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Computing Atmospheric Scale Height for Refraction Corrections

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SHUTTLE PROGRAM

COMPUTING ATMOSPHERIC SCALE HEIGHT FOR REFRACTION CORRECTIONS

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1.0 INTRODUCTION

The index of refraction minus one is called the modulus of refraction, N. Most real-time refraction correction algorithms assume that N decays exponentially with altitude above a station, h. That is,

$$N = N_o \exp(-h/H_s) \qquad (1.1)$$

where

N_o = modulus of refraction at the station

H_s = atmospheric scale height

Errors in either N_o or H_s cause errors in the estimated refraction corrections: $\Delta\rho$ for range and ΔE for elevation angle. Errors in ΔE are generally the most critical. For example, using mean monthly values of N_o instead of the actual value is estimated to cause an RMS error of 2.5 percent in ΔE when tracking at orbital altitudes. As will be seen, current methods of computing H_s can cause errors of over 10 percent in ΔE and absolute errors of over 1 milliradian. Note that C-band radar hardware errors are about 0.1 milliradian.

Exact values of N_o can be easily measured at a station. However, there is no exact value of H_s because equation (1.1) is only an approximation, and only some "optimum" value of H_s can be computed. Six different methods of computing H_s have been investigated using 30 different radio atmospheres and 27 optical atmospheres. Exact refraction corrections were computed using tabular values of refractivity, $N \cdot 10^6$; obtained by weather balloons. Exact corrections were computed for four values of elevation angle and for two different altitudes: $H = 10^6$ meters = 540 n. mi., and $H = 10^4$ meters above the tracking site. Approximate corrections were then computed using the different values of H_s. A comparison was then made with the exact values to determine which method of computing H_s was best.

Appendix A contains tables of refractivity versus altitude for 30 different radio atmospheres. Refractivity was computed using the equations in section 2.0 from the information given in the tables of reference 1. Three atmospheres from each location were used: the month with the lowest radio refractivity, the month with the highest radio refractivity, and the mean annual atmosphere. Appendix B contains tables of refractivity versus altitude for 27 different optical atmospheres. Appendix C contains tables of the refraction corrections for the 30 different radio atmospheres. Appendix D contains tables of the refraction corrections for the 27 optical atmospheres. Appendix E lists the equations used to compute the refraction corrections.

2.0 COMPUTING REFRACTIVITY

These equations were obtained from reference 2. The following quantities are defined and used in the equation for refractivity.

n = index of refraction

$N = n-1$, modulus of refraction

$N \cdot 10^6$ = refractivity

T_D = dry bulb temperature in degrees kelvin = 273.15 + t° Celsius

T_W = wet bulb temperature in degrees kelvin

RH = relative humidity in percent

e_s = saturation water vapor pressure in millibars

$e_a = \frac{RH}{100} e_s$, actual or aqueous vapor pressure in millibars

P = pressure in millibars

$\varepsilon = 0.622$, ratio of molecular weight of water to dry air

L = 595 calorie/gram, latent heat of vaporization

e_{so} = 6.11 millibars, saturation vapor pressure at 273.15 K

K = 19.75366

c_p = 0.24 calorie/gram/deg K, specific heat of dry air at a constant pressure

c_{pv} = 0.441 calorie/gram/deg K, specific heat of water vapor at a constant pressure

$D = T_D - T_W$ degrees kelvin

λ = wavelength of light in microns
= 0.555 micron for yellow-green light
= 0.75 micron for a ruby laser

The equation for optical refractivity is

$$N\cdot 10^6 = \frac{77.5P}{T_D}\left(1 + 5.15\cdot 10^{-3}/\lambda^2 + 1.07\cdot 10^{-4}/\lambda^4\right) \tag{2.1}$$

For radio frequencies, the refractivity is given by

$$N\cdot 10^6 = \frac{77.6}{T_D}\left(P + 4810\,\frac{e_a}{T_D}\right) \tag{2.2}$$

The following equation for e_a is used when T_D and T_W are given.

$$e_a = \frac{\varepsilon L e_{so}\,\mathrm{EXP}\big(K(T_W - 273.15)/T_W\big) - c_P P D}{\varepsilon(L + c_{PV}D)}\ \mathrm{mbar} \tag{2.3}$$

If RH and T_D are given, the following equations can be used to compute e_a (ref. 2).

$$x = \frac{17.2694\,(T_D - 273.15)}{T_D - 35.85} \tag{2.4}$$

$$e_s = 6.11\ e^x\ \text{millibars} \tag{2.5}$$

$$e_a = \frac{RH}{100}\,e_s \tag{2.6}$$

The IRIG documents (ref. 1) use an alternate set of equations.

$$x = 24.858048\left(1 - \frac{273.16}{T_D}\right) - 5.028 \ln \frac{T_D}{273.16} \tag{2.7}$$

$$+ 3.464878\cdot10^{-4}\left[1 - \exp\left(-19.104276\left(\frac{T_D}{273.16} - 1\right)\right)\right]$$

$$- 9.87200\cdot10^{-4}\left[1 - \exp\left(10.98227\left(1 - \frac{273.16}{T_D}\right)\right)\right]$$

$$e_s = 6.11136e^x \text{ millibars} \tag{2.8}$$

$$e_a = \frac{RH}{100} e_s \tag{2.9}$$

Note that the maximum difference between equation (2.5) and equation (2.8) is about 0.019 millibar, a small quantity.

3.0 METHODS OF COMPUTING H_S

Six different methods of computing H_S were used. They are described below. N_o is the modulus of refraction at the tracking site.

H_{S1}

$$N_{1000} = N_o - 7.32\cdot10^{-6} \exp(5577\ N_o)$$

$$H_{S1} = \frac{1000}{\ln(N_o/N_{1000})} \text{ meters}$$

This method of computing H_S was developed in 1959 at the National Bureau of Standards (ref. 3). It is the most widely used. Goddard Spaceflight Center uses this method to compute H_S and supplies these values in their station characteristics tables, which are in turn used by Johnson Space Center. An advantage is that it only requires the value of N_o at the tracking site. No high altitude weather data are needed. A deficiency is that it does not account directly for station altitude. For example, if H_S = 6000 meters for a particular station, then the equation will give H_S = 7000 meters for a station 1 kilometer above it. The fact is that both stations may have very nearly the same value of H_S. H_{S1} has a maximum value of about 8502 meters, a deficiency for optical atmospheres since they require values as large as 11 000 meters.

$\underline{H_{S2}}$

$\bar{N}_{30\ 000}$ = annual value of N at 30 000 meters above the tracking site.

$$H_{S2} = \frac{30\ 000}{\ln(N_o/\bar{N}_{30\ 000})} \text{ meters}$$

This is approximately the method used at Patrick AFB for the Eastern Test Range. An advantage is that $\bar{N}_{30\ 000}$ is approximately the same for all tracking sites, and thus high altitude weather data is not required for all sites. Also, the mean monthly values of N at h = 30 000 meters change very little. A disadvantage is that most of the refraction (bending) occurs well below h = 30 000 meters, and the refractivity at h = 30 000 meters has little significance.

$\underline{H_{S3}}$

N_{4500} = value of N at 4500 meters above the tracking site.

$$H_{S3} = \frac{4500}{\ln(N_o/N_{4500})} \text{ meters}$$

The method of computing H_S requires weather data at h = 4500 meters above the tracking site.

$\underline{H_{S4}}$

$\bar{h}$ = altitude above tracking site at which $N = N_o/2$
$(4000 < \bar{h} < 6000 \text{ m})$

$$H_{S4} = \bar{h}/\ln(2)$$

H_{S4} requires low altitude weather data.

H_{S5}

H_{S5} is determined by a percentage-least-squares fit of the elevation angle refraction corrections. It is the optimum value of H_S, giving the least amount of error. The errors would be zero if N truly decayed exponentially with altitude. The errors in the refraction corrections using H_{S5} are a measure of the nonexponentiality of the atmosphere. This method requires complete high altitude weather data and nontrivial computer programs to fit the data.

HS6 For Radio Atmospheres

h_{STA} = altitude of station in meters above MSL.

Obtain H_{S6} by iterating the equation below. Use H_{S6} = 7000 meters as an initial estimate.

$$H_{S6} = A - B(N_o \cdot 10^6) \exp\left[(h_{STA} - C)/H_{S6}\right]$$

where, for $h_{STA} < 1500$ meters

A = 17 590 meters B = 30.55 meters C = 0

(A = 20 285 meters B = 40 meters C = 0 for Point Arguello, California)

For $1500 \leq h_{STA} < 2500$ meters

A = 18 588 meters B = 40.814 meters C = 1500 meters

For $h_{STA} \geq 2500$ meters

A = 21 273 meters B = 60.227 meters C = 3000 meters

Note if $h_{STA} = C$, then H_{S6} is a linear function of N_o.

$$H_{S6} = A - B(N \cdot 10^6)$$

The linear coefficients $A = 17\,590$ meters, $B = 30.55$ meters for stations at sea level were determined by a percentage least-squares fit of all the elevation angle refraction corrections for 24 different atmospheres, 4 elevation angles, and 2 different altitudes: $H = 10^6$ meters and $H = 10^4$ meters. A total of 192 nonlinear equations in the two unknowns, A and B. A quadratic fit was also tried and yielded no signifiant improvement. The results of this exercise showed H_{S3} to also be a good estimate of scale height (but also requiring low altitude weather data). The remaining values of A and B were obtained by a standard least-squares fit to the H_{S3} values for 24 different atmospheres, except for 13 atmospheres at Point Arguello.

The radio atmospheres in the vicinity of Point Arguello, California required separate treatment because of the high degree of nonexponentiallity of the radio atmospheres there (fig. A3 appendix A). This was probably caused by the cool Peru current flowing past Point Arguello. The average relative humidity was frequently very high at low altitudes (92 percent for July, a very dry month).

Like H_{S1}, H_{S6} requires no high altitude weather data, only the refractivity at the station. Unlike H_{S1}, H_{S6} does account for the altitude of the station. To elaborate further, let $N_C \cdot 10^6$ be the refractivity at the altitude C (C = 0, 1500, 3000 meters). At the altitude of $h = C$ above MSL, it was determined that

$$H_{S6} = A - B(N_C \cdot 10^6)$$

a linear function of $N_C \cdot 10^6$, where A and B were determined by least squares fits to minimize the errors in the elevation angle refraction corrections. However, refractivity $N_o \cdot 10^6$ is given at the station altitude h_{STA}. Refractivity at the altitude $h = C$ is (for an exponential atmosphere)

$$N_C \cdot 10^6 \doteq N_o \cdot 10^6 \exp\left[(h_{STA} - C)/H_{S6}\right]$$

Combining these two equations gives the iteration equation for H_{S6}.

H_{S6} For Optical Atmospheres

h_{STA} = station altitude in meters above MSL

λ = wavelength of light in microns
= 0.555 micron for yellow-green light
= 0.75 micron for ruby laser

N_o = modulus of refraction at station for the wavelength λ

For optical atmospheres, convert N_o to the modulus of refraction for yellow-green light by

$$N_o = \frac{1.017847170}{1 + 5.15 \cdot 10^{-3}/\lambda^2 + 1.07 \cdot 10^{-4}/\lambda^4} N_o$$

Then obtain H_{S6} by iterating the equation below. Use $H_{S6} = 9800$ meters as an initial estimate.

$$H_{S6} = A - B(N_o \cdot 10^6) \exp\left[(h_{STA} - C)/H_{S6}\right]$$

where, for $h_{STA} < 1500$ meters

A = 27 480 meters B = 64.38 meters C = 0

For $1500 \leq h_{STA} < 2500$ meters

A = 24 035 meters B = 61.181 meters C = 1500 meters

For $h_{STA} \geq 2500$ meters

A = 19 092 meters B = 47.371 meters C = 3000 meters

The A and B coefficients were obtained in a similar manner to those for the radio atmospheres.

4.0 SUMMARY OF RESULTS

The very accurate refraction correction equations of appendix E were used to compute the exact refraction corrections using the tabular values of refractivity in appendixes A and B. The the approximate corrections were computed using the six values of H_S (sec. 3). Again, the equations in appendix E were used, but with the assumption of an exponential atmosphere.

$$N = N_o \exp(-h/H_S)$$

The percentage errors in the corrections were then computed to determine which method of computing H_S was best.

Figures 1 and 2 are revealing. They show plots of H_{S1}, H_{S5}, and H_{S6} versus $N_{SL} \cdot 10^6$ (refractivity at sea level) for radio atmospheres and optical atmospheres. Remember, H_{S5} represents the optimum scale height, giving the least amount of error. From figure 1, for radio atmospheres it is clear that H_{S6} is better than H_{S1}, which is generally too small, the maximum error being about 1500 meters. From figure 2, for optical atmospheres, it is even clearer that H_{S1} is inadequate, with a maximum error from optimum of over 3000 meters.

Table 1 shows the percentage error in computing the elevation angle refraction correction, ΔE, at the various locations of the radio atmospheres. As a point of comparison, using mean monthly values of N_o cause about a 2.5 percent RMS error in ΔE at orbital altitudes and slightly more at low altitudes (ref. 4). As can be seen from the overall RMS statistics in table 1, H_{S1} and H_{S2} cause errors of about 7 percent in ΔE. H_{S6} offers a factor of 2.5 improvement over using H_{S1} and gives an RMS error of 2.8 percent. For semiarid atmospheres, as found at White Sands and Edwards AFB, the errors in computing ΔE by using H_{S1} were over 10 percent. Using H_{S2} here was even worse. However, using H_{S6} reduced the errors to 2 percent and 1 percent, a factor of 5 and 10 improvement. H_{S5}, the optimum scale height, has an RMS error of 1.6 percent, which is a measure of the nonexponentiality of the radio atmospheres. 1.6 percent is very good; but remember, to achieve this requires extensive high altitude weather data and complicated computer programs. The overall accuracy using H_{S3} and H_{S4} is about 2.9 percent of ΔE. Both are easy to compute but require a small amount of low altitude weather data, which may not be available. It is encouraging to see that H_{S6}, which requires only N_o at the site, is slightly better than either H_{S3} or H_{S4}. Thus, it is not generally even necessary or desirable to obtain low altitude weather data.

Table 2 shows the percentage error in computing the range refraction correction, $\Delta\rho$, for radio atmospheres. While it is not a goal of this study to improve the accuracy of $\Delta\rho$, table 2 shows an improvement in estimation accuracy of $\Delta\rho$ by a factor of 1.9 when using H_{S6} compared to using H_{S1}, bringing the errors down from 7.2 percent to 3.8 percent. Note though that no scale height gave an absolute error of greater than 10 meters, which is about the standard deviation of the range bias error for a C-band radar. Also note that using a mean monthly value of N_o causes an RMS error of about 1.7 percent for $\Delta\rho$ (ref. 4).

Table 3 shows the percentage error in ΔE for optical atmospheres. Clearly, H_{S1} does not do well for optical atmospheres, giving an RMS error of 18.7 percent. H_{S2} does even worse with an RMS error of 23 percent. H_{S6} does quite well at 1.8 percent, which is close to the optimum value for H_{S5} of 1.5 percent of ΔE. H_{S3} at 1.9 percent is the choice over H_{S4} at 2.7 percent.

Table 4 shows the percentage error in $\Delta\rho$ for optical atmospheres. The errors are quite large. Still H_{S6} at 6.5 percent is better than H_{S1} at 9.5 percent. From the tables in appendix D, it can be seen that the range refraction correction errors are much larger at orbital altitudes. At $H = 10^4$ meters, the errors are very small for H_{S6}. For example, at White Sands, the error in $\Delta\rho$ using H_{S6} was 10.7 percent for $H = 10^6$ meters and 0.3 percent for $H = 10^4$ meters. This bodes well for surveying work.

Figures A-1, A-2 and A-3 in appendix A are plots of $\ln(N \cdot 10^6)$ versus altitude for three different radio atmospheres. If the atmospheres were truly exponential, these plots would be straight lines. Figure A-3 for Point Arguello, California shows a highly nonlinear plot, particularly at the low altitudes where most of the bending takes place. This will cause large errors in computing real-time refraction corrections, which assume a linear plot. Table 5 shows the percentage errors in computing ΔE for the Point Arguello radio atmospheres. It is seen that the errors are quite large. If the measured elevation angle is restricted to be greater than or equal to 3 degrees, table 6 shows that H_{S6} will do a good job though with errors on the order of 1 percent of ΔE. Because of the unusual nature of this Pacific Coast atmosphere, a special set of fit coefficients was required for H_{S6} here. The fit coefficients were based on the computed values of H_{S3} for the 12 monthly atmospheres and 1 annual atmosphere from reference 1. Below $E_M = 3$ degrees, use of H_{S6} though causes a maximum error of about 1.7 milliradians at $E_M = 0.5$ degree for the July atmosphere. At $E_M = 1$ degree, the error is about 0.6 milliradian.

Figures 3 through 6 show plots of H_{S1}, H_{S3} and H_{S6} versus the refractivity at the altitudes of 1500 meter and 3000 meter. The reference points, of H_{S3}, show a strong linear trend. Thus, H_{S6} was made to be a linear function of refractivity at the altitudes: $C = 1500$ meter and $C = 3000$ meter.

Tables 7 through 12 list values of H_{S1}, H_{S3} and H_{S6} for stations above sea level for various radio atmospheres. Tables 13 through 18 show values of H_{S3} and H_{S6} for stations above sea level for various optical atmospheres. It is regretted that values of H_{S5} were not available for stations above sea level. The large amount of time and work involved in computing these values was beyond the scope of this study. However, H_{S3} is generally fairly close to optimum and easily computed. Thus, H_{S3} should be used as the reference scale height in these tables. It is seen that H_{S6} generally agrees well with H_{S3}. The performance of H_{S1} is generally poor, and completely unacceptable for optical atmospheres.

5.0 CONCLUSIONS AND RECOMMENDATIONS

It is clear that the best algorithm for general use is the one for H_{S6}. It is easy to use and requires no high altitude weather data, only the refractivity at the radar site. It is the second most accurate value of H_S, with H_{S5}, by definition, being the most accurate. H_{S5} is not simple to compute and requires complete high altitude weather data. The worldwide RMS accuracy of computing the elevation angle refraction correction using H_{S6} is about 2.8 percent for radio atmospheres, in line with the 2.5 percent error in ΔE due to uncertainties in N_o.

H_{S3} and H_{S4} both are easy to compute but require low altitude weather data above the site. For radio and optical atmospheres, their accuracy is not generally quite as good as that provided by H_{S6}, which requires no low altitude weather data. So, why bother with weather balloons?

H_{S1}, the most widely used value currently, is easily obtained but gives RMS worldwide errors of 7 percent of ΔE for radio atmospheres, 2.5 times larger than using H_{S6}. For semiarid atmospheres, the errors caused by using H_{S1} can be over 10 percent, whereas H_{S6} offers 1-percent to 2-percent accuracy here, a factor of 5 to 10 improvement in accuracy.

H_{S2} for radio atmospheres works well at Patrick AFB, where it was developed. However, its overall accuracy of 7.4-percent error in ΔE is the worst. It can not be recommended.

For optical atmospheres, H_{S6} is the clear choice, offering 1.8 percent accuracy in computing ΔE, close to the optimum of 1.5 percent using H_{S5}. H_{S3} at 1.9 percent is the choice over H_{S4} at 2.7 percent. The use of H_{S1} or H_{S2} with optical atmospheres is unacceptable, with errors of 19 percent and 23 percent.

Using H_{S6} compared with H_{S1} or H_{S2} also improves the accuracy of the range refraction correction, $\Delta\rho$. Use of H_{S6} gives errors of 3.8 percent of $\Delta\rho$ for radio atmospheres and 6.5 percent for optical atmospheres. However, for optical atmospheres where the target is below 10 000 meters in altitude, the $\Delta\rho$ errors are generally negligible using H_{S6}. This bodes well for surveying work.

6.0 REFERENCES

1. Inter-Range Instrumentation Group (IRIG) Range Reference Atmospheres. U.S. government agencies may request copies from

   Secretariat
   Range Commanders Council
   ATTN: STEWS-SA-S-RCC
   White Sands Missile Range
   New Mexico 88002

   Others may request copies from

   Defense Documentation Center (DDC)
   ATTN: DDC-IRA
   Cameron Station
   Alexandria, Virginia 22314

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3. Bean, B. R.; Thayer, B. D.; and Cahoon, B. A.: Methods of Predicting Atmospheric Bending of Radio Waves. NBS Report 6056, National Bureau of Standards, Boulder, Colorado, May 18, 1959.

4. Lear, William M.: Refraction Correction Equations and Tables. NASA/JSC IN 79-FM-42, October 1979.

TABLE 1.-.PERCENTAGE ERROR IN ΔE FOR RADIO ATMOSPHERES

LOCATION	H_{S1}	H_{S2}	H_{S3}	H_{S4}	H_{S5}	H_{S6}
White Sands	10.65	10.93	2.76	1.72	0.68	2.03
Edwards AFB	10.40	13.18	1.34	.86	.70	1.06
Eglin AFB	7.74	4.18	3.86	3.51	1.38	3.44
Ascension	3.50	3.87	3.02	3.32	1.83	2.59
Kwajalein	6.23	3.52	2.92	2.77	1.38	3.05
Wallops	8.14	8.65	2.97	2.69	1.91	2.34
Cape Canaveral	3.00	8.11	3.91	3.79	2.83	4.27
Cape Canaveral[a]	3.53	3.48	1.91	2.74	2.94	3.03
Patrick AFB	4.55	2.04	1.79	2.07	1.51	3.10
Hawaii	3.61	2.51	2.94	3.96	1.03	2.20
RMS	7.00	7.37	2.94	2.91	1.60	2.81

[a]For $E_M \geq 3$ degrees.

TABLE 2.- PERCENTAGE ERROR IN $\Delta\rho$ FOR RADIO ATMOSPHERES

LOCATION	H_{S1}	H_{S2}	H_{S3}	H_{S4}	H_{S5}	H_{S6}
White Sands	7.81	7.41	1.25	1.71	2.79	2.81
Edwards AFB	6.66	9.07	2.47	2.83	2.98	2.73
Eglin AFB	7.23	3.81	3.37	2.87	1.62	3.33
Ascension	6.67	2.14	5.42	5.68	4.36	2.95
Kwajalein	8.46	1.47	3.89	3.94	3.58	5.69
Wallops	7.16	5.32	2.59	2.73	4.32	3.10
Cape Canaveral	7.39	2.26	5.26	6.18	6.67	5.89
Patrick AFB	7.37	4.02	2.75	2.65	3.57	3.82
Hawaii	6.09	1.84	5.56	6.54	3.20	1.70
RMS	7.23	4.85	3.89	4.25	3.91	3.79

TABLE 3.- PERCENTAGE ERROR IN ΔE FOR OPTICAL ATMOSPHERES

LOCATION	H_{S1}	H_{S2}	H_{S3}	H_{S4}	H_{S5}	H_{S6}
White Sands	23.26	28.30	2.11	3.99	2.04	2.58
Edwards AFB	17.95	24.02	1.35	1.57	1.27	1.42
Eglin AFB	14.66	18.20	1.50	1.48	.93	2.03
Ascension	19.78	24.39	2.69	3.62	1.99	2.18
Kwajalein	19.40	24.20	1.69	2.64	1.50	1.76
Wallops	15.52	18.79	1.10	1.58	1.00	1.06
Cape Canaveral	18.90	23.15	1.70	2.49	1.50	1.58
Hawaii	19.15	23.37	2.21	2.58	1.62	1.06
RMS	18.74	23.25	1.86	2.65	1.53	1.84

TABLE 4.- PERCENTAGE ERROR IN $\Delta\rho$ FOR OPTICAL ATMOSPHERES

LOCATION	H_{S1}	H_{S2}	H_{S3}	H_{S4}	H_{S5}	H_{S6}
White Sands	10.61	13.80	8.63	6.03	8.85	7.55
Edwards AFB	9.12	13.22	7.08	5.88	6.74	6.65
Eglin AFB	9.02	11.56	5.05	4.78	4.15	5.71
Ascension	9.68	12.77	5.57	4.56	7.07	6.72
Kwajalein	9.82	13.03	5.84	4.70	6.51	7.33
Wallops	8.70	11.03	5.13	4.89	4.99	5.02
Cape Canaveral	9.66	12.56	5.78	5.03	6.42	6.22
Hawaii	9.65	12.54	5.36	4.97	6.69	6.32
RMS	9.55	12.59	6.16	5.13	6.56	6.49

TABLE 5.- PERCENTAGE ERROR IN ΔE FOR POINT ARGUELLO RADIO ATMOSPHERES

TIME	H_{S1}	H_{S2}	H_{S3}	H_{S4}	H_{S5}	H_{S6}
July	6.96	9.38	8.65	9.06	4.79	8.28
December	3.58	3.18	3.40	4.69	1.79	3.35
Annual	3.29	4.63	5.45	6.47	2.92	5.67

TABLE 6.- PERCENTAGE ERROR IN ΔE FOR POINT ARGUELLO RADIO ATMOSPHERES FOR $E_M \geq 3$ DEGREES

TIME	H_{S1}	H_{S2}	H_{S3}	H_{S4}	H_{S5}	H_{S6}
July	0.96	2.08	1.38	1.77	5.05	1.05
December	4.47	4.08	.71	1.91	1.87	.66
Annual	1.95	.56	.96	1.87	3.21	1.14

TABLE 7.- VALUES OF H_S FOR STATIONS ABOVE SEA LEVEL
(White Sands March Radio Atmosphere)

h_{STA}, m	$N_o \cdot 10^6$	H_{S3}, m	H_{S6}, m	H_{S1}, m
0[a]	294.53	8333	8592	7273
250	286.90	8338	8566	7401
500	279.36	8348	8541	7525
750	271.89	8364	8519	7643
1000	264.48	8384	8502	7755
1250	257.13	8419	8488	7862
1499.9	250.51	8421	8451	7953
1500	250.51	8421	8364	7953
1750	244.61	8381	8299	8031
2000	237.95	8399	8271	8112
2250	230.94	8443	8267	8192
2499.9	223.82	8514	8280	8266
2500	223.82	8514	8558	8266
2750	216.70	8594	8596	8331
3000	209.93	8661	8630	8384
3250	203.85	8695	8635	8424
3500	197.39	8770	8680	8459
3750	190.02	8945	8812	8486
4000	182.66	9158	8975	8500

[a]H_{S5} = 8874 meters.

TABLE 8.- VALUES OF H_S FOR STATIONS ABOVE SEA LEVEL
(Wallops March Radio Atmosphere)

h_{STA}, m	$N_o \cdot 10^6$	H_{S3}, m	H_{S6}, m	H_{S1}, m
0[a]	306.80	8089	8217	7061
250	298.61	8065	8185	7204
500	290.66	8043	8148	7339
750	282.83	8021	8113	7468
1000	275.06	8014	8080	7593
1250	267.52	8010	8043	7710
1499.9	258.66	8088	8075	7840
1500	258.66	8088	8031	7840
1750	249.27	8227	8095	7970
2000	240.47	8358	8153	8082
2250	232.83	8423	8172	8171
2499.9	226.10	8436	8156	8243
2500	226.10	8436	8439	8243
2750	219.86	8418	8419	8303
3000	212.99	8453	8445	8361
3250	205.80	8538	8509	8412
3500	198.84	8618	8579	8452
3750	192.51	8651	8625	8478
4000	186.63	8671	8656	8494

[a]H_{S5} = 8376 meters.

TABLE 9.- VALUES OF H_S FOR STATIONS ABOVE SEA LEVEL
(Cape Canaveral January Radio Atmosphere)

h_{STA}, m	$N_o \cdot 10^6$	H_{S3}, m	H_{S6}, m	H_{S1}, m
0[a]	349.76	6256	6905	6281
250	335.33	6403	6972	6547
500	318.47	6647	7157	6853
750	306.33	6777	7205	7069
1000	296.43	6845	7181	7241
1250	287.36	6899	7129	7394
1499.9	276.39	7040	7186	7572
1500	276.39	7040	7307	7572
1750	262.40	7336	7516	7786
2000	248.70	7682	7762	7977
2250	236.99	7977	7960	8124
2499.9	225.15	8343	8208	8253
2500	225.15	8343	8489	8253
2750	212.37	8862	8839	8366
3000	201.39	9349	9144	8439
3250	193.98	9556	9271	8473
3500	188.91	9540	9265	8489
3750	184.09	9517	9249	8498
4000	179.42	9485	9231	8502

[a]H_{S5} = 6389 meters.

TABLE 10.- VALUES OF H_S FOR STATIONS ABOVE SEA LEVEL
(White Sands August Radio Atmosphere)

h_{STA}, m	$N_o \cdot 10^6$	H_{S3}, m	H_{S6}, m	H_{S1}, m
0[a]	348.95	7475	6930	6296
250	336.40	7501	6936	6527
500	324.33	7509	6942	6748
750	312.72	7488	6947	6956
1000	301.53	7473	6954	7153
1250	290.73	7475	6961	7338
1499.9	280.30	7493	6971	7510
1500	280.30	7493	7148	7510
1750	271.92	7442	7092	7642
2000	264.19	7373	7008	7760
2250	256.55	7323	6918	7870
2499.9	248.91	7289	6826	7975
2500	248.91	7289	7277	7975
2750	241.23	7285	7238	8073
3000	233.43	7322	7214	8165
3250	225.39	7400	7220	8250
3500	217.51	7487	7236	8324
3750	210.26	7545	7224	8382
4000	203.81	7558	7158	8425

[a]H_{S5} = 7239 meters.

TABLE 11.- VALUES OF H_S FOR STATIONS ABOVE SEA LEVEL
(Wallops July Radio Atmosphere)

h_{STA}, m	$N_o \cdot 10^6$	H_{S3}, m	H_{S6}, m	H_{S1}, m
0[a]	372.34	6313	6215	5863
250	348.65	6559	6523	6301
500	329.85	6749	6737	6647
750	316.79	6834	6780	6884
1000	306.56	6859	6722	7065
1250	296.56	6856	6659	7239
1499.9	286.86	6812	6584	7402
1500	286.86	6812	6880	7402
1750	277.42	6762	6844	7556
2000	267.48	6768	6844	7710
2250	256.92	6876	6898	7865
2499.9	247.07	6991	6942	7999
2500	247.07	6991	7369	7999
2750	238.42	7090	7391	8107
3000[b]	230.12	7188	7414	8201
3250	221.63	7319	7471	8287
3500	213.08	7482	7563	8360
3750	204.87	7646	7666	8418
4000	197.24	7793	7760	8459

[a]H_{S5} = 5997 meters.

[b]H_{S5} = 7091 meters.

TABLE 12.- VALUES OF H_S FOR STATIONS ABOVE SEA LEVEL
(Cape Canaveral August Radio Atmosphere)

h_{STA}, m	$N_o \cdot 10^6$	H_{S3}, m	H_{S6}, m	H_{S1}, m
0[a]	399.42	5943	5388	5366
250	373.95	6237	5649	5833
500	355.84	6393	5727	6168
750	339.52	6501	5781	6470
1000	324.12	6596	5838	6751
1250	308.60	6732	5964	7029
1499.9	295.35	6866	6008	7259
1500[b]	295.35	6866	6534	7259
1750	284.98	6932	6501	7433
2000	274.65	7003	6479	7600
2250	262.98	7124	6553	7777
2499.9	251.73	7243	6645	7937
2500	251.73	7243	7138	7937
2750	242.23	7301	7183	8060
3000	233.74	7338	7196	8161
3250	226.16	7356	7169	8242
3500	218.80	7383	7139	8312
3750	210.94	7456	7167	8376
4000	202.04	7615	7325	8435

[a]H_{S5} = 5501 meters.

[b]$H_{S5} \approx$ 6400 meters.

TABLE 13.- VALUES OF H_S FOR STATIONS ABOVE SEA LEVEL
(White Sands March Optical Atmosphere)

h_{STA}, m	$N_o \cdot 10^6$	H_{S3}, m	H_{S6}, m
0[a]	270.06	10 300	10 094
250	264.44	10 185	10 025
500	258.78	10 086	9 962
750	253.06	10 004	9 907
1000	247.28	9 932	9 861
1250	241.44	9 887	9 828
1499.9	235.81	9 837	9 783
1500	235.81	9 837	9 608
1750	229.86	9 818	9 601
2000	224.46	9 760	9 565
2250	219.16	9 694	9 529
2499.9	213.92	9 637	9 493
2500	213.92	9 637	9 479
2750	208.72	9 581	9 463
3000	203.56	9 526	9 449
3250	198.52	9 481	9 435
3500	193.55	9 433	9 424
3750	188.63	9 388	9 416
4000	183.79	9 353	9 409

[a]H_{S5} = 10 355 meters.

TABLE 14.- VALUES OF H_S FOR STATIONS ABOVE SEA LEVEL
(Wallops March Optical Atmosphere)

h_{STA}, m	$N_o \cdot 10^6$	H_{S3}, m	H_{S6}, m
0[a]	290.21	8 997	8 796
250	281.80	9 040	8 816
500	274.20	9 035	8 794
750	266.99	9 009	8 754
1000	259.76	9 010	8 726
1250	252.28	9 058	8 741
1499.9	245.12	9 092	8 747
1500	245.12	9 092	9 038
1750	238.28	9 122	9 043
2000	231.52	9 157	9 067
2250	224.99	9 176	9 085
2499.9	218.77	9 190	9 095
2500	218.77	9 190	9 273
2750	212.86	9 187	9 277
3000	207.14	9 176	9 280
3250	201.47	9 175	9 288
3500	195.98	9 155	9 295
3750	190.71	9 103	9 299
4000	185.64	9 050	9 300

[a]H_{S5} = 8883 meters.

TABLE 15.- VALUES OF H_S FOR STATIONS ABOVE SEA LEVEL
(Cape Canaveral January Optical Atmosphere)

h_{STA}, m	$N_o \cdot 10^6$	H_{S3}, m	H_{S6}, m
0[a]	276.95	9 586	9 650
250	269.82	9 594	9 653
500	263.17	9 577	9 635
750	256.93	9 539	9 594
1000	250.74	9 502	9 557
1250	244.45	9 491	9 539
1499.9	238.06	9 505	9 546
1500	238.06	9 505	9 470
1750	231.63	9 528	9 485
2000	225.32	9 561	9 505
2250	219.23	9 576	9 523
2499.9	213.46	9 582	9 531
2500	213.46	9 582	9 499
2750	207.89	9 573	9 500
3000	202.48	9 568	9 500
3250	197.18	9 557	9 502
3500	192.03	9 539	9 504
3750	187.13	9 518	9 499
4000	182.38	9 486	9 493

[a]H_{S5} = 9581 meters.

