38	13	11 9 10
30,000	22	12	7	14	13	0	-7	-24	-14	-10	-18	-16	-30	-38	21	18 16 20
20,000	15	7	7	8	9	0	-5	-17	-9	-8	-9	-10	-20	-25	22	20 16 21
															16	15 11 14
MINOT AFB TO MOSCOW INTERNATIONAL																
53,000	15	7	2	11	8	3	0	-16	-8	-2	-12	-9	-15	-18	4227 N.MI.	
40,000	13	11	6	10	10	4	1	-15	-12	-8	-12	-12	-18	-21	8	6 4 6
30,000	11	11	7	9	9	2	-2	-13	-13	-9	-11	-12	-19	-23	9	8 8 10
20,000	6	8	3	5	6	0	-3	-8	-10	-4	-7	-7	-13	-16	11	11 10 11
															9	9 7 9
MINOT AFB TO MYRTLE BEACH AFB																
53,000	32	20	10	20	20	11	7	-34	-22	-11	-21	-21	-31	-37	1329 N.MI.	
40,000	47	32	30	32	35	21	14	-53	-36	-32	-37	-39	-53	-61	13	12 9 11
30,000	43	30	23	29	30	17	10	-49	-33	-25	-32	-34	-49	-57	20	19 17 21
20,000	29	21	15	21	21	11	6	-32	-23	-16	-22	-22	-33	-40	21	21 15 22
															16	16 10 16

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEADWINDS*								STANDARD DEVIATION			
	D I R E C T								R E T U R N											
	JAN	APR	JUL	OCT	**A50	A75	A85		JAN	APR	JUL	OCT	A50	A75	A85		JAN	APR	JUL	OCT
MINOT AFB TO NOUASSEUR AB																				
53,000	24	14	15	19	17	12	10		-25	-15	-15	-20	-18	-24	-27		8	7	6	7
40,000	34	21	30	34	30	21	17		-36	-23	-32	-37	-32	-41	-45		12	11	11	12
30,000	33	22	27	31	28	19	14		-36	-24	-28	-34	-31	-40	-45		13	13	11	13
20,000	23	13	18	22	19	13	9		-25	-15	-19	-24	-21	-28	-31		11	10	7	10
MINOT AFB TO ORLY AP																				
53,000	22	10	8	15	13	8	5		-24	-11	-9	-16	-14	-20	-24		9	7	5	7
40,000	28	17	19	23	22	14	9		-30	-18	-21	-26	-24	-32	-37		12	11	10	13
30,000	26	17	19	22	21	12	7		-29	-20	-21	-25	-24	-33	-38		14	14	12	14
20,000	17	12	11	14	13	6	3		-19	-13	-12	-16	-15	-22	-26		11	11	8	10
MINOT AFB TO PALAM AP																				
53,000	-2	-1	-2	0	-1	-5	-7		0	0	2	-1	0	-3	-5		7	5	4	5
40,000	-4	-2	-1	-2	-2	-7	-10		2	0	-1	-1	0	-5	-8		8	7	7	8
30,000	-4	-1	-1	-1	-2	-7	-11		1	-1	-1	-1	0	-6	-9		9	9	8	8
20,000	-4	-1	-1	-3	-2	-7	-9		2	0	1	2	1	-3	-6		7	7	6	6
MINOT AFB TO PATRICK AFB																				
53,000	26	19	7	16	16	8	4		-30	-21	-7	-17	-18	-28	-33		12	11	8	11
40,000	36	27	21	27	27	15	8		-44	-32	-23	-31	-32	-46	-53		19	18	16	19
30,000	33	25	16	23	23	11	5		-40	-29	-18	-27	-27	-41	-49		19	19	13	20
20,000	22	17	10	16	16	7	3		-26	-19	-11	-18	-17	-27	-33		15	14	9	14
MINOT AFB TO PIARCO AP																				
53,000	25	20	3	12	14	6	2		-27	-21	-3	-13	-16	-25	-29		9	9	6	8
40,000	36	28	14	21	24	14	10		-42	-33	-15	-24	-28	-39	-45		13	13	10	13
30,000	32	25	11	17	20	11	7		-36	-28	-12	-19	-23	-34	-39		12	12	8	11
20,000	18	15	4	9	11	4	2		-20	-16	-5	-9	-12	-19	-24		9	9	6	8
MINOT AFB TO POPE AFB																				
53,000	32	21	11	21	20	11	7		-35	-22	-12	-22	-22	-31	-37		13	12	9	11
40,000	49	32	32	34	36	22	15		-54	-36	-34	-38	-40	-55	-63		21	20	18	22
30,000	45	31	26	30	32	18	11		-51	-34	-27	-34	-35	-51	-59		22	22	15	22
20,000	31	22	17	22	22	12	7		-34	-24	-17	-24	-24	-35	-41		17	16	10	16
MINOT AFB TO PRESTWICK AB																				
53,000	22	10	7	15	12	7	4		-23	-10	-7	-15	-13	-20	-24		9	7	5	7
40,000	26	17	17	21	20	12	8		-28	-18	-19	-23	-22	-30	-35		12	11	11	13
30,000	23	17	17	19	19	10	5		-26	-20	-19	-22	-22	-31	-37		14	14	13	15
20,000	15	12	10	13	12	5	1		-16	-13	-11	-14	-13	-21	-25		11	11	9	11
MINOT AFB TO RAMEY AFB																				
53,000	28	22	5	15	17	8	4		-31	-23	-5	-16	-18	-28	-33		10	10	6	9
40,000	41	32	18	25	28	17	12		-46	-36	-20	-28	-32	-44	-51		15	15	12	15
30,000	36	28	14	21	24	14	9		-40	-31	-15	-23	-26	-38	-45		15	14	10	14
20,000	22	17	7	11	13	6	3		-24	-19	-7	-12	-15	-23	-28		11	11	6	10
MINOT AFB TO RHEIN MAIN AB																				
53,000	22	10	6	14	12	7	4		-23	-10	-7	-15	-13	-19	-24		9	7	5	7
40,000	25	17	16	21	19	12	8		-28	-18	-18	-23	-21	-29	-34		11	10	10	12
30,000	23	17	16	19	19	9	5		-26	-19	-18	-22	-21	-30	-35		14	13	12	14
20,000	15	11	9	12	12	5	2		-17	-13	-10	-14	-13	-20	-24		11	10	8	10
MINOT AFB TO SEOUL AB																				
53,000	-24	-11	-5	-19	-14	-21	-25		22	10	5	18	13	7	4		8	6	5	6
40,000	-20	-13	-14	-19	-17	-23	-27		18	11	12	17	14	8	5		9	9	9	9
30,000	-18	-13	-12	-16	-15	-22	-25		16	11	11	14	13	6	2		10	10	9	10
20,000	-11	-7	-8	-11	-9	-14	-17		10	6	7	10	8	3	0		8	8	6	8
MINOT AFB TO STEVENSON FIELD																				
53,000	20	15	14	15	15	7	2		-21	-15	-14	-16	-16	-26	-31		16	13	11	14
40,000	31	22	34	26	28	12	3		-34	-23	-36	-30	-31	-48	-57		24	22	23	29
30,000	31	20	29	24	26	8	-2		-35	-22	-31	-27	-29	-47	-57		27	27	22	29
20,000	19	13	19	16	17	5	-2		-22	-14	-20	-18	-19	-31	-37		20	18	15	19
MINOT AFB TO SUNG SHAN																				
53,000	-29	-14	-3	-20	-16	-25	-29		26	12	3	18	14	7	3		8	6	5	6
40,000	-25	-17	-14	-21	-19	-26	-30		21	14	12	18	16	10	7		9	8	9	9
30,000	-23	-16	-12	-18	-17	-24	-28		19	13	11	15	14	7	4		10	10	9	10
20,000	-14	-9	-8	-12	-10	-16	-18		12	8	7	10	9	4	2		8	7	6	7

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION					
	O I R E C T							R E T U R N							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85				
MINOT AFB TO TACHIKAWA AB																		
53,000	-30	-16	-6	-23	-19	-27	-31	28	15	6	22	17	10	6	4810 N.MI.			
40,000	-31	-21	-17	-31	-25	-33	-38	28	19	15	29	23	15	11	9	6	5	
30,000	-29	-20	-17	-27	-23	-31	-36	25	17	15	24	20	12	8	10	10	10	
20,000	-20	-13	-9	-18	-15	-21	-25	18	11	9	17	13	7	4	11	11	10	
MINOT AFB TO TAN SAN NHUT																		
53,000	-25	-11	1	-13	-12	-19	-23	22	9	-2	12	10	3	-1	6957 N.MI.			
40,000	-20	-12	-9	-14	-13	-20	-23	16	9	8	11	11	5	2	8	6	5	
30,000	-18	-11	-9	-11	-12	-18	-22	14	8	8	9	10	4	1	8	8	8	
20,000	-9	-6	-7	-8	-7	-11	-14	7	5	6	7	6	2	0	9	9	8	
MINOT AFB TO THULE AB																		
53,000	1	1	0	2	1	-4	-7	-3	-2	-1	-3	-2	-7	-10	1865 N.MI.			
40,000	1	3	3	0	2	-7	-11	-3	-4	-5	-2	-4	-12	-16	11	8	6	
30,000	0	2	1	0	1	-9	-14	-2	-4	-3	-3	-3	-13	-18	12	11	12	
20,000	-2	0	0	0	0	-8	-12	0	-1	-2	-1	-1	-8	-12	14	15	14	
MINOT AFB TO TORBAY AP																		
53,000	30	17	16	24	21	14	10	-31	-17	-16	-25	-22	-30	-34	1918 N.MI.			
40,000	44	26	39	41	38	26	19	-46	-28	-41	-44	-40	-52	-58	11	9	8	
30,000	41	27	36	38	35	23	16	-44	-30	-37	-40	-38	-50	-57	17	15	15	
20,000	30	17	24	26	24	15	10	-32	-18	-25	-27	-26	-35	-40	19	19	15	
MINOT AFB TO TORREJON AFB																		
53,000	23	12	13	18	16	11	8	-24	-12	-13	-18	-16	-22	-26	3926 N.MI.			
40,000	31	18	26	31	27	18	13	-34	-20	-28	-34	-29	-38	-42	9	6	6	
30,000	31	19	25	29	26	17	12	-35	-22	-27	-32	-29	-38	-44	12	11	11	
20,000	21	13	17	20	17	11	7	-23	-14	-18	-22	-19	-26	-30	14	13	12	
MINOT AFB TO TRAVIS AFB																		
53,000	-23	-18	-15	-18	-18	-26	-31	21	17	15	17	17	10	6	1078 N.MI.			
40,000	-35	-26	-36	-31	-32	-46	-54	31	24	35	28	29	15	7	14	11	9	
30,000	-33	-25	-30	-26	-29	-43	-51	29	22	28	23	26	11	3	22	20	19	
20,000	-21	-16	-19	-18	-18	-28	-34	19	14	18	16	17	7	1	25	23	18	
MINOT AFB TO WAKE AP																		
53,000	-25	-17	-6	-15	-15	-22	-26	23	16	6	14	14	8	5	4624 N.MI.			
40,000	-47	-37	-18	-33	-34	-45	-50	43	34	16	30	31	20	15	9	7	6	
30,000	-44	-35	-18	-32	-32	-43	-48	41	32	17	29	29	19	15	12	11	10	
20,000	-32	-25	-15	-23	-23	-31	-35	30	24	14	22	22	15	12	13	12	9	
MINOT AFB TO WESTOVER AFB																		
53,000	35	22	15	25	23	15	11	-36	-22	-15	-26	-24	-33	-39	1259 N.MI.			
40,000	54	35	41	41	43	29	22	-57	-37	-43	-44	-45	-59	-67	13	11	9	
30,000	52	35	36	38	40	25	18	-56	-37	-38	-41	-42	-57	-66	20	19	18	
20,000	36	24	24	27	27	17	12	-38	-25	-25	-28	-28	-39	-46	23	22	17	
MINOT AFB TO WHEELUS AP																		
53,000	23	12	10	16	14	9	7	-24	-13	-11	-16	-15	-21	-24	4802 N.MI.			
40,000	30	18	22	26	24	16	12	-33	-20	-24	-29	-26	-34	-38	8	6	5	
30,000	28	18	20	25	23	14	10	-31	-21	-22	-28	-25	-34	-39	11	10	10	
20,000	19	12	14	16	15	9	6	-21	-13	-15	-17	-16	-23	-26	13	12	10	
MOSCOW INTERNATIONAL TO MYRTLE BEACH AFB																		
53,000	-31	-14	-7	-20	-17	-26	-30	29	13	7	20	16	9	6	4535 N.MI.			
40,000	-39	-26	-20	-32	-29	-38	-43	35	23	18	29	26	17	13	9	7	5	
30,000	-37	-27	-19	-29	-27	-38	-43	33	23	17	25	24	15	10	12	11	10	
20,000	-24	-17	-11	-19	-17	-25	-29	22	16	10	17	16	9	5	14	14	12	
MOSCOW INTERNATIONAL TO NOUASSEUR AB																		
53,000	-14	-12	-14	-10	-12	-18	-21	12	11	13	9	11	6	2	2291 N.MI.			
40,000	-12	-15	-23	-21	-18	-28	-34	9	13	22	19	16	6	0	11	8	7	
30,000	-10	-15	-22	-20	-17	-28	-34	7	12	21	17	15	3	-3	16	14	13	
20,000	-8	-10	-15	-13	-12	-20	-24	7	9	15	12	11	3	-2	17	16	14	
MOSCOW INTERNATIONAL TO DRLY AP																		
53,000	-19	-12	-11	-13	-13	-20	-25	17	11	11	12	12	6	2	1344 N.MI.			
40,000	-19	-15	-24	-24	-21	-33	-40	16	13	23	22	18	6	-1	14	10	8	
30,000	-17	-15	-24	-24	-20	-35	-43	13	12	22	21	17	2	-7	20	18	17	
20,000	-14	-11	-17	-17	-15	-26	-32	12	10	16	16	14	3	-4	23	23	20	

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION							
	DIRECT								RETURN								JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85						
MOSCOW INTERNATIONAL TO PALAM AP																				
53,000	26	13	8	22	16	8	5	-29	-15	-9	-24	-18	-27	-32	2343 N.M.I.					
40,000	20	14	18	22	18	9	4	-25	-17	-20	-24	-21	-31	-36	12	9	8	9		
30,000	18	15	17	20	18	9	4	-21	-18	-18	-22	-20	-29	-33	15	13	13	13		
20,000	12	10	7	13	10	4	1	-13	-11	-8	-14	-11	-18	-21	14	13	11	13		
MOSCOW INTERNATIONAL TO PATRICK AFB																				
53,000	-31	-15	-7	-20	-17	-25	-30	29	13	6	19	16	9	6	4859 N.M.I.					
40,000	-39	-27	-19	-33	-29	-38	-44	35	24	17	29	26	17	13	9	7	5	7		
30,000	-38	-27	-19	-29	-28	-38	-43	34	24	16	26	24	15	10	12	11	10	12		
20,000	-25	-18	-12	-19	-18	-25	-29	23	16	11	17	16	9	6	14	13	11	13		
MOSCOW INTERNATIONAL TO PIARCO AP																				
53,000	-17	-13	-6	-9	-10	-16	-19	16	12	5	8	9	5	3	5174 N.M.I.					
40,000	-26	-23	-17	-18	-21	-28	-32	23	20	15	16	18	11	7	8	6	5	6		
30,000	-22	-18	-15	-17	-18	-25	-30	19	16	14	15	16	9	5	11	10	9	11		
20,000	-14	-11	-11	-13	-12	-18	-21	13	10	10	11	11	6	3	12	11	9	11		
MOSCOW INTERNATIONAL TO POPE AFB																				
53,000	-30	-14	-7	-20	-17	-25	-30	29	13	7	20	16	9	6	4461 N.M.I.					
40,000	-38	-25	-19	-32	-28	-37	-43	35	23	17	29	25	17	12	9	7	5	7		
30,000	-37	-26	-19	-28	-27	-37	-43	33	23	16	25	24	14	9	12	11	10	12		
20,000	-24	-17	-11	-18	-17	-25	-29	22	15	10	17	15	8	5	14	14	12	14		
MOSCOW INTERNATIONAL TO PRESTWICK AB																				
53,000	-26	-14	-9	-16	-15	-23	-28	24	13	9	16	14	7	4	1407 N.M.I.					
40,000	-26	-20	-23	-28	-24	-36	-43	24	18	21	26	22	10	3	14	10	7	10		
30,000	-25	-20	-23	-26	-24	-39	-47	22	17	21	23	21	6	-3	20	17	17	20		
20,000	-19	-15	-16	-19	-17	-28	-34	18	13	15	17	16	5	-1	23	23	21	24		
MOSCOW INTERNATIONAL TO RAMEY AFB																				
53,000	-23	-14	-7	-13	-13	-20	-24	21	12	6	12	12	7	4	4964 N.M.I.					
40,000	-33	-27	-19	-25	-25	-34	-38	29	24	17	22	23	15	11	9	7	5	7		
30,000	-31	-25	-19	-24	-24	-33	-38	28	22	17	21	22	13	9	13	12	10	12		
20,000	-22	-18	-14	-18	-17	-24	-27	20	16	13	16	16	10	7	10	9	7	9		
MOSCOW INTERNATIONAL TO RHEIN MAIN AB																				
53,000	-19	-12	-11	-13	-13	-21	-26	17	11	11	13	13	5	1	1097 N.M.I.					
40,000	-18	-15	-24	-24	-20	-34	-41	16	13	23	21	18	5	-3	15	11	9	11		
30,000	-17	-15	-24	-23	-19	-36	-44	13	12	22	20	17	1	-8	21	19	18	21		
20,000	-13	-11	-16	-17	-14	-26	-32	12	10	15	15	13	1	-5	25	24	22	25		
MOSCOW INTERNATIONAL TO SEOUL AB																				
53,000	24	20	12	21	19	13	10	-27	-21	-13	-22	-20	-27	-30	3565 N.M.I.					
40,000	30	29	21	31	28	20	16	-32	-30	-23	-33	-30	-37	-41	10	8	6	7		
30,000	26	27	14	24	23	14	9	-28	-29	-15	-26	-24	-33	-38	12	10	10	11		
20,000	20	19	10	20	17	10	7	-21	-20	-11	-21	-18	-25	-29	12	13	11	12		
MOSCOW INTERNATIONAL TO STEVENSON FIELD																				
53,000	-18	-8	-2	-13	-9	-16	-19	16	7	2	12	9	3	1	4073 N.M.I.					
40,000	-17	-13	-8	-13	-13	-19	-23	15	12	7	11	11	5	1	8	7	4	6		
30,000	-15	-15	-9	-12	-12	-20	-24	12	13	7	9	10	2	-2	10	9	8	10		
20,000	-9	-10	-4	-8	-8	-14	-17	8	9	3	6	6	1	-3	12	11	11	12		
MOSCOW INTERNATIONAL TO SUNG SHAN																				
53,000	28	22	11	22	20	14	10	-32	-23	-12	-23	-22	-30	-34	3970 N.M.I.					
40,000	32	31	18	30	28	20	15	-36	-34	-19	-32	-31	-39	-43	9	8	7	8		
30,000	30	30	11	22	23	14	9	-34	-32	-12	-24	-25	-35	-40	11	10	10	11		
20,000	21	17	8	18	16	10	6	-22	-18	-9	-19	-17	-23	-27	11	12	9	11		
MOSCOW INTERNATIONAL TO TACHIKAWA AB																				
53,000	22	19	11	18	17	11	9	-25	-20	-11	-20	-18	-25	-28	4026 N.M.I.					
40,000	30	26	18	28	25	18	14	-33	-28	-20	-30	-27	-35	-39	10	7	6	7		
30,000	24	25	12	24	21	13	8	-27	-27	-14	-26	-23	-32	-36	11	10	10	10		
20,000	19	18	9	18	16	10	6	-20	-19	-10	-20	-17	-24	-27	11	12	11	12		
MOSCOW INTERNATIONAL TO TAN SAN NHUT																				
53,000	25	14	1	11	12	5	1	-28	-16	-2	-13	-14	-23	-27	4160 N.M.I.					
40,000	20	21	9	15	16	9	5	-25	-24	-11	-17	-19	-27	-31	9	8	7	7		
30,000	19	19	9	15	15	9	5	-23	-21	-10	-17	-17	-25	-29	11	10	9	10		
20,000	13	11	3	9	9	4	1	-14	-12	-4	-10	-10	-15	-18	10	10	8	9		