TABLE 16.- VALUES OF H_S FOR STATIONS ABOVE SEA LEVEL
(White Sands August Optical Atmosphere)

h_{STA}, m	$N_o \cdot 10^6$	H_{S3}, m	H_{S6}, m
0[a]	255.22	11 267	11 049
250	250.44	11 097	10 986
500	245.60	10 946	10 928
750	240.72	10 864	10 876
1000	235.78	10 801	10 832
1250	230.78	10 726	10 799
1499.9	225.73	10 591	10 777
1500	225.73	10 591	10 225
1750	220.75	10 428	10 194
2000	215.80	10 272	10 167
2250	210.99	10 153	10 135
2499.9	206.30	10 042	10 100
2500	206.30	10 042	9 805
2750	201.73	9 945	9 777
3000	197.22	9 868	9 749
3250	192.77	9 786	9 722
3500	188.39	9 703	9 695
3750	184.04	9 639	9 671
4000	179.75	9 574	9 647

[a]H_{S5} = 11 218 meters.

TABLE 17.- VALUES OF H_S FOR STATIONS ABOVE SEA LEVEL
(Wallops July Optical Atmosphere)

h_{STA}, m	$N_o \cdot 10^6$	H_{S3}, m	H_S, m
0[a]	269.61	10 057	10 123
250	263.77	9 952	10 072
500	257.37	9 905	10 067
750	251.19	9 847	10 056
1000	245.21	9 794	10 040
1250	239.43	9 739	10 017
1499.9	233.86	9 674	9 983
1500	233.86	9 674	9 727
1750	228.31	9 624	9 702
2000	222.87	9 569	9 676
2250	217.49	9 522	9 653
2499.9	212.07	9 484	9 643
2500	212.07	9 484	9 558
2750	206.54	9 479	9 561
3000	201.08	9 479	9 567
3250	195.86	9 477	9 568
3500	190.89	9 472	9 564
3750	186.11	9 451	9 556
4000	181.48	9 419	9 546

[a]H_{S5} = 10 092 meters.

TABLE 18.- VALUES OF H_S FOR STATIONS ABOVE SEA LEVEL
(Cape Canaveral August Optical Atmosphere)

h_{STA}, m	$N_o \cdot 10^6$	H_{S3}, m	H_{S6}, m
0[a]	265.64	10 302	10 378
250	260.77	10 134	10 278
500	254.91	10 057	10 248
750	248.97	9 997	10 232
1000	243.13	9 942	10 218
1250	237.51	9 873	10 194
1499.9	231.99	9 820	10 171
1500	231.99	9 820	9 842
1750	226.41	9 789	9 826
2000	220.91	9 754	9 813
2250	215.50	9 723	9 802
2499.9	210.21	9 685	9 791
2500	210.21	9 685	9 638
2750	205.07	9 640	9 627
3000	200.00	9 607	9 618
3250	195.01	9 571	9 611
3500	190.10	9 536	9 605
3750	185.32	9 511	9 600
4000	180.65	9 482	9 594

[a]H_{S5} = 10 459 meters.

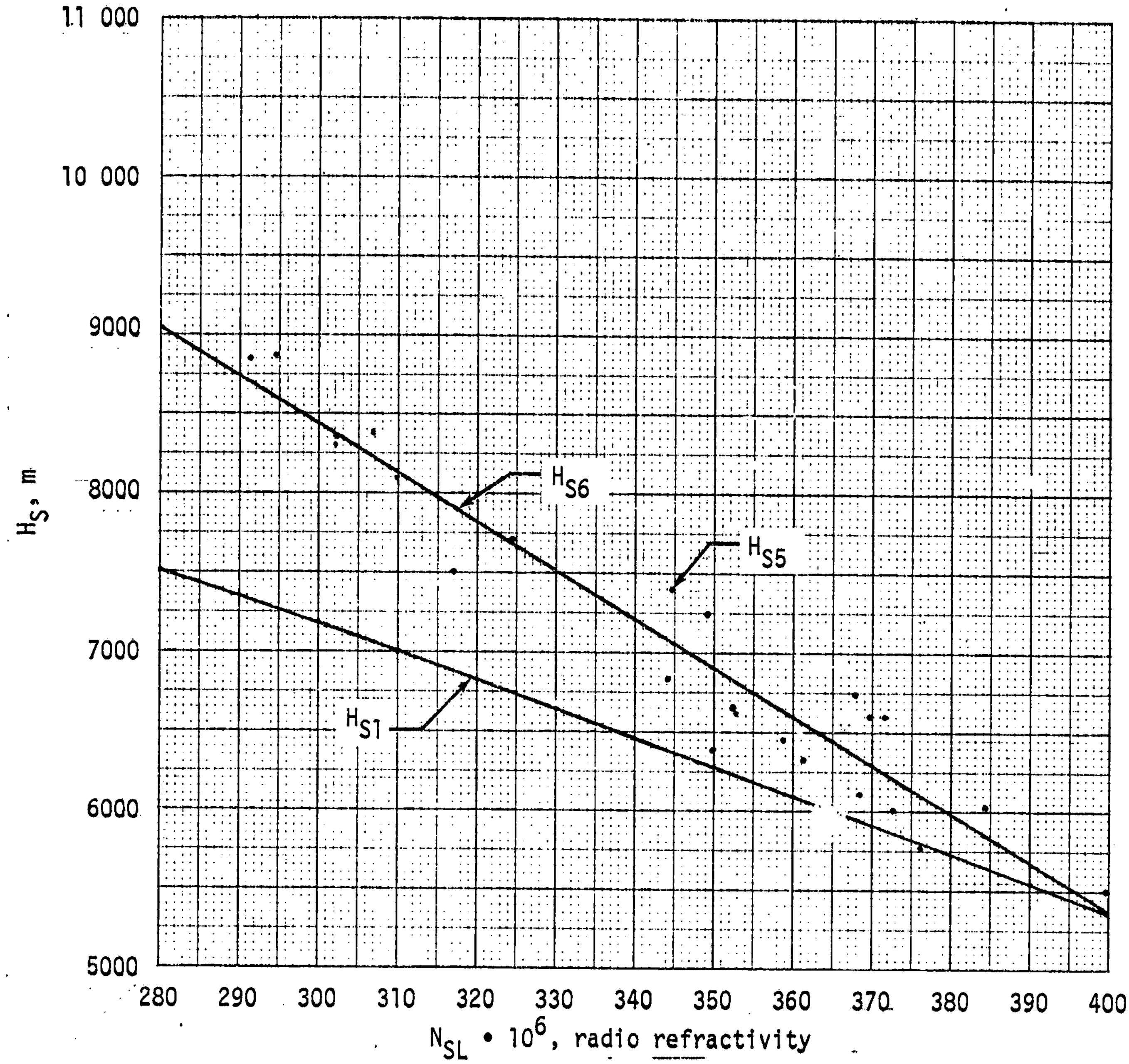

Figure 1.- H_S versus radio refractivity, $N_{SL} \cdot 10^6$.

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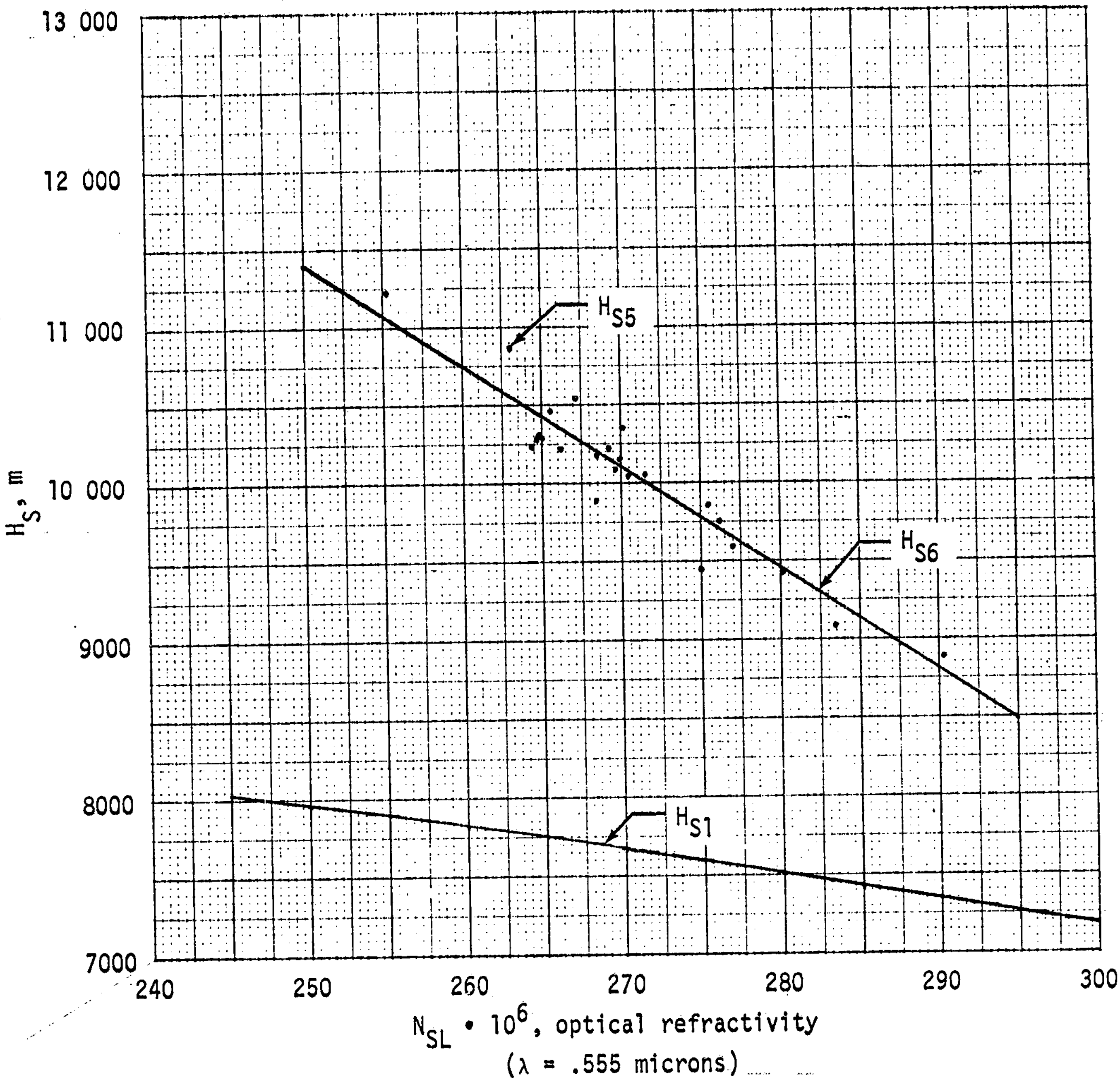

Figure 2.- H_S versus optical refractivity, $N_{SL} \cdot 10^6$.

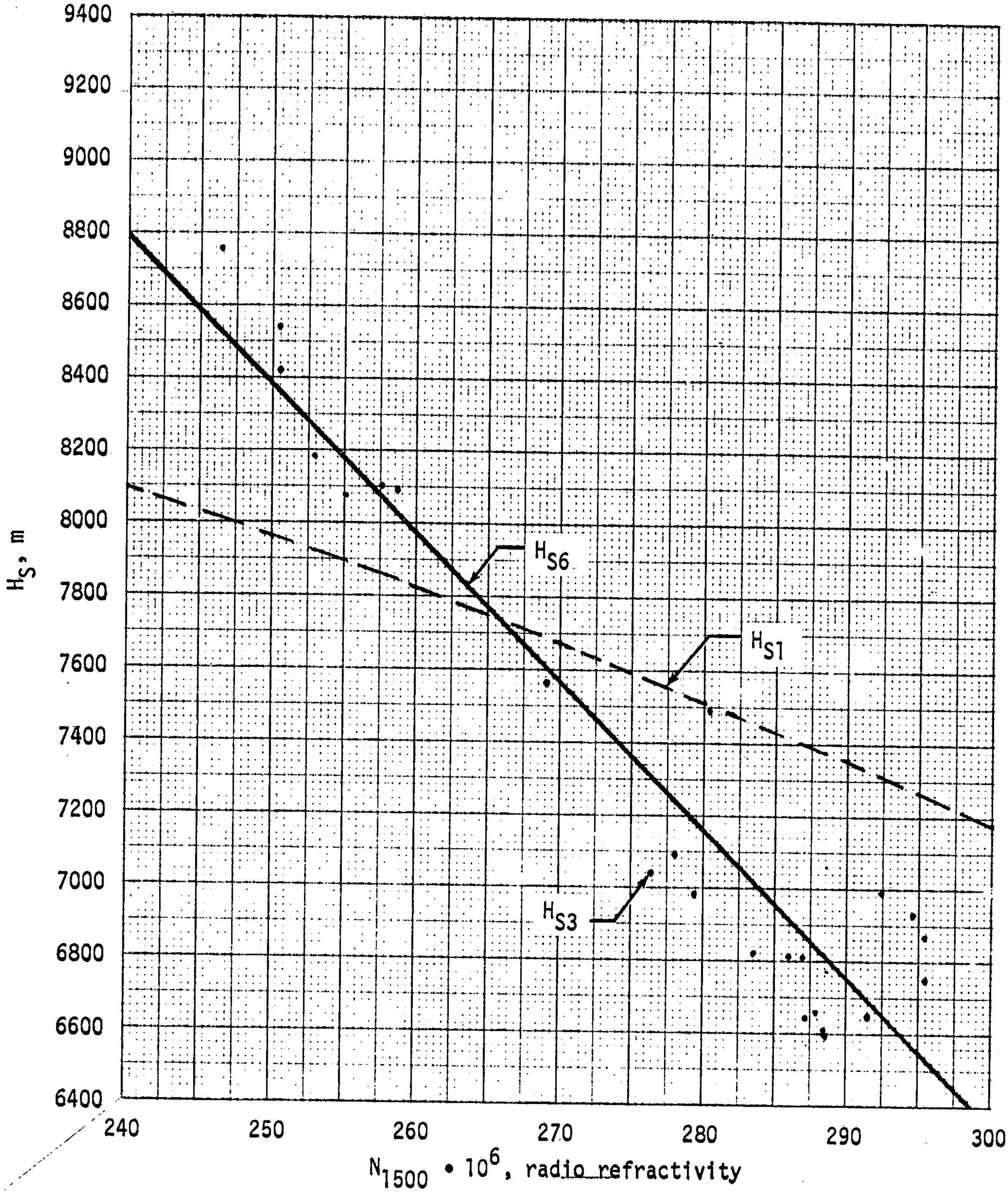

Figure 3.- H_S versus radio refractivity, $N_{1500} \cdot 10^6$ (h_{STA} = 1500 meters).

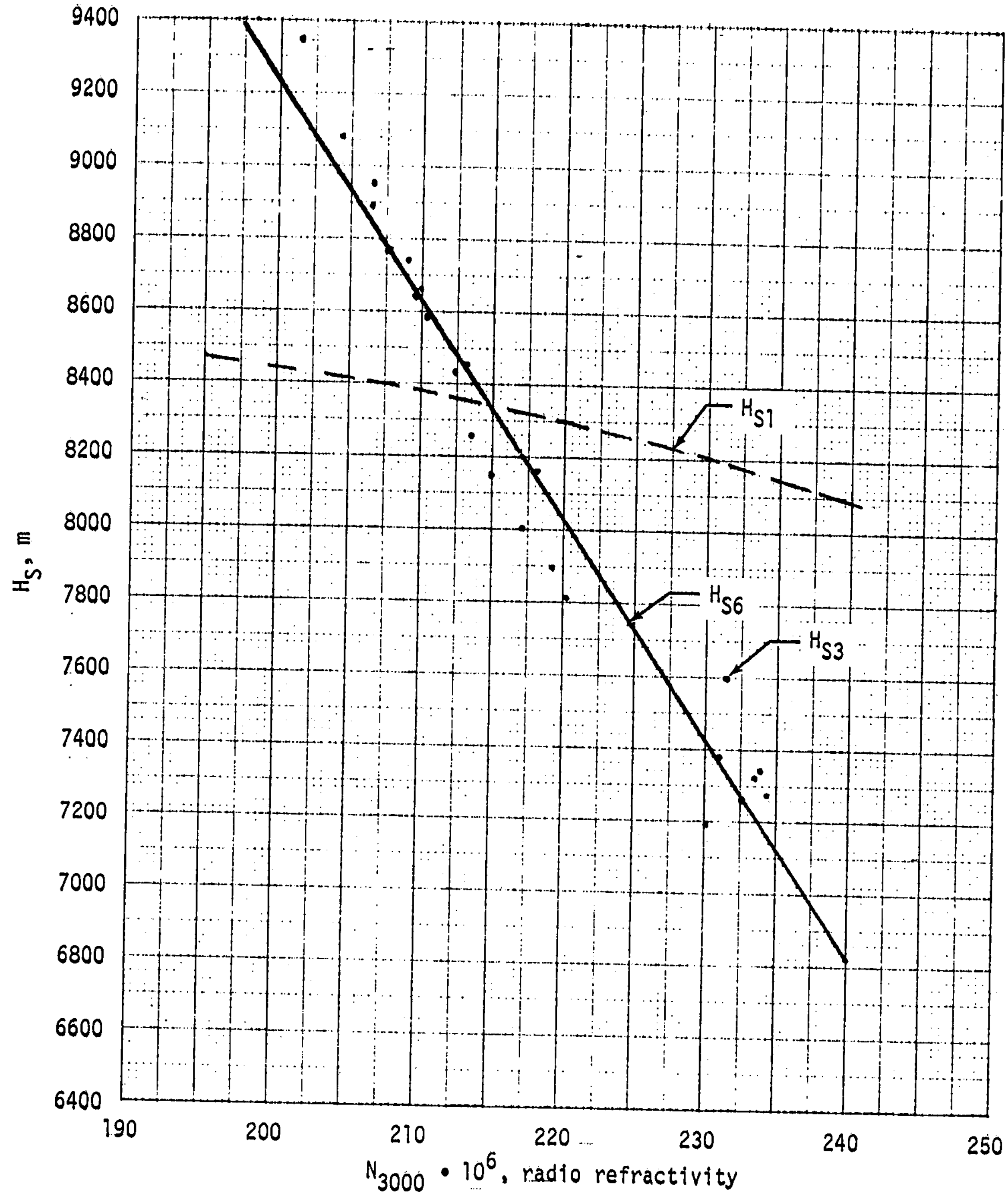

Figure 4.- H_S versus radio refractivity, $N_{3000} \cdot 10^6$ (h_{STA} = 3000 meters).

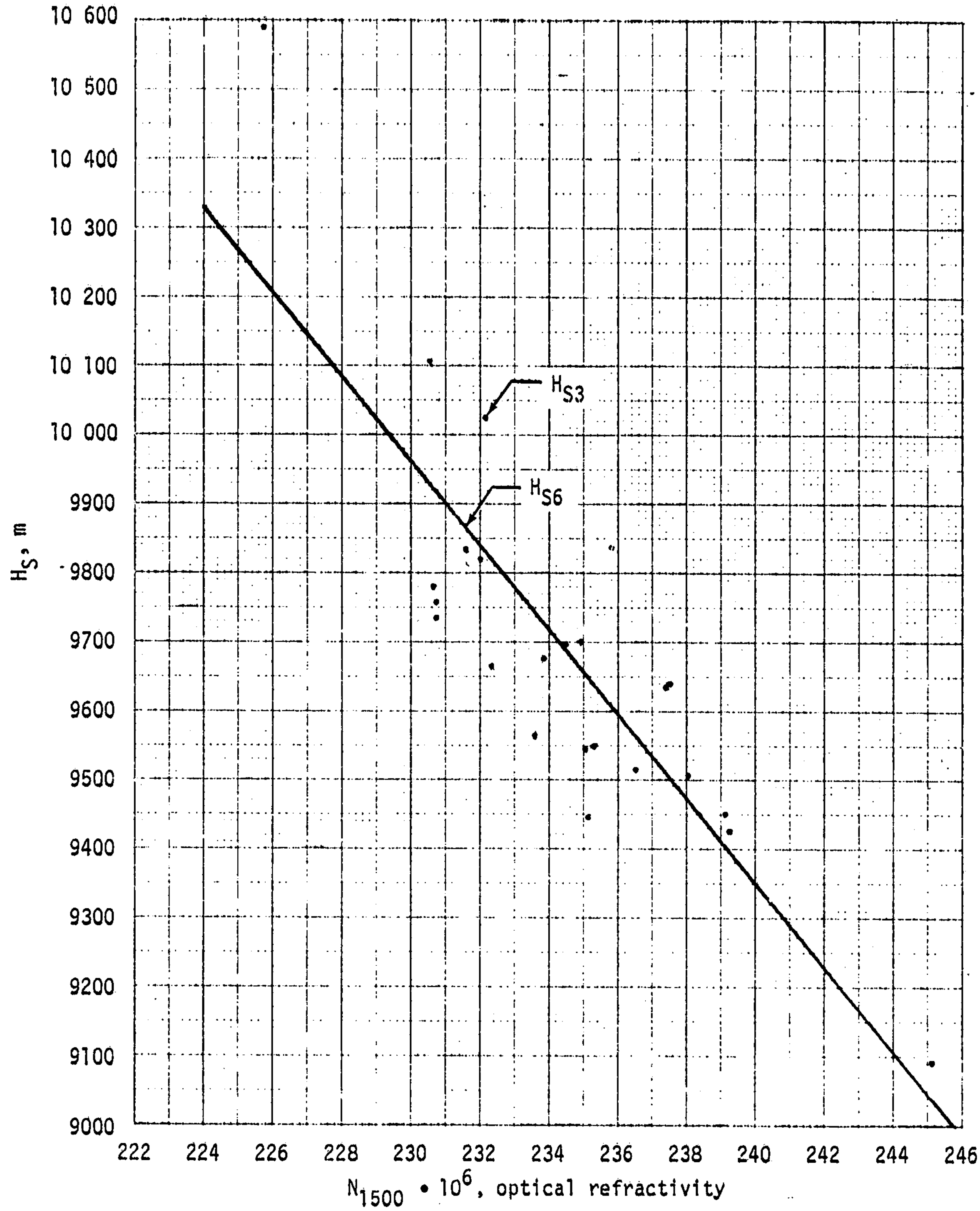

Figure 5.- H_S versus optical refractivity, $N_{1500} \bullet 10^6$
(h_{STA} = 1500 meters).

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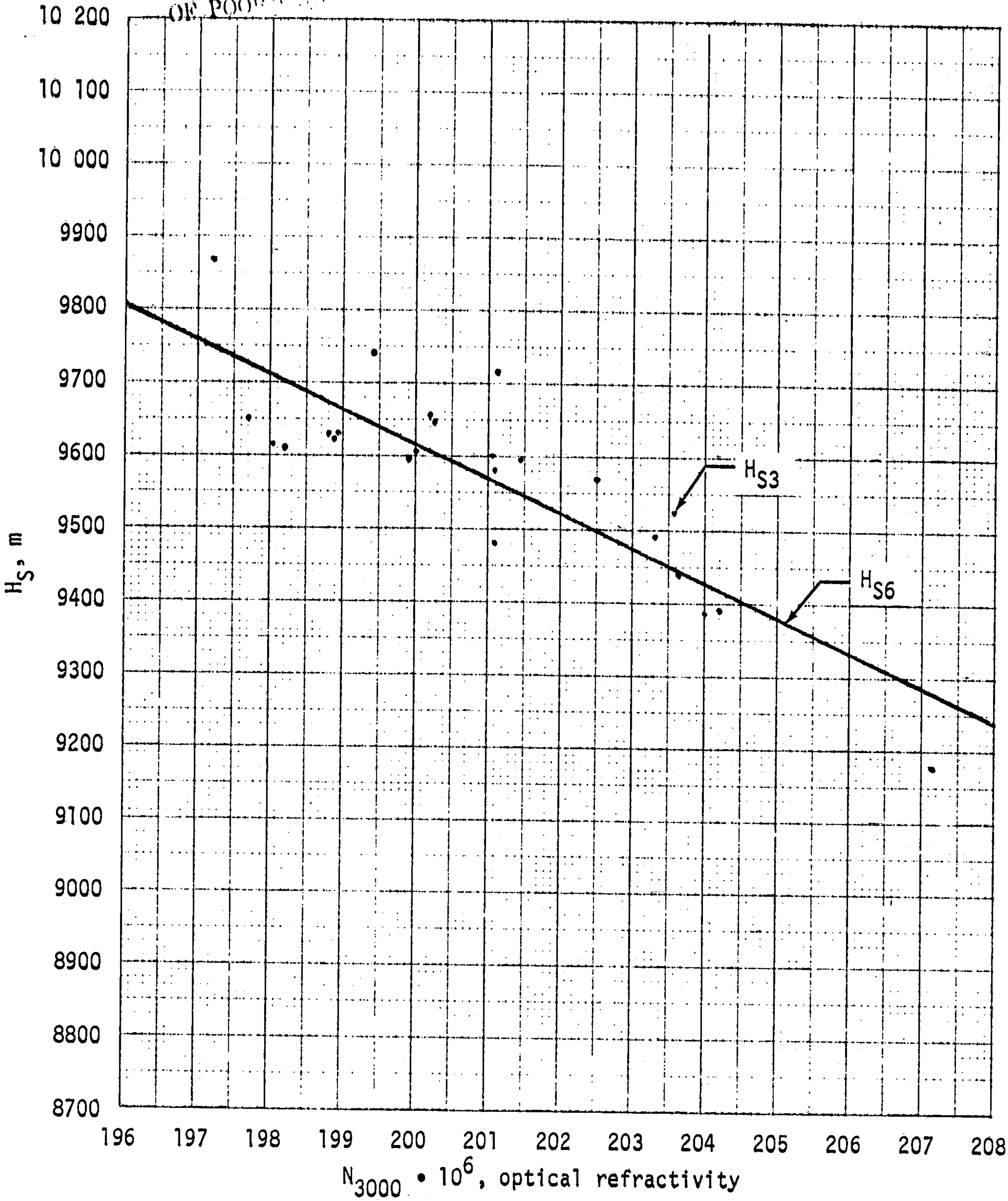

Figure 6.- H_S versus optical refractivity, $N_{3000} \cdot 10^6$ (h_{STA} = 3000 meters).

APPENDIX A

TABLES OF RADIO REFRACTIVITY

This appendix contains tables of radio refractivity versus altitude above mean sea level for 10 different locations. Shown for each location are three atmospheres: the monthly atmosphere with the lowest radio refractivity at sea level, the monthly atmosphere with the highest refractivity, and the annual atmosphere. All atmospheres except those at Patrick AFB were obtained from the IRIG documents (ref. 1), using the equations of section 2. Each atmosphere shown here is the result of several years of measurements at each site.

Also shown in this appendix are tables of the Gaussian quadrature points for each of the radio atmospheres. The quadrature points are those points at which the integrands are evaluated for the refraction correction integrals given in Appendix E.

Figures A-1, A-2 and A-3 are plots of $\ln(N \cdot 10^6)$ versus altitude for three different types of atmospheres: dry semiarid, moist tropical and Point Arguello, California. The Point Arguello July radio atmosphere is highly nonexponential, as can be seen by the nonlinearity of the plot shown in figure A-3. This probably is caused by the cool Peru current flowing past Point Arguello, which causes an inversion layer in the atmosphere.

The locations of the weather stations at the various sites are shown in appendix B.

TABLE A-1.- REFRACTIVITY FOR WHITE SANDS MARCH RADIO ATMOSPHERE

h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$
0	294.53	10 000	93.736	20 000	20.134
250	286.90	10 250	90.879	20 250	19.331
500	279.36	10 500	88.056	20 500	18.532
750	271.89	10 750	85.415	20 750	17.799
1 000	264.48	11 000	82.710	21 000	17.069
1 250	257.13	11 250	79.924	21 250	16.344
1 500	250.51	11 500	77.090	21 500	15.704
1 750	244.61	11 750	74.237	21 750	15.068
2 000	237.95	12 000	71.366	22 000	14.434
2 250	230.94	12 250	68.540	22 250	13.880
2 500	223.82	12 500	65.885	22 500	13.328
2 750	216.70	12 750	63.312	22 750	12.778
3 000	209.93	13 000	60.948	23 000	12.295
3 250	203.85	13 250	58.666	23 250	11.815
3 500	197.39	13 500	56.480	23 500	11.337
3 750	190.02	13 750	54.390	23 750	10.859
4 000	182.66	14 000	52.425	24 000	10.457
4 250	176.38	14 250	50.519	24 250	10.057
4 500	171.63	14 500	48.677	24 500	9.6578
4 750	167.24	14 750	46.905	24 750	9.2603
5 000	162.95	15 000	45.208	25 000	8.8643
5 250	158.76	15 250	43.566	25 250	8.5460
5 500	154.63	15 500	41.973	25 500	8.2292
5 750	150.67	15 750	40.422	25 750	7.9132
6 000	146.81	16 000	38.864	26 000	7.5986
6 250	142.98	16 250	37.386	26 250	7.2851
6 500	139.25	16 500	35.947	26 500	6.9725
6 750	135.53	16 750	34.551	26 750	6.7315
7 000	131.93	17 000	33.202	27 000	6.4916
7 250	128.37	17 250	31.852	27 250	6.2527
7 500	124.86	17 500	30.580	27 500	6.0146
7 750	121.49	17 750	29.360	27 750	5.7773
8 000	118.16	18 000	28.142	28 000	5.5410
8 250	114.90	18 250	27.006	28 250	5.3055
8 500	111.75	18 500	25.873	28 500	5.1339
8 750	108.64	18 750	24.830	28 750	4.9632
9 000	105.57	19 000	23.842	29 000	4.7934
9 250	102.55	19 250	22.857	29 250	4.6241
9 500	99.567	19 500	21.947	29 500	4.4555
9 750	96.625	19 750	21.039	29 750	4.2877
				30 000	4.1208

TABLE A-2.- REFRACTIVITY FOR WHITE SANDS AUGUST RADIO ATMOSPHERE

h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$
0	348.95	10 000	94.044	20 000	21.275
250	336.40	10 250	91.513	20 250	20.377
500	324.33	10 500	89.028	20 500	19.564
750	312.72	10 750	86.588	20 750	18.754
1 000	301.53	11 000	84.180	21 000	17.948
1 250	290.73	11 250	81.734	21 250	17.244
1 500	280.30	11 500	79.403	21 500	16.543
1 750	271.92	11 750	77.127	21 750	15.906
2 000	264.19	12 000	74.901	22 000	15.272
2 250	256.55	12 250	72.721	22 250	14.640
2 500	248.91	12 500	70.549	22 500	14.082
2 750	241.23	12 750	68.405	22 750	13.527
3 000	233.43	13 000	66.322	23 000	12.974
3 250	225.39	13 250	64.251	23 250	12.424
3 500	217.51	13 500	62.190	23 500	11.958
3 750	210.26	13 750	60.187	23 750	11.495
4 000	203.81	14 000	58.201	24 000	11.034
4 250	197.50	14 250	56.236	24 250	10.575
4 500	191.13	14 500	54.340	24 500	10.190
4 750	184.63	14 750	52.442	24 750	9.8059
5 000	178.12	15 000	50.550	25 000	9.4240
5 250	171.46	15 250	48.670	25 250	9.0432
5 500	165.13	15 500	46.812	25 500	8.6638
5 750	159.23	15 750	44.972	25 750	8.3589
6 000	153.75	16 000	43.152	26 000	8.0553
6 250	148.54	16 250	41.365	26 250	7.7525
6 500	143.50	16 500	39.616	26 500	7.4507
6 750	138.77	16 750	37.914	26 750	7.1502
7 000	134.25	17 000	36.221	27 000	6.8504
7 250	130.07	17 250	34.627	27 250	6.6199
7 500	126.25	17 500	33.105	27 500	6.3901
7 750	122.70	17 750	31.658	27 750	6.1610
8 000	119.25	18 000	30.224	28 000	5.9324
8 250	115.81	18 250	28.898	28 250	5.7048
8 500	112.37	18 500	27.655	28 500	5.4779
8 750	108.87	18 750	26.423	28 750	5.2517
9 000	105.50	19 000	25.299	29 000	5.0876
9 250	102.31	19 250	24.185	29 250	4.9240
9 500	99.347	19 500	23.179	29 500	4.7610
9 750	96.665	19 750	22.179	29 750	4.5984
				30 000	4.4363

TABLE A-3.- REFRACTIVITY FOR WHITE SANDS ANNUAL RADIO ATMOSPHERE

h, m	N·10^6	h, m	N·10^6	h, m	N·10^6
0	302.21	10 000	94.146	20 000	20.499
250	293.42	10 250	91.394	20 250	19.676
500	284.87	10 500	88.677	20 500	18.856
750	276.53	10 750	85.928	20 750	18.112
1 000	268.40	11 000	83.224	21 000	17.371
1 250	260.44	11 250	80.485	21 250	16.634
1 500	252.65	11 500	77.902	21 500	15.986
1 750	248.47	11 750	75.411	21 750	15.339
2 000	241.96	12 000	72.990	22 000	14.697
2 250	233.69	12 250	70.655	22 250	14.136
2 500	255.40	12 500	68.353	22 500	13.577
2 750	217.41	12 750	66.014	22 750	13.020
3 000	210.31	13 000	63.643	23 000	12.466
3 250	204.32	13 250	61.168	23 250	11.995
3 500	198.79	13 500	58.803	23 500	11.525
3 750	193.06	13 750	56.600	23 750	11.058
4 000	186.98	14 000	54.740	24 000	10.593
4 250	180.76	14 250	52.980	24 250	10.200
4 500	173.93	14 500	51.265	24 500	9.8090
4 750	167.45	14 750	49.555	24 750	9.4197
5 000	161.93	15 000	47.826	25 000	9.0317
5 250	157.52	15 250	46.019	25 250	8.7102
5 500	153.45	15 500	44.214	25 500	8.3899
5 750	149.53	15 750	42.441	25 750	8.0708
6 000	145.74	16 000	40.721	26 000	7.7529
6 250	141.98	16 250	39.062	26 250	7.4363
6 500	138.30	16 500	37.481	26 500	7.1208
6 750	134.57	16 750	35.902	26 750	6.8784
7 000	131.02	17 000	34.424	27 000	6.6372
7 250	127.58	17 250	32.999	27 250	6.3964
7 500	124.51	17 500	31.630	27 500	6.1564
7 750	121.53	17 750	30.265	27 750	5.9175
8 000	118.58	18 000	28.979	28 000	5.6792
8 250	115.56	18 250	27.763	28 250	5.4419
8 500	112.37	18 500	26.552	28 500	5.2050
8 750	109.10	18 750	25.438	28 750	5.0405
9 000	105.86	19 000	24.331	29 000	4.8763
9 250	102.70	19 250	23.321	29 250	4.7125
9 500	99.782	19 500	22.318	29 500	4.5493
9 750	96.935	19 750	21.406	29 750	4.3866
				30 000	4.2242