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	D I R E C T							R E T U R N							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85				
MOSCOW INTERNATIONAL TO THULE AB																		2395 N.MI.
53,000	-17	-14	-1	-13	-11	-18	-22	15	13	1	12	10	3	0	11	9	5	8
40,000	-14	-12	-5	-12	-10	-18	-22	13	10	4	10	9	1	-3	12	11	9	12
30,000	-13	-13	-7	-9	-10	-20	-25	10	10	5	7	8	-2	-7	15	14	14	14
20,000	-7	-10	-3	-5	-6	-14	-18	6	9	3	3	5	-2	-6	12	11	9	11
MOSCOW INTERNATIONAL TO TORBAY AP																		3153 N.MI.
53,000	-29	-14	-10	-21	-17	-25	-30	28	13	10	20	17	10	7	11	8	6	8
40,000	-38	-25	-24	-33	-30	-40	-45	36	24	23	31	28	18	13	14	13	12	15
30,000	-39	-28	-24	-30	-30	-42	-49	36	25	22	27	27	15	10	18	17	15	17
20,000	-27	-19	-15	-21	-20	-29	-34	25	18	14	19	18	10	6	14	13	10	12
MOSCOW INTERNATIONAL TO TORREJON AFB																		1846 N.MI.
53,000	-14	-11	-12	-10	-12	-18	-22	13	10	12	10	11	5	1	12	9	8	9
40,000	-13	-14	-24	-22	-18	-30	-36	10	12	22	20	16	5	-2	17	16	15	17
30,000	-12	-14	-24	-21	-18	-31	-37	8	11	22	18	15	2	-5	20	19	16	20
20,000	-10	-10	-16	-15	-13	-22	-27	8	8	15	14	12	2	-3	15	14	11	14
MOSCOW INTERNATIONAL TO TRAVIS AFB																		5063 N.MI.
53,000	-7	-9	-2	-8	-6	-11	-13	5	8	1	7	5	1	-1	7	6	4	5
40,000	-5	-6	-4	-7	-6	-11	-14	3	5	3	5	4	-2	-5	9	8	8	9
30,000	-4	-7	-5	-5	-5	-12	-16	1	4	3	3	3	-4	-8	11	10	9	10
20,000	-2	-5	-3	-2	-3	-8	-11	0	4	2	1	2	-4	-6	8	8	7	8
MOSCOW INTERNATIONAL TO WAKE AP																		5812 N.MI.
53,000	15	15	8	11	12	7	5	-19	-16	-8	-12	-13	-19	-22	8	6	5	6
40,000	23	21	15	19	19	13	9	-28	-24	-16	-22	-23	-30	-33	10	9	8	9
30,000	18	19	10	16	16	9	5	-23	-22	-12	-19	-19	-26	-30	10	10	9	10
20,000	13	13	5	10	10	5	2	-16	-15	-6	-11	-12	-18	-21	8	8	6	8
MOSCOW INTERNATIONAL TO WESTOVER AFB																		3942 N.MI.
53,000	-30	-14	-8	-21	-17	-25	-30	29	13	8	20	16	9	6	10	7	5	7
40,000	-37	-24	-20	-31	-28	-37	-42	35	22	18	29	26	17	12	12	11	10	13
30,000	-36	-26	-20	-28	-27	-37	-43	33	23	17	25	24	14	9	15	14	13	15
20,000	-23	-17	-11	-18	-17	-25	-29	21	15	10	16	15	8	4	11	11	8	11
MOSCOW INTERNATIONAL TO WHEELUS AP																		1705 N.MI.
53,000	-11	-10	-13	-9	-11	-18	-22	9	9	12	8	10	2	-1	14	10	8	9
40,000	-9	-14	-22	-15	-15	-27	-33	5	11	19	13	12	1	-6	18	16	15	17
30,000	-8	-13	-14	-12	-12	-24	-30	5	10	12	9	9	-3	-10	20	18	16	18
20,000	-6	-7	-9	-8	-8	-16	-21	4	6	8	7	6	-2	-7	15	13	11	13
MYRTLE BEACH AFB TO NOUASSEUR AB																		3490 N.MI.
53,000	33	25	9	18	21	12	9	-34	-26	-10	-19	-22	-31	-35	9	8	6	8
40,000	43	39	21	34	34	23	18	-45	-41	-22	-36	-36	-47	-52	14	13	10	13
30,000	39	36	18	30	30	20	15	-41	-37	-19	-31	-31	-42	-48	14	13	9	12
20,000	29	24	15	20	21	14	11	-31	-25	-15	-21	-22	-30	-35	11	10	7	9
MYRTLE BEACH AFB TO ORLY AP																		3601 N.MI.
53,000	31	18	12	22	20	13	10	-33	-19	-13	-23	-21	-28	-33	10	8	6	8
40,000	47	31	31	43	37	27	22	-50	-33	-33	-45	-40	-51	-57	14	13	12	15
30,000	47	30	29	39	36	25	20	-51	-33	-31	-42	-39	-50	-57	16	15	12	15
20,000	35	22	21	28	25	18	14	-37	-23	-22	-29	-27	-36	-41	13	12	8	11
MYRTLE BEACH AFB TO PALAM AP																		6825 N.MI.
53,000	22	10	4	16	12	6	3	-24	-12	-5	-17	-14	-21	-25	8	6	5	6
40,000	21	15	11	21	17	10	7	-25	-18	-13	-23	-20	-26	-30	10	9	8	9
30,000	19	15	11	19	16	9	5	-23	-18	-13	-21	-19	-26	-30	11	10	9	10
20,000	13	11	6	12	10	5	2	-15	-12	-7	-13	-12	-17	-20	8	8	6	8
MYRTLE BEACH AFB TO PATRICK AFB																		337 N.MI.
53,000	-16	-6	3	-6	-5	-17	-24	10	3	-4	4	3	-8	-13	16	17	11	18
40,000	-23	-20	4	-15	-12	-31	-41	11	10	-5	10	6	-11	-19	25	27	19	25
30,000	-18	-9	1	-12	-9	-24	-32	10	3	-2	8	4	-9	-17	21	23	15	23
20,000	-12	-9	-4	-8	-7	-18	-24	9	6	3	7	6	-4	-9	18	18	10	16
MYRTLE BEACH AFB TO PIARCO AP																		1690 N.MI.
53,000	20	19	-3	7	10	0	-4	-22	-21	3	-8	-11	-22	-27	11	11	7	10
40,000	29	25	2	13	16	4	-1	-33	-30	-3	-14	-19	-34	-40	15	16	10	15
30,000	24	21	2	9	13	3	-1	-27	-23	-2	-10	-14	-26	-32	14	13	8	11
20,000	11	10	-4	-1	3	-4	-7	-12	-11	4	0	-3	-12	-16	10	9	6	8

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS INDICATE HEADWINDS.THE BOEING COMPANY
TRANSPORT DIVISION

ND. D6-9175

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEADWINDS*							STANDARD DEVIATION						
	D I R E C T								R E T U R N													
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT				
MYRTLE BEACH AFB TO PDPE AFB																			89 N.M.I.			
53,000	-6	-5	-6	-2	-5	-16	-22	-1	1	5	0	2	-9	-16	18	19	12	18				
40,000	-11	-8	-8	2	-6	-25	-35	-3	-2	7	-9	-1	-20	-31	28	30	22	29				
30,000	-9	-7	-4	2	-5	-21	-30	-2	0	3	-7	-1	-18	-27	25	29	17	28				
20,000	1	-3	0	2	0	-12	-19	-7	0	-1	-4	-2	-15	-22	21	21	12	20				
MYRTLE BEACH AFB TO PRESTWICK AB																			3255 N.M.I.			
53,000	32	16	11	23	19	12	9	-33	-17	-11	-24	-20	-29	-34	10	8	6	8				
40,000	47	30	29	42	36	26	20	-51	-33	-31	-45	-39	-51	-57	15	14	13	15				
30,000	47	30	28	38	35	24	18	-51	-33	-30	-42	-38	-51	-57	18	17	13	17				
20,000	34	21	19	26	24	16	11	-36	-23	-20	-27	-26	-35	-40	14	13	9	12				
MYRTLE BEACH AFB TO RAMEY AFB																			1109 N.M.I.			
53,000	23	22	-1	9	12	1	-3	-26	-24	0	-10	-14	-27	-33	14	14	8	13				
40,000	34	31	6	16	20	7	0	-39	-36	-7	-18	-24	-40	-49	19	20	13	19				
30,000	28	25	5	11	16	4	-1	-31	-28	-5	-13	-18	-32	-39	17	16	10	15				
20,000	14	13	-2	0	5	-3	-7	-15	-14	2	-1	-5	-16	-21	13	12	7	10				
MYRTLE BEACH AFB TO RHEIN MAIN AB																			3802 N.M.I.			
53,000	31	17	12	22	19	13	10	-32	-18	-12	-22	-20	-28	-32	9	7	6	8				
40,000	46	29	30	41	36	26	21	-49	-32	-32	-44	-39	-49	-55	14	13	12	14				
30,000	45	29	28	38	35	24	18	-50	-32	-31	-41	-38	-49	-56	16	15	12	15				
20,000	33	21	20	26	24	17	13	-36	-22	-21	-28	-26	-35	-40	13	12	8	11				
MYRTLE BEACH AFB TO SEOUL AB																			6290 N.M.I.			
53,000	-21	-10	-6	-15	-12	-18	-22	19	8	6	13	11	6	4	8	5	4	6				
40,000	-18	-13	-15	-17	-16	-22	-25	14	11	13	14	13	7	4	8	8	8	9				
30,000	-16	-13	-14	-15	-15	-21	-24	13	11	12	13	12	6	3	9	9	8	9				
20,000	-10	-9	-10	-10	-10	-14	-17	8	7	9	8	8	4	1	7	7	6	7				
MYRTLE BEACH AFB TO STEVENSON FIELD																			1265 N.M.I.			
53,000	-30	-19	-11	-18	-18	-28	-33	26	17	10	17	17	9	4	13	12	9	12				
40,000	-46	-31	-29	-31	-34	-48	-56	38	26	27	26	29	16	8	20	20	17	22				
30,000	-43	-30	-23	-28	-30	-45	-53	36	26	21	24	26	13	6	21	22	15	22				
20,000	-29	-21	-15	-19	-20	-31	-37	25	19	14	17	18	9	3	17	16	10	16				
MYRTLE BEACH AFB TO SUNG SHAN																			7086 N.M.I.			
53,000	-24	-11	-4	-15	-12	-19	-23	21	9	4	13	11	5	3	8	6	5	6				
40,000	-20	-14	-15	-17	-16	-22	-25	15	11	13	14	13	7	4	8	8	8	9				
30,000	-18	-14	-14	-15	-15	-21	-24	14	11	12	12	12	6	3	9	9	8	9				
20,000	-11	-9	-9	-9	-9	-14	-16	8	7	9	8	8	4	1	7	7	6	7				
MYRTLE BEACH AFB TO TACHIKAWA AB																			6115 N.M.I.			
53,000	-29	-15	-6	-21	-17	-25	-29	27	13	6	19	16	9	6	8	6	5	6				
40,000	-31	-21	-18	-28	-24	-32	-35	26	18	16	25	21	14	11	9	9	9	10				
30,000	-28	-20	-17	-24	-22	-30	-34	24	17	15	21	19	12	8	10	10	9	11				
20,000	-19	-13	-10	-16	-14	-20	-23	17	12	9	15	13	8	5	9	8	6	8				
MYRTLE BEACH AFB TO TAN SAN NHUT																			8111 N.M.I.			
53,000	-12	-6	-1	-5	-5	-10	-13	8	4	0	3	3	-1	-3	7	5	4	5				
40,000	-8	-4	-8	-6	-6	-12	-14	3	1	6	3	3	-2	-5	8	7	7	8				
30,000	-6	-4	-7	-6	-6	-11	-14	2	1	5	3	3	-3	-5	8	9	7	8				
20,000	-2	-3	-5	-3	-3	-7	-10	0	1	5	2	2	-2	-5	7	6	5	6				
MYRTLE BEACH AFB TO THULE AB																			2586 N.M.I.			
53,000	4	0	-2	3	1	-4	-7	-7	-1	1	-5	-2	-8	-12	10	8	6	8				
40,000	4	0	-3	2	1	-8	-12	-10	-3	0	-7	-5	-14	-18	13	12	11	13				
30,000	2	-1	-2	2	0	-9	-14	-8	-3	0	-6	-4	-14	-19	14	14	12	14				
20,000	3	0	-1	2	1	-6	-10	-6	-2	0	-4	-3	-10	-14	11	11	8	11				
MYRTLE BEACH AFB TO TORBAY AP																			1444 N.M.I.			
53,000	37	21	7	24	21	11	6	-39	-23	-8	-25	-23	-35	-41	14	12	9	12				
40,000	54	39	26	46	40	25	18	-59	-42	-29	-49	-44	-60	-69	21	21	18	21				
30,000	51	36	25	40	37	23	15	-56	-40	-27	-43	-40	-57	-66	23	22	15	21				
20,000	38	25	18	27	26	15	10	-40	-27	-18	-28	-27	-39	-47	17	17	10	16				
MYRTLE BEACH AFB TO TORREJON AFB																			3525 N.M.I.			
53,000	32	21	12	19	20	13	10	-33	-22	-12	-20	-21	-29	-34	9	8	6	8				
40,000	44	34	26	39	36	26	21	-47	-37	-28	-41	-38	-48	-54	14	14	11	14				
30,000	43	33	24	35	33	23	19	-46	-35	-26	-38	-35	-46	-52	15	14	10	14				
20,000	33	23	20	25	24	17	14	-34	-25	-20	-26	-26	-34	-38	12	11	7	10				