TABLE A-4.- REFRACTIVITY FOR EDWARDS AFB MAY RADIO ATMOSPHERE

h, m	N·10^6	h, m	N·10^6	h, m	N·10^6
0	309.83	10 000	92.891	20 000	19.058
250	301.35	10 250	90.010	20 250	18.250
500	292.95	10 500	87.141	20 500	17.501
750	284.62	10 750	84.326	20 750	16.771
1 000	276.35	11 000	81.535	21 000	16.059
1 250	267.45	11 250	78.760	21 250	15.412
1 500	257.59	11 500	76.008	21 500	14.768
1 750	248.05	11 750	73.284	21 750	14.150
2 000	239.04	12 000	70.587	22 000	13.590
2 250	231.03	12 250	67.909	22 250	13.032
2 500	223.43	12 500	65.276	22 500	12.475
2 750	215.71	12 750	62.760	22 750	11.987
3 000	208.93	13 000	60.231	23 000	11.500
3 250	203.24	13 250	57.796	23 250	11.[illegible]16
3 500	196.78	13 500	55.477	23 500	10.544
3 750	190.51	13 750	53.261	23 750	10.132
4 000	184.83	14 000	51.150	24 000	9.7225
4 250	179.54	14 250	49.138	24 250	9.3152
4 500	174.57	14 500	47.212	24 500	8.9100
4 750	169.74	14 750	45.362	24 750	8.5510
5 000	165.07	15 000	43.604	25 000	8.2281
5 250	160.57	15 250	41.914	25 250	7.9065
5 500	156.20	15 500	40.287	25 500	7.5864
5 750	151.95	15 750	38.716	25 750	7.2673
6 000	147.79	16 000	37.199	26 000	6.9497
6 250	143.60	16 250	35.731	26 250	6.6958
6 500	139.68	16 500	34.312	26 500	6.4520
6 750	135.71	16 750	32.934	26 750	6.2094
7 000	132.82	17 000	31.619	27 000	5.9673
7 250	129.15	17 250	30.341	27 250	5.7264
7 500	124.85	17 500	29.098	27 500	5.4861
7 750	121.41	17 750	27.912	27 750	5.2469
8 000	117.99	18 000	26.769	28 000	5.0387
8 250	114.71	18 250	25.654	28 250	4.8704
8 500	111.36	18 500	24.601	28 500	4.7024
8 750	108.05	18 750	23.565	28 750	4.5351
9 000	104.86	19 000	22.594	29 000	4.3685
9 250	101.76	19 250	21.641	29 250	4.2024
9 500	98.751	19 500	20.750	29 500	4.0368
9 750	95.803	19 750	19.870	29 750	3.8720
				30 000	3.7075

TABLE A-5.- REFRACTIVITY FOR EDWARDS AFB JULY RADIO ATMOSPHERE

h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$
0	292.24	10 000	93.252	20 000	19.695
250	284.85	10 250	90.422	20 250	18.868
500	277.47	10 500	87.674	20 500	18.045
750	270.12	10 750	84.992	20 750	17.302
1 000	262.81	11 000	82.395	21 000	16.567
1 250	255.14	11 250	79.858	21 250	15.865
1 500	246.29	11 500	77.374	21 500	15.219
1 750	237.55	11 750	74.941	21 750	14.576
2 000	229.81	12 000	72.555	22 000	13.971
2 250	223.04	12 250	70.203	22 250	13.415
2 500	217.60	12 500	67.938	22 500	12.860
2 750	211.68	12 750	65.725	22 750	12.315
3 000	207.66	13 000	63.537	23 000	11.835
3 250	203.61	13 250	61.393	23 250	11.355
3 500	198.14	13 500	59.297	23 500	10.879
3 750	192.18	13 750	57.237	23 750	10.420
4 000	185.85	14 000	55.221	24 000	10.016
4 250	180.33	14 250	53.252	24 250	9.6148
4 500	175.22	14 500	51.294	24 500	9.2152
4 750	170.05	14 750	49.355	24 750	8.8171
5 000	165.14	15 000	47.443	25 000	8.4689
5 250	160.32	15 250	45.548	25 250	8.1518
5 500	155.82	15 500	43.684	25 500	7.8355
5 750	151.48	15 750	41.859	25 750	7.5207
6 000	147.31	16 000	40.084	26 000	7.2071
6 250	143.22	16 250	38.358	26 250	6.8946
6 500	139.25	16 500	36.680	26 500	6.6457
6 750	135.41	16 750	35.049	26 750	6.4057
7 000	131.59	17 000	33.469	27 000	6.1665
7 250	127.76	17 250	31.972	27 250	5.9282
7 500	124.31	17 500	30.573	27 500	5.6910
7 750	120.87	17 750	29.223	27 750	5.4543
8 000	117.56	18 000	27.903	28 000	5.2183
8 250	114.34	18 250	26.663	28 250	5.0112
8 500	111.07	18 500	25.473	28 500	4.8458
8 750	108.06	18 750	24.432	28 750	4.6807
9 000	105.08	19 000	23.414	29 000	4.5161
9 250	102.10	19 250	22.443	29 250	4.3522
9 500	99.124	19 500	21.495	29 500	4.1886
9 750	96.155	19 750	20.583	29 750	4.0256
				30 000	3.8632

TABLE A-6.- REFRACTIVITY FOR EDWARDS AFB ANAUAL RADIO ATMOSPHERE

h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$
0	302.08	10 000	93.284	20 000	19.295
250	294.23	10 250	90.399	20 250	18.476
500	286.42	10 500	87.549	20 500	17.710
750	278.63	10 750	84.753	20 750	16.975
1 000	270.85	11 000	81.985	21 000	16.248
1 250	261.47	11 250	79.248	21 250	15.598
1 500	250.39	11 500	76.541	21 500	14.949
1 750	241.16	11 750	73.888	21 750	14.315
2 000	233.23	12 000	71.284	22 000	13.747
2 250	226.26	12 250	68.683	22 250	13.186
2 500	219.37	12 500	66.144	22 500	12.623
2 750	212.89	12 750	63.683	22 750	12.123
3 000	206.60	13 000	61.288	23 000	11.636
3 250	200.61	13 250	58.975	23 250	11.151
3 500	194.98	13 500	56.743	23 500	10.668
3 750	189.59	13 750	54.596	23 750	10.258
4 000	184.48	14 000	52.535	24 000	9.8492
4 250	179.44	14 250	50.548	24 250	9.4427
4 500	174.64	14 500	48.622	24 500	9.0375
4 750	169.85	14 750	46.752	24 750	8.6670
5 000	165.18	15 000	44.947	25 000	8.3426
5 250	160.65	15 250	43.200	25 250	8.0193
5 500	156.25	15 500	41.500	25 500	7.6970
5 750	152.03	15 750	39.849	25 750	7.3759
6 000	147.85	16 000	38.244	26 000	7.0558
6 250	143.71	16 250	36.686	26 250	6.7910
6 500	139.74	16 500	35.167	26 500	6.5448
6 750	135.78	16 750	33.702	26 750	6.2993
7 000	132.50	17 000	32.294	27 000	6.0544
7 250	129.04	17 250	30.940	27 250	5.8106
7 500	124.99	17 500	29.634	27 500	5.5675
7 750	121.59	17 750	28.387	27 750	5.3252
8 000	118.26	18 000	27.179	28 000	5.1090
8 250	114.98	18 250	26.019	28 250	4.9385
8 500	111.73	18 500	24.941	28 500	4.7684
8 750	108.53	18 750	23.885	28 750	4.5988
9 000	105.38	19 000	22.904	29 000	4.4299
9 250	102.28	19 250	21.930	29 250	4.2614
9 500	99.220	19 500	21.024	29 500	4.0934
9 750	96.225	19 750	20.121	29 750	3.9261
				30 000	3.7591

TABLE A-7.- REFRACTIVITY FOR EGLIN AFB JANUARY RADIO ATMOSPHERE

h, m	N·10^6	h, m	N·10^6	h, m	N·10^6
0	316.92	10 000	93.957	20 000	20.426
250	305.58	10 250	91.237	20 250	19.583
500	296.92	10 500	88.561	20 500	18.744
750	291.00	10 750	86.054	20 750	17.984
1 000	282.04	11 000	83.539	21 000	17.227
1 250	267.82	11 250	80.963	21 250	16.473
1 500	255.08	11 500	78.317	21 500	15.820
1 750	247.59	11 750	75.646	21 750	15.170
2 000	240.90	12 000	72.935	22 000	14.587
2 250	233.80	12 250	70.141	22 250	14.006
2 500	226.15	12 500	67.508	22 500	13.427
2 750	217.59	12 750	65.010	22 750	12.850
3 000	209.60	13 000	62.811	23 000	12.360
3 250	203.36	13 250	60.698	23 250	11.871
3 500	197.09	13 500	58.645	23 500	11.384
3 750	189.95	13 750	56.619	23 750	10.899
4 000	182.59	14 000	54.533	24 000	10.490
4 250	176.11	14 250	52.464	24 250	10.083
4 500	170.97	14 500	50.459	24 500	9.6771
4 750	166.51	14 750	48.540	24 750	9.2731
5 000	162.23	15 000	46.713	25 000	8.9356
5 250	158.05	15 250	45.000	25 250	8.5990
5 500	153.99	15 500	43.351	25 500	8.2642
5 750	149.97	15 750	41.751	25 750	7.9304
6 000	146.10	16 000	40.197	26 000	7.5983
6 250	142.33	16 250	38.682	26 250	7.2675
6 500	138.59	16 500	37.216	26 500	7.0128
6 750	134.97	16 750	35.783	26 750	6.7596
7 000	131.38	17 000	34.344	27 000	6.5070
7 250	127.91	17 250	32.964	27 250	6.2557
7 500	124.49	17 500	31.623	27 500	6.0052
7 750	121.12	17 750	30.319	27 750	5.7559
8 000	117.88	18 000	29.021	28 000	5.5074
8 250	114.66	18 250	27.795	28 250	5.2601
8 500	111.49	18 500	26.575	28 500	5.0896
8 750	108.37	18 750	25.448	28 750	4.9199
9 000	105.40	19 000	24.385	29 000	4.7506
9 250	102.46	19 250	23.328	29 250	4.5820
9 500	99.568	19 500	22.355	29 500	4.4138
9 750	96.735	19 750	21.387	29 750	4.2463
				30 000	4.0792

TABLE A-8.- REFRACTIVITY FOR EGLIN AFB AUGUST RADIO ATMOSPHERE

h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$
0	367.68	10 000	94.027	20 000	21.288
250	351.27	10 250	91.467	20 250	20.390
500	341.16	10 500	88.979	20 500	19.572
750	338.15	10 750	86.534	20 750	18.758
1 000	329.31	11 000	84.125	21 000	18.015
1 250	312.45	11 250	81.671	21 250	17.276
1 500	295.33	11 500	79.339	21 500	16.540
1 750	283.39	11 750	77.061	21 750	15.898
2 000	272.86	12 000	74.834	22 000	15.258
2 250	261.26	12 250	72.650	22 250	14.621
2 500	250.48	12 500	70.475	22 500	14.072
2 750	242.05	12 750	68.326	22 750	13.523
3 000	234.27	13 000	66.242	23 000	12.977
3 250	226.54	13 250	64.171	23 250	12.432
3 500	218.52	13 500	62.146	23 500	11.964
3 750	210.13	13 750	60.129	23 750	11.498
4 000	201.29	14 000	58.127	24 000	11.033
4 250	192.99	14 250	56.148	24 250	10.571
4 500	185.64	14 500	54.212	24 500	10.178
4 750	179.08	14 750	52.279	24 750	9.7877
5 000	172.90	15 000	50.355	25 000	9.3989
5 250	167.12	15 250	48.447	25 250	9.0119
5 500	161.64	15 500	46.567	25 500	8.6930
5 750	156.41	15 750	44.716	25 750	8.3756
6 000	151.60	16 000	42.896	26 000	8.0594
6 250	147.02	16 250	41.117	26 250	7.7444
6 500	142.57	16 500	39.384	26 500	7.4302
6 750	138.22	16 750	37.701	26 750	7.1176
7 000	133.99	17 000	36.029	27 000	6.8775
7 250	129.95	17 250	34.461	27 250	6.6382
7 500	126.20	17 500	32.967	27 500	6.3996
7 750	122.69	17 750	31.548	27 750	6.1617
8 000	119.27	18 000	30.140	28 000	5.9243
8 250	115.83	18 250	28.839	28 250	5.6879
8 500	112.40	18 500	27.617	28 500	5.4523
8 750	108.89	18 750	26.403	28 750	5.2173
9 000	105.49	19 000	25.292	29 000	5.0520
9 250	102.30	19 250	24.188	29 250	4.8873
9 500	99.392	19 500	23.187	29 500	4.7231
9 750	96.656	19 750	22.191	29 750	4.5595
				30 000	4.3965

TABLE A-9.- REFRACTIVITY FOR EGLIN AFB ANNUAL RADIO ATMOSPHERE

h, m	N·10⁶	h, m	N·10⁶	h, m	N·10⁶
0	344.63	10 000	95.266	20 000	20.768
250	340.26	10 250	92.830	20 250	19.920
500	331.09	10 500	90.285	20 500	19.076
750	316.79	10 750	87.634	20 750	18.238
1 000	302.42	11 000	84.727	21 000	17.504
1 250	289.83	11 250	81.853	21 250	16.774
1 500	278.00	11 500	79.086	21 500	16.114
1 750	266.26	11 750	76.438	21 750	15.458
2 000	255.15	12 000	73.912	22 000	14.806
2 250	244.77	12 250	71.457	22 250	14.235
2 500	235.51	12 500	69.076	22 500	13.667
2 750	227.24	12 750	66.795	22 750	13.100
3 000	219.19	13 000	64.540	23 000	12.537
3 250	210.88	13 250	62.303	23 250	12.063
3 500	202.68	13 500	60.145	23 500	11.570
3 750	195.19	13 750	58.017	23 750	11.120
4 000	188.59	14 000	55.937	24 000	10.652
4 250	182.49	14 250	53.912	24 250	10.258
4 500	176.71	14 500	51.975	24 500	9.8662
4 750	171.30	14 750	50.075	24 750	9.4761
5 000	166.29	15 000	48.222	25 000	9.0875
5 250	161.80	15 250	46.424	25 250	8.7637
5 500	157.26	15 500	44.673	25 500	8.4415
5 750	152.49	15 750	42.961	25 750	8.1201
6 000	147.39	16 000	41.291	26 000	7.8000
6 250	142.55	16 250	39.662	26 250	7.4815
6 500	138.21	16 500	38.030	26 500	7.1638
6 750	134.26	16 750	36.481	26 750	6.9189
7 000	130.77	17 000	34.981	27 000	6.6749
7 250	127.33	17 250	33.534	27 250	6.4321
7 500	123.97	17 500	32.139	27 500	6.1898
7 750	120.79	17 750	30.750	27 750	5.9484
8 000	117.64	18 000	29.445	28 000	5.7079
8 250	114.54	18 250	28.147	28 250	5.4683
8 500	111.49	18 500	26.953	28 500	5.2297
8 750	108.47	18 750	25.824	28 750	5.0634
9 000	105.53	19 000	24.700	29 000	4.8978
9 250	102.72	19 250	23.667	29 250	4.7328
9 500	100.03	19 500	22.638	29 500	4.5683
9 750	97.628	19 750	21.700	29 750	4.4044
				30 000	4.2409

TABLE A-10.- REFRACTIVITY FOR ASCENSION FEBRUARY RADIO ATMOSPHERE

h, m	N·10⁶	h, m	N·10⁶	h, m	N·10⁶
0	368.20	10 000	94.233	20 000	21.312
250	353.11	10 250	91.598	20 250	20.373
500	337.76	10 500	89.044	20 500	19.444
750	323.08	10 750	86.559	20 750	18.610
1 000	310.52	11 000	84.143	21 000	17.784
1 250	301.81	11 250	81.796	21 250	16.964
1 500	288.26	11 500	79.410	21 500	16.255
1 750	264.16	11 750	77.165	21 750	15.550
2 000	243.46	12 000	74.970	22 000	14.852
2 250	232.11	12 250	72.823	22 250	14.247
2 500	226.37	12 500	70.678	22 500	13.646
2 750	221.55	12 750	68.575	22 750	13.049
3 000	217.07	13 000	66.520	23 000	12.532
3 250	212.33	13 250	64.477	23 250	12.018
3 500	206.96	13 500	62.476	23 500	11.507
3 750	200.84	13 750	60.475	23 750	10.999
4 000	194.22	14 000	58.506	24 000	10.575
4 250	187.04	14 250	56.585	24 250	10.154
4 500	179.34	14 500	54.671	24 500	9.7353
4 750	171.80	14 750	52.792	24 750	9.3191
5 000	165.12	15 000	50.952	25 000	8.9739
5 250	159.33	15 250	49.154	25 250	8.6307
5 500	154.54	15 500	47.413	25 500	8.2898
5 750	150.15	15 750	45.692	25 750	7.9504
6 000	145.89	16 000	43.978	26 000	7.6128
6 250	141.87	16 250	42.271	26 250	7.2775
6 500	137.96	16 500	40.574	26 500	7.0206
6 750	134.27	16 750	38.910	26 750	6.7650
7 000	130.65	17 000	37.267	27 000	6.5107
7 250	127.15	17 250	35.650	27 250	6.2577
7 500	123.70	17 500	34.039	27 500	6.0061
7 750	120.25	17 750	32.499	27 750	5.7557
8 000	116.99	18 000	31.016	28 000	5.5068
8 250	113.84	18 250	29.612	28 250	5.2589
8 500	110.81	18 500	28.221	28 500	5.0890
8 750	107.95	18 750	26.944	28 750	4.9201
9 000	105.15	19 000	25.678	29 000	4.7515
9 250	102.42	19 250	24.528	29 250	4.5838
9 500	99.674	19 500	23.388	29 500	4.4167
9 750	96.932	19 750	22.346	29 750	4.2501
				30 000	4.0842

TABLE A-11.- REFRACTIVITY FOR ASCENSION SEPTEMBER RADIO ATMOSPHERE

h, m	N·10^6	h, m	N·10^6	h, m	N·10^6
0	352.17	10 000	94.422	20 000	21.044
250	339.45	10 250	91.790	20 250	20.176
500	327.70	10 500	89.223	20 500	19.314
750	315.85	10 750	86.722	20 750	18.457
1 000	305.96	11 000	84.299	21 000	17.715
1 250	298.98	11 250	81.924	21 250	16.976
1 500	287.21	11 500	79.521	21 500	16.310
1 750	262.76	11 750	77.241	21 750	15.647
2 000	239.23	12 000	75.005	22 000	14.987
2 250	228.44	12 250	72.821	22 250	14.402
2 500	224.07	12 500	70.633	22 500	13.821
2 750	218.92	12 750	68.501	22 750	13.243
3 000	213.47	13 000	66.386	23 000	12.668
3 250	208.05	13 250	64.303	23 250	12.181
3 500	202.10	13 500	62.305	23 500	11.698
3 750	195.09	13 750	60.297	23 750	11.216
4 000	186.73	14 000	58.291	24 000	10.738
4 250	179.18	14 250	56.249	24 250	10.338
4 500	172.98	14 500	54.224	24 500	9.9397
4 750	167.79	14 750	52.238	24 750	9.5440
5 000	163.07	15 000	50.334	25 000	9.1496
5 250	158.49	15 250	48.507	25 250	8.7570
5 500	154.17	15 500	46.826	25 500	8.4415
5 750	150.00	15 750	45.166	25 750	8.1274
6 000	145.89	16 000	43.495	26 000	7.8147
6 250	141.94	16 250	41.804	26 250	7.5033
6 500	138.07	16 500	40.099	26 500	7.1930
6 750	134.38	16 750	38.396	26 750	6.9491
7 000	130.77	17 000	36.716	27 000	6.7063
7 250	127.25	17 250	35.075	27 250	6.4640
7 500	123.76	17 500	33.445	27 500	6.2226
7 750	120.23	17 750	31.901	27 750	5.9820
8 000	116.88	18 000	30.435	28 000	5.7423
8 250	113.67	18 250	28.985	28 250	5.5034
8 500	110.61	18 500	27.657	28 500	5.2652
8 750	107.81	18 750	26.419	28 750	5.0989
9 000	105.10	19 000	25.195	29 000	4.9333
9 250	102.46	19 250	24.089	29 250	4.7679
9 500	99.795	19 500	22.993	29 500	4.6030
9 750	97.099	19 750	22.014	29 750	4.4386
				30 000	4.2748

TABLE A-12.- REFRACTIVITY FOR ASCENSION ANNUAL RADIO ATMOSPHERE

h, m	N·10⁶	h, m	N·10⁶	h, m	N·10⁶
0	358.52	10 000	94.344	20 000	21.208
250	344.34	10 250	91.737	20 250	20.295
500	332.18	10 500	89.167	20 500	19.390
750	320.12	10 750	86.642	20 750	18.566
1 000	309.49	11 000	84.103	21 000	17.749
1 250	300.73	11 250	81.619	21 250	16.940
1 500	288.41	11 500	79.110	21 500	16.231
1 750	267.86	11 750	76.781	21 750	15.530
2 000	248.57	12 000	74.564	22 000	14.835
2 250	235.73	12 250	72.435	22 250	14.248
2 500	227.68	12 500	70.355	22 500	13.665
2 750	221.05	12 750	68.310	22 750	13.085
3 000	214.89	13 000	66.337	23 000	12.585
3 250	208.59	13 250	64.361	23 250	12.088
3 500	201.76	13 500	62.411	23 500	11.593
3 750	194.29	13 750	60.451	23 750	11.100
4 000	186.03	14 000	58.475	24 000	10.681
4 250	178.68	14 250	56.484	24 250	10.264
4 500	172.76	14 500	54.493	24 500	9.8490
4 750	167.79	14 750	52.547	24 750	9.4363
5 000	163.17	15 000	50.661	25 000	9.0262
5 250	158.60	15 250	48.848	25 250	8.6965
5 500	154.20	15 500	47.140	25 500	8.3685
5 750	149.96	15 750	45.475	25 750	8.0422
6 000	145.83	16 000	43.811	26 000	7.7176
6 250	141.88	16 250	42.145	26 250	7.3947
6 500	138.01	16 500	40.473	26 500	7.0735
6 750	134.31	16 750	38.814	26 750	6.8300
7 000	130.68	17 000	37.170	27 000	6.5875
7 250	127.17	17 250	35.549	27 250	6.3457
7 500	123.71	17 500	33.936	27 500	6.1052
7 750	120.25	17 750	32.386	27 750	5.8655
8 000	116.99	18 000	30.901	28 000	5.6271
8 250	113.82	18 250	29.428	28 250	5.3896
8 500	110.78	18 500	28.067	28 500	5.1528
8 750	107.91	18 750	26.791	28 750	4.9890
9 000	105.11	19 000	25.528	29 000	4.8257
9 250	102.39	19 250	24.380	29 250	4.6632
9 500	99.672	19 500	23.242	29 500	4.5010
9 750	96.988	19 750	22.220	29 750	4.3394
				30 000	4.1784

TABLE A-13.- REFRACTIVITY FOR KWAJALEIN MAY RADIO ATMOSPHERE

h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$
0	384.18	10 000	93.394	20 000	21.244
250	365.11	10 250	N/A	20 250	20.290
500	347.65	10 500	88.437	20 500	19.417
750	332.56	10 750	86.039	20 750	18.551
1 000	319.22	11 000	83.696	21 000	17.772
1 250	305.59	11 250	81.415	21 250	17.007
1 500	292.32	11 500	79.179	21 500	16.270
1 750	280.78	11 750	76.992	21 750	15.601
2 000	270.37	12 000	74.839	22 000	14.937
2 250	260.97	12 250	72.723	22 250	14.301
2 500	250.75	12 500	70.637	22 500	13.725
2 750	240.90	12 750	68.604	22 750	13.153
3 000	231.26	13 000	66.599	23 000	12.584
3 250	220.74	13 250	64.628	23 250	12.090
3 500	213.57	13 500	62.676	23 500	11.608
3 750	207.16	13 750	60.758	23 750	11.127
4 000	201.02	14 000	58.877	24 000	10.650
4 250	194.76	14 250	57.027	24 250	10.243
4 500	188.81	14 500	55.186	24 500	9.8445
4 750	182.42	14 750	53.398	24 750	9.4481
5 000	176.07	15 000	51.629	25 000	9.0540
5 250	169.95	15 250	49.856	25 250	8.6704
5 500	164.28	15 500	48.105	25 500	8.3334
5 750	158.92	15 750	46.383	25 750	8.0000
6 000	153.57	16 000	44.658	26 000	7.6701
6 250	148.52	16 250	42.926	26 250	7.3433
6 500	143.58	16 500	41.195	26 500	7.0203
6 750	139.57	16 750	39.468	26 750	6.7207
7 000	135.35	17 000	37.748	27 000	6.5025
7 250	132.50	17 250	36.049	27 250	6.2847
7 500	127.89	17 500	34.396	27 500	6.0671
7 750	122.55	17 750	32.805	27 750	5.8493
8 000	118.82	18 000	31.257	28 000	5.6318
8 250	115.11	18 250	29.739	28 250	5.4142
8 500	111.70	18 500	28.306	28 500	5.1970
8 750	108.34	18 750	26.926	28 750	5.0012
9 000	104.89	19 000	25.649	29 000	4.8405
9 250	101.69	19 250	24.427	29 250	4.6806
9 500	98.723	19 500	23.301	29 500	4.5214
9 750	95.961	19 750	22.231	29 750	4.3627
				30 000	4.2045

TABLE A-14.- REFRACTIVITY FOR KWAJALEIN DECEMBER RADIO ATMOSPHERE

h, m	N·10[6]	h, m	N·10[6]	h, m	N·10[6]
0	369.48	10 000	93.280	20 000	21.247
250	356.50	10 250	90.780	20 250	20.283
500	343.41	10 500	88.329	20 500	19.388
750	329.81	10 750	85.935	20 750	18.511
1 000	316.67	11 000	83.600	21 000	17.730
1 250	303.86	11 250	81.308	21 250	16.956
1 500	291.46	11 500	79.063	21 500	16.230
1 750	282.02	11 750	76.867	21 750	15.554
2 000	273.13	12 000	74.714	22 000	14.881
2 250	262.05	12 250	72.597	22 250	14.258
2 500	251.13	12 500	70.515	22 500	13.676
2 750	240.84	12 750	68.494	22 750	13.098
3 000	232.65	13 000	66.502	23 000	12.536
3 250	225.02	13 250	64.554	23 250	12.045
3 500	215.65	13 500	62.631	23 500	11.557
3 750	207.62	13 750	60.741	23 750	11.071
4 000	197.86	14 000	58.884	24 000	10.604
4 250	189.61	14 250	57.057	24 250	10.201
4 500	180.84	14 500	55.219	24 500	9.7999
4 750	174.48	14 750	53.454	24 750	9.4009
5 000	168.51	15 000	51.722	25 000	9.0040
5 250	163.40	15 250	49.997	25 250	8.6437
5 500	158.07	15 500	48.297	25 500	8.3239
5 750	153.05	15 750	46.656	25 750	8.0052
6 000	148.10	16 000	45.016	26 000	7.6881
6 250	143.66	16 250	43.358	26 250	7.3729
6 500	139.38	16 500	41.679	26 500	7.0589
6 750	135.72	16 750	39.982	26 750	6.7906
7 000	132.04	17 000	38.291	27 000	6.5515
7 250	129.19	17 250	36.583	27 250	6.3133
7 500	125.21	17 500	34.897	27 500	6.0762
7 750	120.81	17 750	33.278	27 750	5.8400
8 000	117.41	18 000	31.681	28 000	5.6048
8 250	114.02	18 250	30.064	28 250	5.3706
8 500	110.84	18 500	28.553	28 500	5.1376
8 750	107.69	18 750	27.108	28 750	4.9680
9 000	104.47	19 000	25.778	29 000	4.8045
9 250	101.42	19 250	24.525	29 250	4.6413
9 500	98.545	19 500	23.357	29 500	4.4790
9 750	95.835	19 750	22.269	29 750	4.3172
				30 000	4.1561

TABLE A-15.- REFRACTIVITY FOR KWAJALEIN ANNUAL RADIO ATMOSPHERE

h, m	N·10^6	h, m	N·10^6	h, m	N·10^6
0.	371.43	10 000	93.934	20 000	21.264
250	357.15	10 250	91.215	20 250	20.313
500	344.43	10 500	88.616	20 500	19.444
750	331.36	10 750	86.118	20 750	18.582
1 000	318.38	11 000	83.700	21 000	17.806
1 250	306.21	11 250	81.416	21 250	17.047
1 500	294.59	11 500	N/A	21 500	16.312
1 750	283.41	11 750	N/A	21 750	15.646
2 000	272.40	12 000	74.820	22 000	14.983
2 250	261.39	12 250	72.703	22 250	14.347
2 500	249.61	12 500	70.616	22 500	13.771
2 750	238.24	12 750	68.581	22 750	13.199
3 000	230.83	13 000	66.579	23 000	12.631
3 250	221.26	13 250	64.616	23 250	12.135
3 500	213.80	13 500	62.671	23 500	11.650
3 750	209.62	13 750	60.769	23 750	11.169
4 000	200.64	14 000	58.902	24 000	10.690
4 250	193.20	14 250	57.065	24 250	10.284
4 500	183.96	14 500	55.236	24 500	9.8859
4 750	178.92	14 750	53.456	24 750	9.4896
5 000	174.17	15 000	51.688	25 000	9.0953
5 250	170.11	15 250	49.915	25 250	8.7156
5 500	164.65	15 500	48.160	25 500	8.3963
5 750	159.14	15 750	46.432	25 750	8.0787
6 000	153.87	16 000	44.689	26 000	7.7627
6 250	148.67	16 250	42.936	26 250	7.4482
6 500	143.75	16 500	41.183	26 500	7.1353
6 750	138.45	16 750	39.433	26 750	6.8449
7 000	133.91	17 000	37.682	27 000	6.6062
7 250	129.19	17 250	35.959	27 250	6.3688
7 500	125.43	17 500	34.294	27 500	6.1325
7 750	122.11	17 750	32.696	27 750	5.8972
8 000	118.46	18 000	31.152	28 000	5.6626
8 250	115.04	18 250	29.648	28 250	5.4293
8 500	111.66	18 500	28.230	28 500	5.1970
8 750	108.74	18 750	26.866	28 750	5.0052
9 000	105.53	19 000	25.618	29 000	4.8431
9 250	102.60	19 250	24.416	29 250	4.6815
9 500	99.690	19 500	23.306	29 500	4.5204
9 750	96.801	19 750	22.246	29 750	4.3600
				30 000	4.2001

TABLE A-16.- REFRACTIVITY FOR WALLOPS MARCH RADIO ATMOSPHERE

h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$
0	306.80	10 000	92.799	20 000	19.707
250	298.61	10 250	89.696	20 250	18.923
500	290.66	10 500	86.456	20 500	18.139
750	282.83	10 750	83.229	20 750	17.435
1 000	275.06	11 000	80.068	21 000	16.733
1 250	267.52	11 250	77.009	21 250	16.097
1 500	258.66	11 500	74.066	21 500	15.462
1 750	249.27	11 750	71.192	21 750	14.830
2 000	240.47	12 000	68.415	22 000	14.279
2 250	232.83	12 250	65.826	22 250	13.728
2 500	226.10	12 500	63.324	22 500	13.177
2 750	219.86	12 750	60.943	22 750	12.629
3 000	212.99	13 000	58.709	23 000	12.152
3 250	205.80	13 250	56.528	23 250	11.677
3 500	198.84	13 500	54.408	23 500	11.204
3 750	192.51	13 750	52.342	23 750	10.733
4 000	186.63	14 000	50.352	24 000	10.331
4 250	181.12	14 250	48.443	24 250	9.9320
4 500	175.90	14 500	46.660	24 500	9.5345
4 750	170.92	14 750	44.940	24 750	9.1382
5 000	166.11	15 000	43.216	25 000	8.8141
5 250	161.39	15 250	41.616	25 250	8.4914
5 500	156.88	15 500	40.071	25 500	8.1690
5 750	152.54	15 750	38.577	25 750	7.8476
6 000	148.28	16 000	37.136	26 000	7.5271
6 250	144.25	16 250	35.742	26 250	7.2074
6 500	140.36	16 500	34.398	26 500	6.9621
6 750	136.46	16 750	33.051	26 750	6.7174
7 000	132.63	17 000	31.786	27 000	6.4732
7 250	128.82	17 250	30.572	27 250	6.2296
7 500	125.07	17 500	29.359	27 500	5.9866
7 750	121.49	17 750	28.218	27 750	5.7440
8 000	117.96	18 000	27.134	28 000	5.5021
8 250	114.43	18 250	26.050	28 250	5.2606
8 500	111.07	18 500	25.045	28 500	5.0896
8 750	107.78	18 750	24.040	28 750	4.9189
9 000	104.59	19 000	23.115	29 000	4.7492
9 250	101.64	19 250	22.190	29 250	4.5798
9 500	98.755	19 500	21.341	29 500	4.4113
9 750	95.820	19 750	20.492	29 750	4.2432
				30 000	4.0759

TABLE A-17.- REFRACTIVITY FOR WALLOPS JULY RADIO ATMOSPHERE

h, m	N·10^6	h, m	N·10^6	h, m	N·10^6
0	372.34	10 000	93.894	20 000	21.089
250	348.65	10 250	91.327	20 250	20.223
500	329.85	10 500	88.812	20 500	19.424
750	316.79	10 750	86.349	20 750	18.631
1 000	306.56	11 000	83.944	21 000	17.841
1 250	296.56	11 250	81.572	21 250	17.133
1 500	286.86	11 500	79.217	21 500	16.430
1 750	277.42	11 750	76.823	21 750	15.804
2 000	267.48	12 000	74.489	22 000	15.180
2 250	256.92	12 250	72.178	22 250	14.559
2 500	247.07	12 500	69.848	22 500	14.028
2 750	238.42	12 750	67.583	22 750	13.496
3 000	230.12	13 000	65.354	23 000	12.966
3 250	221.63	13 250	63.220	23 250	12.437
3 500	213.08	13 500	61.112	23 500	11.979
3 750	204.87	13 750	59.033	23 750	11.522
4 000	197.24	14 000	56.991	24 000	11.067
4 250	189.88	14 250	54.955	24 250	10.613
4 500	182.54	14 500	52.930	24 500	10.226
4 750	175.56	14 750	50.930	24 750	9.8399
5 000	169.33	15 000	48.956	25 000	9.4561
5 250	163.98	15 250	47.021	25 250	9.0736
5 500	159.07	15 500	45.119	25 500	8.6930
5 750	153.84	15 750	43.275	25 750	8.3920
6 000	148.18	16 000	41.491	26 000	8.0917
6 250	142.60	16 250	39.775	26 250	7.7922
6 500	137.57	16 500	38.125	26 500	7.4933
6 750	133.53	16 750	36.547	26 750	7.1956
7 000	129.80	17 000	35.038	27 000	6.8982
7 250	126.39	17 250	33.537	27 250	6.6693
7 500	123.05	17 500	32.140	27 500	6.4408
7 750	119.84	17 750	30.817	27 750	6.2131
8 000	116.77	18 000	29.500	28 000	5.9857
8 250	113.73	18 250	28.280	28 250	5.7587
8 500	110.72	18 500	27.128	28 500	5.5322
8 750	107.72	18 750	25.981	28 750	5.3064
9 000	104.83	19 000	24.927	29 000	5.0809
9 250	102.00	19 250	23.876	29 250	4.9186
9 500	99.220	19 500	22.916	29 500	4.7572
9 750	96.520	19 750	21.960	29 750	4.5964
				30 000	4.4361