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION					
	DIRECT							RETURN										
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
MYRTLE BEACH AFB TO TRAVIS AFB																		
53,000	-42	-31	-8	-24	-26	-37	-43	41	30	8	23	26	14	9	11	10	7	10
40,000	-65	-48	-29	-44	-45	-60	-69	62	45	28	41	43	30	23	18	17	14	17
30,000	-56	-42	-22	-36	-37	-53	-61	53	40	21	34	35	22	16	19	18	12	17
20,000	-36	-27	-14	-21	-23	-34	-40	34	26	13	20	22	13	9	14	13	8	12
MYRTLE BEACH AFB TO WAKE AP																		
53,000	-30	-22	-7	-16	-18	-26	-30	28	21	7	15	17	10	7	8	7	5	7
40,000	-54	-41	-20	-34	-37	-49	-55	51	38	19	32	34	23	18	11	11	9	11
30,000	-48	-37	-17	-30	-33	-44	-50	45	35	16	28	30	20	15	12	11	8	11
20,000	-32	-25	-12	-21	-22	-30	-34	31	24	12	20	21	14	11	9	8	5	8
MYRTLE BEACH AFB TO WESTOVER AFB																		
53,000	25	14	0	15	12	1	-5	-30	-17	0	-17	-15	-28	-35	17	16	11	15
40,000	33	24	9	30	23	6	-4	-44	-31	-12	-36	-30	-50	-59	26	27	21	26
30,000	31	22	10	26	21	5	-4	-41	-28	-12	-30	-26	-45	-56	26	27	17	26
20,000	26	14	9	17	15	4	-2	-31	-18	-10	-19	-18	-32	-40	20	20	11	19
MYRTLE BEACH AFB TO WHEELUS AP																		
53,000	31	23	12	19	20	14	11	-32	-23	-12	-19	-21	-29	-33	8	7	6	7
40,000	43	34	25	36	34	25	21	-45	-36	-27	-38	-36	-45	-51	13	12	10	12
30,000	39	33	23	33	31	23	18	-42	-35	-24	-34	-33	-42	-48	13	12	9	12
20,000	30	23	18	23	23	17	14	-32	-24	-19	-24	-24	-31	-35	10	9	6	9
NOUASSEUR AB TO ORLY AP																		
53,000	2	6	9	2	5	-3	-7	-4	-7	-10	-2	-6	-14	-18	14	11	10	10
40,000	-4	7	13	9	7	-7	-15	0	-9	-15	-13	-10	-23	-30	22	19	16	20
30,000	-5	5	14	8	6	-8	-16	1	-8	-16	-11	-9	-23	-30	23	20	16	21
20,000	-2	5	10	6	5	-5	-11	0	-6	-11	-7	-7	-16	-21	17	15	11	14
NOUASSEUR AB TO PALAM AP																		
53,000	38	31	15	25	27	19	15	-39	-32	-16	-25	-28	-36	-40	9	7	6	7
40,000	45	40	30	33	36	28	24	-48	-42	-31	-35	-38	-47	-52	12	11	9	11
30,000	34	35	26	28	30	23	19	-37	-37	-27	-29	-32	-40	-44	13	11	8	10
20,000	23	22	15	16	19	14	11	-24	-23	-15	-17	-19	-25	-28	8	7	6	7
NOUASSEUR AB TO PATRICK AFB																		
53,000	-33	-27	-6	-16	-20	-30	-34	32	26	6	16	19	10	6	9	8	6	8
40,000	-43	-42	-15	-30	-33	-45	-50	40	40	14	29	31	19	14	13	13	9	12
30,000	-36	-36	-13	-26	-27	-38	-43	34	34	12	25	26	16	11	13	12	8	11
20,000	-26	-23	-11	-17	-18	-26	-30	24	22	11	16	18	11	8	10	9	6	8
NOUASSEUR AB TO PIARCO AP																		
53,000	-20	-22	0	-7	-11	-21	-25	19	21	-1	6	11	2	-1	8	8	5	6
40,000	-34	-35	-14	-13	-23	-35	-41	32	33	14	11	21	12	8	11	11	8	10
30,000	-19	-24	-10	-7	-14	-22	-27	17	23	10	6	13	6	3	10	10	6	8
20,000	-5	-8	-2	-3	-4	-9	-12	4	8	1	3	4	-1	-3	8	7	6	6
NOUASSEUR AB TO POPE AFB																		
53,000	-34	-25	-11	-20	-22	-30	-35	33	24	10	19	21	13	10	9	8	6	8
40,000	-46	-40	-24	-38	-36	-47	-53	44	38	23	36	35	24	19	14	14	11	13
30,000	-42	-37	-21	-33	-33	-43	-49	40	36	20	31	31	21	16	14	13	9	13
20,000	-32	-25	-16	-22	-23	-31	-36	31	24	16	21	22	15	12	11	11	7	9
NOUASSEUR AB TO PRESTWICK AB																		
53,000	-6	-1	2	-3	-2	-9	-13	4	0	-3	2	1	-6	-10	13	10	9	10
40,000	-13	-3	3	0	-3	-16	-23	9	0	-5	-3	0	-13	-19	20	18	16	19
30,000	-13	-4	3	-2	-3	-17	-25	9	1	-6	-2	0	-13	-20	22	20	16	21
20,000	-7	-1	4	1	0	-11	-16	5	0	-5	-2	-1	-11	-16	17	15	11	15
NOUASSEUR AB TO RAMEY AFB																		
53,000	-23	-24	-3	-9	-14	-23	-28	21	23	3	8	13	5	2	9	8	6	7
40,000	-36	-39	-15	-17	-26	-38	-44	33	37	15	16	24	14	10	13	12	8	11
30,000	-23	-29	-11	-12	-17	-27	-32	21	28	10	11	16	9	5	12	11	7	9
20,000	-9	-15	-6	-7	-9	-14	-17	8	14	6	7	8	3	1	9	8	6	6
NOUASSEUR AB TO RHEIN MAIN AB																		
53,000	6	9	11	4	8	0	-4	-8	-10	-12	-5	-9	-16	-20	13	11	9	10
40,000	1	10	17	14	11	-2	-10	-5	-12	-19	-17	-14	-26	-33	21	18	15	19
30,000	-1	8	18	12	10	-4	-12	-3	-11	-19	-15	-13	-26	-33	22	20	15	20
20,000	1	7	12	9	8	-2	-7	-3	-8	-13	-10	-9	-18	-23	16	14	11	14

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION							
	DIRECT							RETURN							JAN	APR	JUL	OCT				
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85								
NOUASSEUR AB TO SEOUL AB																			5846 N.MI.			
53,000	17	15	11	14	14	10	8	-20	-16	-11	-15	-15	-20	-22	8	6	5	6				
40,000	20	21	19	24	21	15	11	-23	-23	-21	-27	-23	-30	-33	10	9	8	10				
30,000	16	20	16	20	18	11	7	-19	-22	-17	-22	-20	-27	-31	11	11	9	11				
20,000	13	15	11	16	14	8	6	-15	-16	-12	-17	-15	-20	-23	9	8	7	8				
NOUASSEUR AB TO STEVENSON FIELD																			3894 N.MI.			
53,000	-25	-14	-15	-20	-18	-24	-27	23	14	14	19	17	12	9	9	7	6	7				
40,000	-36	-23	-31	-37	-32	-40	-45	33	21	29	34	29	21	16	12	11	11	13				
30,000	-35	-24	-28	-34	-30	-39	-44	32	21	26	31	28	19	14	14	13	11	13				
20,000	-25	-15	-19	-24	-20	-27	-31	23	13	18	22	19	12	9	11	10	8	10				
NOUASSEUR AB TO SUNG SHAN																			6248 N.MI.			
53,000	26	19	14	19	19	14	11	-29	-21	-14	-21	-20	-26	-30	8	7	6	6				
40,000	27	26	21	28	26	19	16	-30	-29	-23	-30	-28	-34	-38	10	9	9	10				
30,000	24	25	15	22	21	14	11	-27	-27	-16	-23	-23	-31	-35	10	10	8	10				
20,000	17	15	10	16	14	9	7	-18	-16	-11	-17	-15	-20	-23	8	7	6	7				
NOUASSEUR AB TO TACHIKAWA AB																			6260 N.MI.			
53,000	13	12	8	10	10	7	5	-15	-13	-9	-12	-12	-16	-19	8	6	5	6				
40,000	17	16	14	20	17	11	7	-20	-18	-16	-22	-19	-26	-29	10	9	8	9				
30,000	14	16	12	17	15	8	4	-16	-19	-14	-20	-17	-24	-28	10	10	9	10				
20,000	11	13	9	13	11	6	4	-13	-14	-10	-14	-13	-18	-21	8	8	6	8				
NOUASSEUR AB TO TAN SAN NHUT																			6210 N.MI.			
53,000	35	26	1	14	19	7	2	-37	-28	-2	-15	-21	-32	-37	8	7	6	6				
40,000	39	36	16	23	28	19	15	-42	-37	-17	-25	-30	-40	-45	10	9	7	9				
30,000	31	30	16	21	24	17	14	-33	-32	-16	-22	-25	-33	-37	10	9	6	8				
20,000	20	19	9	12	14	10	7	-21	-19	-10	-12	-15	-21	-24	7	6	5	5				
NOUASSEUR AB TO THULE AB																			3062 N.MI.			
53,000	-11	-6	-2	-7	-6	-12	-15	9	5	1	6	5	0	-3	9	8	5	7				
40,000	-12	-8	-6	-9	-9	-17	-21	9	6	4	6	6	-2	-6	13	12	10	12				
30,000	-11	-9	-7	-9	-9	-18	-24	7	7	5	5	6	-3	-9	15	14	12	15				
20,000	-5	-6	-3	-3	-4	-12	-16	3	4	2	2	3	-4	-8	12	11	8	11				
NOUASSEUR AB TO TORBAY AP																			2193 N.MI.			
53,000	-24	-17	-16	-18	-18	-25	-29	23	17	15	18	18	11	8	11	9	8	9				
40,000	-35	-28	-29	-36	-32	-43	-49	33	26	27	34	30	19	13	17	16	14	16				
30,000	-34	-26	-25	-33	-29	-41	-47	31	24	23	31	27	16	11	18	17	13	17				
20,000	-26	-17	-19	-23	-21	-29	-34	24	16	18	22	20	11	7	14	13	9	12				
NOUASSEUR AB TO TORREJON AFB																			469 N.MI.			
53,000	4	8	11	2	6	-3	-8	-6	-10	-11	-3	-8	-16	-21	16	13	12	11				
40,000	-1	10	14	11	9	-6	-14	-3	-13	-16	-14	-12	-26	-34	25	22	17	21				
30,000	-3	7	13	9	7	-8	-16	0	-10	-14	-12	-10	-24	-31	25	22	16	21				
20,000	-2	6	11	5	6	-5	-11	0	-8	-12	-6	-7	-17	-23	18	16	12	15				
NOUASSEUR AB TO TRAVIS AFB																			5158 N.MI.			
53,000	-25	-15	-15	-20	-18	-23	-26	23	15	15	19	17	13	10	8	6	5	6				
40,000	-36	-24	-33	-36	-32	-40	-44	33	22	31	33	30	22	18	11	10	10	12				
30,000	-35	-24	-29	-33	-30	-38	-43	32	22	27	30	28	19	15	13	12	10	12				
20,000	-24	-15	-19	-22	-20	-26	-30	22	14	18	21	19	13	10	10	9	7	9				
NOUASSEUR AB TO WAKE AP																			7623 N.MI.			
53,000	0	1	4	2	2	-2	-4	-3	-3	-4	-3	-3	-7	-9	7	5	4	5				
40,000	-3	2	6	3	2	-4	-7	-3	-5	-8	-7	-6	-11	-14	9	8	7	9				
30,000	-2	2	5	3	2	-4	-8	-3	-5	-7	-6	-5	-11	-15	10	9	8	9				
20,000	0	1	3	2	2	-3	-6	-2	-2	-4	-4	-3	-8	-10	8	7	6	7				
NOUASSEUR AB TO WESTOVER AFB																			3051 N.MI.			
53,000	-30	-21	-14	-21	-21	-28	-32	29	21	14	20	20	14	11	10	8	7	8				
40,000	-44	-35	-31	-40	-37	-47	-53	42	33	29	38	35	26	21	15	14	12	14				
30,000	-42	-34	-27	-37	-34	-45	-50	39	32	26	35	32	23	18	16	15	11	14				
20,000	-31	-22	-20	-25	-24	-32	-36	30	21	19	24	23	16	12	12	12	8	10				
NOUASSEUR AB TO WHEELUS AP																			1047 N.MI.			
53,000	34	32	14	19	24	15	11	-35	-32	-15	-19	-24	-34	-40	14	12	10	9				
40,000	42	43	25	33	35	22	16	-44	-45	-26	-34	-36	-50	-58	23	19	14	18				
30,000	34	40	20	28	29	17	11	-36	-41	-21	-29	-31	-44	-52	22	18	13	17				
20,000	25	24	13	16	18	10	6	-26	-25	-13	-16	-19	-29	-34	15	13	9	11				

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EQUIVALENT HEADWINDS AND STANOARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION					
	DIRECT							RETURN										
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
ONLY AP TO PALAM AP																		
53,000	30	18	12	23	20	13	10	-32	-19	-13	-24	-21	-29	-33	10	7	6	8
40,000	30	21	22	27	25	17	12	-33	-23	-24	-29	-27	-36	-40	13	11	11	12
30,000	24	20	22	24	23	15	11	-27	-23	-23	-26	-25	-33	-37	13	12	10	12
20,000	17	13	12	16	14	8	5	-18	-14	-12	-16	-15	-21	-24	9	9	7	8
ONLY AP TO PATRICK AFB																		
53,000	-32	-20	-11	-20	-20	-28	-32	31	18	10	19	19	12	9	9	8	6	8
40,000	-48	-34	-28	-41	-37	-48	-54	45	32	26	39	35	25	20	14	13	11	14
30,000	-48	-33	-26	-39	-36	-47	-53	44	30	25	36	33	23	18	15	14	11	14
20,000	-35	-24	-20	-27	-25	-34	-38	33	22	19	26	24	17	13	12	11	7	10
ONLY AP TO PIARCO AP																		
53,000	-14	-15	-5	-5	-9	-15	-19	13	14	5	5	8	3	1	8	7	5	7
40,000	-24	-25	-14	-15	-19	-27	-32	21	22	13	13	17	9	5	12	11	9	11
30,000	-17	-18	-12	-12	-14	-22	-26	14	16	11	11	13	6	2	11	11	8	10
20,000	-9	-9	-8	-8	-8	-14	-16	7	8	8	8	8	3	0	9	8	6	7
ONLY AP TO POPE AFB																		
53,000	-33	-18	-13	-23	-21	-29	-33	31	17	13	22	20	13	10	10	8	6	8
40,000	-50	-32	-34	-46	-40	-51	-57	47	30	32	43	38	27	22	15	13	12	15
30,000	-51	-33	-32	-43	-39	-51	-57	47	30	30	40	36	25	20	17	16	12	16
20,000	-37	-23	-22	-29	-27	-36	-41	35	21	21	28	26	18	14	13	12	8	11
ONLY AP TO PRESTWICK AB																		
53,000	-22	-10	-5	-10	-11	-21	-26	20	9	5	10	10	1	-3	17	13	10	13
40,000	-29	-14	-15	-22	-20	-37	-47	26	13	13	18	17	0	-9	26	23	22	28
30,000	-30	-15	-14	-22	-20	-41	-53	27	12	11	18	17	-4	-15	32	30	26	33
20,000	-20	-10	-8	-12	-12	-27	-35	18	8	6	10	10	-4	-12	24	22	17	22
ONLY AP TO RAMEY AFB																		
53,000	-20	-16	-6	-9	-12	-19	-23	18	15	6	8	11	5	2	9	8	6	8
40,000	-31	-29	-16	-21	-24	-33	-38	28	26	15	19	21	13	9	13	12	10	13
30,000	-26	-24	-14	-20	-20	-29	-34	23	22	13	18	18	10	6	13	12	9	12
20,000	-17	-15	-12	-15	-15	-21	-24	15	14	12	14	14	8	5	10	9	7	8
ONLY AP TO RHEIN MAIN AB																		
53,000	15	12	13	10	12	3	-2	-17	-13	-13	-10	-13	-22	-28	17	13	11	13
40,000	18	12	25	25	20	2	-8	-21	-13	-27	-28	-22	-40	-49	27	25	23	30
30,000	14	12	25	25	19	-2	-13	-18	-14	-27	-28	-22	-43	-54	33	31	26	33
20,000	13	10	18	18	15	0	-8	-15	-11	-19	-19	-17	-31	-38	24	22	17	22
ONLY AP TO SEOUL AB																		
53,000	18	15	9	15	14	9	7	-20	-16	-10	-16	-15	-20	-23	9	6	5	6
40,000	23	22	17	25	22	15	11	-26	-23	-19	-27	-24	-31	-35	11	9	9	10
30,000	19	22	14	20	18	11	7	-21	-24	-15	-22	-21	-29	-33	11	11	10	12
20,000	15	16	10	16	14	9	6	-17	-17	-11	-18	-16	-22	-25	9	9	7	9
ONLY AP TO STEVENSON FIELD																		
53,000	-24	-11	-9	-16	-14	-20	-25	23	10	8	15	13	8	5	9	7	5	7
40,000	-31	-18	-21	-27	-24	-33	-38	29	17	20	24	22	14	9	12	11	11	13
30,000	-30	-20	-21	-26	-24	-34	-39	27	18	19	23	21	12	7	15	14	13	15
20,000	-19	-13	-12	-16	-15	-23	-27	17	12	11	15	14	7	3	11	11	9	11
ONLY AP TO SUNG SHAN																		
53,000	23	18	11	18	17	12	9	-26	-20	-11	-19	-19	-25	-28	8	7	5	6
40,000	27	26	18	27	24	17	14	-30	-29	-19	-29	-27	-34	-38	10	9	9	10
30,000	25	25	13	21	21	13	9	-28	-27	-15	-23	-23	-31	-36	11	11	9	11
20,000	17	15	10	17	15	9	6	-19	-17	-10	-18	-16	-22	-25	8	8	7	8
ONLY AP TO TACHIKAWA AB																		
53,000	14	12	7	11	11	6	4	-17	-13	-8	-13	-12	-17	-20	8	6	5	6
40,000	20	17	13	21	18	11	8	-23	-19	-15	-23	-20	-27	-31	10	9	9	10
30,000	16	18	11	19	16	8	5	-19	-20	-13	-21	-18	-26	-30	11	11	10	11
20,000	13	14	8	14	12	7	4	-15	-15	-9	-15	-13	-19	-22	9	8	7	8
ONLY AP TO TAN SAN NHUT																		
53,000	26	15	3	13	13	6	3	-29	-16	-4	-14	-15	-23	-28	8	7	6	7
40,000	23	21	13	19	19	12	8	-27	-23	-14	-20	-21	-28	-32	10	9	8	9
30,000	21	19	13	18	18	11	8	-24	-21	-14	-20	-19	-26	-30	10	10	8	9
20,000	15	12	7	11	11	6	4	-16	-12	-7	-12	-12	-17	-19	7	7	6	6