TABLE A-18.- REFRACTIVITY FOR WALLOPS ANNUAL RADIO ATMOSPHERE

h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$
0	324.40	10 000	93.708	20 000	20.265
250	312.77	10 250	90.929	20 250	19.454
500	302.92	10 500	88.185	20 500	18.647
750	294.74	10 750	85.478	20 750	17.929
1 000	286.65	11 000	82.792	21 000	17.213
1 250	277.72	11 250	80.133	21 250	16.500
1 500	269.13	11 500	77.499	21 500	15.872
1 750	261.45	11 750	74.895	21 750	15.245
2 000	252.93	12 000	72.272	22 000	14.620
2 250	242.85	12 250	69.744	22 250	14.067
2 500	233.54	12 500	67.236	22 500	13.516
2 750	225.39	12 750	64.784	22 750	12.966
3 000	217.99	13 000	62.340	23 000	12.418
3 250	211.00	13 250	59.957	23 250	11.955
3 500	204.07	13 500	57.720	23 500	11.492
3 750	196.97	13 750	55.554	23 750	11.031
4 000	190.02	14 000	53.510	24 000	10.571
4 250	183.64	14 250	51.548	24 250	10.185
4 500	178.04	14 500	49.651	24 500	9.8000
4 750	172.68	14 750	47.801	24 750	9.4160
5 000	167.32	15 000	45.996	25 000	9.0334
5 250	162.07	15 250	44.225	25 250	8.7152
5 500	157.14	15 500	42.503	25 500	8.3977
5 750	152.66	15 750	40.834	25 750	8.0815
6 000	148.39	16 000	39.220	26 000	7.7659
6 250	144.38	16 250	37.661	26 250	7.4517
6 500	140.43	16 500	36.146	26 500	7.1384
6 750	136.52	16 750	34.699	26 750	6.8961
7 000	132.70	17 000	33.254	27 000	6.6549
7 250	129.07	17 250	31.926	27 250	6.4141
7 500	125.58	17 500	30.666	27 500	6.1743
7 750	122.17	17 750	29.408	27 750	5.9349
8 000	118.76	18 000	28.287	28 000	5.6965
8 250	115.35	18 250	27.198	28 250	5.4585
8 500	111.91	18 500	26.110	28 500	5.2215
8 750	108.62	18 750	25.070	28 750	5.0555
9 000	105.44	19 000	24.032	29 000	4.8900
9 250	102.35	19 250	23.053	29 250	4.7251
9 500	99.400	19 500	22.080	29 500	4.5606
9 750	96.524	19 750	21.169	29 750	4.3967
				30 000	4.2334

TABLE A-19.- REFRACTIVITY FOR CAPE CANAVERAL JANUARY RADIO ATMOSPHERE

h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$
0	349.76	10 000	94.321	20 000	20.641
250	335.33	10 250	91.643	20 250	19.761
500	318.47	10 500	89.009	20 500	18.890
750	306.33	10 750	86.520	20 750	18.102
1 000	296.43	11 000	83.980	21 000	17.321
1 250	287.36	11 250	81.525	21 250	16.546
1 500	276.39	11 500	78.991	21 500	15.878
1 750	262.40	11 750	76.400	21 750	15.213
2 000	248.70	12 000	73.784	22 000	14.552
2 250	236.99	12 250	71.105	22 250	13.984
2 500	225.15	12 500	68.463	22 500	13.417
2 750	212.37	12 750	66.043	22 750	12.853
3 000	201.39	13 000	63.736	23 000	12.361
3 250	193.98	13 250	61.712	23 250	11.871
3 500	188.91	13 500	59.711	23 500	11.384
3 750	184.09	13 750	57.720	23 750	10.897
4 000	179.42	14 000	55.707	24 000	10.489
4 250	174.80	14 250	53.686	24 250	10.082
4 500	170.37	14 500	51.701	24 500	9.6765
4 750	166.05	14 750	49.772	24 750	9.2727
5 000	161.83	15 000	47.914	25 000	8.8710
5 250	157.69	15 250	46.137	25 250	8.5479
5 500	153.61	15 500	44.424	25 500	8.2261
5 750	149.68	15 750	42.773	25 750	7.9056
6 000	145.86	16 000	41.172	26 000	7.5868
6 250	142.09	16 250	39.617	26 250	7.2689
6 500	138.44	16 500	38.120	26 500	7.0178
6 750	134.81	16 750	36.614	26 750	6.7674
7 000	131.29	17 000	35.175	27 000	6.5182
7 250	127.81	17 250	33.760	27 250	6.2699
7 500	124.45	17 500	32.373	27 500	6.0222
7 750	121.13	17 750	30.986	27 750	5.7757
8 000	117.87	18 000	29.657	28 000	5.5301
8 250	114.73	18 250	28.379	28 250	5.2851
8 500	111.64	18 500	27.108	28 500	5.1163
8 750	108.60	18 750	25.921	28 750	4.9477
9 000	105.62	19 000	24.743	29 000	4.7795
9 250	102.71	19 250	23.661	29 250	4.6121
9 500	99.857	19 500	22.646	29 500	4.4448
9 750	97.032	19 750	21.639	29 750	4.2780
				30 000	4.1116

TABLE A-20.- REFRACTIVITY FOR CAP CANAVERAL AUGUST RADIO ATMOSPHERE

h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$
0	399.42	10 000	93.940	20 000	21.281
250	373.95	10 250	91.381	20 250	20.368
500	355.84	10 500	88.883	20 500	19.540
750	339.52	10 750	86.447	20 750	18.718
1 000	324.12	11 000	84.072	21 000	17.975
1 250	308.60	11 250	81.655	21 250	17.236
1 500	295.35	11 500	79.374	21 500	16.500
1 750	284.98	11 750	77.134	21 750	15.854
2 000	274.65	12 000	74.930	22 000	15.210
2 250	262.98	12 250	72.757	22 250	14.570
2 500	251.73	12 500	70.589	22 500	14.009
2 750	242.23	12 750	68.435	22 750	13.451
3 000	233.74	13 000	66.345	23 000	12.895
3 250	226.16	13 250	64.268	23 250	12.412
3 500	218.80	13 500	62.242	23 500	11.931
3 750	210.94	13 750	60.221	23 750	11.452
4 000	202.04	14 000	58.221	24 000	10.974
4 250	193.91	14 250	56.245	24 250	10.573
4 500	187.33	14 500	54.322	24 500	10.172
4 750	181.65	14 750	52.395	24 750	9.7739
5 000	176.02	15 000	50.477	25 000	9.3764
5 250	169.92	15 250	48.570	25 250	8.9809
5 500	163.84	15 500	46.690	25 500	8.6609
5 750	158.16	15 750	44.833	25 750	8.3425
6 000	153.36	16 000	43.007	26 000	8.0249
6 250	148.90	16 250	41.220	26 250	7.7084
6 500	144.45	16 500	39.480	26 500	7.3935
6 750	139.83	16 750	37.789	26 750	7.0793
7 000	135.24	17 000	36.163	27 000	6.8382
7 250	130.78	17 250	34.544	27 250	6.5977
7 500	126.59	17 500	33.039	27 500	6.3580
7 750	122.67	17 750	31.612	27 750	6.1194
8 000	118.94	18 000	30.196	28 000	5.8814
8 250	115.36	18 250	28.900	28 250	5.6442
8 500	111.89	18 500	27.676	28 500	5.4081
8 750	108.48	18 750	26.459	28 750	5.1726
9 000	105.23	19 000	25.339	29 000	5.0091
9 250	102.61	19 250	24.225	29 250	4.8461
9 500	99.320	19 500	23.210	29 500	4.6836
9 750	96.594	19 750	22.201	29 750	4.5215
				30 000	4.3600

TABLE A-21.- REFRACTIVITY FOR CAPE CANAVERAL ANNUAL RADIO ATMOSPHERE

h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$
0	376.07	10 000	94.206	20 000	20.822
250	354.09	10 250	91.553	20 250	19.961
500	338.07	10 500	88.954	20 500	19.105
750	324.29	10 750	86.403	20 750	18.255
1 000	311.43	11 000	83.893	21 000	17.514
1 250	298.35	11 250	81.427	21 250	16.777
1 500	285.92	11 500	79.008	21 500	16.112
1 750	274.92	11 750	76.631	21 750	15.451
2 000	262.91	12 000	74.296	22 000	14.792
2 250	249.27	12 250	71.929	22 250	14.216
2 500	237.30	12 500	69.656	22 500	13.642
2 750	228.13	12 750	67.398	22 750	13.071
3 000	220.23	13 000	65.196	23 000	12.503
3 250	212.56	13 250	63.006	23 250	12.027
3 500	204.69	13 500	60.850	23 500	11.554
3 750	196.62	13 750	58.757	23 750	11.083
4 000	188.16	14 000	56.688	24 000	10.614
4 250	181.02	14 250	54.649	24 250	10.221
4 500	175.59	14 500	52.658	24 500	9.8296
4 750	171.12	14 750	50.749	24 750	9.4394
5 000	166.81	15 000	48.872	25 000	9.0512
5 250	162.51	15 250	47.045	25 250	8.7273
5 500	157.90	15 500	45.261	25 500	8.4047
5 750	152.94	15 750	43.519	25 750	8.0831
6 000	147.67	16 000	41.820	26 000	7.7630
6 250	142.57	16 250	40.160	26 250	7.4443
6 500	138.08	16 500	38.498	26 500	7.1267
6 750	134.02	16 750	36.924	26 750	6.8819
7 000	130.50	17 000	35.396	27 000	6.6384
7 250	127.11	17 250	33.916	27 250	6.3957
7 500	123.76	17 500	32.438	27 500	6.1540
7 750	120.55	17 750	31.048	27 750	5.9131
8 000	117.37	18 000	29.711	28 000	5.6731
8 250	114.25	18 250	28.383	28 250	5.4338
8 500	111.20	18 500	27.152	28 500	5.1956
8 750	108.26	18 750	25.991	28 750	5.0306
9 000	105.34	19 000	24.839	29 000	4.8659
9 250	102.48	19 250	23.780	29 250	4.7020
9 500	99.666	19 500	22.728	29 500	4.5385
9 750	96.907	19 750	21.772	29 750	4.3754
				30 000	4.2129

TABLE A-22.- REFRACTIVITY FOR HAWAII FEBRUARY RADIO ATMOSPHERE

h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$
0	344.07	10 000	93.253	20 000	20.919
250	332.46	10 250	90.461	20 250	20.008
500	321.50	10 500	87.737	20 500	19.105
750	310.01	10 750	85.093	20 750	18.303
1 000	299.13	11 000	82.526	21 000	17.507
1 250	289.36	11 250	80.028	21 250	16.718
1 500	279.42	11 500	77.595	21 500	16.039
1 750	268.79	11 750	75.237	21 750	15.364
2 000	256.37	12 000	72.948	22 000	14.693
2 250	240.97	12 250	70.625	22 250	14.111
2 500	226.42	12 500	68.439	22 500	13.533
2 750	213.98	12 750	66.284	22 750	12.957
3 000	204.31	13 000	64.215	23 000	12.457
3 250	197.56	13 250	62.171	23 250	11.961
3 500	192.55	13 500	60.167	23 500	11.466
3 750	187.51	13 750	58.243	23 750	10.974
4 000	182.41	14 000	56.340	24 000	10.561
4 250	177.43	14 250	54.459	24 250	10.151
4 500	172.59	14 500	52.618	24 500	9.7429
4 750	167.98	14 750	50.826	24 750	9.3363
5 000	163.49	15 000	49.111	25 000	8.9310
5 250	159.07	15 250	47.416	25 250	8.6063
5 500	154.74	15 500	45.748	25 500	8.2833
5 750	150.59	15 750	44.114	25 750	7.9611
6 000	146.62	16 000	42.509	26 000	7.6404
6 250	142.69	16 250	40.890	26 250	7.3209
6 500	138.88	16 500	39.338	26 500	7.0030
6 750	135.07	16 750	37.835	26 750	6.7612
7 000	131.42	17 000	36.337	27 000	6.5203
7 250	127.85	17 250	34.848	27 250	6.2801
7 500	124.47	17 500	33.376	27 500	6.0408
7 750	121.14	17 750	31.907	27 750	5.8022
8 000	117.85	18 000	30.486	28 000	5.5645
8 250	114.61	18 250	29.120	28 250	5.3275
8 500	111.46	18 500	27.765	28 500	5.1567
8 750	108.31	18 750	26.498	28 750	4.9865
9 000	105.20	19 000	25.243	29 000	4.8167
9 250	102.13	19 250	24.096	29 250	4.6476
9 500	99.111	19 500	22.961	29 500	4.4789
9 750	96.145	19 750	21.934	29 750	4.3108
				30 000	4.1432

TABLE A-23.- REFRACTIVITY FOR HAWAII JULY RADIO ATMOSPHERE

h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$
0	361.17	10 000	94.573	20 000	21.129
250	345.61	10 250	91.861	20 250	20.223
500	333.65	10 500	89.244	20 500	19.397
750	321.09	10 750	86.714	20 750	18.576
1 000	309.43	11 000	84.247	21 000	17.834
1 250	298.58	11 250	81.854	21 250	17.097
1 500	287.76	11 500	79.504	21 500	16.363
1 750	277.15	11 750	77.114	21 750	15.721
2 000	263.75	12 000	74.830	22 000	15.082
2 250	247.29	12 250	72.578	22 250	14.447
2 500	232.33	12 500	70.334	22 500	13.891
2 750	221.42	12 750	68.128	22 750	13.337
3 000	212.42	13 000	65.922	23 000	12.786
3 250	203.49	13 250	63.748	23 250	12.305
3 500	194.80	13 500	61.580	23 500	11.826
3 750	187.39	13 750	59.431	23 750	11.350
4 000	181.65	14 000	57.340	24 000	10.875
4 250	176.66	14 250	55.259	24 250	10.476
4 500	172.00	14 500	53.212	24 500	10.078
4 750	167.51	14 750	51.215	24 750	9.6818
5 000	163.13	15 000	49.273	25 000	9.2875
5 250	158.78	15 250	47.387	25 250	8.8944
5 500	154.56	15 500	45.569	25 500	8.5772
5 750	150.45	15 750	43.800	25 750	8.2612
6 000	146.39	16 000	42.075	26 000	7.9465
6 250	142.50	16 250	40.396	26 250	7.6331
6 500	138.67	16 500	38.762	26 500	7.3211
6 750	135.04	16 750	37.184	26 750	7.0101
7 000	131.46	17 000	35.655	27 000	6.7728
7 250	128.00	17 250	34.129	27 250	6.5366
7 500	124.57	17 500	32.688	27 500	6.3008
7 750	121.16	17 750	31.305	27 750	6.0660
8 000	117.92	18 000	29.984	28 000	5.8320
8 250	114.75	18 250	28.669	28 250	5.5984
8 500	111.69	18 500	27.451	28 500	5.3658
8 750	108.77	18 750	26.240	28 750	5.1337
9 000	105.92	19 000	25.135	29 000	4.9709
9 250	103.06	19 250	24.037	29 250	4.8087
9 500	100.22	19 500	23.036	29 500	4.6472
9 750	97.367	19 750	22.041	29 750	4.4860
				30 000	4.3253

TABLE A-24.- REFRACTIVITY FOR HAWAII ANNUAL RADIO ATMOSPHERE

h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$
0	352.67	10 000	94.496	20 000	20.923
250	339.91	10 250	91.775	20 250	20.048
500	329.05	10 500	89.103	20 500	19.180
750	317.55	10 750	86.505	20 750	18.318
1 000	305.99	11 000	83.983	21 000	17.569
1 250	294.86	11 250	81.529	21 250	16.826
1 500	283.46	11 500	79.127	21 500	16.155
1 750	271.05	11 750	76.781	21 750	15.487
2 000	258.38	12 000	74.395	22 000	14.825
2 250	245.81	12 250	72.124	22 250	14.245
2 500	232.44	12 500	69.876	22 500	13.668
2 750	218.47	12 750	67.691	22 750	13.095
3 000	206.50	13 000	65.520	23 000	12.524
3 250	198.11	13 250	63.424	23 250	12.047
3 500	192.35	13 500	61.341	23 500	11.571
3 750	187.35	13 750	59.273	23 750	11.098
4 000	182.28	14 000	57.239	24 000	10.626
4 250	177.38	14 250	55.099	24 250	10.232
4 500	172.59	14 500	53.014	24 500	9.8393
4 750	167.95	14 750	51.067	24 750	9.4485
5 000	163.44	15 000	49.296	25 000	9.0594
5 250	159.07	15 250	47.684	25 250	8.7367
5 500	154.77	15 500	46.539	25 500	8.4151
5 750	150.63	15 750	45.308	25 750	8.0944
6 000	146.52	16 000	43.884	26 000	7.7754
6 250	142.59	16 250	42.263	26 250	7.4576
6 500	138.82	16 500	40.482	26 500	7.1409
6 750	135.24	16 750	38.467	26 750	6.8975
7 000	131.76	17 000	36.533	27 000	6.6545
7 250	128.17	17 250	34.742	27 250	6.4127
7 500	124.49	17 500	32.978	27 500	6.1718
7 750	120.37	17 750	31.440	27 750	5.9314
8 000	116.44	18 000	30.040	28 000	5.6921
8 250	112.84	18 250	28.651	28 250	5.4536
8 500	109.62	18 500	27.393	28 500	5.2158
8 750	107.25	18 750	26.205	28 750	5.0503
9 000	104.86	19 000	25.027	29 000	4.8853
9 250	102.42	19 250	23.942	29 250	4.7207
9 500	99.922	19 500	22.866	29 500	4.5567
9 750	97.229	19 750	21.891	29 750	4.3931
				30 000	4.2302

TABLE A-25.- REFRACTIVITY FOR POINT ARGUELLO JULY RADIO ATMOSPHERE

h, m	N·10^6	h, m	N·10^6	h, m	N·10^6
0	340.70	10 000	94.173	20 000	21.189
250	326.90	10 250	91.435	20 250	20.298
500	308.83	10 500	88.787	20 500	19.493
750	284.76	10 750	86.217	20 750	18.693
1 000	259.66	11 000	83.709	21 000	17.896
1 250	250.29	11 250	81.262	21 250	17.205
1 500	244.32	11 500	78.865	21 500	16.518
1 750	237.05	11 750	76.435	21 750	15.885
2 000	230.09	12 000	74.111	22 000	15.256
2 250	223.73	12 250	71.844	22 250	14.629
2 500	218.01	12 500	69.589	22 500	14.064
2 750	212.64	12 750	67.402	22 750	13.501
3 000	207.22	13 000	65.234	23 000	12.942
3 250	201.53	13 250	63.103	23 250	12.386
3 500	195.71	13 500	61.031	23 500	11.930
3 750	190.02	13 750	58.992	23 750	11.474
4 000	184.61	14 000	56.997	24 000	11.020
4 250	179.38	14 250	55.108	24 250	10.568
4 500	174.28	14 500	53.239	24 500	10.191
4 750	169.32	14 750	51.380	24 750	9.8161
5 000	164.57	15 000	49.526	25 000	9.4412
5 250	159.99	15 250	47.676	25 250	9.0672
5 500	155.65	15 500	45.807	25 500	8.6944
5 750	151.43	15 750	43.969	25 750	8.3822
6 000	147.26	16 000	42.186	26 000	8.0712
6 250	143.24	16 250	40.463	26 250	7.7621
6 500	139.30	16 500	38.808	26 500	7.4546
6 750	135.50	16 750	37.236	26 750	7.1486
7 000	131.85	17 000	35.667	27 000	6.8440
7 250	128.30	17 250	34.198	27 250	6.6082
7 500	124.81	17 500	32.772	27 500	6.3733
7 750	121.37	17 750	31.398	27 750	6.1397
8 000	118.10	18 000	30.031	28 000	5.9073
8 250	114.90	18 250	28.732	28 250	5.6762
8 500	111.77	18 500	27.506	28 500	5.4465
8 750	108.75	18 750	26.292	28 750	5.2179
9 000	105.79	19 000	25.179	29 000	5.0573
9 250	102.83	19 250	24.075	29 250	4.8970
9 500	99.900	19 500	23.077	29 500	4.7373
9 750	97.003	19 750	22.086	29 750	4.5781
				30 000	4.4191

TABLE A-26.- REFRACTIVITY FOR POINT ARGUELLO DECEMBER RADIO ATMOSPHERE

h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$
0	316.84	10 000	95.462	20 000	20.394
250	309.16	10 250	92.723	20 250	19.570
500	293.83	10 500	89.909	20 500	18.745
750	277.74	10 750	86.953	20 750	17.998
1 000	265.14	11 000	83.989	21 000	17.253
1 250	257.27	11 250	81.071	21 250	16.570
1 500	249.43	11 500	78.218	21 500	15.890
1 750	239.51	11 750	75.444	21 750	15.213
2 000	230.73	12 000	72.652	22 000	14.609
2 250	224.54	12 250	70.048	22 250	14.007
2 500	218.73	12 500	67.459	22 500	13.410
2 750	212.83	12 750	64.928	22 750	12.815
3 000	206.95	13 000	62.404	23 000	12.331
3 250	201.17	13 250	59.989	23 250	11.848
3 500	195.60	13 500	57.653	23 500	11.367
3 750	190.37	13 750	55.417	23 750	10.886
4 000	185.37	14 000	53.303	24 000	10.490
4 250	180.45	14 250	51.333	24 250	10.094
4 500	175.52	14 500	49.416	24 500	9.6990
4 750	170.63	14 750	47.560	24 750	9.3043
5 000	165.90	15 000	45.768	25 000	8.9663
5 250	161.34	15 250	44.036	25 250	8.6289
5 500	156.94	15 500	42.364	25 500	8.2931
5 750	152.63	15 750	40.747	25 750	7.9583
6 000	148.53	16 000	39.127	26 000	7.6246
6 250	144.53	16 250	37.608	26 250	7.2920
6 500	140.57	16 500	36.153	26 500	7.0337
6 750	136.70	16 750	34.745	26 750	6.7761
7 000	132.94	17 000	33.384	27 000	6.5196
7 250	129.41	17 250	32.023	27 250	6.2642
7 500	126.02	17 500	30.740	27 500	6.0100
7 750	122.69	17 750	29.491	27 750	5.7568
8 000	119.41	18 000	28.248	28 000	5.5046
8 250	116.12	18 250	27.101	28 250	5.2538
8 500	112.77	18 500	25.957	28 500	5.0838
8 750	109.51	18 750	24.926	28 750	4.9144
9 000	106.47	19 000	23.959	29 000	4.7453
9 250	103.53	19 250	22.992	29 250	4.5767
9 500	100.81	19 500	22.106	29 500	4.4084
9 750	98.143	19 750	21.220	29 750	4.2407
				30 000	4.0734

TABLE A-27.- REFRACTIVITY FOR POINT ARGUELLO ANNUAL RADIO ATMOSPHERE

h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$
0	331.51	10 000	94.178	20 000	20.451
250	322.29	10 250	91.411	20 250	19.640
500	308.14	10 500	88.678	20 500	18.832
750	285.65	10 750	85.954	20 750	18.100
1 000	265.43	11 000	83.238	21 000	17.370
1 250	254.58	11 250	80.553	21 250	16.643
1 500	246.18	11 500	77.839	21 500	15.992
1 750	237.88	11 750	74.955	21 750	15.344
2 000	230.29	12 000	72.631	22 000	14.698
2 250	223.84	12 250	70.087	22 250	14.121
2 500	217.68	12 500	67.615	22 500	13.546
2 750	211.69	12 750	65.168	22 750	12.975
3 000	205.87	13 000	62.784	23 000	12.407
3 250	200.24	13 250	60.444	23 250	11.945
3 500	194.73	13 500	58.180	23 500	11.483
3 750	189.31	13 750	56.061	23 750	11.023
4 000	184.06	14 000	54.019	24 000	10.565
4 250	179.00	14 250	52.053	24 250	10.185
4 500	174.19	14 500	50.153	24 500	9.8049
4 750	169.46	14 750	48.313	24 750	9.4262
5 000	164.87	15 000	46.524	25 000	9.0481
5 250	160.33	15 250	44.784	25 250	8.7239
5 500	155.95	15 500	43.089	25 500	8.4007
5 750	151.65	15 750	41.439	25 750	8.0792
6 000	147.55	16 000	39.836	26 000	7.7585
6 250	143.59	16 250	38.279	26 250	7.4392
6 500	139.70	16 500	36.773	26 500	7.1214
6 750	135.93	16 750	35.267	26 750	6.8737
7 000	132.24	17 000	33.851	27 000	6.6270
7 250	128.67	17 250	32.487	27 250	6.3814
7 500	125.29	17 500	31.175	27 500	6.1372
7 750	121.96	17 750	29.868	27 750	5.8941
8 000	118.72	18 000	28.643	28 000	5.6522
8 250	115.47	18 250	27.481	28 250	5.4114
8 500	112.22	18 500	26.323	28 500	5.1718
8 750	108.99	18 750	25.251	28 750	5.0085
9 000	105.82	19 000	24.183	29 000	4.8456
9 250	102.79	19 250	23.205	29 250	4.6830
9 500	99.848	19 500	22.230	29 500	4.5210
9 750	96.978	19 750	21.338	29 750	4.3595
				30 000	4.1985

TABLE A-28.- REFRACTIVITY FOR PATRICK AFB AUGUST RADIO ATMOSPHERE

h, ft	N·10[6]	h, ft	N·10[6]	h, ft	N·10[6]
0	378.63	37 000	81.36	74 000	13.39
1 000	361.52	38 000	78.45	75 000	12.77
2 000	341.08	39 000	75.71	76 000	12.17
3 000	322.90	40 000	73.08	77 000	11.42
4 000	306.76	41 000	70.43	78 000	11.00
5 000	292.29	42 000	67.89	79 000	10.38
6 000	277.80	43 000	65.33	80 000	9.98
7 000	264.30	44 000	62.82	81 000	9.38
8 000	252.21	45 000	60.35	82 000	9.00
9 000	240.31	46 000	57.86	83 000	8.38
10 000	229.29	47 000	55.38	84 000	8.11
11 000	218.95	48 000	53.03	85 000	7.56
12 000	209.46	49 000	50.58	86 000	7.36
13 000	201.07	50 000	48.21	87 000	7.00
14 000	192.84	51 000	45.89	88 000	6.41
15 000	184.51	52 000	43.83	89 000	6.35
16 000	176.55	53 000	41.48	90 000	6.00
17 000	169.50	54 000	39.24	91 000	5.54
18 000	162.82	55 000	37.45	92 000	5.36
19 000	156.50	56 000	35.41	93 000	5.16
20 000	150.37	57 000	33.50	94 000	5.00
21 000	144.73	58 000	31.69	95 000	4.42
22 000	139.26	59 000	29.94	96 000	4.32
23 000	134.16	60 000	28.29	97 000	4.26
24 000	129.28	61 000	26.77	98 000	3.96
25 000	124.63	62 000	25.29	99 000	3.95
26 000	120.10	63 000	24.01	100 000	3.32
27 000	115.73	64 000	22.71	101 000	3.31
28 000	111.59	65 000	21.46	102 000	3.31
29 000	107.66	66 000	20.37	103 000	3.00
30 000	103.93	67 000	19.33	104 000	2.97
31 000	100.35	68 000	18.33	105 000	2.93
32 000	95.90	69 000	17.38	106 000	2.32
33 000	93.56	70 000	16.46	107 000	2.28
34 000	90.39	71 000	15.64	108 000	2.24
35 000	87.32	72 000	14.94	109 000	2.22
36 000	84.30	73 000	14.20	110 000	2.06

TABLE A-29.- REFRACTIVITY FOR PATRICK AFB DECEMBER RADIO ATMOSPHERE

h, ft	N·10^6	h, ft	N·10^6	h, ft	N·10^6
0	338.81	37 000	80.71	74 000	12.86
1 000	322.24	38 000	77.73	75 000	12.36
2 000	308.78	39 000	74.78	76 000	11.46
3 000	294.24	40 000	71.87	77 000	11.10
4 000	280.52	41 000	69.00	78 000	10.40
5 000	267.25	42 000	66.20	79 000	9.91
6 000	254.64	43 000	63.39	80 000	9.40
7 000	242.93	44 000	60.64	81 000	8.95
8 000	232.64	45 000	57.89	82 000	8.41
9 000	222.54	46 000	55.31	83 000	8.16
10 000	213.17	47 000	52.84	84 000	7.53
11 000	204.94	48 000	50.43	85 000	7.38
12 000	197.12	49 000	48.15	86 000	6.91
13 000	189.89	50 000	45.98	87 000	6.41
14 000	183.07	51 000	43.85	88 000	6.36
15 000	176.48	52 000	41.82	89 000	5.95
16 000	170.27	53 000	39.88	90 000	5.45
17 000	164.38	54 000	37.95	91 000	5.37
18 000	158.63	55 000	36.10	92 000	5.11
19 000	153.20	56 000	34.30	93 000	4.93
20 000	147.86	57 000	32.60	94 000	4.39
21 000	142.69	58 000	30.87	95 000	4.36
22 000	137.72	59 000	29.30	96 000	4.14
23 000	132.98	60 000	27.76	97 000	3.99
24 000	128.36	61 000	26.24	98 000	3.91
25 000	123.96	62 000	24.82	99 000	3.38
26 000	119.73	63 000	23.45	100 000	3.34
27 000	115.60	64 000	22.17	101 000	3.20
28 000	111.60	65 000	20.96	102 000	3.00
29 000	107.77	66 000	19.81	103 000	3.00
30 000	104.01	67 000	18.74	104 000	2.91
31 000	100.39	68 000	17.72	105 000	2.42
32 000	96.91	69 000	16.78	106 000	2.30
33 000	93.47	70 000	15.96	107 000	2.27
34 000	90.16	71 000	15.19	108 000	2.17
35 000	86.95	72 000	14.39	109 000	2.01
36 000	83.78	73 000	13.48	110 000	2.00

TABLE A-30.- REFRACTIVITY FOR PATRICK AFB ANNUAL RADIO ATMOSPHERE

h, ft	$N \cdot 10^6$	h, ft	$N \cdot 10^6$	h, ft	$N \cdot 10^6$
0	355.89	37 000	80.84	74 000	13.20
1 000	337.94	38 000	77.88	75 000	12.53
2 000	321.79	39 000	74.99	76 000	11.85
3 000	306.38	40 000	72.15	77 000	11.31
4 000	291.22	41 000	69.35	78 000	10.67
5 000	277.00	42 000	66.63	79 000	10.23
6 000	263.23	43 000	63.92	80 000	9.63
7 000	250.54	44 000	61.29	81 000	9.24
8 000	239.09	45 000	58.71	82 000	8.68
9 000	228.40	46 000	56.29	83 000	8.33
10 000	218.52	47 000	53.77	84 000	7.92
11 000	209.51	48 000	51.39	85 000	7.48
12 000	201.17	49 000	49.06	86 000	7.20
13 000	193.38	50 000	46.83	87 000	6.73
14 000	186.05	51 000	44.65	88 000	6.41
15 000	178.98	52 000	42.55	89 000	6.19
16 000	172.24	53 000	40.49	90 000	5.81
17 000	165.92	54 000	38.51	91 000	5.46
18 000	159.88	55 000	36.57	92 000	5.29
19 000	154.13	56 000	34.70	93 000	5.10
20 000	148.58	57 000	32.91	94 000	4.72
21 000	143.24	58 000	31.20	95 000	4.41
22 000	138.14	59 000	29.54	96 000	4.31
23 000	133.25	60 000	27.98	97 000	4.15
24 000	128.53	61 000	26.46	98 000	3.99
25 000	124.01	62 000	25.05	99 000	3.65
26 000	119.67	63 000	23.69	100 000	3.36
27 000	115.51	64 000	22.42	101 000	3.32
28 000	111.56	65 000	21.23	102 000	3.20
29 000	107.63	66 000	20.12	103 000	3.05
30 000	103.91	67 000	19.05	104 000	2.98
31 000	100.31	68 000	18.07	105 000	2.67
32 000	96.82	69 000	17.13	106 000	2.34
33 000	93.43	70 000	16.25	107 000	2.36
34 000	90.16	71 000	15.42	108 000	2.27
35 000	86.98	72 000	14.62	109 000	2.18
36 000	83.87	73 000	13.86	110 000	2.08

TABLE A-31.- QUADRATURE POINTS FOR WHITE SANDS MARCH RADIO ATMOSPHERE

h = 0 meters	N_o = .000 294 53
h = 4500 meters	N = .000 171 63
h = 10 000 meters	N = .000 093 736
h = 30 000 meters	N = .000 004 1208

H_{S1} = 7273 m H_{S2} = 7068 m H_{S3} = 8333 m H_{S4} = 8613 m
H_{S5} = 8874 m H_{S6} = 8592 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 280 71	h_1 = 455.1 m
N_2 = .000 226 56	h_2 = 2404 m
N_3 = .000 147 26	h_3 = 5970 m
N_4 = .000 067 967	h_4 = 12 303 m
N_5 = .000 013 816	h_5 = 22 279 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 093 736

N_1 = .000 285 11	h_1 = 309.1 m
N_2 = .000 248 19	h_2 = 1603 m
N_3 = .000 194 13	h_3 = 3614 m
N_4 = .000 140 07	h_4 = 6444 m
N_5 = .000 103 16	h_5 = 9199 m

TABLE A-32.- QUADRATURE POINTS FOR WHITE SANDS AUGUST RADIO ATMOSPHERE

h = 0 meters	N_0 = .000 348 95
h = 4500 meters	N = .000 191 13
h = 10 000 meters	N = .000 094 044
h = 30 000 meters	N = .000 004 4363

H_{S1} = 6296 m H_{S2} = 6796 m H_{S3} = 7475 m H_{S4} = 7410 m
H_{S5} = 7239 m H_{S6} = 6930 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 332 58	h_1 = 328.1 m
N_2 = .000 268 42	h_2 = 1862 m
N_3 = .000 174 48	h_3 = 5136 m
N_4 = .000 080 526	h_4 = 11 378 m
N_5 = .000 016 369	h_5 = 21 566 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 094 044