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION					
	D I R E C T							R E T U R N										
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
ONLY AP TO THULE AB																		
53,000	-16	-8	0	-9	-7	-15	-19	14	7	0	8	6	0	-3	11	9	2321 N.MI.	8
40,000	-15	-11	-7	-11	-11	-20	-25	13	10	5	9	9	0	-4	14	12	11	14
30,000	-14	-12	-7	-10	-11	-22	-28	11	10	5	7	8	-3	-9	17	16	15	17
20,000	-7	-8	-3	-4	-5	-14	-19	5	7	2	2	4	-4	-9	14	13	10	13
ONLY AP TO TORBAY AP																		
53,000	-28	-15	-16	-21	-19	-27	-31	27	15	15	20	19	12	8	12	9	2158 N.MI.	10
40,000	-44	-26	-35	-43	-37	-49	-56	42	24	33	41	35	22	16	18	16	15	19
30,000	-47	-28	-33	-42	-37	-51	-59	44	25	31	39	34	21	13	21	20	17	21
20,000	-34	-20	-24	-29	-26	-37	-43	32	18	23	28	25	15	9	17	15	11	15
ONLY AP TO TORREJON AFB																		
53,000	-3	-5	-8	-2	-5	-14	-18	1	4	7	1	4	-5	-10	16	13	554 N.MI.	12
40,000	3	-6	-15	-12	-8	-24	-32	-6	4	12	8	5	-11	-20	25	23	20	25
30,000	3	-6	-17	-11	-9	-25	-34	-6	4	15	7	6	-12	-22	28	25	20	26
20,000	0	-5	-10	-8	-6	-18	-24	-2	3	9	7	5	-8	-14	21	19	14	18
ONLY AP TO TRAVIS AFB																		
53,000	-20	-10	-8	-14	-12	-18	-21	18	10	7	13	11	7	5	8	6	4800 N.MI.	6
40,000	-24	-17	-19	-21	-20	-27	-31	21	15	17	19	18	11	7	11	10	9	11
30,000	-23	-18	-18	-20	-20	-28	-32	20	15	16	17	17	9	5	13	12	11	13
20,000	-14	-12	-10	-13	-12	-18	-22	12	10	9	11	11	5	2	10	9	7	9
ONLY AP TO WAKE AP																		
53,000	4	5	5	4	4	1	-2	-7	-6	-5	-5	-6	-10	-12	8	6	6633 N.MI.	6
40,000	4	6	9	7	6	1	-2	-9	-9	-11	-11	-10	-16	-19	9	8	8	9
30,000	4	6	8	7	6	0	-3	-8	-10	-9	-10	-9	-15	-19	10	9	8	9
20,000	3	4	4	4	4	-1	-3	-6	-6	-5	-6	-6	-10	-13	8	7	6	7
ONLY AP TO WESTOVER AFB																		
53,000	-31	-16	-15	-23	-20	-28	-32	30	16	14	23	20	13	10	10	8	3049 N.MI.	8
40,000	-49	-29	-36	-46	-40	-51	-57	46	27	34	44	37	26	21	15	14	13	16
30,000	-50	-30	-34	-44	-39	-52	-58	46	28	32	41	36	24	18	18	17	14	17
20,000	-35	-21	-23	-29	-27	-36	-41	33	19	22	28	25	16	12	14	13	9	13
ONLY AP TO WHEELUS AP																		
53,000	17	11	4	9	10	2	-2	-18	-13	-5	-10	-11	-20	-24	14	11	1069 N.MI.	10
40,000	25	14	11	14	16	2	-4	-28	-17	-14	-17	-19	-32	-40	22	19	16	20
30,000	21	13	8	15	13	0	-7	-24	-16	-10	-18	-16	-30	-38	23	20	16	21
20,000	15	8	8	8	9	0	-5	-17	-9	-9	-9	-11	-20	-26	17	15	11	14
PALAM AP TO PATRICK AFB																		
53,000	-25	-12	-5	-17	-14	-21	-25	22	10	4	16	12	6	3	8	6	7159 N.MI.	6
40,000	-26	-19	-13	-24	-20	-27	-31	22	16	11	21	17	10	7	10	9	8	9
30,000	-24	-19	-13	-22	-19	-27	-30	20	16	11	19	16	9	6	11	10	9	10
20,000	-15	-13	-7	-14	-12	-18	-21	14	11	7	12	11	5	3	8	8	6	7
PALAM AP TO PIARCO AP																		
53,000	-24	-19	-10	-15	-16	-22	-25	22	18	9	14	15	10	8	7	6	7437 N.MI.	6
40,000	-30	-27	-20	-22	-25	-31	-35	27	25	19	20	23	16	13	10	9	8	9
30,000	-22	-22	-18	-19	-20	-26	-29	20	20	17	17	19	13	10	10	9	7	8
20,000	-13	-12	-10	-12	-12	-16	-18	12	11	10	11	11	7	4	7	7	5	6
PALAM AP TO POPE AFB																		
53,000	-24	-11	-5	-17	-14	-21	-24	21	10	4	15	12	6	3	8	6	6744 N.MI.	6
40,000	-24	-17	-13	-23	-19	-26	-29	20	14	11	20	16	10	6	9	9	8	9
30,000	-22	-18	-13	-21	-18	-25	-29	18	15	11	18	15	8	5	11	10	9	10
20,000	-14	-12	-7	-13	-11	-17	-20	12	10	6	11	10	5	2	8	8	6	8
PALAM AP TO PRESTWICK AB																		
53,000	-30	-16	-10	-22	-18	-26	-31	27	14	9	21	17	10	7	10	7	3734 N.MI.	7
40,000	-28	-19	-21	-27	-24	-32	-37	25	17	20	25	21	13	9	12	11	11	12
30,000	-25	-20	-21	-25	-22	-31	-35	22	17	19	23	20	12	7	13	12	11	12
20,000	-17	-13	-11	-16	-14	-20	-24	16	12	10	15	13	7	4	10	9	7	9
PALAM AP TO RAMEY AFB																		
53,000	-26	-15	-8	-17	-16	-22	-26	24	14	7	16	14	9	6	8	6	7297 N.MI.	6
40,000	-32	-24	-20	-25	-25	-32	-36	28	21	18	23	22	15	12	11	10	9	10
30,000	-28	-23	-19	-24	-23	-30	-34	25	20	17	22	21	14	10	11	10	8	10
20,000	-20	-15	-13	-17	-16	-21	-24	18	14	12	16	15	10	7	8	8	6	7

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HEIGHT IN FEET	EQUIVALENT HEADWINDS*							STANDARD DEVIATION			
	D I R E C T							R E T U R N			
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT
PALAM AP TO RHEIN MAIN AB											
53,000	-33	-19	-12	-25	-21	-29	-34	30	17	12	23
40,000	-33	-23	-23	-29	-27	-35	-40	30	20	22	27
30,000	-27	-22	-23	-26	-24	-33	-37	24	20	21	24
20,000	-18	-14	-12	-16	-15	-21	-24	17	13	11	15
PALAM AP TO SEOUL AB											
53,000	61	45	7	44	43	23	10	-63	-46	-8	-45
40,000	69	54	20	40	46	29	20	-71	-56	-21	-42
30,000	56	44	14	30	35	20	14	-58	-47	-14	-31
20,000	35	25	8	16	20	12	8	-36	-26	-8	-17
PALAM AP TO STEVENSON FIELD											
53,000	-4	-2	1	-4	-2	-6	-8	2	1	-1	2
40,000	-2	-3	-2	-4	-3	-8	-10	-1	0	1	1
30,000	-1	-3	-3	-4	-3	-9	-12	-1	1	1	2
20,000	0	-2	-1	0	-1	-5	-8	-1	1	0	-1
PALAM AP TO SUNG SHAN											
53,000	68	45	-20	15	29	-5	-18	-70	-46	19	-16
40,000	73	55	-5	23	39	6	-3	-76	-56	4	-24
30,000	63	46	-3	20	32	7	-1	-65	-47	2	-21
20,000	38	26	-2	12	18	5	0	-38	-26	1	-12
PALAM AP TO TACHIKAWA AB											
53,000	64	47	8	44	45	25	11	-66	-49	-9	-45
40,000	72	56	22	45	50	32	23	-74	-58	-23	-47
30,000	61	47	15	34	40	23	16	-63	-50	-16	-35
20,000	38	28	9	20	23	14	9	-39	-28	-9	-20
PALAM AP TO TAN SAN NHUT											
53,000	30	18	-33	-11	3	-22	-31	-33	-20	31	9
40,000	29	29	-17	2	11	-9	-16	-34	-30	16	-3
30,000	26	22	-8	8	12	-2	-7	-28	-23	8	-8
20,000	18	12	-3	2	6	-1	-4	-18	-12	3	-2
PALAM AP TO THULE AB											
53,000	-11	-5	-1	-9	-6	-11	-15	9	4	0	8
40,000	-7	-7	-6	-10	-8	-13	-17	4	5	5	8
30,000	-8	-9	-7	-12	-9	-15	-19	5	6	6	10
20,000	-4	-6	-4	-5	-5	-10	-12	3	5	3	4
PALAM AP TO TORBAY AP											
53,000	-28	-14	-9	-21	-17	-25	-29	26	13	8	20
40,000	-31	-22	-21	-28	-25	-33	-37	28	19	19	25
30,000	-30	-23	-20	-25	-25	-33	-38	27	21	18	23
20,000	-20	-15	-11	-17	-16	-22	-25	18	14	10	16
PALAM AP TO TORREJON AFB											
53,000	-35	-26	-15	-24	-24	-32	-36	33	24	15	23
40,000	-40	-33	-29	-32	-33	-41	-46	37	30	28	30
30,000	-31	-29	-27	-27	-29	-36	-40	29	27	26	26
20,000	-20	-18	-15	-16	-17	-23	-26	19	17	14	16
PALAM AP TO TRAVIS AFB											
53,000	11	7	4	6	7	3	1	-13	-8	-5	-8
40,000	11	6	6	7	8	2	-1	-14	-9	-8	-9
30,000	9	5	4	4	5	-1	-4	-12	-8	-6	-7
20,000	6	2	5	3	4	-1	-3	-7	-4	-6	-4
PALAM AP TO WAKE AP											
53,000	61	43	-4	24	33	9	-2	-63	-44	3	-25
40,000	72	59	9	34	47	20	11	-75	-61	-10	-35
30,000	65	48	6	27	37	15	7	-67	-50	-6	-28
20,000	35	28	4	14	20	9	5	-36	-28	-5	-14
PALAM AP TO WESTOVER AFB											
53,000	-25	-12	-6	-18	-14	-22	-25	23	10	5	16
40,000	-25	-18	-14	-24	-20	-27	-31	22	15	12	21
30,000	-23	-19	-14	-22	-19	-27	-31	20	16	12	19
20,000	-14	-13	-8	-13	-12	-17	-20	13	11	7	12

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION					
	DIRECT							RETURN										
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
PALAM AP TO WHEELUS AP																		
53,000	-49	-39	-13	-31	-34	-44	-49	48	37	12	30	33	21	14	10	8	7	8
40,000	-65	-55	-30	-41	-46	-60	-67	62	52	28	39	44	33	27	14	12	10	12
30,000	-52	-46	-25	-33	-38	-50	-56	49	45	25	32	36	27	22	14	12	8	10
20,000	-31	-28	-12	-18	-22	-30	-34	30	27	12	18	21	14	11	9	8	6	7
PATRICK AFB TO PIARCO AP																		
53,000	19	19	-6	5	8	-2	-6	-20	-20	5	-6	-9	-21	-26	12	12	7	9
40,000	31	29	0	11	17	4	-2	-34	-32	-1	-13	-19	-34	-41	15	15	10	14
30,000	24	22	1	7	12	2	-2	-25	-23	-1	-8	-13	-25	-31	13	12	8	10
20,000	8	9	-6	-2	1	-5	-8	-9	-9	6	2	-2	-10	-14	9	9	6	7
PATRICK AFB TO POPE AFB																		
53,000	7	1	-4	3	1	-9	-14	-13	-5	4	-5	-4	-15	-22	16	17	10	17
40,000	7	7	-6	9	3	-13	-21	-19	-16	4	-14	-10	-28	-38	25	26	19	25
30,000	7	1	-2	7	3	-11	-18	-16	-7	1	-11	-8	-23	-30	21	23	15	23
20,000	8	4	3	6	5	-5	-10	-12	-7	-3	-8	-7	-18	-23	18	18	10	16
PATRICK AFB TO PRESTWICK AB																		
53,000	31	17	9	21	18	11	8	-33	-18	-10	-22	-20	-28	-33	10	8	6	8
40,000	45	31	25	39	35	24	19	-49	-34	-27	-43	-38	-49	-55	14	14	12	15
30,000	45	29	25	36	33	22	17	-49	-33	-27	-39	-36	-48	-55	16	15	12	15
20,000	32	21	17	24	23	15	11	-35	-23	-18	-26	-25	-34	-39	13	12	8	11
PATRICK AFB TO RAMEY AFB																		
53,000	26	25	-4	8	13	0	-5	-28	-26	4	-9	-14	-28	-34	14	14	8	12
40,000	40	40	5	17	24	8	1	-43	-43	-5	-18	-26	-45	-54	19	19	13	19
30,000	30	30	4	11	17	5	0	-32	-31	-4	-12	-18	-33	-40	16	15	10	14
20,000	13	14	-4	0	4	-4	-7	-13	-15	4	0	-4	-15	-20	12	11	7	9
PATRICK AFB TO RHEIN MAIN AB																		
53,000	30	17	10	20	18	12	9	-32	-19	-10	-21	-19	-27	-32	9	7	6	8
40,000	44	30	26	39	34	25	20	-48	-33	-28	-41	-37	-47	-53	13	13	11	14
30,000	43	29	25	36	33	23	18	-47	-32	-27	-39	-35	-47	-53	15	14	11	14
20,000	32	21	19	25	23	16	13	-34	-23	-19	-26	-25	-33	-38	12	11	8	10
PATRICK AFB TO SEOUL AB																		
53,000	-23	-11	-6	-16	-13	-20	-23	21	10	6	15	12	7	4	8	6	4	6
40,000	-21	-15	-15	-19	-17	-23	-27	17	12	13	16	14	9	5	9	8	8	9
30,000	-19	-15	-13	-16	-16	-22	-25	15	12	12	15	13	7	4	9	10	8	9
20,000	-12	-9	-9	-11	-10	-15	-17	10	8	8	9	9	4	2	8	7	6	7
PATRICK AFB TO STEVENSON FIELD																		
53,000	-25	-17	-8	-15	-15	-24	-29	21	15	7	13	13	6	2	12	11	8	11
40,000	-37	-27	-22	-26	-28	-41	-48	28	21	19	21	22	10	3	19	18	16	20
30,000	-34	-26	-17	-23	-24	-37	-44	26	21	15	18	19	8	1	19	19	13	20
20,000	-22	-17	-10	-15	-15	-25	-30	18	14	9	13	13	5	0	15	15	9	14
PATRICK AFB TO SUNG SHAN																		
53,000	-27	-13	-4	-17	-14	-22	-26	23	11	4	15	13	6	3	8	6	5	6
40,000	-24	-17	-15	-20	-19	-25	-29	19	13	13	16	15	9	6	9	8	8	9
30,000	-22	-16	-13	-16	-17	-23	-27	17	13	12	14	14	8	4	9	9	8	9
20,000	-13	-10	-9	-11	-10	-15	-18	11	8	8	9	9	5	2	7	7	5	7
PATRICK AFB TO TACHIKAWA AB																		
53,000	-30	-17	-6	-22	-19	-26	-30	28	16	6	21	17	10	6	8	6	5	6
40,000	-34	-24	-19	-31	-27	-35	-39	30	21	16	28	24	16	12	10	9	9	10
30,000	-31	-22	-17	-27	-24	-32	-36	27	19	15	24	21	14	10	11	11	9	11
20,000	-21	-14	-10	-18	-15	-22	-25	19	13	9	16	14	8	5	9	8	6	8
PATRICK AFB TO TAN SAN NHUT																		
53,000	-16	-8	-1	-8	-7	-13	-16	13	6	0	6	6	1	-1	7	5	4	5
40,000	-13	-7	-9	-10	-10	-15	-18	8	4	8	7	6	1	-2	8	7	7	8
30,000	-10	-7	-9	-9	-9	-14	-17	6	4	7	6	6	1	-2	8	8	7	8
20,000	-5	-5	-7	-5	-5	-9	-12	2	3	6	4	4	0	-2	6	6	5	6
PATRICK AFB TO THULE AB																		
53,000	4	0	-2	3	1	-4	-7	-7	-1	1	-4	-2	-8	-11	9	8	6	8
40,000	3	0	-4	2	0	-8	-12	-10	-4	1	-7	-5	-13	-18	12	12	11	13
30,000	2	-1	-2	2	0	-9	-13	-8	-3	0	-6	-4	-15	-18	13	13	11	13
20,000	3	-1	0	2	1	-6	-9	-6	-2	-1	-4	-3	-10	-14	11	11	8	10