N_1 = .000 336 99	h_1 = 238.0 m
N_2 = .000 290 13	h_2 = 1264 m
N_3 = .000 221 50	h_3 = 3372 m
N_4 = .000 152 87	h_4 = 6041 m
N_5 = .000 106 00	h_5 = 8962 m

TABLE A-33.- QUADRATURE POINTS FOR WHITE SANDS ANNUAL RADIO ATMOSPHERE

h = 0 meters	N_o = .000 302 21
h = 4500 meters	N = .000 173 93
h = 10 000 meters	N = .000 094 146
h = 30 000 meters	N = .000 004 2242

H_{S1} = 7141 m	H_{S2} = 7025 m	H_{S3} = 8145 m	H_{S4} = 8148 m
H_{S5} = 8345 m	H_{S6} = 8357 m		

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 288 03	h_1 = 406.9 m
N_2 = .000 232 47	h_2 = 2286 m
N_3 = .000 151 10	h_3 = 5648 m
N_4 = .000 069 740	h_4 = 12 349 m
N_5 = .000 014 177	h_5 = 22 232 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 094 146

N_1 = .000 292 45	h_1 = 278.0 m
N_2 = .000 254 20	h_2 = 1424 m
N_3 = .000 198 18	h_3 = 3527 m
N_4 = .000 142 16	h_4 = 6238 m
N_5 = .000 103 91	h_5 = 9153 m

TABLE A-34.- QUADRATURE POINTS FOR EDWARDS AFB MAY RADIO ATMOSPHERE

h = 0 meters $\quad N_o$ = .000 309 83
h = 4500 meters $\quad N$ = .000 174 57
h = 10 000 meters $\quad N$ = .000 092 891
h = 30 000 meters $\quad N$ = .000 003 7075

H_{S1} = 7008 m $\quad H_{S2}$ = 6800 m $\quad H_{S3}$ = 7844 m $\quad H_{S4}$ = 8042 m
H_{S5} = 8088 m $\quad H_{S6}$ = 8125 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i \qquad N_H = 0$

N_1 = .000 295 30	h_1 = 429.8 m
N_2 = .000 238 33	h_2 = 2021 m
N_3 = .000 154 92	h_3 = 5574 m
N_4 = .000 071 498	h_4 = 11 915 m
N_5 = .000 014 534	h_5 = 21 591 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i \qquad N_H$ = .000 092 891

N_1 = .000 299 65	h_1 = 300.5 m
N_2 = .000 259 77	h_2 = 1445 m
N_3 = .000 201 36	h_3 = 3324 m
N_4 = .000 142 95	h_4 = 6293 m
N_5 = .000 103 07	h_5 = 9143 m

TABLE A-35.- QUADRATURE POINTS FOR EDWARDS AFB JULY RADIO ATMOSPHERE

h = 0 meters	N_o = .000 292 24
h = 4500 meters	N = .000 175.22
h = 10 000 meters	N = .000 093 252
h = 30 000 meters	N = .000 003 8632

H_{S1} = 7312 m H_{S2} = 6891 m H_{S3} = 8797 m H_{S4} = 8760 m
H_{S5} = 8845 m H_{S6} = 8662 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 278 53	h_1 = 464.0 m
N_2 = .000 224 80	h_2 = 2177 m
N_3 = .000 146 12	h_3 = 6072 m
N_4 = .000 067 439	h_4 = 12 556 m
N_5 = .000 013 709	h_5 = 22 117 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 093 252

N_1 = .000 282 91	h_1 = 315.6 m
N_2 = .000 246 32	h_2 = 1499 m
N_3 = .000 192 75	h_3 = 3727 m
N_4 = .000 139 17	h_4 = 6505 m
N_5 = .000 102 58	h_5 = 9210 m

TABLE A-36.- QUADRATURE POINTS FOR EDWARDS AFB ANNUAL RADIO ATMOSPHERE

h = 0 meters	N_o = .000 302 08
h = 4500 meters	N = .000 174 64
h = 10 000 meters	N = .000 093 284
h = 30 000 meters	N = .000 003 7591

H_{S1} = 7144 m H_{S2} = 6839 m H_{S3} = 8212 m H_{S4} = 8381 m
H_{S5} = 8296 m H_{S6} = 8361 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 287 91	h_1 = 452.1 m
N_2 = .000 232 37	h_2 = 2030 m
N_3 = .000 151 04	h_3 = 5809 m
N_4 = .000 069 710	h_4 = 12 151 m
N_5 = .000 014 171	h_5 = 21 813 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 093 284

N_1 = .000 292 29	h_1 = 311.9 m
N_2 = .000 253 90	h_2 = 1418 m
N_3 = .000 197 68	h_3 = 3379 m
N_4 = .000 141 46	h_4 = 6393 m
N_5 = .000 103 07	h_5 = 9186 m

TABLE A-37.- QUADRATURE POINTS FOR EGLIN AFB JANUARY RADIO ATMOSPHERE

h = 0 meters	N_o = .000 316 92
h = 4500 meters	N = .000 170 97
h = 10 000 meters	N = .000 093 957
h = 30 000 meters	N = .000 04 0792

H_{S1} = 6881 m H_{S2} = 6954 m H_{S3} = 7291 m H_{S4} = 7538 m
H_{S5} = 7498 m H_{S6} = 7908 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 302 05	h_1 = 345.7 m
N_2 = .000 243 79	h_2 = 1892 m
N_3 = .000 158 46	h_3 = 5225 m
N_4 = .000 073 134	h_4 = 11 982 m
N_5 = .000 014 867	h_5 = 21 879 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 093 957

N_1 = .000 306 46	h_1 = 227.5 m
N_2 = .000 265 47	h_2 = 1282 m
N_3 = .000 205 44	h_3 = 3165 m
N_4 = .000 145 41	h_4 = 6046 m
N_5 = .000 104 42	h_5 = 9083 m

TABLE A-38.- QUADRATURE POINTS FOR EGLIN AFB AUGUST RADIO ATMOSPHERE

h = 0 meters	N_o = .000 367 68
h = 4500 meters	N = .000 185 64
h = 10 000 meters	N = .000 094 027
h = 30 000 meters	N = .000 004 3965

H_{S1} = 5949 m H_{S2} = 6723 m H_{S3} = 6585 m H_{S4} = 6589 m
H_{S5} = 6739 m H_{S6} = 6357 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 350 43	h_1 = 268.0 m
N_2 = .000 282 83	h_2 = 1763 m
N_3 = .000 183 84	h_3 = 4567 m
N_4 = .000 084 848	h_4 = 10 926 m
N_5 = .000 017 248	h_5 = 21 259 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 094 027

N_1 = .000 354 84	h_1 = 179.2 m
N_2 = .000 304 53	h_2 = 1350 m
N_3 = .000 230 86	h_3 = 3111 m
N_4 = .000 157 18	h_4 = 5712 m
N_5 = .000 106 87	h_5 = 8897 m

TABLE A-39.- QUADRATURE POINTS FOR EGLIN AFB ANNUAL RADIO ATMOSPHERE

h = 0 meters N_o = .000 344 63
h = 4500 meters N = .000 176 71
h = 10 000 meters N = .000 095 266
h = 30 000 meters N = .000 004 2409

H_{S1} = 6375 m H_{S2} = 6822 m H_{S3} = 6737 m H_{S4} = 6784 m
H_{S5} = 7405 m H_{S6} = 7062 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 328 46	h_1 = 553.3 m
N_2 = .000 265 10	h_2 = 1776 m
N_3 = .000 172 32	h_3 = 4702 m
N_4 = .000 079 529	h_4 = 11 459 m
N_5 = .000 016 167	h_5 = 21 480 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 095 266

N_1 = .000 332 93	h_1 = 466.3 m
N_2 = .000 287 09	h_2 = 1307 m
N_3 = .000 219 95	h_3 = 2977 m
N_4 = .000 152 81	h_4 = 5734 m
N_5 = .000 106 97	h_5 = 8876 m

TABLE A-40.- QUADRATURE POINTS FOR ASCENSION FEBRUARY RADIO ATMOSPHERE

h = 0 meters	N_o = .000 368 20
h = 4500 meters	N = .000 179 34
h = 10 000 meters	N = .000 094 233
h = 30 000 meters	N = .000 004 0842

H_{S1} = 5939 m H_{S2} = 6698 m H_{S3} = 6256 m H_{S4} = 6271 m
H_{S5} = 6111 m H_{S6} = 6341 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 350 93	h_1 = 285.7 m
N_2 = .000 283 23	h_2 = 1825 m
N_3 = .000 184 10	h_3 = 4347 m
N_4 = .000 084 968	h_4 = 10 914 m
N_5 = .000 017 272	h_5 = 21.151 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 094 233

N_1 = .000 355 35	h_1 = 213.2 m
N_2 = .000 304 98	h_2 = 1162 m
N_3 = .000 231 22	h_3 = 2294 m
N_4 = .000 157 45	h_4 = 5344 m
N_5 = .000 107 08	h_5 = 8827 m

TABLE A-41.- QUADRATURE POINTS FOR ASCENSION SEPTEMBER RADIO ATMOSPHERE

h = 0 meters	N_o = .000 352 17
h = 4500 meters	N = .000 172 98
h = 10 000 meters	N = .000 094 422
h = 30 000 meters	N = .000 004 2748

H_{S1} = 6236 m　H_{S2} = 6766 m　H_{S3} = 6330 m　H_{S4} = 6302 m
H_{S5} = 6647 m　H_{S6} = 6831 m

<u>Quadrature points for H = 10^6 meters</u>

$N_i = N_o - (N_o - N_H)X_i$　　$N_H = 0$

N_1 = .000 335 65	h_1 = 331.6 m
N_2 = .000 270 90	h_2 = 1689 m
N_3 = .000 176 09	h_3 = 4368 m
N_4 = .000 081 269	h_4 = 11 317 m
N_5 = .000 016 520	h_5 = 21 420 m

<u>Quadrature points for H = 10^4 meters</u>

$N_i = N_o - (N_o - N_H)X_i$　　N_H = .000 094 422

N_1 = .000 340 08	h_1 = 236.6 m
N_2 = .000 292 69	h_2 = 1404 m
N_3 = .000 223 30	h_3 = 2539 m
N_4 = .000 153 90	h_4 = 5516 m
N_5 = .000 106 51	h_5 = 8869 m

TABLE A-42.—QUADRATURE POINTS FOR ASCENSION ANNUAL RADIO ATMOSPHERE

h = 0 meters	N_o = .000 358 52
h = 4500 meters	N = .000 172 76
h = 10 000 meters	N = .000 094 344
h = 30 000 meters	N = .000 004 1784

H_{S1} = 6118 m H_{S2} = 6738 m H_{S3} = 6164 m H_{S4} = 6100 m
H_{S5} = 6445 m H_{S6} = 6637 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 341 70	h_1 = 303.7 m
N_2 = .000 275 79	h_2 = 1664 m
N_3 = .000 179 26	h_3 = 4228 m
N_4 = .000 082 734	h_4 = 11 138 m
N_5 = .000 016 818	h_5 = 21 292 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 094 344

N_1 = .000 346 13	h_1 = 214.1 m
N_2 = .000 297 56	h_2 = 1325 m
N_3 = .000 226 43	h_3 = 2545 m
N_4 = .000 155 30	h_4 = 5437 m
N_5 = .000 106 73	h_5 = 8854 m

TABLE A-43.- QUADRATURE POINTS FOR KWAJALEIN MAY RADIO ATMOSPHERE

h = 0 meters	N_o = .000 384 18
h = 4500 meters	N = .000 188 81
h = 10 000 meters	N = .000 093 394
h = 30 000 meters	N = .000 004 2045

H_{S1} = 5644 m H_{S2} = 6643 m H_{S3} = 6335 m H_{S4} = 6294 m
H_{S5} = 6027 m H_{S6} = 5853 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 366 16	h_1 = 235.9 m
N_2 = .000 295 52	h_2 = 1437 m
N_3 = .000 192 09	h_3 = 4363 m
N_4 = .000 088 655	h_4 = 10 478 m
N_5 = .000 018 022	h_5 = 20 919 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 093 394

N_1 = .000 370 54	h_1 = 178.0 m
N_2 = .000 317 08	h_2 = 1040 m
N_3 = .000 238 79	h_3 = 2808 m
N_4 = .000 160 49	h_4 = 5677 m
N_5 = .000 107 03	h_5 = 8844 m

TABLE A-44.- QUADRATURE POINTS FOR KWAJALEIN DECEMBER RADIO ATMOSPHERE

h = 0 meters	N_o = .000 369 48
h = 4500 meters	N = .000 180 84
h = 10 000 meters	N = .000 093 280
h = 30 000 meters	N = .000 004 1561

H_{S1} = 5915 m H_{S2} = 6701 m H_{S3} = 6298 m H_{S4} = 6315 m
H_{S5} = 6614 m H_{S6} = 6302 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 352 15	h_1 = 334.2 m
N_2 = .000 284 22	h_2 = 1689 m
N_3 = .000 184 74	h_3 = 4377 m
N_4 = .000 085 263	h_4 = 10 821 m
N_5 = .000 017 332	h_5 = 21 127 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 093 280

N_1 = .000 356 52	h_1 = 249.7 m
N_2 = .000 305 74	h_2 = 1214 m
N_3 = .000 231 38	h_3 = 3044 m
N_4 = .000 157 02	h_4 = 5552 m
N_5 = .000 106 24	h_5 = 8862 m

TABLE A-45.- QUADRATURE POINTS FOR KWAJALEIN ANNUAL RADIO ATMOSPHERE

h = 0 meters	N_o = .000 371 43
h = 4500 meters	N = .000 183 96
h = 10 000 meters	N = .000 093 934
h = 30 000 meters	N = .000 004 2001

H_{S1} = 5879 m H_{S2} = 6693 m H_{S3} = 6404 m H_{S4} = 6394 m
H_{S5} = 6598 m H_{S6} = 6243 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 354 01	h_1 = 311.3 m
N_2 = .000 285 72	h_2 = 1698 m
N_3 = .000 185 72	h_3 = 4432 m
N_4 = .000 085 713	h_4 = 10 791 m
N_5 = .000 017 424	h_5 = 21 125 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 093 934

N_1 = .000 358 41	h_1 = 225.7 m
N_2 = .000 307 39	h_2 = 1225 m
N_3 = .000 232 68	h_3 = 2942 m
N_4 = .000 157 97	h_4 = 5805 m
N_5 = .000 106 95	h_5 = 8878 m

TABLE A-46.- QUADRATURE POINTS FOR WALLOPS MARCH RADIO ATMOSPHERE

h = 0 meters	N_o = .000 306 80
h = 4500 meters	N = .000 175 90
h = 10 000 meters	N = .000 092 799
h = 30 000 meters	N = .000 004 0759

H_{S1} = 7061 m H_{S2} = 7004 m H_{S3} = 8089 m H_{S4} = 8223 m
H_{S5} = 8376 m H_{S6} = 8217 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 292 41	h_1 = 444.7 m
N_2 = .000 236 00	h_2 = 2142 m
N_3 = .000 153 40	h_3 = 5700 m
N_4 = .000 070 799	h_4 = 11 784 m
N_5 = .000 014 392	h_5 = 21 948 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 092 799

N_1 = .000 296 76	h_1 = 307.7 m
N_2 = .000 257 42	h_2 = 1533 m
N_3 = .000 199 80	h_3 = 3464 m
N_4 = .000 142 18	h_4 = 6383 m
N_5 = .000 102 84	h_5 = 9147 m

TABLE A-47.- QUADRATURE POINTS FOR WALLOPS JULY RADIO ATMOSPHERE

h = 0 meters	N_o = .000 372 34
h = 4500 meters	N = .000 182 54
h = 10 000 meters	N = .000 093 894
h = 30 000 meters	N = .000 004 4361

H_{S1} = 5863 m H_{S2} = 6701 m H_{S3} = 6313 m H_{S4} = 6313 m
H_{S5} = 5997 m H_{S6} = 6215 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i \qquad N_H = 0$

N_1 = .000 354 87	h_1 = 185.1 m
N_2 = .000 286 42	h_2 = 1512 m
N_3 = .000 186 17	h_3 = 4376 m
N_4 = .000 085 923	h_4 = 10 794 m
N_5 = .000 017 466	h_5 = 21 132 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i \qquad N_H$ = .000 093 894

N_1 = .000 359 28	h_1 = 140.7 m
N_2 = .000 308 08	h_2 = 961.9 m
N_3 = .000 233 12	h_3 = 2910 m
N_4 = .000 158 15	h_4 = 5546 m
N_5 = .000 106 96	h_5 = 8815 m

TABLE A-48.- QUADRATURE POINTS FOR WALLOPS ANNUAL RADIO ATMOSPHERE

h = 0 meters	N_o = .000 324 40
h = 4500 meters	N = .000 178 04
h = 10 000 meters	N = .000 093 708
h = 30 000 meters	N = .000 004 2334

H_{S1} = 6746 m H_{S2} = 6914 m H_{S3} = 7500 m H_{S4} = 7564 m
H_{S5} = 7696 m H_{S6} = 7680 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i \quad N_H = 0$

N_1 = .000 309 18	h_1 = 334.0 m
N_2 = .000 249 54	h_2 = 2085 m
N_3 = .000 162 20	h_3 = 5243 m
N_4 = .000 074 860	h_4 = 11 753 m
N_5 = .000 015 218	h_5 = 21 760 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i \quad N_H$ = .000 093 708

N_1 = .000 313 58	h_1 = 232.0 m
N_2 = .000 271 16	h_2 = 1438 m
N_3 = .000 209 05	h_3 = 3321 m
N_4 = .000 146 94	h_4 = 6090 m
N_5 = .000 104 53	h_5 = 9072 m

TABLE A-49.- QUADRATURE POINTS FOR CAPE CANAVERAL JANUARY RADIO ATMOSPHERE

h = 0 meters	N_o = .000 349 76
h = 4500 meters	N = .000 170 37
h = 10 000 meters	N = .000 094 321
h = 30 000 meters	N = .000 004 1116

H_{S1} = 6281 m H_{S2} = 6789 m H_{S3} = 6256 m H_{S4} = 6126 m
H_{S5} = 6389 m H_{S6} = 6905 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 333 35	h_1 = 277.12 m
N_2 = .000 269 05	h_2 = 1635 m
N_3 = .000 174 88	h_3 = 4246 m
N_4 = .000 080 712	h_4 = 11 331 m
N_5 = .000 016 407	h_5 = 21 301 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 094 321

N_1 = .000 337 78	h_1 = 215.6 m
N_2 = .000 290 81	h_2 = 1158 m
N_3 = .000 222 04	h_3 = 2562 m
N_4 = .000 153 27	h_4 = 5521 m
N_5 = .000 106 30	h_5 = 8943 m

TABLE A-50.- QUADRATURE POINTS FOR CAPE CANAVERAL AUGUST RADIO ATMOSPHERE

h = 0 meters	N_o = .000 399 42
h = 4500 meters	N = .000 187 33
h = 10 000 meters	N = .000 093 940
h = 30 000 meters	N = .000 004 3600

H_{S1} = 5366 m H_{S2} = 6591 m H_{S3} = 5943 m H_{S4} = 5866 m
H_{S5} = 5501 m H_{S6} = 5388 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 380 68	h_1 = 169.0 m
N_2 = .000 307 25	h_2 = 1272 m
N_3 = .000 199 71	h_3 = 4066 m
N_4 = .000 092 172	h_4 = 10 172 m
N_5 = .000 018 737	h_5 = 20 744 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 093 940

N_1 = .000 385 09	h_1 = 120.9 m
N_2 = .000 328 93	h_2 = 922.7 m
N_3 = .000 246 68	h_3 = 2629 m
N_4 = .000 164 43	h_4 = 5475 m
N_5 = .000 108 27	h_5 = 8766 m

TABLE A-51.- QUADRATURE POINTS FOR CAPE CANAVERAL ANNUAL RADIO ATMOSPHERE

h = 0 meters	N_o = .000 376 07
h = 4500 meters	N = .000 175 59
h = 10 000 meters	N = .000 094 206
h = 30 000 meters	N = .000 004 2129

H_{S1} = 5794 m H_{S2} = 6679 m H_{S3} = 5908 m H_{S4} = 5777 m
H_{S5} = 5774 m H_{S6} = 6101 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 358 43	h_1 = 191.7 m
N_2 = .000 289 29	h_2 = 1428 m
N_3 = .000 188 04	h_3 = 4004 m
N_4 = .000 086 784	h_4 = 10 712 m
N_5 = .000 017 641	h_5 = 20 957 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 094 206

N_1 = .000 362 85	h_1 = 136.7 m
N_2 = .000 311 03	h_2 = 1008 m
N_3 = .000 235 14	h_3 = 2554 m
N_4 = .000 159 25	h_4 = 5429 m
N_5 = .000 107 43	h_5 = 8821 m

TABLE A-52.- QUADRATURE POINTS FOR HAWAII FEBRUARY RADIO ATMOSPHERE

h = 0 meters	N_o = .000 344 07
h = 4500 meters	N = .000 172 59
h = 10 000 meters	N = .000 093 253
h = 30 000 meters	N = .000 004 1432

H_{S1} = 6386 m H_{S2} = 6820 m H_{S3} = 6522 m H_{S4} = 6534 m
H_{S5} = 6831 m H_{S6} = 7079 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 327 93	h_1 = 354.3 m
N_2 = .000 264 67	h_2 = 1839 m
N_3 = .000 172 04	h_3 = 4529 m
N_4 = .000 079 399	h_4 = 11 314 m
N_5 = .000 016 140	h_5 = 21 462 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 093 253

N_1 = .000 332 30	h_1 = 253.7 m
N_2 = .000 286 19	h_2 = 1331 m
N_3 = .000 218 66	h_3 = 2651 m
N_4 = .000 151 13	h_4 = 5717 m
N_5 = .000 105 02	h_5 = 9015 m

TABLE A-53.- QUADRATURE POINTS FOR HAWAII JULY RADIO ATMOSPHERE

h = 0 meters	N_o = .000 361 17
h = 4500 meters	N = .000 172 00
h = 10 000 meters	N = .000 094 573
h = 30 000 meters	N = .000 004 3253

H_{S1} = 6069 m H_{S2} = 6746 m H_{S3} = 6066 m H_{S4} = 5844 m
H_{S5} = 6320 m H_{S6} = 6556 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 344 23	h_1 = 278.6 m
N_2 = .000 277 82	h_2 = 1735 m
N_3 = .000 180 59	h_3 = 4051 m
N_4 = .000 083 346	h_4 = 11 093 m
N_5 = .000 016 943	h_5 = 21 300 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 094 573

N_1 = .000 348 66	h_1 = 188.8 m
N_2 = .000 299 65	h_2 = 1225 m
N_3 = .000 227 87	h_3 = 2594 m
N_4 = .000 156 09	h_4 = 5409 m
N_5 = .000 107 08	h_5 = 8898 m

TABLE A-54.- QUADRATURE POINTS FOR HAWAII ANNUAL RADIO ATMOSPHERE

h = 0 meters	N_o = .000 352 67
h = 4500 meters	N = .000 172 59
h = 10 000 meters	N = .000 094 496
h = 30 000 meters	N = .000 004 2302

H_{S1} = 6227 m H_{S2} = 6782 m H_{S3} = 6297 m H_{S4} = 6209 m
H_{S5} = 6629 m H_{S6} = 6816 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i \quad N_H = 0$

N_1 = .000 336 13	h_1 = 337.0 m
N_2 = .000 271 29	h_2 = 1745 m
N_3 = .000 176 34	h_3 = 4303 m
N_4 = .000 081 384	h_4 = 11 265 m
N_5 = .000 016 544	h_5 = 21 354 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i \quad N_H$ = .000 094 496

N_1 = .000 340 56	h_1 = 235.2 m
N_2 = .000 293 09	h_2 = 1290 m
N_3 = .000 223 58	h_3 = 2658 m
N_4 = .000 154 07	h_4 = 5542 m
N_5 = .000 106 61	h_5 = 8818 m

TABLE A-55.- QUADRATURE POINTS FOR POINT ARGUELLO JULY RADIO ATMOSPHERE

h = 0 meters	N_o = .000 340 70
h = 4500 meters	N = .000 174 28
h = 10 000 meters	N = .000 094 173
h = 30 000 meters	N = .000 004 4191

H_{S1} = 6448 m　H_{S2} = 6824 m　H_{S3} = 6713 m　H_{S4} = 6776 m
H_{S5} = 5884 m　H_{S6} = 6657 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$　$N_H = 0$

N_1 = .000 324 72	h_1 = 284.4 m
N_2 = .000 262 08	h_2 = 956.5 m
N_3 = .000 170 35	h_3 = 4697 m
N_4 = .000 078 622	h_4 = 11 525 m
N_5 = .000 015 982	h_5 = 21 712 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$　N_H = .000 094 173

N_1 = .000 329 14	h_1 = 213.4 m
N_2 = .000 283 81	h_2 = 756.0 m
N_3 = .000 217 44	h_3 = 2526 m
N_4 = .000 151 06	h_4 = 5772 m
N_5 = .000 105 74	h_5 = 9004 m

TABLE A-56.- QUADRATURE POINTS FOR POINT ARGUELLO DECEMBER RADIO ATMOSPHERE

h = 0 meters	N_o = .000 316 84
h = 4500 meters	N = .000 175 52
h = 10 000 meters	N = .000 095 462
h = 30 000 meters	N = .000 004 0734

H_{S1} = 6883 m H_{S2} = 6939 m H_{S3} = 7619 m H_{S4} = 7814 m
H_{S5} = 7250 m H_{S6} = 7611 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 301 98	h_1 = 387.7 m
N_2 = .000 243 72	h_2 = 1647 m
N_3 = .000 158 42	h_3 = 5416 m
N_4 = .000 073 116	h_4 = 11 957 m
N_5 = .000 014 863	h_5 = 21 894 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 095 462

N_1 = .000 306 46	h_1 = 309.2 m
N_2 = .000 265 75	h_2 = 983.1 m
N_3 = .000 206 15	h_3 = 3034 m
N_4 = .000 146 55	h_4 = 6123 m
N_5 = .000 105 85	h_5 = 9051 m

TABLE A-57.- QUADRATURE POINTS FOR POINT ARGUELLO ANNUAL RADIO ATMOSPHERE

h = 0 meters	N_o = .000 331 51
h = 4500 meters	N = .000 174 19
h = 10 000 meters	N = .000 094 178
h = 30 000 meters	N = .000 004 1985

H_{S1} = 6617 m — H_{S2} = 6867 m H_{S3} = 6993 m H_{S4} = 7143 m

H_{S5} = 6444 m H_{S6} = 7025 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 315 96	h_1 = 377.6 m
N_2 = .000 255 01	h_2 = 1238 m
N_3 = .000 165 76	h_3 = 4951 m
N_4 = .000 076 501	h_4 = 11 608 m
N_5 = .000 015 551	h_5 = 21 671 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 094 178

N_1 = .000 320 38	h_1 = 291.7 m
N_2 = .000 276 74	h_2 = 832.1 m
N_3 = .000 212 84	h_3 = 2701 m
N_4 = .000 148 95	h_4 = 5914 m
N_5 = .000 105 31	h_5 = 9042 m

TABLE A-58.- QUADRATURE POINTS FOR PATRICK AFB AUGUST RADIO ATMOSPHERE

h = 0 meters	N_o = .000 378 63
h = 4500 meters	N = .000 184 51
h = 10 000 meters	N = .000 094 04
h = 30 000 meters	N = .000 003 32

H_{S1} = 5746 m H_{S2} = 6451 m H_{S3} = 6360 m H_{S4} = 6351 m
H_{S5} = 6328 m H_{S6} = 6023 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 360 87	h_1 = 315.2 m
N_2 = .000 291 26	h_2 = 1546 m
N_3 = .000 189 32	h_3 = 4402 m
N_4 = .000 087 375	h_4 = 10 663 m
N_5 = .000 017 762	h_5 = 20 909 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 094 04

N_1 = .000 365 28	h_1 = 246.3 m
N_2 = .000 312 96	h_2 = 1101 m
N_3 = .000 236 34	h_3 = 2851 m
N_4 = .000 159 71	h_4 = 5633 m
N_5 = .000 107 39	h_5 = 8861 m

TABLE A-59.- QUADRATURE POINTS FOR PATRICK AFB DECEMBER RADIO ATMOSPHERE

h = 0 meters	N_o = .000 338 81
h = 4500 meters	N = .000 176 48
h = 10 000 meters	N = .000 094 12
h = 30 000 meters	N = .000 003 34

H_{S1} = 6483 m H_{S2} = 6607 m H_{S3} = 7010 m H_{S4} = 7102 m
H_{S5} = 6845 m H_{S6} = 7239 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 322 92	h_1 = 289.5 m
N_2 = .000 260 62	h_2 = 1682 m
N_3 = .000 169 40	h_3 = 4923 m
N_4 = .000 078 19	h_4 = 11 535 m
N_5 = .000 015 89	h_5 = 21 363 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 094 12

N_1 = .000 327 33	h_1 = 193.7 m
N_2 = .000 282 34	h_2 = 1174 m
N_3 = .000 216 46	h_3 = 2936 m
N_4 = .000 150 59	h_4 = 5941 m
N_5 = .000 105 60	h_5 = 9014 m

TABLE A-60.- QUADRATURE POINTS FOR PATRICK AFB ANNUAL RADIO ATMOSPHERE

h = 0 meters	N_o = -.000 355 89
h = 4500 meters	N = .000 178 98
h = 10 000 meters	N = .000 094 07
h = 30 000 meters	N = .000 003 36

H_{S1} = 6167 m H_{S2} = 6537 m H_{S3} = 6652 m H_{S4} = 6662 m

H_{S5} = 6525 m H_{S6} = 6718 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 339 20	h_1 = 282.0 m
N_2 = .000 273 76	h_2 = 1596 m
N_3 = .000 177 94	h_3 = 4618 m
N_4 = .000 082 13	h_4 = 11 147 m
N_5 = .000 016 69	h_5 = 21 181 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 094 07

N_1 = .000 343 61	h_1 = 203.7 m
N_2 = .000 295 47	h_2 = 1134 m
N_3 = .000 224 98	h_3 = 2845 m
N_4 = .000 154 49	h_4 = 5772 m
N_5 = .000 106 35	h_5 = 8942 m

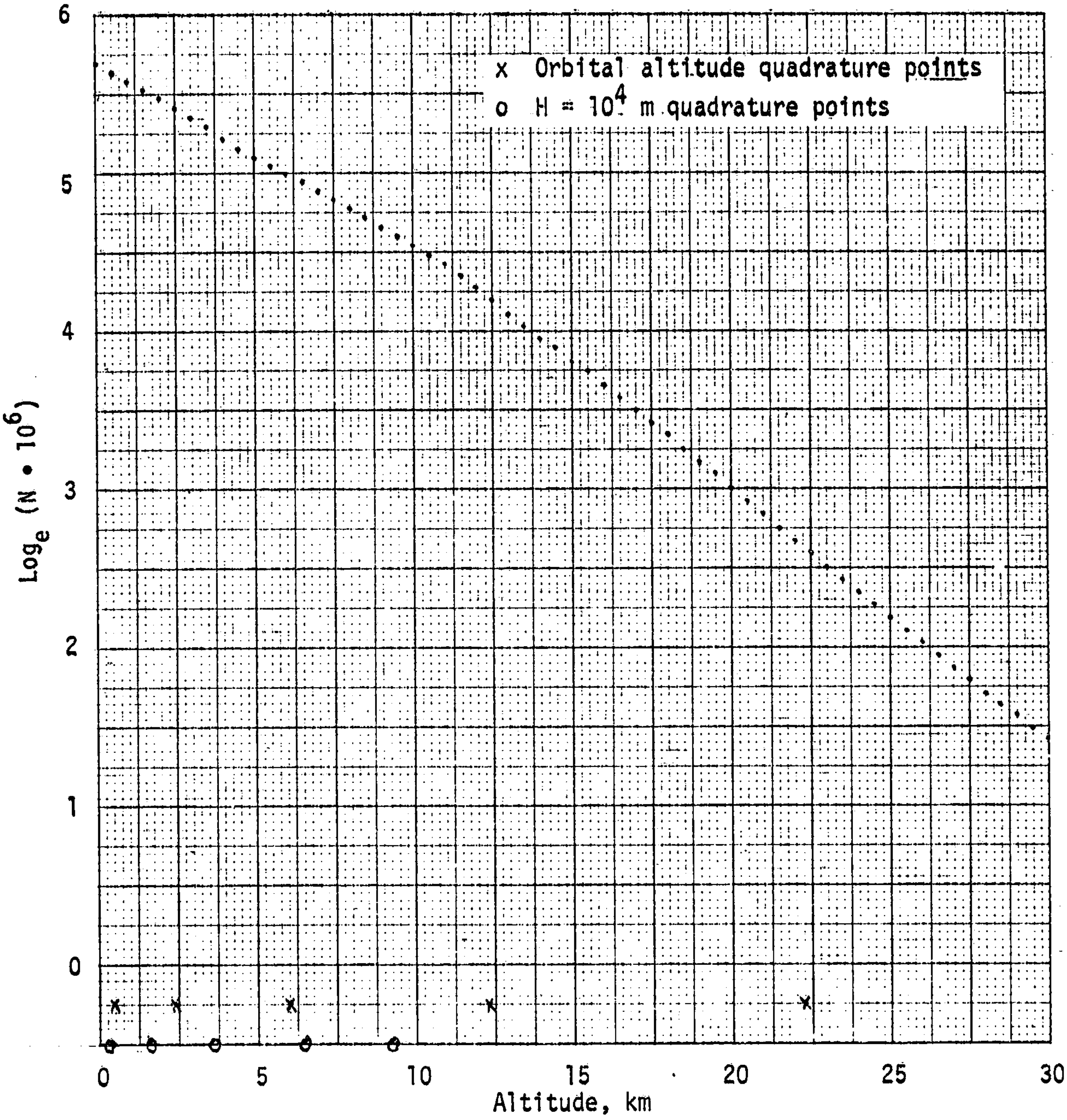

Figure A-1.- $\text{Log}_e\ (N \bullet 10^6)$ versus altitude for March radio atmosphere at White Sands.

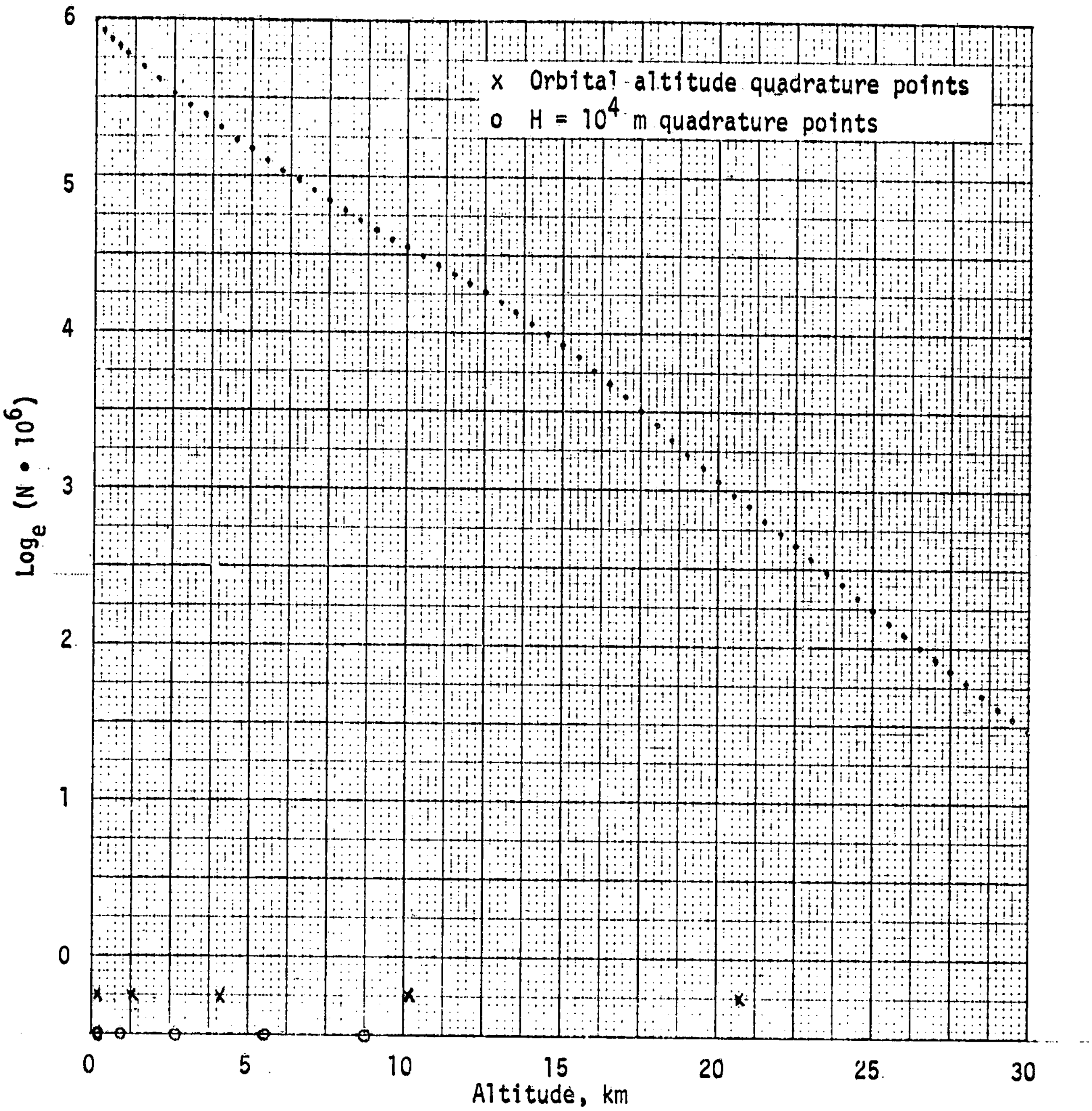

Figure A-2.- $\text{Log}_e\ (N \cdot 10^6)$ versus altitude for August radio atmosphere at Cape Canaveral.

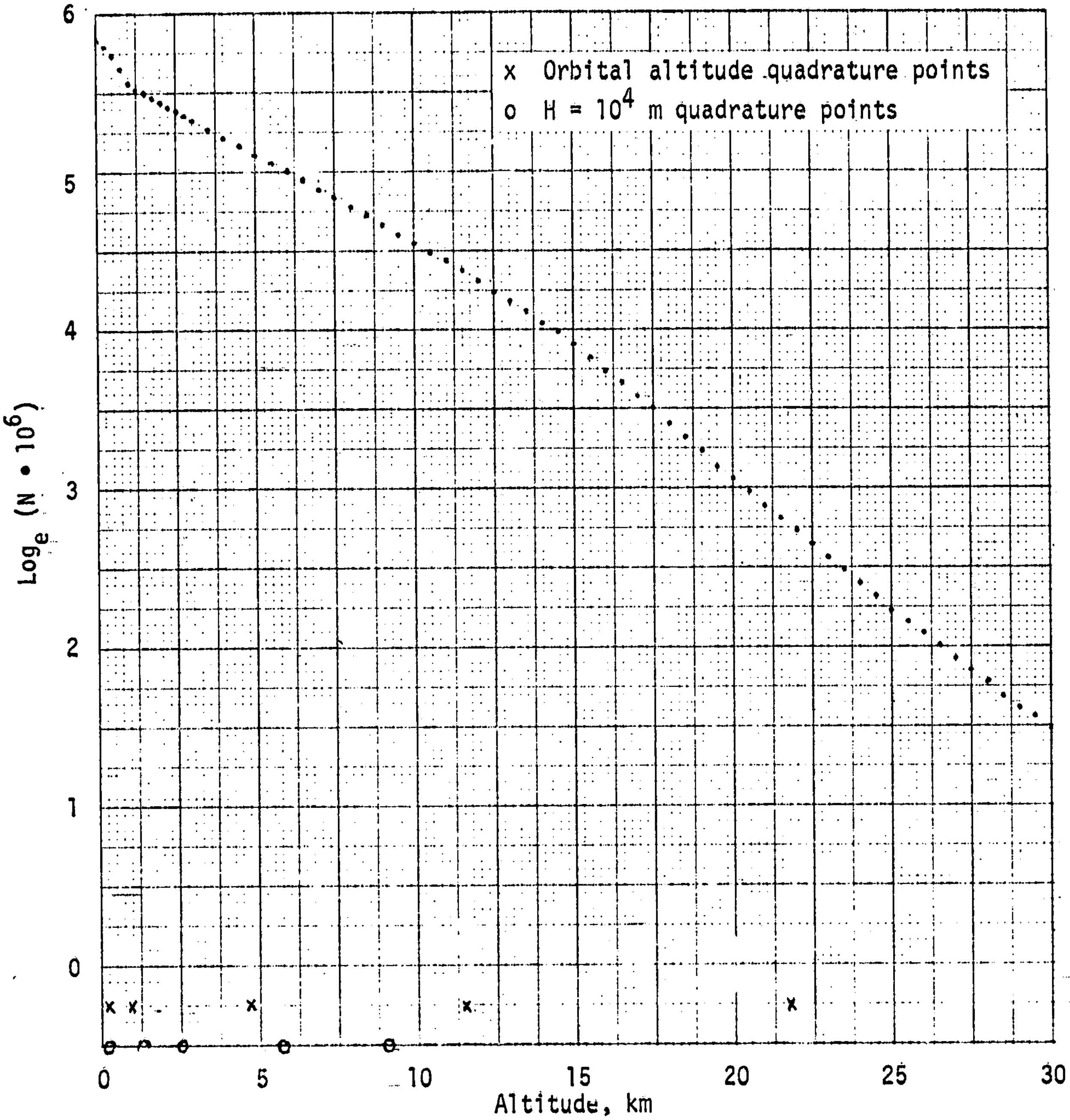

Figure A-3.- $\mathrm{Log}_e\ (N \bullet 10^6)$ versus altitude for July radio atmosphere at Point Arguello.

APPENDIX B

TABLE OF OPTICAL REFRACTIVITY

This appendix contains tables of optical refractivity for $\lambda = 0.555$ micron (yellow-green light) versus altitude above mean sea level for nine different locations. Three atmospheres from each location are shown: two monthly atmospheres and the annual atmosphere. Also included are tables of the Gaussian quadrature points for each of the 27 atmospheres. These are the points at which the integrands are evaluated for the refraction correction integrals shown in appendix E. The 27 atmospheres were obtained from the IRIG documents of reference 1.

Figures B-1 and B-2 show plots of $\ln(N.10^6)$ versus altitude for two different optical atmospheres. Note that these plots would be straight lines if the atmospheres were truly exponential.

The nine locations of the weather stations are shown below.

Weather Station	Altitude	Latitude	Longitude
White Sands, N. M.	1292 m	32° 22'N	106° 22'W
Edwards AFB, Calif.	706 m	34° 55'N	117° 54'W
Eglin AFB, Fla.	20 m	30° 29'N	86° 31'W
Ascension Island	79 m	7° 58'S	14° 24'W
Kwajalein Island	4 m	8° 43'N	167° 44'E
Wallops Island	88 m	38° 50'N	76° 57'W
Cape Canaveral, Fla.	5 m	28° 29'N	80° 33'W
Lihue, Kauai, Hawaii	45 m	21° 59'N	159° 21'W
Point Arguello, Calif.	113 m	34° 40'N	120° 35'W

TABLE B-1.- REFRACTIVITY FOR WHITE SANDS MARCH OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$
0	270.06	10 000	95.286	20 000	20.467
250	264.44	10 250	92.382	20 250	19.651
500	258.78	10 500	89.512	20 500	18.838
750	253.06	10 750	86.828	20 750	18.093
1 000	247.28	11 000	84.077	21 000	17.352
1 250	241.44	11 250	81.246	21 250	16.614
1 500	235.81	11 500	78.365	21 500	15.964
1 750	229.86	11 750	75.465	21 750	15.317
2 000	224.46	12 000	72.546	22 000	14.673
2 250	219.16	12 250	69.673	22 250	14.110
2 500	213.92	12 500	66.975	22 500	13.548
2 750	208.72	12 750	64.359	22 750	12.989
3 000	203.56	13 000	61.956	23 000	12.499
3 250	198.52	13 250	59.636	23 250	12.011
3 500	193.55	13 500	57.414	23 500	11.524
3 750	188.63	13 750	55.290	23 750	11.039
4 000	183.79	14 000	53.292	24 000	10.630
4 250	179.06	14 250	51.354	24 250	10.223
4 500	174.47	14 500	49.482	24 500	9.3175
4 750	170.00	14 750	47.680	24 750	9.4134
5 000	165.64	15 000	45.956	25 000	9.0109
5 250	161.39	15 250	44.287	25 250	8.6873
5 500	157.19	15 500	42.667	25 500	8.3653
5 750	153.16	15 750	41.090	25 750	8.0440
6 000	149.24	16 000	39.506	26 000	7.7242
6 250	145.35	16 250	38.004	26 250	7.4056
6 500	141.55	16 500	36.542	26 500	7.0877
6 750	137.77	16 750	35.123	26 750	6.8428
7 000	134.11	17 000	33.751	27 000	6.5989
7 250	130.49	17 250	32.378	27 250	6.3561
7 500	126.92	17 500	31.086	27 500	6.1140
7 750	123.50	17 750	29.845	27 750	5.8729
8 000	120.12	18 000	28.608	28 000	5.6326
8 250	116.80	18 250	27.453	28 250	5.3932
8 500	113.60	18 500	26.301	28 500	5.2188
8 750	110.43	18 750	25.241	28 750	5.0452
9 000	107.31	19 000	24.237	29 000	4.8726
9 250	104.25	19 250	23.236	29 250	4.7005
9 500	101.21	19 500	22.310	29 500	4.5292
9 750	98.223	19 750	21.387	29 750	4.3586
				30 000	4.1889

TABLE B-2.- REFRACTIVITY FOR WHITE SANDS AUGUST OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h, m	N·10[6]	h, m	N·10[6]	h, m	N·10[6]
0	255.22	10 000	95.599	20 000	21.627
250	250.44	10 250	93.026	20 250	20.714
500	245.60	10 500	90.501	20 500	19.887
750	240.72	10 750	88.020	20 750	19.064
1 000	235.78	11 000	85.572	21 000	18.245
1 250	230.78	11 250	83.086	21 250	17.529
1 500	225.73	11 500	80.716	21 500	16.817
1 750	220.75	11 750	78.403	21 750	16.169
2 000	215.80	12 000	76.140	22 000	15.525
2 250	210.99	12 250	73.923	22 250	14.882
2 500	206.30	12 500	71.716	22 500	14.315
2 750	201.73	12 750	69.536	22 750	13.751
3 000	197.22	13 000	67.419	23 000	13.189
3 250	192.77	13 250	65.313	23 250	12.629
3 500	188.39	13 500	63.219	23 500	12.156
3 750	184.04	13 750	61.183	23 750	11.685
4 000	179.75	14 000	59.164	24 000	11.217
4 250	175.47	14 250	57.166	24 250	10.750
4 500	171.18	14 500	55.238	24 500	10.358
4 750	166.95	14 750	53.309	24 750	9.9680
5 000	162.81	15 000	51.386	25 000	9.5798
5 250	159.08	15 250	49.475	25 250	9.1926
5 500	155.44	15 500	47.586	25 500	8.8071
5 750	151.70	15 750	45.715	25 750	8.4971
6 000	147.59	16 000	43.866	26 000	8.1885
6 250	143.38	16 250	42.049	26 250	7.8807
6 500	139.25	16 500	40.271	26 500	7.5739
6 750	135.45	16 750	38.541	26 750	7.2684
7 000	131.79	17 000	36.820	27 000	6.9637
7 250	128.31	17 250	35.199	27 250	6.7294
7 500	125.00	17 500	33.652	27 500	6.4958
7 750	121.71	17 750	32.182	27 750	6.2629
8 000	118.48	18 000	30.724	28 000	6.0305
8 250	115.39	18 250	29.376	28 250	5.7992
8 500	112.34	18 500	28.113	28 500	5.5685
8 750	109.36	18 750	26.860	28 750	5.3385
9 000	106.45	19 000	25.718	29 000	5.1718
9 250	103.61	19 250	24.585	29 250	5.0055
9 500	100.85	19 500	23.562	29 500	4.8397
9 750	98.211	19 750	22.546	29 750	4.6744
				30 000	4.5097

TABLE B-3.- REFRACTIVITY FOR WHITE SANDS ANNUAL OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h, m	N·10^6	h, m	N·10^6	h, m	N·10^6
0	263.05	10 000	95.703	20 000	20.838
250	258.05	10 250	92.906	20 250	20.001
500	252.98	10 500	90.144	20 500	19.167
750	247.85	10 750	87.349	20 750	18.412
1 000	242.67	11 000	84.600	21 000	17.658
1 250	237.41	11 250	81.816	21 250	16.909
1 500	232.10	11 500	79.190	21 500	16.250
1 750	226.80	11 750	76.658	21 750	15.593
2 000	221.48	12 000	74.197	22 000	14.940
2 250	216.29	12 250	71.824	22 250	14.370
2 500	211.16	12 500	69.483	22 500	13.802
2 750	206.11	12 750	67.105	22 750	13.236
3 000	201.13	13 000	64.696	23 000	12.672
3 250	196.19	13 250	62.180	23 250	12.193
3 500	191.36	13 500	59.775	23 500	11.716
3 750	186.63	13 750	57.536	23 750	11.241
4 000	181.99	14 000	55.646	24 000	10.768
4 250	177.39	14 250	53.856	24 250	10.369
4 500	172.94	14 500	52.112	24 500	9.9712
4 750	168.57	14 750	50.375	24 750	9.5755
5 000	164.30	15 000	48.617	25 000	9.1811
5 250	160.12	15 250	46.780	25 250	8.8542
5 500	155.99	15 500	44.946	25 500	8.5286
5 750	152.01	15 750	43.143	25 750	8.2042
6 000	148.15	16 000	41.394	26 000	7.8811
6 250	144.32	16 250	39.708	26 250	7.5592
6 500	140.59	16 500	38.100	26 500	7.2386
6 750	136.80	16 750	36.495	26 750	6.9912
7 000	133.18	17 000	34.993	27 000	6.7469
7 250	129.69	17 250	33.545	27 250	6.5022
7 500	126.57	17 500	32.153	27 500	6.2582
7 750	123.54	17 750	30.766	27 750	6.0154
8 000	120.54	18 000	29.458	28 000	5.7731
8 250	117.47	18 250	28.222	28 250	5.5318
8 500	114.23	18 500	26.991	28 500	5.2911
8 750	110.90	18 750	25.859	28 750	5.1238
9 000	107.61	19 000	24.733	29 000	4.9570
9 250	104.40	19 250	23.706	29 250	4.7904
9 500	101.43	19 500	22.687	29 500	4.6245
9 750	98.538	19 750	21.760	29 750	4.4591
				30 000	4.2940

TABLE B-4.- REFRACTIVITY FOR EDWARDS AFB MAY OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h, m	N·10^6	h, m	N·10^6	h, m	N·10^6
0	275.36	10 000	94.427	20 000	19.374
250	269.14	10 250	91.499	20 250	18.552
500	262.88	10 500	88.582	20 500	17.790
750	256.56	10 750	85.721	20 750	17.049
1 000	250.20	11 000	82.883	21 000	16.324
1 250	243.79	11 250	80.062	21 250	15.667
1 500	237.54	11 500	77.265	21 500	15.012
1 750	231.54	11 750	74.496	21 750	14.384
2 000	225.75	12 000	71.754	22 000	13.815
2 250	220.13	12 250	69.032	22 250	13.247
2 500	214.63	12 500	66.355	22 500	12.681
2 750	209.28	12 750	63.798	22 750	12.185
3 000	204.01	13 000	61.227	23 000	11.690
3 250	198.84	13 250	58.751	23 250	11.198
3 500	193.82	13 500	56.394	23 500	10.718
3 750	188.91	13 750	54.142	23 750	10.300
4 000	184.10	14 000	51.996	24 000	9.8833
4 250	179.37	14 250	49.950	24 250	9.4693
4 500	174.75	14 500	47.992	24 500	9.0574
4 750	170.21	14 750	46.112	24 750	8.6924
5 000	165.77	15 000	44.325	25 000	8.3642
5 250	161.43	15 250	42.607	25 250	8.0372
5 500	157.17	15 500	40.953	25 500	7.7119
5 750	153.01	15 750	39.356	25 750	7.3875
6 000	148.94	16 000	37.814	26 000	7.0646
6 250	144.93	16 250	36.322	26 250	6.8065
6 500	141.04	16 500	34.880	26 500	6.5587
6 750	137.23	16 750	33.479	26 750	6.3121
7 000	133.60	17 000	32.141	27 000	6.0660
7 250	129.97	17 250	30.842	27 250	5.8211
7 500	126.31	17 500	29.579	27 500	5.5768
7 750	122.85	17 750	28.374	27 750	5.3337
8 000	119.47	18 000	27.212	28 000	5.1220
8 250	116.14	18 250	26.078	28 250	4.9509
8 500	112.87	18 500	25.008	28 500	4.7802
8 750	109.67	18 750	23.955	28 750	4.6101
9 000	106.52	19 000	22.968	29 000	4.4407
9 250	103.43	19 250	21.999	29 250	4.2718
9 500	100.38	19 500	21.093	29 500	4.1035
9 750	97.387	19 750	20.199	29 750	3.9360
				30 000	3.7688

TABLE B-5.- REFRACTIVITY FOR EDWARDS AFB JULY OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$
0	266.20	10 000	94.595	20 000	20.021
250	260.33	10 250	91.806	20 250	19.180
500	254.41	10 500	89.067	20 500	18.343
750	248.45	10 750	86.390	20 750	17.568
1 000	242.45	11 000	83.757	21 000	16.841
1 250	236.40	11 250	81.179	21 250	16.127
1 500	230.49	11 500	78.654	21 500	15.471
1 750	224.86	11 750	76.180	21 750	14.817
2 000	219.46	12 000	73.754	22 000	14.202
2 250	214.25	12 250	71.364	22 250	13.636
2 500	209.17	12 500	69.061	22 500	13.073
2 750	204.24	12 750	66.812	22 750	12.519
3 000	199.42	13 000	64.588	23 000	12.030
3 250	194.72	13 250	62.409	23 250	11.543
3 500	190.10	13 500	60.277	23 500	11.059
3 750	185.54	13 750	58.184	23 750	10.592
4 000	181.08	14 000	56.134	24 000	10.182
4 250	176.65	14 250	54.133	24 250	9.7738
4 500	172.27	14 500	52.142	24 500	9.3675
4 750	168.00	14 750	50.171	24 750	8.9629
5 000	163.79	15 000	48.228	25 000	8.6089
5 250	159.68	15 250	46.301	25 250	8.2866
5 500	155.60	15 500	44.406	25 500	7.9651
5 750	151.60	15 750	42.552	25 750	7.6451
6 000	147.67	16 000	40.746	26 000	7.3263
6 250	143.80	16 250	38.993	26 250	7.0087
6 500	140.00	16 500	37.286	26 500	6.7556
6 750	136.33	16 750	35.628	26 750	6.5117
7 000	132.69	17 000	34.022	27 000	6.2685
7 250	129.16	17 250	32.501	27 250	6.0263
7 500	125.64	17 500	31.079	27 500	5.7851
7 750	122.19	17 750	29.707	27 750	5.5444
8 000	118.87	18 000	28.365	28 000	5.3046
8 250	115.61	18 250	27.104	28 250	5.0940
8 500	112.42	18 500	25.894	28 500	4.9259
8 750	109.30	18 750	24.836	28 750	4.7581
9 000	106.25	19 000	23.801	29 000	4.5907
9 250	103.26	19 250	22.814	29 250	4.4242
9 500	100.32	19 500	21.851	29 500	4.2579
9 750	97.435	19 750	20.923	29 750	4.0921
				30 000	3.9271

TABLE B-6.- REFRACTIVITY FOR EDWARDS AFB ANNUAL OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$
0	276.15	10 000	94.760	20 000	19.614
250	269.75	10 250	91.864	20 250	18.781
500	263.32	10 500	88.989	20 500	18.003
750	256.84	10 750	86.154	20 750	17.256
1 000	250.32	11 000	83.340	21 000	16.516
1 250	243.75	11 250	80.558	21 250	15.855
1 500	237.41	11 500	77.807	21 500	15.196
1 750	231.34	11 750	75.109	21 750	14.552
2 000	225.50	12 000	72.463	22 000	13.977
2 250	219.87	12 250	69.818	22 250	13.404
2 500	214.33	12 500	67.238	22 500	12.832
2 750	208.91	12 750	64.736	22 750	12.324
3 000	203.63	13 000	62.302	23 000	11.829
3 250	198.47	13 250	59.950	23 250	11.336
3 500	193.44	13 500	57.681	23 500	10.844
3 750	188.53	13 750	55.499	23 750	10.427
4 000	183.71	14 000	53.404	24 000	10.012
4 250	179.01	14 250	51.384	24 250	9.5989
4 500	174.41	14 500	49.426	24 500	9.1869
4 750	169.91	14 750	47.525	24 750	8.8103
5 000	165.51	15 000	45.690	25 000	8.4805
5 250	161.20	15 250	43.915	25 250	8.1519
5 500	156.98	15 500	42.186	25 500	7.8243
5 750	152.86	15 750	40.508	25 750	7.4978
6 000	148.82	16 000	38.877	26 000	7.1724
6 250	144.86	16 250	37.293	26 250	6.9033
6 500	141.01	16 500	35.749	26 500	6.6530
6 750	137.21	16 750	34.259	26 750	6.4035
7 000	133.63	17 000	32.828	27 000	6.1546
7 250	130.07	17 250	31.451	27 250	5.9066
7 500	126.41	17 500	30.124	27 500	5.6596
7 750	122.97	17 750	28.856	27 750	5.4133
8 000	119.61	18 000	27.629	28 000	5.1935
8 250	116.32	18 250	26.449	28 250	5.0202
8 500	113.07	18 500	25.354	28 500	4.8472
8 750	109.87	18 750	24.280	28 750	4.6748
9 000	106.75	19 000	23.283	29 000	4.5032
9 250	103.68	19 250	22.293	29 250	4.3318
9 500	100.66	19 500	21.371	29 500	4.1610
9 750	97.693	19 750	20.453	29 750	3.9910
				30 000	3.8213

TABLE B-7.- REFRACTIVITY FOR EGLIN AFB JANUARY OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h, m	N·10^6	h, m	N·10^6	h, m	N·10^6
0	283.43	10 000	95.511	20 000	20.763
250	275.73	10 250	92.745	20 250	19.906
500	267.88	10 500	90.026	20 500	19.054
750	260.19	10 750	87.476	20 750	18.281
1 000	252.83	11 000	84.920	21 000	17.512
1 250	245.85	11 250	82.302	21 250	16.746
1 500	239.12	11 500	79.612	21 500	16.082
1 750	232.68	11 750	76.897	21 750	15.421
2 000	226.39	12 000	74.141	22 000	14.828
2 250	220.32	12 250	71.301	22 250	14.238
2 500	214.43	12 500	68.625	22 500	13.649
2 750	208.76	12 750	66.084	22 750	13.062
3 000	203.31	13 000	63.849	23 000	12.564
3 250	198.10	13 250	61.701	23 250	12.068
3 500	193.00	13 500	59.615	23 500	11.572
3 750	188.01	13 750	57.556	23 750	11.079
4 000	183.13	14 000	55.435	24 000	10.663
4 250	178.39	14 250	53.331	24 250	10.250
4 500	173.79	14 500	51.294	24 500	9.8372
4 750	169.26	14 750	49.343	24 750	9.4265
5 000	164.91	15 000	47.485	25 000	9.0834
5 250	160.67	15 250	45.744	25 250	8.7412
5 500	156.54	15 500	44.068	25 500	8.4009
5 750	152.54	15 750	42.441	25 750	8.0615
6 000	148.52	16 000	40.862	26 000	7.7239
6 250	144.68	16 250	39.321	26 250	7.3876
6 500	140.88	16 500	37.832	26 500	7.1288
6 750	137.20	16 750	36.375	26 750	6.8713
7 000	133.55	17 000	34.912	27 000	6.6146
7 250	130.03	17 250	33.509	27 250	6.3592
7 500	126.54	17 500	32.146	27 500	6.1045
7 750	123.12	17 750	30.821	27 750	5.8511
8 000	119.82	18 000	29.500	28 000	5.5985
8 250	116.56	18 250	28.255	28 250	5.3471
8 500	113.33	18 500	27.015	28 500	5.1738
8 750	110.17	18 750	25.868	28 750	5.0013
9 000	107.14	19 000	24.788	29 000	4.8291
9 250	104.16	19 250	23.714	29 250	4.6578
9 500	101.21	19 500	22.725	29 500	4.4868
9 750	98.334	19 750	21.741	29 750	4.3165
				30 000	4.1467

TABLE B-8.- REFRACTIVITY FOR EGLIN AFB AUGUST OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$
0	268.37	10 000	95.561	20 000	21.640
250	260.88	10 250	92.979	20 250	20.728
500	254.19	10 500	90.450	20 500	19.896
750	248.37	10 750	87.964	20 750	19.068
1 000	242.78	11 000	85.516	21 000	18.313
1 250	237.13	11 250	83.022	21 250	17.562
1 500	231.58	11 500	80.651	21 500	16.814
1 750	226.13	11 750	78.335	21 750	16.161
2 000	220.77	12 000	76.072	22 000	15.510
2 250	215.42	12 250	73.851	22 250	14.863
2 500	210.12	12 500	71.641	22 500	14.304
2 750	204.97	12 750	69.456	22 750	13.747
3 000	199.91	13 000	67.337	23 000	13.191
3 250	194.94	13 250	65.232	23 250	12.637
3 500	190.07	13 500	63.174	23 500	12.162
3 750	185.29	13 750	61.124	23 750	11.688
4 000	180.59	14 000	59.089	24 000	11.215
4 250	175.99	14 250	57.076	24 250	10.746
4 500	171.47	14 500	55.108	24 500	10.347
4 750	167.06	14 750	53.144	24 750	9.9495
5 000	162.71	15 000	51.188	25 000	9.5543
5 250	158.51	15 250	49.248	25 250	9.1610
5 500	154.43	15 500	47.337	25 500	8.8367
5 750	150.40	15 750	45.455	25 750	8.5141
6 000	146.53	16 000	43.605	26 000	8.1927
6 250	142.75	16 250	41.797	26 250	7.8725
6 500	139.03	16 500	40.036	26 500	7.5531
6 750	135.43	16 750	38.325	26 750	7.2353
7 000	131.87	17 000	36.624	27 000	6.9912
7 250	128.40	17 250	35.031	27 250	6.7479
7 500	125.06	17 500	33.512	27 500	6.5054
7 750	121.77	17 750	32.070	27 750	6.2636
8 000	118.55	18 000	30.638	28 000	6.0223
8 250	115.46	18 250	29.316	28 250	5.7820
8 500	112.41	18 500	28.074	28 500	5.5424
8 750	109.40	18 750	26.840	28 750	5.3036
9 000	106.47	19 000	25.710	29 000	5.1355
9 250	103.61	19 250	24.588	29 250	4.9681
9 500	100.88	19 500	23.570	29 500	4.8012
9 750	98.195	19 750	22.558	29 750	4.6349
				30 000	4.4692

TABLE B-9.- REFRACTIVITY FOR EGLIN AFB ANNUAL OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h, m	N·10^6	h, m	N·10^6	h, m	N·10^6
0	274.94	10 000	96.841	20 000	21.111
250	266.66	10 250	94.365	20 250	20.249
500	259.36	10 500	91.778	20 500	19.392
750	253.01	10 750	89.083	20 750	18.540
1 000	246.95	11 000	86.128	21 000	17.793
1 250	240.89	11 250	83.207	21 250	17.051
1 500	234.88	11 500	80.394	21 500	16.381
1 750	228.93	11 750	77.702	21 750	15.714
2 000	223.10	12 000	75.134	22 000	15.051
2 250	217.48	12 250	72.638	22 250	14.471
2 500	212.04	12 500	70.218	22 500	13.892
2 750	206.69	12 750	67.900	22 750	13.317
3 000	201.45	13 000	65.607	23 000	12.744
3 250	196.35	13 250	63.333	23 250	12.262
3 500	191.39	13 500	61.139	23 500	11.782
3 750	186.53	13 750	58.976	23 750	11.304
4 000	181.74	14 000	56.862	24 000	10.828
4 250	177.08	14 250	54.803	24 250	10.428
4 500	172.57	14 500	52.835	24 500	10.029
4 750	168.20	14 750	50.903	24 750	9.6328
5 000	163.91	15 000	49.020	25 000	9.2378
5 250	159.72	15 250	47.192	25 250	8.9086
5 500	155.57	15 500	45.412	25 500	8.5810
5 750	151.57	15 750	43.672	25 750	8.2544
6 000	147.69	16 000	41.974	26 000	7.9290
6 250	143.86	16 250	40.318	26 250	7.6052
6 500	140.16	16 500	38.659	26 500	7.2823
6 750	136.48	16 750	37.085	26 750	7.0333
7 000	132.93	17 000	35.560	27 000	6.7853
7 250	129.43	17 250	34.088	27 250	6.5384
7 500	126.02	17 500	32.671	27 500	6.2921
7 750	122.79	17 750	31.259	27 750	6.0468
8 000	119.59	18 000	29.932	28 000	5.8023
8 250	116.43	18 250	28.613	28 250	5.5587
8 500	113.33	18 500	27.399	28 500	5.3162
8 750	110.26	18 750	26.251	28 750	5.1471
9 000	107.28	19 000	25.109	29 000	4.9788
9 250	104.41	19 250	24.057	29 250	4.8110
9 500	101.68	19 500	23.012	29 500	4.6438
9 750	99.243	19 750	22.059	29 750	4.4772
				30 000	4.3111

TABLE B-10.- REFRACTIVITY FOR ASCENSION FEBRUARY OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h, m	N·10^6	h, m	N·10^6	h, m	N·10^6
0	267.06	10 000	95.402	20 000	21.664
250	261.95	10 250	92.819	20 250	20.710
500	256.31	10 500	90.294	20 500	19.766
750	250.53	10 750	87.828	20 750	18.918
1 000	244.60	11 000	85.412	21 000	18.078
1 250	238.54	11 250	83.054	21 250	17.244
1 500	232.28	11 500	80.649	21 500	16.523
1 750	225.78	11 750	78.380	21 750	15.808
2 000	219.59	12 000	76.163	22 000	15.098
2 250	213.94	12 250	73.988	22 250	14.482
2 500	208.74	12 500	71.823	22 500	13.871
2 750	203.70	12 750	69.684	22 750	13.265
3 000	198.81	13 000	67.604	23 000	12.739
3 250	194.05	13 250	65.526	23 250	12.217
3 500	189.37	13 500	63.492	23 500	11.697
3 750	184.76	13 750	61.466	23 750	11.181
4 000	180.22	14 000	59.464	24 000	10.750
4 250	175.68	14 250	57.512	24 250	10.322
4 500	171.11	14 500	55.575	24 500	9.8963
4 750	166.59	14 750	53.665	24 750	9.4732
5 000	162.17	15 000	51.794	25 000	9.1223
5 250	157.84	15 250	49.967	25 250	8.7734
5 500	153.71	15 500	48.196	25 500	8.4269
5 750	149.73	15 750	46.448	25 750	8.0818
6 000	145.80	16 000	44.705	26 000	7.7387
6 250	142.04	16 250	42.970	26 250	7.3978
6 500	138.34	16 500	41.245	26 500	7.1367
6 750	134.79	16 750	39.554	26 750	6.8769
7 000	131.30	17 000	37.883	27 000	6.6184
7 250	127.92	17 250	36.240	27 250	6.3612
7 500	124.58	17 500	34.601	27 500	6.1054
7 750	121.29	17 750	33.036	27 750	5.8509
8 000	118.13	18 000	31.528	28 000	5.5978
8 250	115.02	18 250	30.102	28 250	5.3459
8 500	111.99	18 500	28.688	28 500	5.1732
8 750	109.05	18 750	27.389	28 750	5.0014
9 000	106.19	19 000	26.102	29 000	4.8300
9 250	103.45	19 250	24.934	29 250	4.6596
9 500	100.72	19 500	23.775	29 500	4.4897
9 750	98.039	19 750	22.715	29 750	4.3203
				30 000	4.1518