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT								HEADWINDS*								STANDARD DEVIATION			
	DIRECT								RETURN								JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85						
PATRICK AFB TO TORBAY AP																	1740 N.MI.			
53,000	33	19	4	20	18	8	3	-36	-21	-5	-21	-20	-32	-38	13	12	8	12		
40,000	47	36	18	38	34	20	13	-53	-41	-20	-42	-39	-54	-62	19	19	15	19		
30,000	43	32	18	34	31	18	11	-49	-36	-20	-37	-34	-49	-57	20	19	13	18		
20,000	32	23	14	23	22	13	8	-35	-25	-15	-24	-23	-34	-41	15	15	9	13		
PATRICK AFB TO TORREJON AFB																	3770 N.MI.			
53,000	31	22	9	17	19	11	8	-32	-23	-9	-18	-20	-28	-33	9	8	6	8		
40,000	41	36	19	34	32	22	17	-44	-38	-21	-36	-34	-45	-51	14	13	10	13		
30,000	38	32	18	30	29	19	15	-41	-34	-19	-32	-31	-41	-47	14	13	9	12		
20,000	29	23	16	21	22	15	12	-30	-24	-17	-22	-23	-30	-34	11	10	7	9		
PATRICK AFB TO TRAVIS AFB																	2140 N.MI.			
53,000	-41	-32	-4	-21	-25	-37	-42	39	31	4	20	24	11	5	11	10	7	10		
40,000	-60	-50	-20	-41	-43	-58	-66	57	47	19	39	40	25	18	18	17	13	16		
30,000	-51	-42	-15	-33	-34	-49	-57	48	40	14	31	32	18	12	18	16	11	16		
20,000	-32	-26	-8	-18	-20	-31	-37	31	25	8	17	19	10	6	13	12	7	11		
PATRICK AFB TO WAKE AP																	5971 N.MI.			
53,000	-31	-24	-5	-14	-18	-28	-32	29	23	4	14	17	8	4	8	7	5	7		
40,000	-54	-42	-16	-32	-36	-49	-54	50	39	14	30	33	21	15	11	11	9	10		
30,000	-45	-37	-12	-26	-30	-41	-47	42	34	11	24	28	16	11	12	10	7	10		
20,000	-29	-23	-7	-16	-18	-26	-30	28	22	7	15	17	10	7	9	7	5	7		
PATRICK AFB TO WESTOVER AFB																	924 N.MI.			
53,000	20	10	-2	11	9	-2	-6	-25	-13	2	-13	-11	-24	-30	15	15	10	14		
40,000	25	20	3	23	17	1	-7	-36	-28	-5	-28	-24	-41	-50	23	24	18	23		
30,000	23	15	5	19	14	1	-6	-32	-21	-7	-23	-20	-35	-45	22	23	15	22		
20,000	19	11	6	13	12	2	-3	-24	-14	-7	-15	-14	-25	-32	17	17	9	16		
PATRICK AFB TO WHEELUS AP																	4683 N.MI.			
53,000	30	24	10	17	19	12	9	-32	-25	-10	-17	-20	-28	-33	8	7	5	7		
40,000	40	36	19	31	31	22	17	-42	-38	-20	-33	-33	-43	-48	12	12	9	11		
30,000	35	32	17	28	28	19	15	-37	-34	-18	-30	-29	-39	-44	12	11	8	11		
20,000	27	22	15	19	20	14	12	-28	-23	-15	-20	-21	-28	-32	9	9	6	8		
PIARCO AP TO POPE AFB																	1762 N.MI.			
53,000	-22	-20	2	-8	-11	-22	-27	20	19	-2	7	10	1	-3	11	11	7	9		
40,000	-33	-29	-4	-15	-19	-33	-40	28	24	3	12	16	4	-1	15	16	11	15		
30,000	-27	-23	-3	-10	-14	-26	-32	24	21	2	9	13	3	-1	14	13	8	11		
20,000	-12	-11	3	0	-4	-12	-17	11	10	-3	-1	3	-3	-6	10	10	6	8		
PIARCO AP TO PRESTWICK AB																	3770 N.MI.			
53,000	13	11	4	5	8	2	0	-15	-12	-4	-6	-9	-15	-18	9	8	6	7		
40,000	23	21	13	13	17	9	5	-27	-24	-14	-16	-20	-29	-33	13	12	10	12		
30,000	19	16	12	12	14	7	3	-22	-19	-13	-15	-17	-25	-29	-13	12	9	11		
20,000	12	10	9	10	10	4	1	-14	-11	-9	-11	-11	-17	-20	10	9	6	8		
PIARCO AP TO RAMEY AFB																	582 N.MI.			
53,000	-12	-13	7	-3	-4	-14	-20	11	12	-8	3	3	-6	-10	15	14	9	9		
40,000	-21	-17	5	-7	-9	-23	-30	19	14	-6	6	7	-5	-11	18	18	12	16		
30,000	-17	-13	4	-3	-6	-17	-23	16	12	-4	3	5	-4	-8	15	14	9	10		
20,000	-4	-4	7	3	1	-6	-10	3	3	-7	-3	-2	-8	-11	11	10	7	8		
PIARCO AP TO RHEIN MAIN AB																	4143 N.MI.			
53,000	13	13	5	5	9	4	1	-15	-14	-5	-6	-9	-15	-19	8	7	5	6		
40,000	21	21	14	14	17	10	6	-24	-24	-15	-16	-19	-27	-32	12	11	9	11		
30,000	15	15	12	12	13	7	3	-17	-18	-13	-13	-15	-22	-26	12	11	8	10		
20,000	8	8	8	8	8	3	0	-9	-9	-9	-9	-9	-14	-17	9	8	6	7		
PIARCO AP TO SEOUL AB																	7877 N.MI.			
53,000	-11	-7	-3	-6	-6	-10	-13	8	5	2	5	5	1	-1	7	5	4	5		
40,000	-6	-7	-7	-7	-6	-12	-14	1	4	5	4	4	-2	-5	8	8	7	8		
30,000	-5	-7	-6	-5	-6	-11	-14	2	4	4	3	3	-2	-5	8	9	7	8		
20,000	-1	-3	-4	-3	-3	-7	-9	-1	2	3	1	1	-3	-5	7	7	5	6		
PIARCO AP TO STEVENSON FIELD																	2952 N.MI.			
53,000	-25	-20	-4	-13	-15	-23	-27	23	18	3	12	13	6	2	9	9	6	8		
40,000	-39	-30	-15	-22	-26	-37	-43	33	25	13	19	22	13	8	13	13	10	13		
30,000	-34	-26	-12	-18	-21	-32	-38	30	23	11	16	19	10	6	13	12	8	12		
20,000	-20	-15	-5	-8	-11	-19	-23	18	14	4	7	10	4	1	10	9	6	8		

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HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	DIRECT							RETURN							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85				
PIARCO AP TO SUNG SHAN																		8654 N.MI.
53,000	-7	-4	-1	-3	-4	-8	-10	4	3	0	2	2	-2	-4	7	6	4	5
40,000	0	-3	-4	-1	-2	-7	-10	-5	-1	2	-2	-1	-7	-10	8	8	7	8
30,000	-1	-2	-3	-1	-2	-7	-10	-3	-1	2	-2	-1	-7	-10	8	8	7	8
20,000	1	0	-1	1	0	-4	-7	-3	-1	1	-2	-1	-6	-8	7	7	5	6
PIARCO AP TO TACHIKAWA AB																		7784 N.MI.
53,000	-25	-14	-5	-16	-14	-21	-25	23	13	4	15	13	7	4	7	6	4	6
40,000	-26	-19	-14	-22	-20	-27	-30	22	16	12	20	17	11	8	9	8	8	9
30,000	-24	-18	-13	-19	-18	-25	-28	20	15	12	16	16	9	6	9	9	8	9
20,000	-15	-11	-8	-11	-11	-16	-19	13	10	7	10	10	5	3	7	7	5	7
PIARCO AP TO TAN SAN NHUT																		9330 N.MI.
53,000	18	12	4	9	10	5	3	-21	-13	-5	-10	-12	-18	-21	7	6	5	6
40,000	21	20	12	15	17	10	7	-25	-23	-13	-17	-19	-26	-30	9	9	8	9
30,000	20	18	11	14	15	9	6	-23	-21	-13	-16	-18	-25	-28	10	10	7	9
20,000	14	12	7	10	10	6	4	-15	-13	-8	-11	-11	-16	-19	7	7	5	6
PIARCO AP TO THULE AB																		3964 N.MI.
53,000	-2	-4	-1	-1	-2	-7	-9	-1	2	1	0	0	-4	-7	9	8	5	7
40,000	1	-1	-1	0	0	-7	-11	-6	-4	-1	-3	-3	-10	-14	11	11	9	11
30,000	-1	-2	0	1	0	-7	-11	-4	-2	-1	-4	-3	-10	-14	12	11	9	10
20,000	0	0	2	2	1	-4	-7	-2	-2	-2	-4	-2	-8	-11	9	9	6	8
PIARCO AP TO TORBAY AP																		2264 N.MI.
53,000	0	-1	-1	-2	-1	-7	-11	-3	-1	1	0	-1	-7	-11	12	10	7	9
40,000	6	9	2	1	4	-5	-10	-12	-15	-4	-4	-8	-18	-24	16	15	11	14
30,000	3	5	3	3	3	-5	-9	-8	-9	-4	-5	-6	-15	-20	15	14	9	12
20,000	1	4	3	3	3	-3	-7	-3	-6	-4	-5	-4	-10	-14	11	10	7	9
PIARCO AP TO TORREJON AFB																		3533 N.MI.
53,000	15	17	3	5	9	3	1	-16	-18	-4	-6	-10	-17	-21	8	7	5	6
40,000	25	27	14	12	19	11	7	-27	-30	-15	-13	-21	-30	-35	12	11	8	10
30,000	14	19	11	8	13	6	3	-16	-21	-11	-9	-14	-21	-25	11	10	7	9
20,000	5	8	6	5	6	1	-2	-6	-9	-6	-5	-6	-11	-14	8	8	6	6
PIARCO AP TO TRAVIS AFB																		3628 N.MI.
53,000	-29	-25	3	-12	-17	-27	-32	28	24	-3	12	17	3	-2	8	8	5	7
40,000	-46	-42	-9	-26	-32	-45	-50	43	39	8	24	29	15	8	12	12	9	11
30,000	-37	-33	-7	-19	-24	-35	-41	35	31	6	18	22	11	6	12	11	7	9
20,000	-19	-17	0	-7	-10	-19	-23	18	16	-1	7	10	2	-1	8	8	5	7
PIARCO AP TO WAKE AP																		7444 N.MI.
53,000	-27	-23	1	-9	-15	-25	-29	25	22	-2	9	14	3	-1	7	7	5	6
40,000	-46	-40	-8	-23	-30	-43	-48	43	38	7	22	28	14	8	10	9	7	9
30,000	-36	-31	-5	-17	-22	-34	-39	34	30	5	16	21	10	5	10	8	6	7
20,000	-20	-16	0	-6	-10	-18	-21	19	15	-1	6	9	2	-1	7	6	4	5
PIARCO AP TO WESTOVER AFB																		1986 N.MI.
53,000	-16	-15	-2	-7	-9	-18	-22	13	13	1	6	8	1	-3	11	11	7	9
40,000	-23	-17	-4	-10	-13	-24	-30	16	11	3	7	8	-1	-6	16	16	11	15
30,000	-20	-16	-3	-7	-10	-21	-27	15	12	2	5	8	-1	-5	15	14	9	12
20,000	-10	-9	1	0	-4	-11	-16	8	7	-1	-1	2	-4	-7	11	10	6	9
PIARCO AP TO WHEELUS AP																		4286 N.MI.
53,000	24	25	2	10	15	6	2	-25	-25	-2	-10	-15	-25	-29	8	7	5	5
40,000	36	38	16	17	25	16	12	-39	-40	-16	-18	-27	-39	-45	11	10	7	9
30,000	24	29	12	11	17	11	8	-25	-30	-12	-12	-18	-28	-33	10	9	6	7
20,000	10	12	2	5	7	2	0	-10	-13	-3	-6	-8	-13	-15	7	6	5	5
POPE AFB TO PRESTWICK AB																		3192 N.MI.
53,000	32	16	11	23	19	12	9	-33	-17	-12	-24	-20	-29	-34	10	8	7	8
40,000	47	29	29	42	36	26	20	-51	-32	-32	-45	-39	-51	-57	15	14	13	15
30,000	47	29	29	39	35	23	17	-51	-33	-31	-42	-38	-51	-58	18	17	14	17
20,000	33	20	19	26	24	15	11	-36	-22	-20	-27	-25	-35	-40	14	13	9	12
POPE AFB TO RAMEY AFB																		1183 N.MI.
53,000	22	21	0	9	12	2	-3	-25	-23	-1	-10	-14	-26	-32	13	14	8	12
40,000	32	29	7	15	20	6	0	-38	-34	-8	-18	-23	-39	-48	19	20	13	19
30,000	27	24	5	11	15	4	-1	-31	-27	-5	-13	-18	-31	-39	17	16	10	15
20,000	14	12	-2	0	5	-3	-7	-15	-14	1	-1	-6	-16	-21	13	12	7	10

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION			
	D I R E C T						R E T U R N						JAN	APR	JUL	OCT
	JAN	APR	JUL	DCT	**A50	A75	A85	JAN	APR	JUL	DCT	A50	A75	A85		
POPE AFB TO RHEIN MAIN AB																
53,000	31	17	12	22	19	13	10	-32	-17	-12	-23	-20	-28	-32	3743 N.MI.	
40,000	46	28	30	42	36	26	21	-49	-31	-32	-45	-39	-50	-55	9	7 6 8
30,000	46	28	29	39	35	24	18	-50	-31	-31	-42	-38	-50	-56	14	13 12 15
20,000	33	20	20	26	24	16	12	-35	-22	-21	-28	-26	-34	-40	17	15 13 16
POPE AFB TO SEOUL AB																
53,000	-21	-9	-6	-14	-12	-18	-21	19	8	6	13	10	6	4	6206 N.MI.	
40,000	-18	-13	-15	-17	-16	-21	-25	14	10	13	14	13	7	4	8	5 4 6
30,000	-16	-13	-14	-15	-15	-21	-24	13	10	13	13	12	6	3	8	8 8 9
20,000	-10	-8	-10	-10	-9	-14	-17	8	7	9	8	8	3	1	9	9 8 9
POPE AFB TO STEVENSON FIELD																
53,000	-30	-19	-11	-19	-19	-28	-34	27	17	11	18	17	9	5	1190 N.MI.	
40,000	-48	-31	-31	-33	-35	-50	-58	40	27	29	28	31	17	9	14	12 9 12
30,000	-45	-31	-25	-30	-32	-47	-55	38	27	23	26	28	14	7	21	20 18 22
20,000	-30	-22	-16	-20	-21	-33	-39	27	20	15	18	19	10	4	22	22 16 23
POPE AFB TO SUNG SHAN																
53,000	-24	-11	-4	-14	-12	-19	-23	20	9	4	13	10	5	3	7002 N.MI.	
40,000	-19	-14	-15	-17	-16	-22	-25	14	11	13	13	13	7	4	8	6 5 6
30,000	-18	-13	-14	-15	-15	-21	-24	13	10	12	12	12	6	3	8	8 8 9
20,000	-10	-8	-10	-9	-9	-14	-16	8	7	9	8	8	3	1	9	9 8 9
POPE AFB TO TACHIKAWA AB																
53,000	-29	-14	-6	-20	-17	-24	-29	26	13	6	19	15	9	6	6036 N.MI.	
40,000	-30	-20	-18	-28	-24	-31	-35	26	17	16	25	21	14	10	8	6 5 6
30,000	-28	-19	-17	-24	-22	-29	-33	24	16	15	21	19	12	8	9	9 9 10
20,000	-19	-13	-10	-16	-14	-20	-23	17	12	10	15	13	8	5	10	10 9 10
POPE AFB TO TAN SAN NHUT																
53,000	-12	-6	-1	-5	-5	-10	-13	8	4	0	3	3	-1	-3	8022 N.MI.	
40,000	-8	-4	-7	-6	-6	-11	-14	3	1	5	3	3	-2	-5	7	5 4 5
30,000	-6	-3	-6	-5	-5	-11	-13	2	0	5	3	3	-3	-6	8	7 7 8
20,000	-2	-3	-5	-3	-3	-7	-10	0	1	5	2	2	-2	-5	8	8 7 8
POPE AFB TO THULE AB																
53,000	4	0	-2	3	1	-4	-7	-7	-1	1	-5	-3	-9	-12	2498 N.MI.	
40,000	4	0	-3	2	1	-8	-12	-10	-3	0	-6	-5	-13	-18	10	8 6 8
30,000	2	-1	-2	2	0	-9	-14	-8	-3	-1	-6	-4	-14	-19	13	12 12 13
20,000	3	-1	-1	2	1	-6	-10	-6	-1	-1	-4	-3	-10	-14	14	14 12 14
POPE AFB TO TORBAY AP																
53,000	38	22	9	25	22	12	7	-40	-23	-9	-27	-24	-36	-42	1388 N.MI.	
40,000	56	39	29	48	42	27	19	-61	-43	-32	-51	-46	-62	-71	14	12 9 12
30,000	53	37	28	42	39	24	17	-58	-41	-30	-45	-42	-59	-68	22	21 18 22
20,000	39	26	19	28	27	16	11	-42	-28	-20	-30	-28	-41	-48	24	22 16 21
POPE AFB TO TURNER AFB																
53,000	32	21	13	20	20	14	11	-33	-22	-13	-21	-21	-29	-34	3483 N.MI.	
40,000	45	34	29	41	37	27	22	-48	-36	-30	-43	-39	-49	-55	9	8 6 8
30,000	44	33	26	37	34	24	19	-47	-35	-28	-39	-36	-47	-53	14	14 12 14
20,000	33	23	20	26	25	18	14	-35	-25	-21	-27	-26	-34	-39	15	14 11 14
POPE AFB TO TRAVIS AFB																
53,000	-41	-30	-10	-24	-26	-37	-42	40	30	9	23	25	14	9	2054 N.MI.	
40,000	-65	-47	-32	-44	-46	-60	-69	62	44	31	42	44	30	24	11	10 7 10
30,000	-56	-41	-24	-36	-38	-53	-61	53	39	23	34	36	23	17	18	17 14 17
20,000	-36	-27	-15	-22	-24	-34	-40	35	26	15	21	23	14	10	19	18 12 18
POPE AFB TO WAKE AP																
53,000	-29	-21	-7	-16	-18	-26	-30	27	20	7	16	17	10	7	5840 N.MI.	
40,000	-54	-40	-21	-35	-37	-49	-54	50	37	20	32	34	24	19	8	7 5 7
30,000	-48	-37	-18	-31	-33	-45	-50	45	35	17	29	31	21	16	11	11 9 11
20,000	-33	-25	-14	-22	-23	-31	-35	31	24	13	21	22	15	12	12	11 8 11
POPE AFB TO WESTOVER AFB																
53,000	30	16	1	18	15	3	-3	-34	-19	-1	-20	-18	-31	-39	519 N.MI.	
40,000	39	28	13	34	28	9	0	-49	-34	-16	-39	-34	-54	-64	17	16 11 15
30,000	37	25	14	29	25	8	-1	-46	-31	-16	-34	-30	-50	-61	27	27 22 27
20,000	30	16	11	20	18	6	-1	-34	-20	-12	-22	-20	-35	-43	27	28 18 27

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION					
	O I R E C T							R E T U R N							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85				
POPE AFB TO WHEELUS AP																		
53,000	31	22	13	19	20	14	11	-32	-23	-13	-20	-21	-28	-33	8	7	6	7
40,000	43	34	27	37	35	26	22	-46	-36	-29	-39	-37	-46	-51	13	12	10	12
30,000	40	32	25	34	32	24	19	-43	-34	-26	-36	-34	-44	-49	13	12	9	12
20,000	31	22	19	24	23	17	14	-32	-24	-20	-25	-24	-31	-35	10	10	7	9
PRESTWICK AB TO RAMEY AFB																		
53,000	-21	-14	-6	-11	-12	-19	-23	19	13	6	10	11	5	2	10	8	6	8
40,000	-35	-29	-18	-24	-26	-36	-41	31	26	16	21	23	14	9	14	13	11	14
30,000	-32	-26	-17	-23	-24	-34	-39	29	23	15	20	21	12	8	15	14	10	13
20,000	-22	-18	-14	-17	-17	-24	-28	20	17	13	16	16	10	6	12	10	7	9
PRESTWICK AB TO RHEIN MAIN AB																		
53,000	25	12	8	13	13	5	0	-26	-13	-8	-14	-14	-24	-29	17	12	10	12
40,000	31	17	20	26	23	7	-2	-33	-18	-22	-29	-25	-42	-51	25	22	22	28
30,000	30	16	19	26	22	2	-9	-33	-18	-21	-29	-25	-46	-57	31	30	26	32
20,000	22	12	13	16	15	1	-6	-24	-13	-14	-18	-17	-31	-39	24	22	17	22
PRESTWICK AB TO SEOUL AB																		
53,000	16	12	7	13	11	7	5	-18	-13	-8	-14	-13	-18	-21	9	6	5	6
40,000	22	20	13	23	19	13	9	-24	-22	-15	-25	-21	-28	-32	11	9	8	10
30,000	20	21	11	20	18	10	6	-22	-24	-12	-22	-20	-28	-32	11	11	10	11
20,000	15	15	8	15	13	7	4	-16	-16	-9	-16	-14	-20	-23	9	9	7	8
PRESTWICK AB TO STEVENSON FIELD																		
53,000	-24	-10	-7	-16	-13	-21	-25	23	10	7	15	13	7	4	10	7	5	7
40,000	-29	-18	-19	-24	-22	-31	-36	27	17	17	22	20	12	8	12	11	11	13
30,000	-27	-20	-19	-23	-22	-32	-38	24	18	17	20	20	10	5	15	15	13	15
20,000	-17	-13	-11	-15	-14	-21	-26	15	12	10	13	12	5	1	12	11	9	11
PRESTWICK AB TO SUNG SHAN																		
53,000	20	15	8	16	14	9	7	-23	-17	-9	-17	-16	-22	-25	9	7	5	6
40,000	25	25	13	25	22	15	11	-29	-28	-15	-28	-25	-32	-36	10	9	9	10
30,000	23	26	10	19	19	11	7	-27	-28	-12	-21	-22	-31	-35	11	11	9	11
20,000	17	16	8	16	14	8	5	-19	-17	-9	-17	-15	-21	-24	8	8	7	8
PRESTWICK AB TO TACHIKAWA AB																		
53,000	11	9	5	9	8	4	2	-14	-10	-6	-11	-10	-14	-17	8	6	4	6
40,000	18	14	9	17	14	8	5	-21	-16	-11	-20	-17	-23	-27	10	9	8	9
30,000	17	16	8	17	14	7	3	-19	-19	-10	-19	-17	-24	-28	10	11	10	10
20,000	13	11	6	12	10	5	2	-14	-13	-7	-13	-11	-17	-20	8	8	7	8
PRESTWICK AB TO TAN SAN NHUT																		
53,000	23	13	3	12	12	6	3	-26	-15	-5	-13	-14	-21	-25	8	7	5	6
40,000	20	20	12	17	17	10	7	-24	-22	-14	-19	-20	-26	-30	10	9	8	9
30,000	19	18	12	17	16	9	6	-22	-21	-13	-18	-18	-25	-29	10	10	8	10
20,000	14	12	6	11	11	6	3	-15	-13	-7	-12	-11	-17	-19	7	7	6	7
PRESTWICK AB TO THULE AB																		
53,000	-15	-7	1	-9	-6	-15	-19	13	6	-1	8	6	-1	-4	12	10	6	9
40,000	-12	-11	-5	-9	-9	-18	-23	9	9	4	7	7	-2	-7	15	13	12	15
30,000	-10	-11	-7	-7	-9	-21	-27	7	9	5	5	6	-5	-12	19	17	16	19
20,000	-3	-8	-3	-2	-4	-13	-18	1	6	2	1	3	-7	-12	15	14	11	14
PRESTWICK AB TO TORBAY AP																		
53,000	-30	-15	-15	-23	-19	-28	-33	28	14	14	22	19	11	8	13	10	8	11
40,000	-46	-28	-34	-43	-38	-51	-59	44	26	32	41	36	23	16	20	18	17	20
30,000	-50	-30	-34	-42	-39	-54	-63	47	27	32	39	36	20	12	24	22	19	23
20,000	-36	-22	-22	-28	-26	-38	-45	33	20	21	26	25	13	8	19	17	13	17
PRESTWICK AB TO TORREJON AFB																		
53,000	8	3	0	3	3	-4	-9	-10	-4	-1	-4	-4	-13	-17	14	11	10	11
40,000	14	4	0	2	5	-10	-18	-18	-6	-3	-6	-8	-23	-31	23	20	19	24
30,000	14	4	-2	4	4	-12	-21	-18	-7	-1	-8	-8	-25	-34	26	24	20	26
20,000	8	2	-2	0	1	-10	-16	-10	-4	0	-2	-3	-16	-22	20	18	14	18
PRESTWICK AB TO TRAVIS AFB																		
53,000	-19	-10	-7	-13	-11	-17	-20	17	9	7	12	11	6	4	8	6	5	6
40,000	-21	-16	-17	-19	-18	-25	-29	13	15	15	17	16	9	6	11	10	9	11
30,000	-21	-17	-16	-18	-18	-26	-31	17	15	14	15	15	7	3	13	12	11	13
20,000	-12	-12	-9	-12	-11	-17	-21	10	10	8	10	10	4	0	10	9	7	9

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES																		
HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION					
	D I R E C T							R E T U R N										
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
PRESTWICK AB TO WAKE AP																		
53,000	1	1	4	3	2	-2	-4	-4	-2	-4	-4	-4	-7	-10	6291 N.MI.			
40,000	-1	2	6	3	3	-3	-7	-4	-6	-8	-7	-6	-12	-15	8	6	4	6
30,000	0	2	5	3	3	-4	-7	-5	-6	-6	-6	-6	-12	-15	9	8	7	9
20,000	1	1	2	2	1	-3	-6	-3	-2	-3	-3	-3	-8	-10	10	9	8	9
PRESTWICK AB TO WESTOVER AFB																		
53,000	-32	-16	-13	-24	-20	-29	-34	31	15	13	24	20	12	9	2681 N.MI.			
40,000	-49	-29	-34	-45	-39	-51	-57	46	27	31	42	36	25	19	11	8	7	9
30,000	-50	-31	-33	-42	-38	-52	-59	46	28	30	39	35	22	16	16	15	14	17
20,000	-34	-21	-20	-27	-25	-35	-40	32	19	19	26	23	14	9	20	18	15	19
PRESTWICK AB TO WHEELUS AP																		
53,000	18	11	4	9	10	3	-1	-19	-12	-5	-10	-11	-18	-23	1548 N.MI.			
40,000	26	13	12	15	16	4	-2	-28	-16	-14	-19	-19	-31	-38	12	10	8	9
30,000	23	13	9	16	14	2	-5	-26	-15	-12	-19	-17	-31	-38	19	17	15	19
20,000	16	8	7	9	10	1	-4	-18	-9	-9	-10	-11	-21	-26	21	19	16	20
RAMEY AFB TO RHEIN MAIN AB																		
53,000	19	14	6	9	11	6	3	-20	-15	-6	-10	-12	-19	-23	4009 N.MI.			
40,000	28	25	16	20	22	14	9	-31	-28	-17	-23	-24	-33	-38	9	7	6	7
30,000	24	21	14	19	19	11	7	-27	-24	-15	-21	-21	-30	-35	13	12	10	12
20,000	17	14	13	15	14	9	6	-18	-16	-13	-16	-15	-21	-25	13	12	9	12
RAMEY AFB TO SEOUL AB																		
53,000	-16	-9	-5	-9	-9	-14	-17	13	8	4	8	8	4	2	7346 N.MI.			
40,000	-13	-11	-11	-12	-12	-17	-20	8	8	10	9	9	3	1	7	5	4	6
30,000	-11	-11	-11	-10	-11	-16	-20	8	8	9	8	8	3	0	8	8	7	8
20,000	-6	-6	-7	-6	-6	-10	-13	4	5	6	4	5	0	-2	9	9	8	8
RAMEY AFB TO STEVENSON FIELD																		
53,000	-28	-21	-6	-14	-17	-26	-31	25	19	5	13	15	7	4	2372 N.MI.			
40,000	-43	-33	-19	-25	-29	-41	-48	36	28	18	21	25	15	9	10	10	7	9
30,000	-38	-29	-15	-21	-25	-36	-43	32	25	14	18	22	12	7	15	15	12	15
20,000	-23	-18	-7	-11	-14	-22	-27	20	16	7	9	12	5	2	15	15	10	14
RAMEY AFB TO SUNG SHAN																		
53,000	-16	-9	-3	-8	-8	-13	-17	12	7	2	6	6	2	0	8137 N.MI.			
40,000	-11	-10	-10	-10	-10	-16	-18	6	6	9	6	7	1	-2	7	6	4	6
30,000	-10	-9	-9	-8	-9	-15	-18	5	6	8	6	6	1	-2	8	8	7	8
20,000	-4	-5	-6	-4	-5	-9	-11	2	3	5	3	3	-1	-3	8	9	7	8
RAMEY AFB TO TACHIKAWA AB																		
53,000	-27	-15	-5	-18	-16	-23	-27	25	14	5	17	14	8	5	7215 N.MI.			
40,000	-29	-21	-16	-25	-23	-30	-33	25	18	14	22	20	13	9	7	6	4	6
30,000	-27	-20	-15	-21	-20	-27	-31	23	17	13	18	17	11	7	9	9	8	9
20,000	-17	-13	-9	-13	-12	-18	-21	15	11	8	11	11	6	4	10	10	8	10
RAMEY AFB TO TAN SAN NHUT																		
53,000	10	5	2	7	6	1	-1	-13	-7	-3	-8	-7	-12	-15	9003 N.MI.			
40,000	12	13	4	11	10	4	1	-16	-16	-6	-14	-13	-19	-23	7	6	4	6
30,000	12	13	3	11	10	3	0	-16	-16	-5	-13	-13	-19	-23	9	8	7	8
20,000	9	9	3	8	7	2	0	-11	-11	-4	-9	-8	-13	-16	9	9	7	8
RAMEY AFB TO THULE AB																		
53,000	0	-3	-2	1	-1	-6	-9	-4	2	1	-2	0	-6	-9	3482 N.MI.			
40,000	1	-2	-2	1	-1	-8	-12	-7	-2	0	-5	-3	-11	-16	9	8	5	7
30,000	0	-2	-2	2	0	-8	-12	-6	-2	0	-6	-3	-11	-16	12	12	10	12
20,000	1	0	1	3	1	-4	-8	-4	-2	-2	-5	-3	-9	-12	13	12	10	12
RAMEY AFB TO TORBAY AP																		
53,000	8	4	-1	4	3	-4	-8	-12	-7	0	-5	-5	-13	-18	1884 N.MI.			
40,000	15	16	4	10	11	0	-6	-22	-22	-6	-13	-15	-28	-34	13	12	8	11
30,000	12	13	5	10	10	0	-5	-18	-18	-7	-13	-13	-24	-30	18	18	13	17
20,000	7	11	7	9	8	1	-3	-10	-13	-7	-10	-10	-17	-22	18	16	11	15
RAMEY AFB TO TORREJON AFB																		
53,000	18	19	5	8	12	5	2	-20	-20	-5	-8	-13	-20	-24	3496 N.MI.			
40,000	27	31	14	16	21	12	8	-30	-33	-15	-18	-23	-33	-39	9	8	6	7
30,000	19	23	11	14	16	9	5	-21	-25	-12	-15	-18	-26	-31	13	12	9	12
20,000	10	13	8	10	10	5	2	-11	-14	-8	-10	-11	-16	-19	12	12	8	10

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES																
HEIGHT IN FEET	EQUIVALENT HEADWINDS*								STANDARD DEVIATION							
	D I R E C T				R E T U R N				JAN				APR			
	JAN	APR	JUL	OCT	**A50	A75	A85		JAN	APR	JUL	OCT	A50	A75	A85	
RAMEY AFB TO TRAVIS AFB																
53,000	-36	-29	-1	-16	-22	-33	-37		34	28	0	16	21	6	1	3076 N.MI.
40,000	-54	-48	-14	-33	-38	-52	-58		51	45	13	31	35	20	13	9 9 6 8
30,000	-44	-38	-10	-25	-29	-42	-48		41	36	10	24	27	15	9	14 13 10 13
20,000	-25	-22	-3	-11	-15	-24	-29		24	21	3	11	14	5	2	13 12 8 12
RAMEY AFB TO WAKE AP																
53,000	-30	-25	-2	-12	-18	-27	-32		29	24	2	12	17	6	2	6906 N.MI.
40,000	-52	-43	-12	-29	-35	-47	-53		48	40	11	27	32	18	12	8 7 5 6
30,000	-42	-35	-9	-22	-27	-39	-44		39	33	9	21	26	14	9	11 10 8 10
20,000	-25	-20	-4	-12	-15	-23	-27		24	20	3	11	14	6	3	11 9 6 9
RAMEY AFB TO WESTOVER AFB																
53,000	-14	-14	-4	-5	-8	-17	-22		9	11	3	4	6	-1	-5	1449 N.MI.
40,000	-21	-16	-6	-8	-12	-25	-32		12	9	4	3	7	-5	-11	13 13 8 12
30,000	-18	-14	-4	-5	-10	-21	-28		11	9	3	2	6	-4	-10	19 19 14 18
20,000	-9	-7	1	2	-2	-11	-16		6	5	-1	-4	1	-6	-10	19 17 11 16
RAMEY AFB TO WHEELUS AP																
53,000	24	24	6	11	16	8	5		-25	-25	-6	-11	-16	-25	-29	4335 N.MI.
40,000	34	37	17	19	26	17	13		-36	-39	-18	-21	-28	-38	-44	8 7 5 6
30,000	23	29	13	15	19	12	9		-25	-31	-13	-16	-20	-29	-34	12 11 8 10
20,000	12	16	8	9	11	6	4		-13	-17	-8	-10	-11	-17	-20	11 10 7 9
RHEIN MAIN AB TO SEOUL AB																
53,000	19	16	10	16	15	10	8		-22	-17	-10	-17	-16	-21	-25	4621 N.MI.
40,000	24	23	18	26	23	16	12		-27	-25	-20	-28	-25	-32	-36	9 6 5 6
30,000	20	22	14	21	19	11	7		-22	-25	-16	-23	-21	-30	-34	11 9 9 10
20,000	16	17	10	17	15	9	6		-17	-18	-11	-18	-16	-22	-25	12 12 10 12
RHEIN MAIN AB TO STEVENSON FIELD																
53,000	-24	-10	-7	-15	-13	-20	-24		23	10	7	15	12	7	4	3704 N.MI.
40,000	-29	-18	-18	-24	-22	-30	-35		27	17	16	22	20	12	8	9 7 5 7
30,000	-27	-20	-18	-23	-22	-31	-37		24	17	16	20	19	10	5	12 11 10 12
20,000	-18	-13	-11	-15	-14	-21	-25		16	12	9	13	12	5	2	14 14 12 14
RHEIN MAIN AB TO SUNG SHAN																
53,000	24	19	11	19	18	12	10		-28	-20	-12	-20	-20	-26	-29	5064 N.MI.
40,000	28	27	18	28	25	18	14		-32	-30	-20	-30	-28	-35	-39	8 7 6 7
30,000	26	26	13	21	21	13	9		-29	-28	-14	-23	-24	-32	-36	10 9 9 10
20,000	18	16	9	17	15	9	6		-20	-17	-10	-18	-16	-22	-25	11 11 9 11
RHEIN MAIN AB TO TACHIKAWA AB																
53,000	15	13	8	12	12	8	5		-18	-15	-9	-14	-13	-18	-21	5034 N.MI.
40,000	22	19	15	22	19	13	9		-25	-21	-16	-25	-22	-29	-32	9 6 5 6
30,000	18	19	12	19	17	9	5		-20	-22	-13	-22	-19	-27	-31	10 9 9 10
20,000	14	15	9	14	13	7	4		-16	-16	-9	-16	-14	-20	-23	11 11 10 11
RHEIN MAIN AB TO TAN SAN NHUT																
53,000	27	15	2	13	13	6	2		-30	-16	-4	-15	-15	-23	-28	5210 N.MI.
40,000	23	21	12	18	18	12	8		-27	-23	-14	-20	-21	-28	-32	9 7 6 7
30,000	22	19	12	18	18	11	8		-25	-21	-13	-19	-19	-26	-30	10 9 8 9
20,000	15	12	6	11	11	6	3		-16	-12	-6	-12	-11	-16	-19	10 10 8 9
RHEIN MAIN AB TO THULE AB																
53,000	-17	-8	0	-11	-8	-16	-20		16	7	0	10	7	1	-2	2334 N.MI.
40,000	-16	-13	-6	-12	-11	-20	-25		14	11	5	10	10	1	-3	11 9 5 8
30,000	-15	-13	-7	-10	-11	-22	-28		12	10	4	7	9	-3	-8	14 12 11 14
20,000	-8	-9	-3	-4	-6	-14	-19		6	8	2	3	5	-4	-8	17 16 15 17
RHEIN MAIN AB TO TORBAY AP																
53,000	-28	-15	-15	-21	-19	-26	-30		27	14	14	20	18	12	8	2357 N.MI.
40,000	-43	-25	-34	-42	-36	-48	-54		41	24	32	39	34	22	16	11 8 7 9
30,000	-46	-27	-33	-40	-36	-50	-58		43	25	31	37	33	20	13	17 15 15 18
20,000	-33	-20	-22	-28	-25	-35	-41		31	18	21	26	24	14	9	21 19 17 20
RHEIN MAIN AB TO TORREJON AFB																
53,000	-8	-9	-11	-5	-8	-17	-21		6	8	11	5	7	-1	-6	764 N.MI.
40,000	-5	-10	-21	-18	-14	-29	-37		1	8	18	15	11	-4	-13	15 12 11 11
30,000	-4	-10	-22	-17	-14	-30	-39		0	8	20	14	11	-6	-16	24 21 19 24
20,000	-5	-8	-14	-12	-10	-22	-28		3	6	13	11	9	-3	-10	26 24 19 25