TABLE B-11.- REFRACTIVITY FOR ASCENSION SEPTEMBER OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h, m	N·10^6	h, m	N·10^6	h, m	N·10^6
0	270.37	10 000	95.612	20 000	21.391
250	265.22	10 250	93.019	20 250	20.510
500	259.44	10 500	90.474	20 500	19.633
750	253.69	10 750	87.985	20 750	18.762
1 000	247.82	11 000	85.555	21 000	18.008
1 250	241.85	11 250	83.176	21 250	17.257
1 500	235.13	11 500	80.753	21 500	16.580
1 750	227.11	11 750	78.457	21 750	15.906
2 000	219.76	12 000	76.199	22 000	15.235
2 250	213.84	12 250	73.986	22 250	14.640
2 500	208.74	12 500	71.769	22 500	14.050
2 750	203.77	12 750	69.609	22 750	13.462
3 000	198.94	13 000	67.467	23 000	12.878
3 250	194.24	13 250	65.350	23 250	12.383
3 500	189.62	13 500	63.318	23 500	11.891
3 750	185.04	13 750	61.277	23 750	11.402
4 000	180.49	14 000	59.237	24 000	10.915
4 250	175.94	14 250	57.170	24 250	10.509
4 500	171.35	14 500	55.112	24 500	10.104
4 750	166.80	14 750	53.102	24 750	9.7018
5 000	162.38	15 000	51.166	25 000	9.3009
5 250	158.06	15 250	49.309	25 250	8.9018
5 500	153.94	15 500	47.600	25 500	8.5811
5 750	149.96	15 750	45.913	25 750	8.2618
6 000	146.01	16 000	44.214	26 000	7.9439
6 250	142.23	16 250	42.495	26 250	7.6274
6 500	138.50	16 500	40.762	26 500	7.3119
6 750	134.95	16 750	39.031	26 750	7.0640
7 000	131.46	17 000	37.323	27 000	6.8172
7 250	128.06	17 250	35.655	27 250	6.5709
7 500	124.67	17 500	33.998	27 500	6.3255
7 750	121.26	17 750	32.429	27 750	6.0809
8 000	117.99	18 000	30.938	28 000	5.8372
8 250	114.82	18 250	29.464	28 250	5.5944
8 500	111.76	18 500	28.114	28 500	5.3523
8 750	108.91	18 750	26.8561	28 750	5.1832
9 000	106.17	19 000	25.612	29 000	5.0148
9 250	103.53	19 250	24.487	29 250	4.8468
9 500	100.90	19 500	23.373	29 500	4.6792
9 750	98.246	19 750	22.378	29 750	4.5120
				30 000	4.3454

TABLE B-12.- REFRACTIVITY FOR ASCENSION ANNUAL OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$
0	268.38	10 000	95.520	20 000	21.559
250	263.35	10 250	92.953	20 250	20.631
500	257.81	10 500	90.405	20 500	19.711
750	252.18	10 750	87.890	20 750	18.873
1 000	246.27	11 000	85.342	21 000	18.042
1 250	240.11	11 250	82.845	21 250	17.220
1 500	233.59	11 500	80.314	21 500	16.500
1 750	226.59	11 750	77.968	21 750	15.787
2 000	219.99	12 000	75.728	22 000	15.080
2 250	214.19	12 250	73.578	22 250	14.484
2 500	208.93	12 500	71.470	22 500	13.891
2 750	203.84	12 750	69.408	22 750	13.301
3 000	198.88	13 000	67.409	23 000	12.793
3 250	194.02	13 250	65.400	23 250	12.288
3 500	189.24	13 500	63.426	23 500	11.785
3 750	184.52	13 750	61.433	23 750	11.283
4 000	179.88	14 000	59.433	24 000	10.857
4 250	175.31	14 250	57.409	24 250	10.433
4 500	170.82	14 500	55.385	24 500	10.012
4 750	166.43	14 750	53.407	24 750	9.5923
5 000	162.14	15 000	51.490	25 000	9.1755
5 250	157.90	15 250	49.646	25 250	8.8403
5 500	153.82	15 500	47.919	25 500	8.5069
5 750	149.85	15 750	46.227	25 750	8.1752
6 000	145.92	16 000	44.536	26 000	7.8452
6 250	142.14	16 250	42.842	26 250	7.5170
6 500	138.42	16 500	41.143	26 500	7.1904
6 750	134.85	16 750	39.456	26 750	6.9429
7 000	131.33	17 000	37.785	27 000	6.6964
7 250	127.95	17 250	36.137	27 250	6.4506
7 500	124.59	17 500	34.497	27 500	6.2062
7 750	121.28	17 750	32.922	27 750	5.9625
8 000	118.11	18 000	31.412	28 000	5.7201
8 250	114.99	18 250	29.914	28 250	5.4787
8 500	111.95	18 500	28.531	28 500	5.2381
8 750	109.02	18 750	27.234	28 750	5.0715
9 000	106.17	19 000	25.950	29 000	4.9055
9 250	103.45	19 250	24.783	29 250	4.7403
9 500	100.75	19 500	23.627	29 500	4.5754
9 750	98.115	19 750	22.588	29 750	4.4112
				30 000	4.2475

TABLE B-13.- REFRACTIVITY FOR KWAJALEIN MAY OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h, m	N·10^6	h, m	N·10^6	h, m	N·10^6
0	264.95	10 000	94.938	20 000	21.595
250	259.52	10 250	N/A	20 250	20.625
500	253.90	10 500	89.899	20 500	19.738
750	248.15	10 750	87.461	20 750	18.858
1 000	242.33	11 000	85.080	21 000	18.065
1 250	236.48	11 250	82.761	21 250	17.288
1 500	230.64	11 500	80.489	21 500	16.540
1 750	224.88	11 750	78.265	21 750	15.859
2 000	219.25	12 000	76.077	22 000	15.184
2 250	213.75	12 250	73.926	22 250	14.537
2 500	208.42	12 500	71.805	22 500	13.952
2 750	203.24	12 750	69.738	22 750	13.370
3 000	198.19	13 000	67.700	23 000	12.792
3 250	193.28	13 250	65.697	23 250	12.290
3 500	188.49	13 500	63.713	23 500	11.800
3 750	183.79	13 750	61.762	23 750	11.311
4 000	179.21	14 000	59.851	24 000	10.826
4 250	174.71	14 250	57.970	24 250	10.413
4 500	170.33	14 500	56.099	24 500	10.007
4 750	165.98	14 750	54.281	24 750	9.6044
5 000	161.69	15 000	52.482	25 000	9.2037
5 250	157.52	15 250	50.680	25 250	8.8138
5 500	153.44	15 500	48.900	25 500	8.4712
5 750	149.46	15 750	47.150	25 750	8.1323
6 000	145.57	16 000	45.397	26 000	7.7969
6 250	141.77	16 250	43.636	26 250	7.4647
6 500	138.06	16 500	41.876	26 500	7.1364
6 750	134.52	16 750	40.120	26 750	6.8319
7 000	130.96	17 000	38.372	27 000	6.6100
7 250	127.43	17 250	36.646	27 250	6.3886
7 500	124.08	17 500	34.965	27 500	6.1674
7 750	120.84	17 750	33.347	27 750	5.9460
8 000	117.63	18 000	31.774	28 000	5.7250
8 250	114.52	18 250	30.231	28 250	5.5038
8 500	111.49	18 500	28.774	28 500	5.2830
8 750	108.54	18 750	27.371	28 750	5.0839
9 000	105.70	19 000	26.073	29 000	4.9206
9 250	102.92	19 250	24.831	29 250	4.7579
9 500	100.20	19 500	23.686	29 500	4.5961
9 750	97.547	19 750	22.599	29 750	4.4348
				30 000	4.2741

TABLE B-14.- REFRACTIVITY FOR KWAJALEIN DECEMBER OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$
0	264.71	10 000	94.822	20 000	21.598
250	259.26	10 250	92.281	20 250	20.618
500	253.70	10 500	89.790	20 500	19.709
750	248.04	10 750	87.356	20 750	18.817
1 000	242.31	11 000	84.983	21 000	18.024
1 250	236.49	11 250	82.653	21 250	17.236
1 500	230.67	11 500	80.371	21 500	16.498
1 750	224.80	11 750	78.138	21 750	15.811
2 000	219.00	12 000	75.949	22 000	15.127
2 250	213.41	12 250	73.798	22 250	14.493
2 500	208.03	12 500	71.681	22 500	13.903
2 750	202.79	12 750	69.627	22 750	13.315
3 000	197.69	13 000	67.601	23 000	12.743
3 250	192.71	13 250	65.622	23 250	12.245
3 500	187.88	13 500	63.667	23 500	11.748
3 750	183.16	13 750	61.745	23 750	11.254
4 000	178.57	14 000	59.858	24 000	10.[illegible]79
4 250	174.57	14 250	58.000	24 50	10.370
4 500	169.71	14 500	56.132	24 500	9.9620
4 750	165.41	14 750	54.337	24 750	9.5564
5 000	161.19	15 000	52.578	25 000	9.1529
5 250	157.07	15 250	50.823	25 250	8.7866
5 500	153.05	15 500	49.096	25 500	8.4615
5 750	149.13	15 750	47.428	25 750	8.1375
6 000	145.30	16 000	45.761	26 000	7.8152
6 250	141.52	16 250	44.075	26 250	7.4948
6 500	137.82	16 500	42.368	26 500	7.1756
6 750	134.31	16 750	40.644	26 750	6.9029
7 000	130.79	17 000	38.924	27 000	6.6598
7 250	127.38	17 250	37.188	27 250	6.4177
7 500	124.01	17 500	35.474	27 500	6.1767
7 750	120.68	17 750	33.829	27 750	5.9366
8 000	117.49	18 000	32.305	28 000	5.6975
8 250	114.40	18 250	30.562	28 250	5.4594
8 500	111.39	18 500	29.025	28 500	5.2225
8 750	108.46	18 750	27.556	28 750	5.0502
9 000	105.60	19 000	26.205	29 000	4.8839
9 250	102.81	19 250	24.931	29 250	4.7181
9 500	100.08	19 500	23.744	29 500	4.5531
9 750	97.419	19 750	22.638	29 750	4.3885
				30 000	4.2240

TABLE B-15.- REFRACTIVITY FOR KWAJALEIN ANNUAL OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h, m	N·10^6	h, m	N·10^6	h, m	N·10^6
0	264.79	10 000	94.915	20 000	21.615
250	259.39	10 250	92.376	20 250	20.649
500	253.81	10 500	89.891	20 500	19.766
750	248.11	10 750	87.459	20 750	18.890
1 000	242.33	11 000	85.084	21 000	18.100
1 250	236.51	11 250	82.762	21 250	17.328
1 500	230.71	11 500	N/A	21 500	16.582
1 750	224.97	11 750	N/A	21 750	15.904
2 000	219.31	12 000	76.057	22 000	15.231
2 250	213.76	12 250	73.905	22 250	14.584
2 500	208.36	12 500	71.784	22 500	13.999
2 750	203.10	12 750	69.715	22 750	13.417
3 000	198.03	13 000	67.680	23 000	12.840
3 250	193.10	13 250	65.684	23 250	12.335
3 500	188.31	13 500	63.708	23 500	11.843
3 750	183.65	13 750	61.774	23 750	11.354
4 000	179.07	14 000	59.876	24 000	10.867
4 250	174.56	14 250	58.008	24 250	10.454
4 500	170.15	14 500	56.150	24 500	10.049
4 750	165.80	14 750	54.340	24 750	9.6465
5 000	161.54	15 000	52.543	25 000	9.2457
5 250	157.38	15 250	50.741	25 250	8.8597
5 500	153.32	15 500	48.957	25 500	8.5352
5 750	149.34	15 750	47.200	25 750	8.2123
6 000	145.47	16 000	45.428	26 000	7.8910
6 250	141.68	16 250	43.646	26 250	7.5714
6 500	137.97	16 500	41.864	26 500	7.2533
6 750	134.40	16 750	40.085	26 750	6.9581
7 000	130.85	17 000	38.305	27 000	6.7155
7 250	127.35	17 250	36.554	27 250	6.4741
7 500	124.01	17 500	34.861	27 500	6.2339
7 750	120.79	17 750	33.237	27 750	5.9947
8 000	117.59	18 000	31.667	28 000	5.7562
8 250	114.49	18 250	30.138	28 250	5.5191
8 500	111.47	18 500	28.697	28 500	5.2830
8 750	108.53	18 750	27.310	28 750	5.0880
9 000	105.67	19 000	26.041	29 000	4.9232
9 250	102.88	19 250	24.820	29 250	4.7590
9 500	100.16	19 500	23.691	29 500	4.5951
9 750	97.510	19 750	22.614	29 750	4.4321
				30 000	4.2695

TABLE B-16.- REFRACTIVITY FOR WALLOPS MARCH OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$
0	290.21	10 000	94.334	20 000	20.033
250	281.80	10 250	91.179	20 250	19.235
500	274.20	10 500	87.885	20 500	18.439
750	266.99	10 750	84.606	20 750	17.723
1 000	259.76	11 000	81.392	21 000	17.009
1 250	252.28	11 250	78.282	21 250	16.363
1 500	245.12	11 500	75.291	21 500	15.718
1 750	238.28	11 750	72.369	21 750	15.075
2 000	231.52	12 000	69.546	22 000	14.515
2 250	224.99	12 250	66.914	22 250	13.955
2 500	218.77	12 500	64.371	22 500	13.395
2 750	212.86	12 750	61.950	22 750	12.837
3 000	207.14	13 000	59.679	23 000	12.353
3 250	201.47	13 250	57.462	23 250	11.870
3 500	195.98	13 500	55.308	23 500	11.389
3 750	190.71	13 750	53.208	23 750	10.910
4 000	185.64	14 000	51.184	24 000	10.502
4 250	180.75	14 250	49.244	24 250	10.096
4 500	175.99	14 500	47.431	24 500	9.6921
4 750	171.30	14 750	45.683	24 750	9.2893
5 000	166.63	15 000	43.931	25 000	8.9599
5 250	162.02	15 250	42.304	25 250	8.6318
5 500	157.64	15 500	40.734	25 500	8.3041
5 750	153.51	15 750	39.215	25 750	7.9774
6 000	149.43	16 000	37.750	26 000	7.6515
6 250	145.50	16 250	36.333	26 250	7.3265
6 500	141.63	16 500	34.967	26 500	7.0772
6 750	137.78	16 750	33.598	26 750	6.8285
7 000	134.07	17 000	32.311	27 000	6.5803
7 250	130.43	17 250	31.078	27 250	6.3326
7 500	126.85	17 500	29.844	27 500	6.0855
7 750	123.37	17 750	28.684	27 750	5.8390
8 000	119.88	18 000	27.582	28 000	5.5930
8 250	116.33	18 250	26.481	28 250	5.3476
8 500	112.91	18 500	25.459	28 500	5.1737
8 750	109.57	18 750	24.437	28 750	5.0003
9 000	106.32	19 000	23.497	29 000	4.8277
9 250	103.32	19 250	22.557	29 250	4.6555
9 500	100.39	19 500	21.694	29 500	4.4842
9 750	97.405	19 750	20.831	29 750	4.3133
				30 000	4.1433

TABLE B-17.- REFRACTIVITY FOR WALLOPS JULY OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$
0	269.61	10 000	95.446	20 000	21.438
250	263.77	10 250	92.837	20 250	20.557
500	257.37	10 500	90.281	20 500	19.746
750	251.19	10 750	87.777	20 750	18.939
1 000	245.21	11 000	85.332	21 000	18.136
1 250	239.43	11 250	82.921	21 250	17.416
1 500	233.86	11 500	80.527	21 500	16.702
1 750	228.31	11 750	78.093	21 750	16.065
2 000	222.87	12 000	75.721	22 000	15.431
2 250	217.49	12 250	73.371	22 250	14.800
2 500	212.07	12 500	71.003	22 500	14.260
2 750	206.54	12 750	68.700	22 750	13.719
3 000	201.08	13 000	66.434	23 000	13.181
3 250	195.86	13 250	64.265	23 250	12.643
3 500	190.89	13 500	62.123	23 500	12.177
3 750	186.11	13 750	60.009	23 750	11.713
4 000	181.48	14 000	57.933	24 000	11.250
4 250	176.91	14 250	55.864	24 250	10.788
4 500	172.35	14 500	53.805	24 500	10.395
4 750	167.82	14 750	51.772	24 750	10.003
5 000	163.40	15 000	49.765	25 000	9.6125
5 250	159.05	15 250	47.799	25 250	9.2236
5 500	154.88	15 500	45.865	25 500	8.8368
5 750	150.84	15 750	43.991	25 750	8.5307
6 000	146.87	16 000	42.177	26 000	8.2255
6 250	143.04	16 250	40.432	26 250	7.9210
6 500	139.26	16 500	38.755	26 500	7.6172
6 750	135.58	16 750	37.151	26 750	7.3146
7 000	131.95	17 000	35.618	27 000	7.0123
7 250	128.48	17 250	34.091	27 250	6.7796
7 500	125.08	17 500	32.672	27 500	6.5473
7 750	121.82	17 750	31.326	27 750	6.3159
8 000	118.70	18 000	29.988	28 000	6.0846
8 250	115.61	18 250	28.747	28 250	5.8539
8 500	112.55	18 500	27.577	28 500	5.6236
8 750	109.50	18 750	26.411	28 750	5.3941
9 000	106.57	19 000	25.339	29 000	5.1649
9 250	103.68	19 250	24.271	29 250	4.9999
9 500	100.86	19 500	23.295	29 500	4.8358
9 750	98.117	19 750	22.323	29 750	4.6724
				30 000	4.5094

TABLE B-18.- REFRACTIVITY FOR WALLOPS ANNUAL OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$
0	280.10	10 000	95.258	20 000	20.600
250	273.12	10 250	92.433	20 250	19.776
500	265.80	10 500	89.643	20 500	18.955
750	258.80	10 750	86.891	20 750	18.225
1 000	252.08	11 000	84.161	21 000	17.498
1 250	245.68	11 250	81.458	21 250	16.773
1 500	239.26	11 500	78.780	21 500	16.134
1 750	232.68	11 750	76.134	21 750	15.497
2 000	226.46	12 000	73.467	22 000	14.862
2 250	220.96	12 250	70.897	22 250	14.299
2 500	215.47	12 500	68.348	22 500	13.739
2 750	209.81	12 750	65.855	22 750	13.180
3 000	204.20	13 000	63.370	23 000	12.624
3 250	198.68	13 250	60.948	23 250	12.152
3 500	193.34	13 500	58.674	23 500	11.682
3 750	188.22	13 750	56.473	23 750	11.213
4 000	183.31	14 000	54.395	24 000	10.746
4 250	178.54	14 250	52.400	24 250	10.353
4 500	173.87	14 500	50.472	24 500	9.9621
4 750	169.32	14 750	48.591	24 750	9.5717
5 000	164.90	15 000	46.757	25 000	9.1828
5 250	160.55	15 250	44.957	25 250	8.8594
5 500	156.39	15 500	43.206	25 500	8.5366
5 750	152.38	15 750	41.509	25 750	8.2152
6 000	148.42	16 000	39.868	26 000	7.8943
6 250	144.61	16 250	38.284	26 250	7.5749
6 500	140.82	16 500	36.743	26 500	7.2564
6 750	137.11	16 750	35.273	26 750	7.0101
7 000	133.46	17 000	33.804	27 000	6.7649
7 250	129.93	17 250	32.453	27 250	6.5201
7 500	126.46	17 500	31.173	27 500	6.2764
7 750	123.12	17 750	29.894	27 750	6.0330
8 000	119.80	18 000	28.755	28 000	5.7907
8 250	116.52	18 250	27.648	28 250	5.5488
8 500	113.27	18 500	26.542	28 500	5.3079
8 750	110.13	18 750	25.484	28 750	5.1391
9 000	107.04	19 000	24.429	29 000	4.9709
9 250	104.00	19 250	23.434	29 250	4.8032
9 500	101.03	19 500	22.445	29 500	4.6361
9 750	98.120	19 750	21.519	29 750	4.4694
				30 000	4.3034

TABLE B-19.- REFRACTIVITY FOR CAPE CANAVERAL JANUARY OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$
0	276.95	10 000	95.881	20 000	20.982
250	269.82	10 250	93.159	20 250	20.088
500	263.17	10 500	90.481	20 500	19.202
750	256.93	10 750	87.950	20 750	18.402
1 000	250.74	11 000	85.368	21 000	17.608
1 250	244.45	11 250	82.873	21 250	16.819
1 500	238.06	11 500	80.297	21 500	16.140
1 750	231.63	11 750	77.663	21 750	15.464
2 000	225.32	12 000	75.004	22 000	14.793
2 250	219.23	12 250	72.281	22 250	14.215
2 500	213.46	12 500	69.595	22 500	13.639
2 750	207.89	12 750	67.135	22 750	13.066
3 000	202.48	13 000	64.790	23 000	12.565
3 250	197.18	13 250	62.732	23 250	12.068
3 500	192.03	13 500	60.698	23 500	11.572
3 750	187.13	13 750	58.674	23 750	11.078
4 000	182.38	14 000	56.628	24 000	10.662
4 250	177.69	14 250	54.574	24 250	10.249
4 500	173.19	14 500	52.556	24 500	9.8365
4 750	168.80	14 750	50.595	24 750	9.4261
5 000	164.50	15 000	48.706	25 000	9.0177
5 250	160.30	15 250	46.899	25 250	8.6892
5 500	156.15	15 500	45.159	25 500	8.3621
5 750	152.15	15 750	43.480	25 750	8.0363
6 000	148.28	16 000	41.853	26 000	7.7[illegible]2
6 250	144.44	16 250	40.272	26 250	7.3891
6 500	140.73	16 500	38.750	26 500	7.1339
6 750	137.04	16 750	37.219	26 750	6.8793
7 000	133.46	17 000	35.757	27 000	6.6260
7 250	129.92	17 250	34.319	27 250	6.3736
7 500	126.51	17 500	32.908	27 500	6.1218
7 750	123.13	17 750	31.499	27 750	5.8712
8 000	119.81	18 000	30.147	28 000	5.6215
8 250	116.63	18 250	28.848	28 250	5.3725
8 500	113.49	18 500	27.556	28 500	5.2009
8 750	110.40	18 750	26.349	28 750	5.0295
9 000	107.37	19 000	25.152	29 000	4.8586
9 250	104.41	19 250	24.052	29 250	4.6883
9 500	101.51	19 500	23.020	29 500	4.5183
9 750	98.636	19 750	21.997	29 750	4.3487
				30 000	4.1796

TABLE B-20.- REFRACTIVITY FOR CAPE CANAVERAL AUGUST OPTICAL ATMOSPHERE

(λ = 0.555 micron).

h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$
0	265.64	10 000	95.494	20 000	21.633
250	260.77	10 250	92.892	20 250	20.705
500	254.91	10 500	90.353	20 500	19.863
750	248.97	10 750	87.876	20 750	19.028
1 000	243.13	11 000	85.462	21 000	18.273
1 250	237.51	11 250	83.005	21 250	17.521
1 500	231.99	11 500	80.686	21 500	16.773
1 750	226.41	11 750	78.410	21 750	16.116
2 000	220.91	12 000	76.169	22 000	15.462
2 250	215.50	12 250	73.960	22 250	14.811
2 500	210.21	12 500	71.756	22 500	14.241
2 750	205.07	12 750	69.567	22 750	13.674
3 000	200.00	13 000	67.442	23 000	13.109
3 250	195.01	13 250	65.331	23 250	12.617
3 500	190.10	13 500	63.271	23 500	12.128
3 750	185.82	13 750	61.217	23 750	11.641
4 000	180.65	14 000	59.184	24 000	11.156
4 250	176.09	14 250	57.175	24 250	10.748
4 500	171.63	14 500	55.220	24 500	10.341
4 750	167.27	14 750	53.261	24 750	9.9355
5 000	162.95	15 000	51.312	25 000	9.5315
5 250	158.73	15 250	49.373	25 250	9.1294
5 500	154.62	15 500	47.462	25 500	8.8041
5 750	150.57	15 750	45.574	25 750	8.4805
6 000	146.71	16 000	43.718	26 000	8.1576
6 250	142.97	16 250	41.902	26 250	7.8359
6 500	139.27	16 500	40.133	26 500	7.5157
6 750	135.66	16 750	38.414	26 750	7.1964
7 000	132.09	17 000	36.761	27 000	6.9513
7 250	128.58	17 250	35.115	27 250	6.7068
7 500	125.20	17 500	33.585	27 500	6.4631
7 750	121.86	17 750	32.135	27 750	6.2206
8 000	118.59	18 000	30.695	28 000	5.9787
8 250	115.46	18 250	29.378	28 250	5.7376
8 500	112.39	18 500	28.133	28 500	5.4976
8 750	109.38	18 750	26.897	28 750	5.2582
9 000	106.45	19 000	25.758	29 000	5.0920
9 250	103.60	19 250	24.625	29 250	4.9263
9 500	100.86	19 500	23.594	29 500	4.7611
9 750	98.152	19 750	22.568	29 750	4.5963
				30 000	4.4321

TABLE B-21.- REFRACTIVITY FOR CAPE CANAVERAL ANNUAL OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$
0	269.36	10 000	95.764	20 000	21.166
250	264.15	10 250	93.067	20 250	20.291
500	258.10	10 500	90.425	20 500	19.421
750	252.13	10 750	87.831	20 750	18.557
1 000	246.16	11 000	85.280	21 000	17.803
1 250	240.24	11 250	82.773	21 250	17.055
1 500	234.38	11 500	80.314	21 500	16.378
1 750	228.51	11 750	77.899	21 750	15.706
2 000	222.75	12 000	75.525	22 000	15.037
2 250	217.08	12 250	73.118	22 250	14.451
2 500	211.61	12 500	70.808	22 500	13.868
2 750	206.26	12 750	68.512	22 750	13.287
3 000	201.03	13 000	66.274	23 000	12.710
3 250	195.90	13 250	64.048	23 250	12.226
3 500	190.89	13 500	61.856	23 500	11.745
3 750	186.03	13 750	59.728	23 750	11.267
4 000	181.36	14 000	57.625	24 000	10.789
4 250	176.78	14 250	55.553	24 250	10.390
4 500	172.29	14 500	53.529	24 500	9.9922
4 750	167.88	14 750	51.588	24 750	9.5955
5 000	163.58	15 000	49.680	25 000	9.2009
5 250	159.33	15 250	47.823	25 250	8.8716
5 500	155.24	15 500	46.010	25 500	8.5437
5 750	151.27	15 750	44.239	25 750	8.2167
6 000	147.35	16 000	42.512	26 000	7.8914
6 250	143.57	16 250	40.824	26 250	7.5673
6 500	139.89	16 500	39.134	26 500	7.2446
6 750	136.24	16 750	37.534	26 750	6.9957
7 000	132.65	17 000	35.981	27 000	6.7481
7 250	129.21	17 250	34.477	27 250	6.5015
7 500	125.81	17 500	32.974	27 500	6.2557
7 750	122.54	17 750	31.562	27 750	6.0109
8 000	119.31	18 000	30.203	28 000	5.7669
8 250	116.14	18 250	28.852	28 250	5.5237
8 500	113.04	18 500	27.601	28 500	5.2815
8 750	110.05	18 750	26.421	28 750	5.1138
9 000	107.08	19 000	25.249	29 000	4.9464
9 250	104.17	19 250	24.173	29 250	4.7797
9 500	101.31	19 500	23.104	29 500	4.6136
9 750	98.510	19 750	22.132	29 750	4.4477
				30 000	4.2826

TABLE B-22.- REFRACTIVITY FOR HAWAII FEBRUARY OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h, m	N·10^6	h, m	N·10^6	h, m	N·10^6
0	271.63	10 000	94.630	20 000	21.265
250	265.88	10 250	91.866	20 250	20.339
500	259.93	10 500	89.152	20 500	19.421
750	254.12	10 750	86.500	20 750	18.606
1 000	248.34	11 000	83.891	21 000	17.797
1 250	242.48	11 250	81.352	21 250	16.994
1 500	236.48	11 500	78.878	21 500	16.304
1 750	230.36	11 750	76.481	21 750	15.618
2 000	224.19	12 000	74.154	22 000	14.936
2 250	218.03	12 250	71.792	22 250	14.344
2 500	212.08	12 500	69.571	22 500	13.757
2 750	206.44	12 750	67.380	22 750	13.171
3 000	201.07	13 000	65.277	23 000	12.663
3 250	195.93	13 250	63.199	23 250	12.159
3 500	191.02	13 500	61.162	23 500	11.655
3 750	186.18	13 750	59.206	23 750	11.155
4 000	181.46	14 000	57.272	24 000	10.736
4 250	176.86	14 250	55.359	24 250	10.319
4 500	172.32	14 500	53.488	24 500	9.9040
4 750	167.95	14 750	51.666	24 750	9.4907
5 000	163.66	15 000	49.923	25 000	9.0787
5 250	159.44	15 250	48.200	25 250	8.7486
5 500	155.28	15 500	46.505	25 500	8.4202
5 750	151.26	15 750	44.844	25 750	8.0928
6 000	147.37	16 000	43.212	26 000	7.7667
6 250	143.52	16 250	41.566	26 250	7.4419
6 500	139.81	16 500	39.989	26 500	7.1188
6 750	136.14	16 750	38.461	26 750	6.8730
7 000	132.60	17 000	36.938	27 000	6.6281
7 250	129.09	17 250	35.424	27 250	6.3840
7 500	125.70	17 500	33.928	27 500	6.1407
7 750	122.33	17 750	32.434	27 750	5.8982
8 000	119.01	18 000	30.990	28 000	5.6565
8 250	115.75	18 250	29.602	28 250	5.4156
8 500	112.58	18 500	28.224	28 500	5.2420
8 750	109.43	18 750	26.936	28 750	5.0689
9 000	106.34	19 000	25.661	29 000	4.8964
9 250	103.31	19 250	24.495	29 250	4.7244
9 500	100.34	19 500	23.341	29 500	4.5530
9 750	97.456	19 750	22.297	29 750	4.3820
				30 000	4.2117

TABLE B-22.- REFRACTIVITY FOR HAWAII JULY OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h, m	N·10⁶	h, m	N·10⁶	h, m	N·10⁶
0	269.23	10 000	95.924	20 000	21.478
250	263.99	10 250	93.262	20 250	20.557
500	258.09	10 500	90.663	20 500	19.718
750	252.42	10 750	88.126	20 750	18.883
1 000	246.70	11 000	85.640	21 000	18.1[illegible]
1 250	240.92	11 250	83.207	21 250	17.379
1 500	235.05	11 500	80.818	21 500	16.634
1 750	229.11	11 750	78.389	21 750	15.981
2 000	223.12	12 000	76.068	22 000	15.332
2 250	217.10	12 250	73.778	22 250	14.686
2 500	211.26	12 500	71.497	22 500	14.120
2 750	205.65	12 750	69.254	22 750	13.557
3 000	200.24	13 000	67.012	23 000	12.997
3 250	194.98	13 250	64.802	23 250	12.508
3 500	189.88	13 500	62.598	23 500	12.022
3 750	184.93	13 750	60.414	23 750	11.537
4 000	180.15	14 000	58.288	24 000	11.054
4 250	175.53	14 250	56.172	24 250	10.649
4 500	171.05	14 500	54.092	24 500	10.244
4 750	166.72	14 750	52.062	24 750	9.8419
5 000	162.51	15 000	50.088	25 000	9.4411
5 250	158.38	15 250	48.170	25 250	9.0414
5 500	154.40	15 500	46.322	25 500	8.7190
5 750	150.53	15 750	44.524	25 750	8.3978
6 000	146.69	16 000	42.771	26 000	8.0779
6 250	142.97	16 250	41.064	26 250	7.7593
6 500	139.30	16 500	39.403	26 500	7.4422
6 750	135.77	16 750	37.799	26 750	7.1260
7 000	132.27	17 000	36.244	27 000	6.8848
7 250	128.91	17 250	34.693	27 250	6.6447
7 500	125.58	17 500	33.229	27 500	6.4050
7 750	122.32	17 750	31.823	27 750	6.1663
8 000	119.18	18 000	30.479	28 000	5.9284
8 250	116.07	18 250	29.144	28 250	5.6910
8 500	113.01	18 500	27.905	28 500	5.4545
8 750	110.01	18 750	26.674	28 750	5.2185
9 000	107.11	19 000	25.551	29 000	5.0531
9 250	104.25	19 250	24.434	29 250	4.8882
9 500	101.42	19 500	23.417	29 500	4.7240
9 750	98.647	19 750	22.406	29 750	4.5602
				30 000	4.3969

TABLE B-24.- REFRACTIVITY FOR HAWAII ANNUAL OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$
0	269.92	10 000	95.851	20 000	21.269
250	264.41	10 250	93.180	20 250	20.379
500	258.53	10 500	90.527	20 500	19.497
750	252.75	10 750	87.921	20 750	18.620
1 000	247.00	11 000	85.371	21 000	17.860
1 250	241.20	11 250	82.877	21 250	17.104
1 500	235.29	11 500	80.436	21 500	16.422
1 750	229.19	11 750	78.050	21 750	15.744
2 000	223.07	12 000	75.625	22 000	15.070
2 250	216.99	12 250	73.317	22 250	14.481
2 500	211.16	12 500	71.032	22 500	13.894
2 750	205.55	12 750	68.810	22 750	13.312
3 000	200.18	13 000	66.603	23 000	12.731
3 250	195.01	13 250	64.472	23 250	12.246
3 500	190.04	13 500	62.356	23 500	11.762
3 750	185.21	13 750	60.253	23 750	11.281
4 000	180.51	14 000	58.186	24 000	10.802
4 250	175.94	14 250	56.010	24 250	10.401
4 500	171.47	14 500	53.890	24 500	10.002
4 750	167.12	14 750	51.912	24 750	9.6048
5 000	162.89	15 000	50.111	25 000	9.2092
5 250	158.78	15 250	48.473	25 250	8.8811
5 500	154.71	15 500	47.308	25 500	8.5543
5 750	150.79	15 750	46.057	25 750	8.2283
6 000	146.87	16 000	44.610	26 000	7.9040
6 250	143.11	16 250	42.962	26 250	7.5809
6 500	139.49	16 500	41.152	26 500	7.2590
6 750	136.08	16 750	39.103	26 750	7.0115
7 000	132.73	17 000	37.137	27 000	6.7646
7 250	129.23	17 250	35.316	27 250	6.5188
7 500	125.60	17 500	33.524	27 500	6.2739
7 750	121.51	17 750	31.960	27 750	6.0295
8 000	117.58	18 000	30.537	28 000	5.7863
8 250	113.96	18 250	29.125	28 250	5.5438
8 500	110.71	18 500	27.846	28 500	5.3020
8 750	108.28	18 750	26.639	28 750	5.1338
9 000	105.90	19 000	25.441	29 000	4.9661
9 250	103.52	19 250	24.338	29 250	4.7987
9 500	101.10	19 500	23.244	29 500	4.6321
9 750	98.512	19 750	22.253	29 750	4.4658
				30 000	4.3002