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	DIRECT							RETURN										
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
RHEIN MAIN AB TO TRAVIS AFB																		
53,000	-19	-10	-6	-13	-11	-16	-20	17	9	6	12	10	6	3	8	6	4	6
40,000	-20	-16	-15	-18	-17	-24	-28	18	14	14	16	15	9	5	10	9	9	11
30,000	-20	-16	-14	-17	-17	-25	-29	17	14	12	14	14	6	2	12	12	11	12
20,000	-12	-11	-8	-11	-10	-16	-20	10	10	7	9	9	3	0	9	9	7	9
RHEIN MAIN AB TO WAKE AP																		
53,000	6	7	5	5	6	2	0	-9	-8	-6	-7	-7	-11	-13	8	6	4	6
40,000	7	9	11	10	9	4	0	-13	-13	-12	-13	-13	-19	-22	9	8	8	9
30,000	7	9	9	9	9	2	-1	-11	-12	-10	-12	-12	-18	-21	9	9	8	9
20,000	5	6	5	6	6	1	-2	-8	-8	-6	-7	-7	-12	-15	8	7	6	7
RHEIN MAIN AB TO WESTOVER AFB																		
53,000	-31	-16	-14	-23	-20	-27	-32	30	15	13	22	19	13	10	10	8	6	8
40,000	-47	-28	-34	-44	-38	-49	-55	45	26	32	41	36	25	19	15	13	13	16
30,000	-48	-29	-33	-42	-38	-50	-57	45	26	31	39	35	23	17	18	17	14	17
20,000	-33	-20	-21	-28	-25	-34	-39	31	19	20	26	24	15	11	14	13	10	12
RHEIN MAIN AB TO WHEELUS AP																		
53,000	11	6	-1	6	5	-3	-7	-13	-7	0	-6	-6	-15	-20	14	12	10	10
40,000	19	7	4	7	8	-5	-12	-22	-10	-7	-10	-12	-26	-34	22	19	16	20
30,000	16	6	1	8	7	-6	-14	-20	-10	-4	-11	-10	-25	-33	24	21	16	21
20,000	11	4	3	4	5	-5	-10	-13	-5	-4	-5	-7	-17	-22	17	15	11	14
SEOUL AB TO STEVENSON FIELD																		
53,000	21	9	5	16	12	6	4	-23	-10	-6	-18	-13	-20	-24	8	6	5	6
40,000	16	10	11	16	13	7	4	-18	-12	-13	-18	-15	-22	-25	9	8	9	9
30,000	14	10	11	13	12	5	2	-16	-12	-13	-15	-14	-20	-24	10	10	9	10
20,000	8	6	8	9	8	3	0	-10	-7	-8	-10	-9	-14	-16	8	7	6	7
SEOUL AB TO SUNG SHAN																		
53,000	-44	-19	11	-14	-16	-35	-45	33	13	-12	11	11	-6	-14	19	19	16	18
40,000	-32	-23	-14	-13	-20	-35	-43	17	13	12	6	12	-2	-9	21	19	20	22
30,000	-31	-17	-11	-12	-17	-31	-39	17	9	10	8	11	-2	-9	20	19	16	20
20,000	-16	-8	-7	-4	-8	-17	-22	11	5	7	3	6	-2	-6	14	12	10	11
SEOUL AB TO TACHIKAWA AB																		
53,000	72	56	17	48	49	29	18	-75	-57	-18	-50	-51	-70	-80	23	20	18	19
40,000	81	61	35	64	61	40	30	-83	-63	-37	-67	-62	-82	-93	26	23	24	26
30,000	77	58	23	51	53	32	21	-79	-59	-25	-53	-55	-75	-86	23	23	22	23
20,000	49	37	14	32	33	19	12	-50	-38	-14	-33	-33	-47	-55	17	16	13	15
SEOUL AB TO TAN SAN NHUT																		
53,000	-42	-20	21	-6	-13	-31	-40	37	18	-23	4	11	-10	-21	12	12	11	11
40,000	-41	-25	1	-17	-20	-35	-41	35	20	-3	14	16	3	-3	13	13	11	12
30,000	-38	-20	-2	-12	-16	-30	-38	32	16	1	10	13	3	-2	12	12	9	11
20,000	-17	-10	-4	-6	-9	-15	-19	15	9	4	6	8	2	0	9	8	7	7
SEOUL AB TO THULE AB																		
53,000	3	1	0	2	1	-3	-5	-5	-2	-1	-4	-2	-7	-9	9	6	4	6
40,000	-8	-2	1	-3	-3	-9	-12	6	0	-2	1	1	-5	-8	9	8	8	8
30,000	-7	-3	0	-4	-3	-10	-13	5	0	-1	2	2	-5	-8	9	10	9	9
20,000	-7	-3	0	-3	-3	-9	-11	5	2	-1	2	2	-3	-6	8	8	7	8
SEOUL AB TO TORBAY AP																		
53,000	-5	-3	-1	-2	-3	-6	-9	3	1	1	1	1	-2	-4	8	5	4	6
40,000	-13	-6	-2	-8	-7	-13	-17	11	4	0	6	5	-1	-4	8	8	7	8
30,000	-12	-7	-2	-8	-7	-14	-17	9	4	1	6	5	-1	-5	9	9	9	9
20,000	-10	-6	-2	-6	-6	-11	-14	8	4	1	4	4	-1	-3	8	8	6	7
SEOUL AB TO TORREJON AFB																		
53,000	-20	-16	-11	-15	-15	-20	-23	18	15	10	14	14	9	7	8	6	5	6
40,000	-24	-23	-20	-27	-23	-30	-34	21	21	18	25	21	15	11	11	9	9	10
30,000	-20	-22	-17	-22	-20	-28	-32	17	20	15	20	18	11	7	11	11	10	11
20,000	-16	-16	-12	-17	-15	-21	-24	14	15	11	16	14	8	6	9	8	7	8
SEOUL AB TO TRAVIS AFB																		
53,000	28	19	9	25	20	12	9	-30	-20	-10	-26	-21	-29	-32	10	7	6	7
40,000	33	29	24	35	30	22	18	-36	-31	-26	-38	-33	-41	-45	11	11	11	12
30,000	29	26	19	29	26	17	13	-32	-29	-21	-32	-28	-37	-42	12	12	11	12
20,000	21	16	13	20	17	11	7	-23	-18	-14	-22	-19	-26	-29	10	9	8	9

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	D I R E C T							R E T U R N							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	DCT	A50	A75	A85				
SEOUL AB TO WAKE AP																		
53,000	49	41	4	20	29	12	4	-54	-43	-4	-22	-31	-48	-55	13	12	10	11
40,000	69	57	17	39	47	27	18	-73	-60	-19	-42	-50	-68	-76	15	15	13	15
30,000	65	48	12	32	39	21	13	-69	-50	-13	-34	-41	-59	-68	14	13	11	13
20,000	35	29	6	16	21	10	6	-38	-30	-6	-17	-22	-34	-39	10	9	7	9
SEOUL AB TO WESTOVER AFB																		
53,000	12	6	4	8	7	3	1	-14	-7	-4	-9	-8	-13	-16	8	5	4	6
40,000	5	6	10	9	7	2	-1	-8	-8	-12	-11	-10	-15	-18	8	8	8	8
30,000	4	6	9	7	7	1	-2	-7	-9	-11	-10	-9	-15	-18	9	9	8	9
20,000	1	4	7	5	4	-1	-3	-3	-5	-8	-6	-6	-10	-13	7	7	6	7
SEOUL AB TO WHEELUS AP																		
53,000	-30	-23	-18	-25	-24	-29	-33	28	22	17	24	22	17	15	9	7	6	6
40,000	-32	-31	-28	-33	-31	-38	-41	30	29	27	31	29	22	19	10	9	9	10
30,000	-28	-29	-19	-25	-25	-32	-36	26	27	17	23	23	16	12	11	11	9	10
20,000	-21	-18	-12	-20	-17	-23	-26	19	17	11	19	16	11	8	8	8	6	8
STEVENSON FIELD TO SUNG SHAN																		
53,000	-28	-12	-3	-18	-15	-23	-27	25	10	3	17	13	6	3	8	6	5	6
40,000	-22	-15	-14	-19	-17	-24	-27	18	12	12	16	14	8	5	9	8	9	9
30,000	-20	-14	-12	-16	-15	-22	-26	16	11	11	13	13	7	3	9	9	9	9
20,000	-12	-8	-8	-10	-10	-14	-17	10	7	8	9	8	4	1	8	7	6	7
STEVENSON FIELD TO TACHIKAWA AB																		
53,000	-30	-15	-6	-22	-18	-26	-30	28	13	5	21	16	9	5	9	6	5	7
40,000	-28	-19	-16	-29	-23	-31	-35	25	17	14	26	21	13	9	10	9	10	10
30,000	-26	-18	-16	-24	-21	-29	-33	23	16	14	22	18	11	7	11	11	10	11
20,000	-18	-12	-9	-17	-14	-20	-23	16	11	9	15	12	7	4	9	8	7	8
STEVENSON FIELD TO TAN SAN NHUT																		
53,000	-23	-10	0	-11	-10	-17	-21	20	8	-1	10	9	2	-1	8	6	5	6
40,000	-17	-10	-9	-12	-12	-17	-20	13	7	7	10	9	4	1	8	8	7	8
30,000	-15	-9	-10	-10	-11	-16	-19	11	6	8	9	9	3	0	8	8	7	8
20,000	-7	-5	-7	-7	-7	-10	-13	5	4	7	6	5	1	-1	6	6	5	6
STEVENSON FIELD TO THULE AB																		
53,000	2	1	0	2	1	-4	-7	-4	-1	0	-3	-2	-7	-11	11	8	6	8
40,000	2	2	2	-1	1	-7	-12	-4	-3	-4	-2	-3	-12	-16	12	12	12	14
30,000	0	2	0	0	0	-9	-15	-2	-4	-2	-2	-3	-12	-18	14	15	14	15
20,000	-1	0	0	0	0	-8	-12	-1	-1	-1	-1	-1	-9	-13	12	12	10	11
STEVENSON FIELD TO TORBAY AP																		
53,000	30	16	16	24	21	13	10	-31	-17	-16	-25	-21	-30	-34	12	9	8	10
40,000	43	25	39	42	37	25	18	-45	-27	-40	-44	-39	-52	-58	17	16	16	19
30,000	40	27	35	38	35	22	15	-43	-29	-37	-41	-38	-50	-58	20	19	16	19
20,000	30	16	24	26	24	15	9	-31	-17	-25	-28	-25	-35	-40	15	14	11	14
STEVENSON FIELD TO TORREJON AFB																		
53,000	23	12	13	18	16	11	8	-25	-12	-13	-19	-16	-23	-26	9	7	6	7
40,000	32	18	26	31	27	18	13	-34	-20	-28	-34	-29	-38	-43	12	11	11	13
30,000	32	19	25	30	26	16	12	-35	-22	-27	-33	-29	-39	-44	14	14	12	14
20,000	21	13	17	20	17	10	7	-23	-14	-18	-22	-19	-26	-30	11	11	8	11
STEVENSON FIELD TO TRAVIS AFB																		
53,000	-23	-17	-15	-18	-18	-25	-29	21	16	15	17	17	10	6	13	11	9	10
40,000	-34	-25	-36	-31	-32	-45	-52	30	23	34	28	29	16	8	20	18	18	22
30,000	-33	-24	-30	-26	-28	-43	-50	29	21	28	23	26	12	4	23	21	17	22
20,000	-21	-15	-19	-18	-18	-28	-33	19	14	18	16	17	7	2	16	15	11	15
STEVENSON FIELD TO WAKE AP																		
53,000	-24	-16	-6	-15	-15	-22	-26	22	15	6	14	14	8	5	9	7	6	7
40,000	-46	-36	-18	-32	-33	-43	-48	42	33	16	29	30	20	15	11	11	10	12
30,000	-43	-34	-18	-32	-31	-42	-47	39	31	17	29	29	19	15	12	12	9	12
20,000	-31	-24	-15	-23	-23	-30	-34	29	23	14	22	21	15	12	10	8	7	8
STEVENSON FIELD TO WESTOVER AFB																		
53,000	33	20	15	24	22	14	9	-35	-21	-15	-25	-23	-32	-38	13	11	10	12
40,000	51	33	39	39	40	26	18	-54	-35	-41	-42	-43	-57	-65	21	20	19	22
30,000	49	33	35	37	38	23	15	-53	-36	-36	-39	-41	-56	-65	24	23	18	23
20,000	34	23	24	25	26	16	10	-36	-24	-25	-27	-27	-39	-45	18	17	12	17

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.
MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT							HEADWINDS*							STANDARD DEVIATION			
	DIRECT							RETURN							JAN	APR	JUL	OCT
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85				
STEVENSON FIELD TO WHEELUS																		
53,000	23	12	10	16	14	10	7	-24	-13	-11	-17	-15	-21	-25	8	6	5	6
40,000	31	18	22	27	24	16	12	-33	-20	-24	-29	-26	-34	-39	11	10	10	12
30,000	29	19	20	25	23	14	10	-32	-21	-22	-28	-26	-34	-39	13	12	11	13
20,000	19	12	14	16	15	9	6	-21	-14	-15	-18	-17	-23	-27	10	9	7	9
SUNG SHAN TO TACHIKAWA AB																		
53,000	71	39	-9	25	32	7	-6	-75	-42	8	-27	-34	-59	-72	17	18	15	16
40,000	68	54	17	39	45	25	15	-75	-59	-19	-43	-50	-70	-80	20	19	19	21
30,000	66	46	13	34	40	21	12	-73	-50	-14	-37	-43	-64	-74	18	17	16	19
20,000	39	27	11	18	23	13	8	-42	-29	-11	-19	-24	-36	-43	13	12	10	11
SUNG SHAN TO TAN SAN NHUT																		
53,000	-30	-10	35	12	1	-19	-28	28	9	-37	-13	-2	-24	-34	13	11	11	10
40,000	-36	-19	19	-9	-13	-28	-36	34	17	-20	9	12	-7	-17	14	14	11	11
30,000	-32	-17	8	-7	-10	-25	-32	30	15	-9	6	10	-3	-9	12	13	8	10
20,000	-13	-8	0	-3	-6	-12	-15	12	7	0	3	5	-1	-4	9	8	7	7
SUNG SHAN TO THULE AB																		
53,000	3	0	-2	1	0	-4	-6	-7	-2	1	-3	-2	-7	-10	8	6	5	6
40,000	-9	-4	2	-6	-4	-10	-13	4	1	-3	3	1	-5	-8	9	8	8	8
30,000	-8	-5	1	-4	-4	-10	-14	4	2	-3	2	1	-5	-8	9	9	9	9
20,000	-7	-4	1	-4	-3	-8	-11	5	3	-1	3	2	-3	-5	7	7	6	7
SUNG SHAN TO TORBAY AP																		
53,000	-8	-5	-3	-6	-5	-9	-12	4	3	3	4	4	0	-2	8	6	4	6
40,000	-16	-11	-2	-13	-11	-17	-21	12	8	1	10	8	2	-2	9	8	7	8
30,000	-15	-11	-3	-11	-10	-17	-20	11	8	1	9	7	1	-3	9	9	8	9
20,000	-11	-9	-2	-8	-7	-13	-15	9	7	2	6	6	1	-2	8	7	6	7
SUNG SHAN TO TORREJON AFB																		
53,000	-27	-20	-13	-20	-19	-25	-29	24	18	12	19	18	13	10	8	7	6	6
40,000	-30	-28	-21	-29	-27	-34	-37	26	26	20	27	25	18	14	10	9	9	10
30,000	-27	-26	-16	-23	-23	-31	-35	24	24	14	21	21	13	10	11	11	9	10
20,000	-19	-15	-11	-18	-15	-21	-24	17	14	10	17	14	9	7	8	8	6	7
SUNG SHAN TO TRAVIS AFB																		
53,000	39	26	7	27	26	15	9	-42	-28	-8	-29	-28	-36	-41	9	7	6	8
40,000	47	40	27	44	40	30	25	-51	-43	-29	-47	-43	-52	-57	11	11	11	12
30,000	43	37	23	39	35	26	21	-47	-40	-24	-42	-39	-48	-53	12	12	10	12
20,000	29	24	15	26	23	17	13	-32	-26	-16	-27	-25	-32	-36	10	9	7	8
SUNG SHAN TO WAKE AP																		
53,000	45	29	-17	2	15	-8	-16	-47	-30	16	-3	-16	-39	-46	10	11	8	9
40,000	56	51	-2	16	33	7	-1	-58	-53	1	-17	-34	-56	-62	12	13	10	12
30,000	54	41	0	15	28	7	1	-56	-42	-1	-16	-29	-49	-56	11	11	7	10
20,000	21	23	0	5	12	3	-1	-23	-23	-1	-6	-13	-23	-27	8	7	6	7
SUNG SHAN TO WESTOVER AFB																		
53,000	12	5	2	6	6	1	-1	-15	-7	-2	-8	-7	-13	-16	8	5	4	6
40,000	3	5	9	6	6	0	-3	-8	-8	-11	-9	-9	-14	-17	8	8	8	8
30,000	3	4	8	5	5	-1	-4	-7	-7	-10	-8	-8	-14	-17	8	9	8	8
20,000	0	3	6	3	3	-1	-4	-2	-4	-7	-5	-5	-9	-12	7	7	6	7
SUNG SHAN TO WHEELUS AP																		
53,000	-41	-31	-17	-29	-29	-37	-41	39	29	17	28	28	21	17	9	7	6	7
40,000	-46	-41	-28	-38	-38	-46	-50	43	39	26	36	36	28	24	10	9	9	10
30,000	-41	-37	-21	-27	-31	-40	-44	38	35	20	25	29	21	18	11	10	8	9
20,000	-25	-21	-10	-17	-18	-24	-27	24	20	9	17	17	12	9	7	7	5	6
TACHIKAWA AB TO TAN SAN NHUT																		
53,000	-50	-24	23	-5	-14	-37	-47	48	22	-24	4	13	-10	-22	11	11	10	10
40,000	-54	-38	2	-25	-31	-46	-54	50	34	-3	22	27	9	-1	13	12	11	12
30,000	-50	-32	-2	-21	-26	-42	-49	46	29	1	19	24	9	2	11	12	9	11
20,000	-26	-18	-5	-10	-14	-22	-27	25	17	5	10	13	6	3	8	8	7	7
TACHIKAWA AB TO THULE AB																		
53,000	7	3	1	5	4	-1	-3	-10	-4	-1	-7	-5	-10	-13	9	6	5	7
40,000	-3	2	2	4	1	-5	-8	-1	-5	-4	-6	-4	-10	-13	9	9	9	9
30,000	-3	1	2	1	0	-6	-10	0	-4	-3	-3	-2	-9	-12	9	10	10	9
20,000	-4	0	2	0	0	-6	-9	2	-1	-3	-2	-1	-6	-9	8	8	7	8

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MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*							STANDARD DEVIATION			
	DIRECT							RETURN			
	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
TACHIKAWA AB TO TORBAY AP											
53,000	5	2	1	4	3	-1	-3	-7	-3	-1	-6
40,000	-4	1	2	2	1	-5	-8	1	-4	-4	-5
30,000	-4	1	1	0	-1	-7	-10	1	-3	-3	-2
20,000	-5	-1	1	0	-1	-6	-9	3	-1	-2	-2
TACHIKAWA AB TO TORREJON AFB											
53,000	-16	-13	-8	-12	-12	-16	-19	13	12	8	11
40,000	-21	-18	-16	-23	-19	-26	-30	18	16	14	20
30,000	-18	-19	-14	-21	-18	-25	-29	15	17	12	18
20,000	-14	-14	-10	-15	-13	-19	-22	12	13	9	13
TACHIKAWA AB TO TRAVIS AFB											
53,000	35	27	11	29	26	17	12	-37	-28	-11	-30
40,000	49	43	30	50	43	33	28	-52	-45	-33	-53
30,000	44	40	26	45	39	29	23	-48	-43	-28	-48
20,000	31	27	18	30	26	19	15	-33	-28	-18	-32
TACHIKAWA AB TO WAKE AP											
53,000	42	36	1	14	22	7	1	-46	-38	-2	-15
40,000	64	53	14	32	41	21	13	-70	-58	-15	-35
30,000	59	44	11	26	34	17	10	-64	-47	-12	-29
20,000	32	26	4	12	18	7	2	-35	-28	-4	-13
TACHIKAWA AB TO WESTOVER AFB											
53,000	22	10	5	15	12	6	4	-24	-11	-5	-16
40,000	17	13	14	20	16	10	7	-21	-16	-16	-23
30,000	15	13	14	17	15	9	5	-19	-16	-16	-20
20,000	11	9	10	11	10	5	3	-12	-10	-11	-13
TACHIKAWA AB TO WHEELUS AP											
53,000	-27	-21	-15	-22	-21	-26	-29	24	20	14	20
40,000	-31	-28	-25	-30	-28	-35	-39	28	26	23	28
30,000	-26	-27	-16	-25	-23	-31	-35	24	25	15	23
20,000	-20	-17	-11	-19	-17	-23	-26	19	16	10	18
TAN SAN NHUT TO THULE AB											
53,000	0	-1	-3	-1	-2	-6	-8	-3	-1	2	0
40,000	-5	-8	0	-5	-4	-10	-13	0	5	-1	3
30,000	-6	-8	1	-4	-4	-10	-13	3	6	-2	2
20,000	-6	-5	0	-3	-3	-8	-10	4	4	-1	2
TAN SAN NHUT TO TORBAY AP											
53,000	-18	-12	-5	-11	-11	-16	-20	15	11	4	9
40,000	-20	-19	-8	-16	-16	-22	-26	16	16	6	14
30,000	-20	-20	-7	-16	-16	-23	-27	17	17	6	14
20,000	-14	-13	-4	-10	-10	-15	-18	12	11	3	9
TAN SAN NHUT TO TORREJON AFB											
53,000	-32	-21	-4	-14	-17	-26	-31	30	19	3	13
40,000	-33	-28	-16	-22	-25	-32	-36	29	26	15	21
30,000	-27	-25	-17	-21	-22	-29	-32	25	23	16	19
20,000	-18	-15	-9	-12	-13	-18	-20	17	14	8	11
TAN SAN NHUT TO TRAVIS AFB											
53,000	36	23	0	20	21	9	1	-39	-24	-1	-22
40,000	43	34	18	37	34	24	19	-46	-37	-20	-39
30,000	39	31	17	32	30	21	16	-42	-34	-18	-34
20,000	25	20	12	21	19	13	10	-27	-22	-13	-22
TAN SAN NHUT TO WAKE AP											
53,000	12	1	-31	-17	-9	-23	-29	-13	-1	30	17
40,000	15	19	-16	-3	5	-10	-15	-16	-20	15	2
30,000	17	13	-7	-1	4	-5	-8	-17	-13	7	1
20,000	0	3	-3	-2	-1	-4	-6	0	-4	3	2
TAN SAN NHUT TO WESTOVER AFB											
53,000	-2	-1	-2	-2	-2	-5	-7	-1	-1	1	0
40,000	-6	-6	0	-5	-4	-9	-12	2	3	-2	2
30,000	-7	-7	0	-4	-4	-10	-13	3	4	-2	2
20,000	-6	-4	0	-3	-3	-8	-10	4	3	-1	2

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EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*								STANDARD DEVIATION													
	D I R E C T								R E T U R N													
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT				
TAN SAN NHUT TO WHEELUS AP																			5216 N.MI.			
53,000	-43	-32	8	-14	-23	-37	-42	41	31	-9	13	21	1	-8	8	7	6	7				
40,000	-54	-46	-8	-25	-35	-50	-56	51	44	7	24	33	15	8	11	10	7	9				
30,000	-44	-38	-9	-23	-28	-41	-46	42	36	9	22	27	15	10	10	9	6	7				
20,000	-27	-22	-6	-11	-16	-24	-28	26	21	5	11	15	8	5	7	6	5	5				
THULE AB TO TORBAY AP																			1778 N.MI.			
53,000	-7	-2	0	-2	-3	-9	-13	5	1	0	1	1	-5	-8	12	10	7	10				
40,000	-13	-5	-1	-6	-6	-16	-22	10	2	-1	2	3	-7	-12	15	14	13	15				
30,000	-12	-4	-2	-7	-6	-18	-25	8	2	0	3	3	-9	-15	18	17	16	18				
20,000	-9	-5	-3	-4	-5	-14	-19	7	3	1	2	3	-6	-11	15	14	11	14				
THULE AB TO TORREJON AFB																			2708 N.MI.			
53,000	11	6	1	7	5	0	-3	-13	-7	-1	-7	-6	-13	-16	10	8	6	8				
40,000	11	8	5	7	8	-1	-5	-14	-10	-7	-10	-10	-19	-23	14	12	11	13				
30,000	9	8	5	7	7	-3	-9	-13	-10	-8	-10	-10	-20	-26	17	15	14	16				
20,000	3	5	3	2	3	-4	-9	-6	-7	-4	-4	-5	-13	-17	13	12	9	12				
THULE AB TO TRAVIS AFB																			2677 N.MI.			
53,000	-4	-4	-4	-6	-4	-9	-12	2	3	3	5	3	-1	-4	9	7	5	7				
40,000	-3	-6	-7	-8	-6	-14	-18	0	4	6	5	4	-4	-9	12	11	11	12				
30,000	-3	-6	-7	-7	-6	-14	-19	-1	4	5	4	3	-6	-11	13	13	12	13				
20,000	-1	-4	-4	-4	-3	-10	-13	-1	3	3	2	2	-5	-8	10	10	8	10				
THULE AB TO WAKE AP																			4721 N.MI.			
53,000	-16	-7	1	-7	-6	-13	-17	13	5	-1	5	5	0	-3	9	6	5	7				
40,000	-18	-13	-4	-11	-11	-19	-23	12	9	2	7	7	1	-3	10	9	9	10				
30,000	-15	-12	-6	-10	-11	-18	-22	10	8	4	7	7	0	-3	11	10	9	10				
20,000	-10	-6	-6	-7	-7	-13	-16	7	5	5	6	6	1	-2	9	8	7	7				
THULE AB TO WESTOVER AFB																			2062 N.MI.			
53,000	-8	-1	0	-5	-3	-9	-13	5	0	-1	3	2	-4	-7	11	9	7	9				
40,000	-11	-2	-1	-7	-5	-14	-20	7	0	-2	3	2	-7	-12	14	13	13	14				
30,000	-11	-3	-1	-7	-5	-16	-22	6	0	-2	3	2	-9	-14	16	15	14	16				
20,000	-7	-2	-1	-4	-3	-11	-16	5	1	-1	2	2	-6	-11	13	12	10	12				
THULE AB TO WHEELUS AP																			3376 N.MI.			
53,000	15	8	0	9	7	1	-1	-17	-9	-1	-9	-8	-15	-18	9	7	5	7				
40,000	16	10	6	9	10	2	-2	-19	-12	-7	-12	-12	-21	-25	12	11	10	12				
30,000	14	10	4	8	9	0	-5	-17	-12	-7	-11	-12	-21	-26	15	13	12	14				
20,000	8	7	3	3	5	-2	-5	-10	-8	-4	-5	-7	-14	-17	12	11	8	10				
TORBAY AP TO TORREJON AFB																			2131 N.MI.			
53,000	25	16	16	18	18	12	8	-26	-16	-17	-19	-19	-26	-30	11	9	8	10				
40,000	37	24	31	38	32	21	15	-39	-26	-33	-40	-34	-46	-53	17	16	15	17				
30,000	37	24	28	36	31	19	13	-40	-27	-30	-38	-33	-46	-53	19	18	15	18				
20,000	27	17	22	26	23	14	9	-29	-19	-22	-27	-24	-33	-39	16	14	10	13				
TORBAY AP TO TRAVIS AFB																			2988 N.MI.			
53,000	-30	-19	-16	-24	-21	-28	-32	29	18	15	23	21	15	12	9	8	6	8				
40,000	-45	-30	-41	-41	-39	-49	-55	43	28	39	39	37	27	22	14	13	13	15				
30,000	-43	-30	-35	-37	-36	-47	-52	40	28	34	34	34	24	18	16	15	12	15				
20,000	-30	-19	-23	-25	-24	-31	-36	28	17	23	24	23	15	11	12	11	8	11				
TORBAY AP TO WAKE AP																			6261 N.MI.			
53,000	-21	-10	-4	-12	-11	-18	-21	19	9	3	11	10	5	2	8	6	5	6				
40,000	-30	-23	-15	-23	-23	-30	-34	25	20	14	20	19	13	9	10	9	9	10				
30,000	-28	-22	-16	-23	-22	-29	-33	23	19	14	20	19	12	8	10	10	9	10				
20,000	-19	-14	-12	-16	-15	-20	-23	17	12	12	14	14	9	6	8	7	6	7				
TORBAY AP TO WESTOVER AFB																			899 N.MI.			
53,000	-40	-22	-14	-29	-25	-37	-44	39	22	14	29	24	14	9	17	14	11	14				
40,000	-63	-42	-41	-56	-50	-68	-77	60	39	39	53	47	30	21	25	24	22	25				
30,000	-61	-41	-39	-50	-47	-65	-75	57	38	37	48	44	27	18	29	27	20	25				
20,000	-42	-27	-25	-34	-31	-45	-52	40	25	24	32	30	17	11	21	20	13	19				
TORBAY AP TO WHEELUS AP																			3052 N.MI.			
53,000	25	18	15	18	18	13	10	-26	-18	-15	-18	-19	-25	-29	10	8	7	8				
40,000	36	26	29	34	31	22	17	-39	-28	-31	-36	-33	-43	-48	15	13	12	14				
30,000	34	25	26	33	29	19	14	-37	-27	-28	-35	-31	-42	-47	16	15	12	15				
20,000	26	17	20	23	21	14	10	-27	-19	-21	-24	-22	-30	-34	13	11	8	10				

*HEADWINDS--COMPUTED FOR A 450-KT AIRSPEED.

**A--DENOTES ANNUAL EQUIVALENT HEADWINDS FOR INDICATED PER CENT RELIABILITIES.

MINUS SIGNS DENOTE HEADWINDS.

EQUIVALENT HEADWINDS AND STANDARD DEVIATION IN KNOTS FOR GREAT CIRCLE AIR ROUTES

HEIGHT IN FEET	EQUIVALENT HEADWINDS*												STANDARD DEVIATION					
	DIRECT							RETURN										
	JAN	APR	JUL	OCT	**A50	A75	A85	JAN	APR	JUL	OCT	A50	A75	A85	JAN	APR	JUL	OCT
TORREJON AFB TO TRAVIS AFB																		
53,000	-22	-12	-13	-17	-15	-21	-23	21	12	12	16	15	10	8	8	8	8	8
40,000	-31	-19	-27	-30	-27	-35	-39	28	17	25	27	24	17	13	11	10	10	12
30,000	-31	-20	-25	-28	-26	-35	-39	28	18	23	25	23	15	11	13	12	10	12
20,000	-20	-13	-16	-19	-17	-23	-26	18	12	15	17	15	8	6	10	8	8	8
TORREJON AFB TO WAKE AP																		
53,000	2	3	4	3	3	-1	-3	-5	-5	-5	-6	-5	-8	-10	8	8	8	8
40,000	0	4	8	5	4	-2	-5	-5	-7	-9	-9	-6	-12	-16	8	8	8	8
30,000	1	4	7	5	4	-2	-6	-5	-7	-8	-8	-7	-13	-17	10	8	8	8
20,000	1	2	4	3	3	-2	-5	-4	-4	-6	-5	-4	-8	-12	8	8	8	8
TORREJON AFB TO WESTOVER AFB																		
53,000	-30	-19	-16	-22	-21	-28	-32	29	18	16	21	20	16	11	15	8	8	8
40,000	-46	-32	-35	-45	-39	-50	-56	44	30	36	42	37	27	22	17	16	16	16
30,000	-46	-32	-32	-42	-38	-49	-55	43	29	31	39	36	27	21	17	16	16	16
20,000	-33	-22	-23	-29	-26	-35	-40	32	20	22	26	25	17	13	15	15	16	16
TORREJON AFB TO WHEELUS AP																		
53,000	28	24	12	16	19	11	6	-29	-25	-15	-16	-20	-20	-25	14	12	12	12
40,000	36	30	24	26	28	15	9	-38	-32	-25	-26	-30	-30	-36	19	16	16	16
30,000	27	28	20	24	25	12	5	-29	-20	-22	-23	-26	-26	-32	19	16	16	16
20,000	22	18	16	15	17	8	4	-23	-19	-15	-16	-20	-20	-25	15	14	14	16
TRAVIS AFB TO WAKE AP																		
53,000	-26	-20	-5	-10	-14	-24	-28	24	19	4	10	15	8	5	10	8	8	8
40,000	-50	-39	-13	-27	-32	-45	-52	47	36	11	25	26	17	11	12	12	12	12
30,000	-42	-34	-10	-22	-26	-39	-45	39	32	8	20	24	18	8	14	12	12	12
20,000	-27	-21	-6	-14	-16	-25	-29	26	20	8	13	15	8	5	12	10	10	12
TRAVIS AFB TO WESTOVER AFB																		
53,000	35	25	14	24	24	16	12	-36	-25	-14	-25	-24	-22	-28	18	16	16	16
40,000	56	38	40	41	43	32	26	-58	-40	-41	-43	-43	-35	-40	19	16	16	16
30,000	51	35	32	35	37	26	20	-54	-37	-34	-36	-36	-27	-32	15	14	14	16
20,000	34	23	21	24	25	17	12	-35	-25	-21	-25	-24	-22	-28	14	13	13	16
TRAVIS AFB TO WHEELUS AP																		
53,000	19	11	9	13	12	8	6	-21	-17	-5	-14	-15	-15	-20	8	8	8	8
40,000	25	16	19	21	20	13	10	-28	-18	-21	-24	-22	-22	-28	10	8	8	10
30,000	23	16	17	20	19	11	7	-26	-19	-19	-22	-22	-24	-29	10	10	10	10
20,000	15	11	11	13	12	7	4	-17	-12	-12	-14	-14	-16	-20	8	8	8	8
WAKE AP TO WESTOVER AFB																		
53,000	24	16	7	16	15	9	7	-26	-17	-9	-17	-18	-22	-26	8	8	8	8
40,000	43	32	20	31	31	22	18	-46	-35	-27	-31	-36	-37	-43	14	13	13	16
30,000	41	31	20	30	30	21	17	-44	-34	-27	-31	-36	-37	-43	13	13	13	16
20,000	30	23	16	22	22	16	13	-31	-24	-17	-24	-22	-22	-28	8	8	8	8
WAKE AP TO WHEELUS AP																		
53,000	-17	-15	-9	-12	-13	-18	-20	14	11	8	12	11	8	5	8	8	8	8
40,000	-24	-22	-18	-21	-21	-27	-31	19	19	16	16	16	15	8	10	8	8	8
30,000	-20	-20	-12	-17	-17	-24	-28	16	17	11	15	16	8	5	10	10	10	10
20,000	-14	-13	-7	-11	-11	-16	-19	12	12	8	8	8	8	5	8	8	8	8
WESTOVER AFB TO WHEELUS AP																		
53,000	29	19	15	20	20	14	12	-30	-20	-15	-21	-20	-22	-28	8	8	8	8
40,000	42	30	31	39	35	26	22	-44	-32	-25	-31	-32	-34	-40	12	10	10	12
30,000	40	29	28	36	33	24	19	-42	-31	-20	-26	-25	-26	-32	10	10	10	12
20,000	29	20	21	25	23	17	13	-31	-21	-22	-26	-26	-25	-32	10	10	10	12

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