TABLE B-25.- REFRACTIVITY FOR POINT ARGUELLO JULY OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$
0	279.11	10 000	95.453	20 000	21.540
250	271.88	10 250	92.789	20 250	20.634
500	261.27	10 500	90.179	20 500	19.816
750	250.51	10 750	87.615	20 750	19.002
1 000	241.05	11 000	85.086	21 000	18.192
1 250	234.29	11 250	82.606	21 250	17.490
1 500	228.28	11 500	80.169	21 500	16.791
1 750	222.75	11 750	77.699	21 750	16.148
2 000	217.42	12 000	75.337	22 000	15.508
2 250	212.27	12 250	73.032	22 250	14.871
2 500	207.33	12 500	70.740	22 500	14.296
2 750	202.48	12 750	68.516	22 750	13.725
3 000	197.72	13 000	66.313	23 000	13.156
3 250	193.03	13 250	64.147	23 250	12.591
3 500	188.43	13 500	62.041	23 500	12.127
3 750	183.94	13 750	59.967	23 750	11.664
4 000	179.60	14 000	57.939	24 000	11.203
4 250	175.28	14 250	56.020	24 250	10.743
4 500	170.91	14 500	54.119	24 500	10.360
4 750	166.56	14 750	52.230	24 750	9.9785
5 000	162.32	15 000	50.345	25 000	9.5973
5 250	158.19	15 250	48.465	25 250	9.2171
5 500	154.25	15 500	46.565	25 500	8.8381
5 750	150.42	15 750	44.696	25 750	8.5208
6 000	146.63	16 000	42.884	26 000	8.2047
6 250	142.96	16 250	41.132	26 250	7.8905
6 500	139.31	16 500	39.450	26 500	7.5779
6 750	135.78	16 750	37.851	26 750	7.2668
7 000	132.27	17 000	36.257	27 000	6.9572
7 250	128.89	17 250	34.764	27 250	6.7174
7 500	125.55	17 500	33.314	27 500	6.4787
7 750	122.29	17 750	31.917	27 750	6.2412
8 000	119.14	18 000	30.528	28 000	6.0050
8 250	116.01	18 250	29.207	28 250	5.7700
8 500	112.90	18 500	27.961	28 500	5.5366
8 750	109.80	18 750	26.727	28 750	5.3041
9 000	106.80	19 000	25.596	29 000	5.1409
9 250	103.85	19 250	24.473	29 250	4.9779
9 500	100.97	19 500	23.459	29 500	4.8156
9 750	98.173	19 750	22.451	29 750	4.6538
				30 000	4.4921

TABLE B-26.- REFRACTIVITY FOR POINT ARGUELLO DECEMBER OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h, m	N·10^6	h, m	N·10^6	h, m	N·10^6
0	283.97	10 000	97.041	20 000	20.731
250	274.16	10 250	94.257	20 250	19.893
500	265.45	10 500	91.395	20 500	19.055
750	257.76	10 750	88.391	20 750	18.296
1 000	250.77	11 000	85.378	21 000	17.539
1 250	244.22	11 250	82.412	21 250	16.844
1 500	237.84	11 500	79.511	21 500	16.153
1 750	231.67	11 750	76.691	21 750	15.464
2 000	225.62	12 000	73.853	22 000	14.850
2 250	219.81	12 250	71.206	22 250	14.239
2 500	214.15	12 500	68.575	22 500	13.631
2 750	208.72	12 750	66.002	22 750	13.027
3 000	203.41	13 000	63.436	23 000	12.535
3 250	198.18	13 250	60.981	23 250	12.044
3 500	193.05	13 500	58.607	23 500	11.555
3 750	188.14	13 750	56.333	23 750	11.066
4 000	183.41	14 000	54.184	24 000	10.664
4 250	178.83	14 250	52.182	24 250	10.261
4 500	174.31	14 500	50.233	24 500	9.8594
4 750	169.84	14 750	48.346	24 750	9.4582
5 000	165.52	15 000	46.525	25 000	9.1145
5 250	161.33	15 250	44.764	25 250	8.7716
5 500	157.22	15 500	43.065	25 500	8.4302
5 750	153.16	15 750	41.421	25 750	8.0899
6 000	149.23	16 000	39.774	26 000	7.7507
6 250	145.39	16 250	38.230	26 250	7.4126
6 500	141.59	16 500	36.750	26 500	7.1500
6 750	137.92	16 750	35.320	26 750	6.8881
7 000	134.28	17 000	33.936	27 000	6.6274
7 250	130.79	17 250	32.552	27 250	6.3678
7 500	127.35	17 500	31.248	27 500	6.1094
7 750	123.97	17 750	29.979	27 750	5.8519
8 000	120.71	18 000	28.715	28 000	5.5957
8 250	117.49	18 250	27.549	28 250	5.3407
8 500	114.26	18 500	26.387	28 500	5.1679
8 750	111.10	18 750	25.338	28 750	4.9957
9 000	108.13	19 000	24.355	29 000	4.8237
9 250	105.21	19 250	23.372	29 250	4.6524
9 500	102.46	19 500	22.471	29 500	4.4813
9 750	99.765	19 750	21.571	29 750	4.3108
				30 000	4.1407

TABLE B-27.- REFRACTIVITY FOR POINT ARGUELLO ANNUAL OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$	h, m	$N \cdot 10^6$
0	281.27	10 000	95.633	20 000	20.789
250	274.27	10 250	92.879	20 250	19.965
500	265.88	10 500	90.129	20 500	19.144
750	257.03	10 750	87.368	20 750	18.400
1 000	248.94	11 000	84.614	21 000	17.657
1 250	242.01	11 250	81.885	21 250	16.918
1 500	235.52	11 500	79.126	21 500	16.256
1 750	229.41	11 750	76.194	21 750	15.597
2 000	223.47	12 000	73.832	22 000	14.941
2 250	217.78	12 250	71.246	22 250	14.354
2 500	212.24	12 500	68.733	22 500	13.770
2 750	206.90	12 750	66.246	22 750	13.190
3 000	201.71	13 000	63.822	23 000	12.612
3 250	196.64	13 250	61.444	23 250	12.142
3 500	191.64	13 500	59.142	23 500	11.673
3 750	186.71	13 750	56.988	23 750	11.205
4 000	181.88	14 000	54.913	24 000	10.740
4 250	177.20	14 250	52.914	24 250	10.353
4 500	172.68	14 500	50.983	24 500	9.9671
4 750	168.23	14 750	49.112	24 750	9.5820
5 000	163.98	15 000	47.293	25 000	9.1977
5 250	159.83	15 250	45.525	25 250	8.8682
5 500	155.80	15 500	43.802	25 500	8.5396
5 750	151.80	15 750	42.124	25 750	8.2128
6 000	147.94	16 000	40.494	26 000	7.8868
6 250	144.18	16 250	38.912	26 250	7.5622
6 500	140.46	16 500	37.381	26 500	7.2392
6 750	136.85	16 750	35.850	26 750	6.9873
7 000	133.29	17 000	34.411	27 000	6.7366
7 250	129.80	17 250	33.024	27 250	6.4869
7 500	126.46	17 500	31.691	27 500	6.2386
7 750	123.15	17 750	30.362	27 750	5.9915
8 000	119.91	18 000	29.117	28 000	5.7456
8 250	116.68	18 250	27.935	28 250	5.5009
8 500	113.41	18 500	26.758	28 500	5.2573
8 750	110.19	18 750	25.669	28 750	5.0913
9 000	107.05	19 000	24.583	29 000	4.9257
9 250	104.08	19 250	23.589	29 250	4.7604
9 500	101.21	19 500	22.598	29 500	4.5958
9 750	98.403	19 750	21.691	29 750	4.4316
				30 000	4.2680

TABLE B-28.- QUADRATURE POINTS FOR WHITE SANDS MARCH OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h = 0 meters	N_o = .000 270 06
h = 4500 meters	N = .000 174 47
h = 10 000 meters	N = .000 095 286
h = 30 000 meters	N = .000 004 1889

H_{S1} = 7671 m H_{S2} = 7244 m H_{S3} = 10 300 m H_{S4} = 10 008 m

H_{S5} = 10 355 m H_{S6} = 10 094 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 257 39	h_1 = 561.0 m
N_2 = .000 207 74	h_2 = 2797 m
N_3 = .000 135 03	h_3 = 6937 m
N_4 = .000 062 320	h_4 = 12 961 m
N_5 = .000 012 668	h_5 = 22 911 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 095 286

N_1 = .000 261 86	h_1 = 364.2 m
N_2 = .000 229 73	h_2 = 1756 m
N_3 = .000 182 67	h_3 = 4059 m
N_4 = .000 135 62	h_4 = 6896 m
N_5 = .000 103 48	h_5 = 9313 m

TABLE B-29.- QUADRATURE POINTS FOR WHITE SANDS AUGUST OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h = 0 meters	N_o = .000 255 22
h = 4500 meters	N = .000 171 18
h = 10 000 meters	N = .000 095 599
h = 30 000 meters	N = .000 004 4363

H_{S1} = 7889 m H_{S2} = 7344 m H_{S3} = 11 267 m H_{S4} = 10 535 m
H_{S5} = 11 218 m H_{S6} 11 049 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 243 25	h_1 = 620.7 m
N_2 = .000 196 32	h_2 = 3050 m
N_3 = .000 127 61	h_3 = 7302 m
N_4 = .000 058 896	h_4 = 14 033 m
N_5 = .000 011 972	h_5 = 23 598 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 095 599

N_1 = .000 247 73	h_1 = 390.3 m
N_2 = .000 218 39	h_2 = 1869 m
N_3 = .000 175 41	h_3 = 4253 m
N_4 = .000 132 43	h_4 = 6956 m
N_5 = .000 103 09	h_5 = 9296 m

TABLE B-30.- QUADRATURE POINTS FOR WHITE SANDS ANNUAL OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h = 0 meters	N_o = .000 263 05
h = 4500 meters	N = .000 172.94
h = 10 000 meters	N = .000 095 703
h = 30 000 meters	N = .000 004 2940

H_{S1} = 7776 m $\quad$ H_{S2} = 7290 m $\quad$ H_{S3} = 10 730 m $\quad$ H_{S4} = 10 268 m

H_{S5} = 10 870 m $\quad$ H_{S6} = 10 545 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i \qquad N_H = 0$

N_1 = .000 250 71	h_1 = 611.0 m
N_2 = .000 202 35	h_2 = 2939 m
N_3 = .000 131 52	h_3 = 7117 m
N_4 = .000 060 703	h_4 = 13 401 m
N_5 = .000 012 340	h_5 = 23 170 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i \qquad N_H$ = .000 095 703

N_1 = .000 255 20	h_1 = 390.9 m
N_2 = .000 224 43	h_2 = 1861 m
N_3 = .000 179 38	h_3 = 4141 m
N_4 = .000 134 32	h_4 = 6921 m
N_5 = .000 103 55	h_5 = 9320 m

TABLE B-31.- QUADRATURE POINTS FOR EDWARDS AFB MAY OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h = 0 meters	N_o = .000 275 36
h = 4500 meters	N = .000 174 75
h = 10 000 meters	N = .000 094 427
h = 30 000 meters	N = .000 003 7688

H_{S1} = 7588 m H_{S2} = 7013 m H_{S3} = 9896 m H_{S4} = 9695 m
H_{S5} = 9863 m H_{S6} = 9752 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 262 44	h_1 = 517.4 m
N_2 = .000 211 82	h_2 = 2631 m
N_3 = .000 137 68	h_3 = 6720 m
N_4 = .000 063 544	h_4 = 12 775 m
N_5 = .000 012 917	h_5 = 22 392 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 094 427

N_1 = .000 266 87	h_1 = 340.9 m
N_2 = .000 233 61	h_2 = 1663 m
N_3 = .000 184 90	h_3 = 3958 m
N_4 = .000 136 18	h_4 = 6822 m
N_5 = .000 102 92	h_5 = 9291 m

TABLE B-32.- QUADRATURE POINTS FOR EDWARDS AFB JULY OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h = 0 meters	N_o = .000 266 20
h = 4500 meters	N = .000 172 27
h = 10 000 meters	N = .000 094 595
h = 30 000 meters	N = .000 003 9271

H_{S1} = 7730 m H_{S2} = 7069 m H_{S3} = 10 340 m H_{S4} = 10 057 m
H_{S5} = 10 217 m H_{S6} = 10 342 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i \quad N_H = 0$

N_1 = .000 253 71	h_1 = 529.4 m
N_2 = .000 204 77	h_2 = 2723 m
N_3 = .000 133 10	h_3 = 6971 m
N_4 = .000 061 430	h_4 = 13 364 m
N_5 = .000 012 487	h_5 = 22 766 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i \quad N_H$ = .000 094 595

N_1 = .000 258 15	h_1 = 342.2 m
N_2 = .000 226 60	h_2 = 1672 m
N_3 = .000 180 40	h_3 = 4038 m
N_4 = .000 134 19	h_4 = 6896 m
N_5 = .000 102 64	h_5 = 9302 m

TABLE B-33.- QUADRATURE POINTS FOR EDWARDS AFB ANNUAL OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h = 0 meters	N_o = .000 276 15
h = 4500 meters	N = .000 174 41
h = 10 000 meters	N = .000 094 760
h = 30 000 meters	N = .000 003 8213

H_{S1} = 7576 m H_{S2} = 7009 m H_{S3} = 9793 m H_{S4} = 9653 m
H_{S5} = 9751 m H_{S6} = 9701 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 263 20	h_1 = 504.5 m
N_2 = .000 212 42	h_2 = 2587 m
N_3 = .000 138 08	h_3 = 6691 m
N_4 = .000 063 726	h_4 = 12 853 m
N_5 = .000 012 954	h_5 = 22 444 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 094 760

N_1 = .000 267 64	h_1 = 332.1 m
N_2 = .000 234 29	h_2 = 1627 m
N_3 = .000 185 46	h_3 = 3909 m
N_4 = .000 136 62	h_4 = 6791 m
N_5 = .000 103 27	h_5 = 9284 m

TABLE B-34.- QUADRATURE POINTS FOR EGLIN AFB JANUARY OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h = 0 meters	N_o = .000 283 43
h = 4500 meters	N = .000 173 79
h = 10 000 meters	N = .000 095 511
h = 30 000 meters	N = .000 004 1467

H_{S1} = 7459 m H_{S2} = 7167 m H_{S3} = 9200 m H_{S4} = 9297 m
H_{S5} = 9073 m H_{S6} = 9233 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 270 13	h_1 = 428.0 m
N_2 = .000 218 02	h_2 = 2347 m
N_3 = .000 141 72	h_3 = 6444 m
N_4 = .000 065 406	h_4 = 12 824 m
N_5 = .000 013 296	h_5 = 22 645 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 095 511

N_1 = .000 274 61	h_1 = 285.5 m
N_2 = .000 240 06	h_2 = 1464 m
N_3 = .000 189 47	h_3 = 3677 m
N_4 = .000 138 88	h_4 = 6636 m
N_5 = .000 104 33	h_5 = 9235 m

TABLE B-35.- QUADRATURE POINTS FOR EGLIN AFB AUGUST OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h = 0 meters	N_o = .000 268 37
h = 4500 meters	N = .000 171 47
h = 10 000 meters	N = .000 095 561
h = 30 000 meters	N = .000 004 4692

H_{S1} = 7697 m H_{S2} = 7262 m H_{S3} = 10 046 m H_{S4} = 9864 m
H_{S5} = 9881 m H_{S6} = 10 202 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 255 78	h_1 = 436.8 m
N_2 = .000 206 44	h_2 = 2678 m
N_3 = .000 134 19	h_3 = 6837 m
N_4 = .000 061 930	h_4 = 13 652 m
N_5 = .000 012 589	h_5 = 23 275 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 095 561

N_1 = .000 260 26	h_1 = 271.5 m
N_2 = .000 228 49	h_2 = 1641 m
N_3 = .000 181 97	h_3 = 3926 m
N_4 = .000 135 44	h_4 = 6749 m
N_5 = .000 103 67	h_5 = 9245 m

TABLE B-36.- QUADRATURE POINTS FOR EGLIN AFB ANNUAL OPTICAL ATMOSPHERE

(λ = 0.555 micron).

h = 0 meters	N_o = .000 274 94
h = 4500 meters	N = .000 172 57
h = 10 000 meters	N = .000 096 841
h = 30 000 meters	N = .000 004 3111

H_{S1} = 7595 m H_{S2} = 7220 m H_{S3} = 9662 m H_{S4} = 9640 m

H_{S5} = 9441 m H_{S6} = 9779 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 262 04	h_1 = 403.4 m
N_2 = .000 211 49	h_2 = 2526 m
N_3 = .000 137 47	h_3 = 6682 m
N_4 = .000 063 447	h_4 = 13 237 m
N_5 = .000 012 897	h_5 = 22 928 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 096 841

N_1 = .000 266 59	h_1 = 252.1 m
N_2 = .000 233 84	h_2 = 1544 m
N_3 = .000 185 89	h_3 = 3783 m
N_4 = .000 137 94	h_4 = 6650 m
N_5 = .000 105 19	h_5 = 9182 m

TABLE B-37.- QUADRATURE POINTS FOR ASCENSION FEBRUARY OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h = 0 meters	N_o = .000 267 06
h = 4500 meters	N = .000 171 11
h = 10 000 meters	N = .000 095 402
h = 30 000 meters	N = .000 004 1518

H_{S1} = 7717 m H_{S2} = 7244 m H_{S3} = 10 109 m H_{S4} = 9867 m
H_{S5} = 10 529 m H_{S6} = 10 287 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 254 53	h_1 = 577.8
N_2 = .000 205 43	h_2 = 2663 m
N_3 = .000 133 53	h_3 = 6839 m
N_4 = .000 061 628	h_4 = 13 730 m
N_5 = .000 012 528	h_5 = 23 101 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 095 402

N_1 = .000 259 01	h_1 = 382.0 m
N_2 = .000 227 45	h_2 = 1936 m
N_3 = .000 181 23	h_3 = 3944 m
N_4 = .000 135 01	h_4 = 6734 m
N_5 = .000 103 45	h_5 = 9250 m

TABLE B-38.- QUADRATURE POINTS FOR ASCENSION SEPTEMBER OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h = 0 meters	N_o = .000 270 37
h = 4500 meters	N = .000 171 35
h = 10 000 meters	N = .000 095 612
h = 30 000 meters	N = .000 004 3454

H_{S1} = 7666 m H_{S2} = 7223 m H_{S3} = 9867 m H_{S4} = 9714 m
H_{S5} = 10 034 m H_{S6} = 10 074 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 257 69	h_1 = 576.5 m
N_2 = .000 207.98	h_2 = 2538 m
N_3 = .000 135 19	h_3 = 6733 m
N_4 = .000 062 392	h_4 = 13 613 m
N_5 = .000 012 683	h_5 = 23 097 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 095 612

N_1 = .000 262 17	h_1 = 383.0 m
N_2 = .000 230 04	h_2 = 1660 m
N_3 = .000 182 99	h_3 = 3863 m
N_4 = .000 135 94	h_4 = 6680 m
N_5 = .000 103 81	h_5 = 9223 m

TABLE B-39.- QUADRATURE POINTS FOR ASCENSION ANNUAL OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h = 0 meters	N_o = .000 268 38
h = 4500 meters	N = .000 170 82
h = 10 000 meters	N = .000 095 520
h = 30 000 meters	N = .000 004 2475

H_{S1} = 7697 m H_{S2} = 7236 m H_{S3} = 9960 m H_{S4} = 9805 m
H_{S5} = 10 170 m H_{S6} = 10 202 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 255 79	h_1 = 590.6 m
N_2 = .000 206 45	h_2 = 2621 m
N_3 = .000 134 19	h_3 = 6796 m
N_4 = .000 061 933	h_4 = 13 687 m
N_5 = .000 012 590	h_5 = 23 100 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 095 520

N_1 = .000 260 27	h_1 = 390.2 m
N_2 = .000 228 49	h_2 = 1682 m
N_3 = .000 181 95	h_3 = 3888 m
N_4 = .000 135 41	h_4 = 6711 m
N_5 = .000 103 63	h_5 = 9234 m

TABLE B-40.—QUADRATURE POINTS FOR KWAJALEIN MAY OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h = 0 meters	N_o = .000 264 95
h = 4500 meters	N = .000 170 33
h = 10 000 meters	N = .000 094 938
h = 30 000 meters	N = .000 004 2741

H_{S1} = 7748 m H_{S2} = 7267 m H_{S3} = 10 186 m H_{S4} = 9946 m
H_{S5} = 10 284 m H_{S6} = 10 423 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 252 52	h_1 = 560.3 m
N_2 = .000 203 81	h_2 = 2722 m
N_3 = .000 132 48	h_3 = 6894 m
N_4 = .000 061 141	h_4 = 13 831 m
N_5 = .000 012 429	h_5 = 23 180 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 094 938

N_1 = .000 256 97	h_1 = 364.2 m
N_2 = .000 225 72	h_2 = 1713 m
N_3 = .000 179 95	h_3 = 3959 m
N_4 = .000 134 17	h_4 = 6775 m
N_5 = .000 102 92	h_5 = 9250 m

TABLE B-41.- QUADRATURE POINTS FOR KWAJALEIN DECEMBER OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h = 0 meters	N_o = .000 264 71
h = 4500 meters	N = .000 169 71
h = 10 000 meters	N = .000 094 822
h = 30 000 meters	N = .000 004 2248

H_{S1} = 7752 m H_{S2} = 7269 m H_{S3} = 10 123 m H_{S4} = 9937 m
H_{S5} = 10 271 m H_{S6} = 10 438 m

Quadrature points for H = 10^6 meters

$N_i \doteq N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 252 29	h_1 = 562.6 m
N_2 = .000 203 62	h_2 = 2710 m
N_3 = .000 132 36	h_3 = 6888 m
N_4 = .000 061 086	h_4 = 13 837 m
N_5 = .000 012 418	h_5 = 23 162 m

Quadrature points for H = 10^4 meters

$N_i \doteq N_o - (N_o - N_H)X_i$ N_H = .000 094 822

N_1 = .000 256 74	h_1 = 364.0 m
N_2 = .000 225 51	h_2 = 1720 m
N_3 = .000 179 77	h_3 = 3934 m
N_4 = .000 134 02	h_4 = 6770 m
N_5 = .000 102 79	h_5 = 9252 m

TABLE B-42.- QUADRATURE POINTS FOR KWAJALEIN ANNUAL OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h = 0 meters	N_o = .000 264 79
h = 4500 meters	N = .000 170 15
h = 10 000 meters	N = .000 094 915
h = 30 000 meters	N = .000 004 2695

H_{S1} = 7751 m H_{S2} = 7268 m H_{S3} = 10 175 m H_{S4} = 9942 m
H_{S5} = 10 300 m H_{S6} = 10 433 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 252 37	h_1 = 563.7 m
N_2 = .000 203 69	h_2 = 2721 m
N_3 = .000 132 40	h_3 = 6891 m
N_4 = .000 061 104	h_4 = 13 838 m
N_5 = .000 012 421	h_5 = 23 207 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 094 915

N_1 = .000 256 82	h_1 = 366.0 m
N_2 = .000 225 59	h_2 = 1723 m
N_3 = .000 179 85	h_3 = 3957 m
N_4 = .000 134 11	h_4 = 6770 m
N_5 = .000 102 88	h_5 = 9250 m

TABLE B-43.- QUADRATURE POINTS FOR WALLOPS MARCH OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h = 0 meters	N_o = .000 290 21
h = 4500 meters	N = .000 175 99
h = 10 000 meters	N = .000 094 334
h = 30 000 meters	N = .000 004 1433

H_{S1} = 7346 m H_{S2} = 7124 m H_{S3} = 8997 m H_{S4} = 9053 m
H_{S5} = 8883 m H_{S6} = 8796 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 276 60	h_1 = 418.9 m
N_2 = .000 223 24	h_2 = 2319 m
N_3 = .000 145 11	h_3 = 6275 m
N_4 = .000 066 970	h_4 = 12 245 m
N_5 = .000 013 614	h_5 = 22 403 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 094 334

N_1 = .000 281 02	h_1 = 274.7 m
N_2 = .000 245 01	h_2 = 1504 m
N_3 = .000 192 27	h_3 = 3675 m
N_4 = .000 139 54	h_4 = 6634 m
N_5 = .000 103 52	h_5 = 9233 m

TABLE B-44.- QUADRATURE POINTS FOR WALLOPS JULY OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h = 0 meters N_o = .000 269 61
h = 4500 meters N = .000 172 35
h = 10 000 meters N = .000 095 446
h = 30 000 meters N = .000 004 5094

H_{S1} = 7678 m H_{S2} = 7251 m H_{S3} = 10 057 m H_{S4} = 9813 m
H_{S5} = 10 092 m H_{S6} = 10 123 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 256 96	h_1 = 516.2 m
N_2 = .000 207 39	h_2 = 2711 m
N_3 = .000 134 81	h_3 = 6802 m
N_4 = .000 062 217	h_4 = 13 489 m
N_5 = .000 012 647	h_5 = 23 248 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 095 446

N_1 = .000 261 44	h_1 = 341.5 m
N_2 = .000 229 42	h_2 = 1700 m
N_3 = .000 182 53	h_3 = 3943 m
N_4 = .000 135 64	h_4 = 6746 m
N_5 = .000 103 62	h_5 = 9255 m

TABLE B-45.- QUADRATURE POINTS FOR WALLOPS ANNUAL OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h = 0 meters	N_o = .000 280 10
h = 4500 meters	N = .000 173 87
h = 10 000 meters	N = .000 095 258
h = 30 000 meters	N = .000 004 3034

H_{S1} = 7513 m H_{S2} = 7184 m H_{S3} = 9437 m H_{S4} = 945[illegible] m
H_{S5} = 9422 m H_{S6} = 9447 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 266 96	h_1 = 460.0 m
N_2 = .000 215 46	h_2 = 2500 m
N_3 = .000 140 05	h_3 = 6552 m
N_4 = .000 064 637	h_4 = 12 872 m
N_5 = .000 013 140	h_5 = 22 767 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 095 258

N_1 = .000 271 43	h_1 = 307.6 m
N_2 = .000 237 44	h_2 = 1569 m
N_3 = .000 187 68	h_3 = 3777 m
N_4 = .000 137 91	h_4 = 6696 m
N_5 = .000 103 93	h_5 = 9256 m

TABLE B-46.- QUADRATURE POINTS FOR CAPE CANAVERAL JANUARY OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h = 0 meters	N_o = .000 276 95
h = 4500 meters	N = .000 173 19
h = 10 000 meters	N = .000 095 881
h = 30 000 meters	N = .000 004 1796

H_{S1} = 7563 m H_{S2} = 7195 m H_{S3} = 9586 m H_{S4} = 9595 m
H_{S5} = 9581 m H_{S6} = 9650 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 263 96	h_1 = 469.1 m
N_2 = .000 213 04	h_2 = 2519 m
N_3 = .000 138 48	h_3 = 6651 m
N_4 = .000 063 910	h_4 = 13 106 m
N_5 = .000 012 992	h_5 = 22 786 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 095 881

N_1 = .000 268 46	h_1 = 299.4 m
N_2 = .000 235 17	h_2 = 1612 m
N_3 = .000 186 42	h_3 = 3787 m
N_4 = .000 137 67	h_4 = 6707 m
N_5 = .000 104 37	h_5 = 9253 m

TABLE B-47.- QUADRATURE POINTS FOR CAPE CANAVERAL AUGUST OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h = 0 meters N_o = .000 265 64
h = 4500 meters N = .000 171 63
h = 10 000 meters N = .000 095 494
h = 30 000 meters N = .000 004 4321

H_{S1} = 7738 m H_{S2} = 7268 m H_{S3} = 10 302 m H_{S4} = 10 025 m
H_{S5} = 10 459 m H_{S6} = 10 378 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 253 18	h_1 = 572.9 m
N_2 = .000 204 34	h_2 = 2786 m
N_3 = .000 132 82	h_3 = 6949 m
N_4 = .000 061 301	h_4 = 13 740 m
N_5 = .000 012 461	h_5 = 23.330 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 095 494

N_1 = .000 257 66	h_1 = 385.6 m
N_2 = .000 226 38	h_2 = 1752 m
N_3 = .000 180 57	h_3 = 4004 m
N_4 = .000 134 76	h_4 = 6813 m
N_5 = .000 103 48	h_5 = 9261 m

TABLE B-48.- QUADRATURE POINTS FOR CAPE CANAVERAL ANNUAL OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h = 0 meters	N_o = .000 269 36
h = 4500 meters	N = .000 172 29
h = 10 000 meters	N = .000 095 764
h = 30 000 meters	N = .000 004 2826

H_{S1} = 7682 m, H_{S2} = 7244 m, H_{S3} = 10 070 m, H_{S4} = 9893 m

H_{S5} = 10 228 m, H_{S6} = 10 139 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 256 72	h_1 = 557.7 m
N_2 = .000 207 20	h_2 = 2705 m
N_3 = .000 134 68	h_3 = 6857 m
N_4 = .000 062 159	h_4 = 13 465 m
N_5 = .000 012 636	h_5 = 23 037 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 095 764

N_1 = .000 261 22	h_1 = 372.6 m
N_2 = .000 229 30	h_2 = 1716 m
N_3 = .000 182 56	h_3 = 3935 m
N_4 = .000 135 82	h_4 = 6779 m
N_5 = .000 103 91	h_5 = 9273 m

TABLE B-49.- QUADRATURE POINTS FOR HAWAII FEBRUARY OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h = 0 meters N_o = .000 271 63
h = 4500 meters N = .000 172 32
h = 10 000 meters N = .000 094 630
h = 30 000 meters N = .000 004 2117

H_{S1} = 7647 m H_{S2} = 7236 m H_{S3} = 9888 m H_{S4} = 9771 m
H_{S5} = 10 061 m H_{S6} = 9992 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 258 89	h_1 = 544.3 m
N_2 = .000 208 95	h_2 = 2637 m
N_3 = .000 135 82	h_3 = 6773 m
N_4 = .000 062 683	h_4 = 13 312 m
N_5 = .000 012 742	h_5 = 22 961 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 094 630

N_1 = .000 263 33	h_1 = 356.9 m
N_2 = .000 230 78	h_2 = 1733 m
N_3 = .000 183 13	h_3 = 3911 m
N_4 = .000 135 48	h_4 = 6797 m
N_5 = .000 102 93	h_5 = 9281 m

TABLE B-50.- QUADRATURE POINTS FOR HAWAII JULY OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h = 0 meters	N_o = .000 269 23
h = 4500 meters	N = .000 171 05
h = 10 000 meters	N = .000 095 924
h = 30 000 meters	N = .000 004 3969

H_{S1} = 7684 m H_{S2} = 7252 m H_{S3} = 9920 m H_{S4} = 9855 m
H_{S5} = 10 221 m H_{S6} = 10 147 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 256 60	h_1 = 565.5 m
N_2 = .000 207 10	h_2 = 2685 m
N_3 = .000 134 62	h_3 = 6831 m
N_4 = .000 062 129	h_4 = 13 553 m
N_5 = .000 012 630	h_5 = 23 187 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 095 924

N_1 = .000 261 10	h_1 = 372.7 m
N_2 = .000 229 24	h_2 = 1745 m
N_3 = .000 182 58	h_3 = 3872 m
N_4 = .000 135 92	h_4 = 6739 m
N_5 = .000 104 05	h_5 = 9267 m

TABLE B-51.- QUADRATURE POINTS FOR HAWAII ANNUAL OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h = 0 meters	N_o = .000 269 92
h = 4500 meters	N = .000 171 47
h = 10 000 meters	N = .000 095 851
h = 30 000 meters	N = .000 004 3002

H_{S1} = 7673 m H_{S2} = 7247 m H_{S3} = 9918 m H_{S4} = 9859 m
H_{S5} = 10 145 m H_{S6} = 10 103 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 257 26	h_1 = 554.5 m
N_2 = .000 207 63	h_2 = 2656 m
N_3 = .000 134 96	h_3 = 6834 m
N_4 = .000 062 288	h_4 = 13 508 m
N_5 = .000 012 662	h_5 = 23 035 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 095 851

N_1 = .000 261 75	h_1 = 363.3 m
N_2 = .000 229 75	h_2 = 1727 m
N_3 = .000 182 89	h_3 = 3873 m
N_4 = .000 136 02	h_4 = 6754 m
N_5 = .000 104 02	h_5 = 9198 m

TABLE B-52.- QUADRATURE POINTS FOR POINT ARGUELLO JULY OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h = 0 meters	N_o = .000 279 11
h = 4500 meters	N = .000 170 91
h = 10 000 meters	N = .000 095 453
h = 30 000 meters	N = .000 004 4921

H_{S1} = 7529 m H_{S2} = 7176 m H_{S3} = 9175 m H_{S4} = 9353 m
H_{S5} = 8644 m H_{S6} = 9511 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 266 02	h_1 = 395.3 m
N_2 = .000 214 70	h_2 = 2131 m
N_3 = .000 139 56	h_3 = 6483 m
N_4 = .000 064 409	h_4 = 13 219 m
N_5 = .000 013 093	h_5 = 23 026 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 095 453

N_1 = .000 270 49	h_1 = 287.3 m
N_2 = .000 236 73	h_2 = 1155 m
N_3 = .000 187 28	h_3 = 3563 m
N_4 = .000 137 83	h_4 = 6604 m
N_5 = .000 104 07	h_5 = 9231 m

TABLE B-53.- QUADRATURE POINTS FOR POINT ARGUELLO DECEMBER OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h = 0 meters N_0 = .000 283 97
h = 4500 meters N = -.000 174 31
h = 10 000 meters N = .000 097 041
h = 30 000 meters N = .000 004 1407

H_{S1} = 7450 m H_{S2} = 7147 m H_{S3} = 9221 m H_{S4} = 9339 m
H_{S5} = 8826 m H_{S6} = 9198 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 270 65	h_1 = 346.8 m
N_2 = .000 218 44	h_2 = 2310 m
N_3 = .000 141 99	h_3 = 6473 m
N_4 = .000 065 530	h_4 = 12 795 m
N_5 = .000 013 321	h_5 = 22 621 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 097 041

N_1 = .000 275 20	h_1 = 222.3 m
N_2 = .000 240 83	h_2 = 1382 m
N_3 = .000 190 51	h_3 = 3628 m
N_4 = .000 140 18	h_4 = 6596 m
N_5 = .000 105 81	h_5 = 9198 m

TABLE B-54.- QUADRATURE POINTS FOR POINT ARGUELLO ANNUAL OPTICAL ATMOSPHERE

(λ = 0.555 micron)

h = 0 meters	N_o = .000 281 27
h = 4500 meters	N = .000 172 68
h = 10 000 meters	N = .000 095 633
h = 30 000 meters	N = .000 004 2680

H_{S1} = 7494 m H_{S2} = 7163 m H_{S3} = 9224 m H_{S4} = 9360 m
H_{S5} = 9053 m H_{S6} = 9372 m

Quadrature points for H = 10^6 meters

$N_i = N_o - (N_o - N_H)X_i$ $N_H = 0$

N_1 = .000 268 08	h_1 = 437.3 m
N_2 = .000 216 36	h_2 = 2313 m
N_3 = .000 140 64	h_3 = 6488 m
N_4 = .000 064 907	h_4 = 12 888 m
N_5 = .000 013 194	h_5 = 22 748 m

Quadrature points for H = 10^4 meters

$N_i = N_o - (N_o - N_H)X_i$ N_H = .000 095 633

N_1 = .000 272 56	h_1 = 304.1 m
N_2 = .000 238 43	h_2 = 1386 m
N_3 = .000 188 45	h_3 = 3661 m
N_4 = .000 138 47	h_4 = 6637 m
N_5 = .000 104 34	h_5 = 9227 m

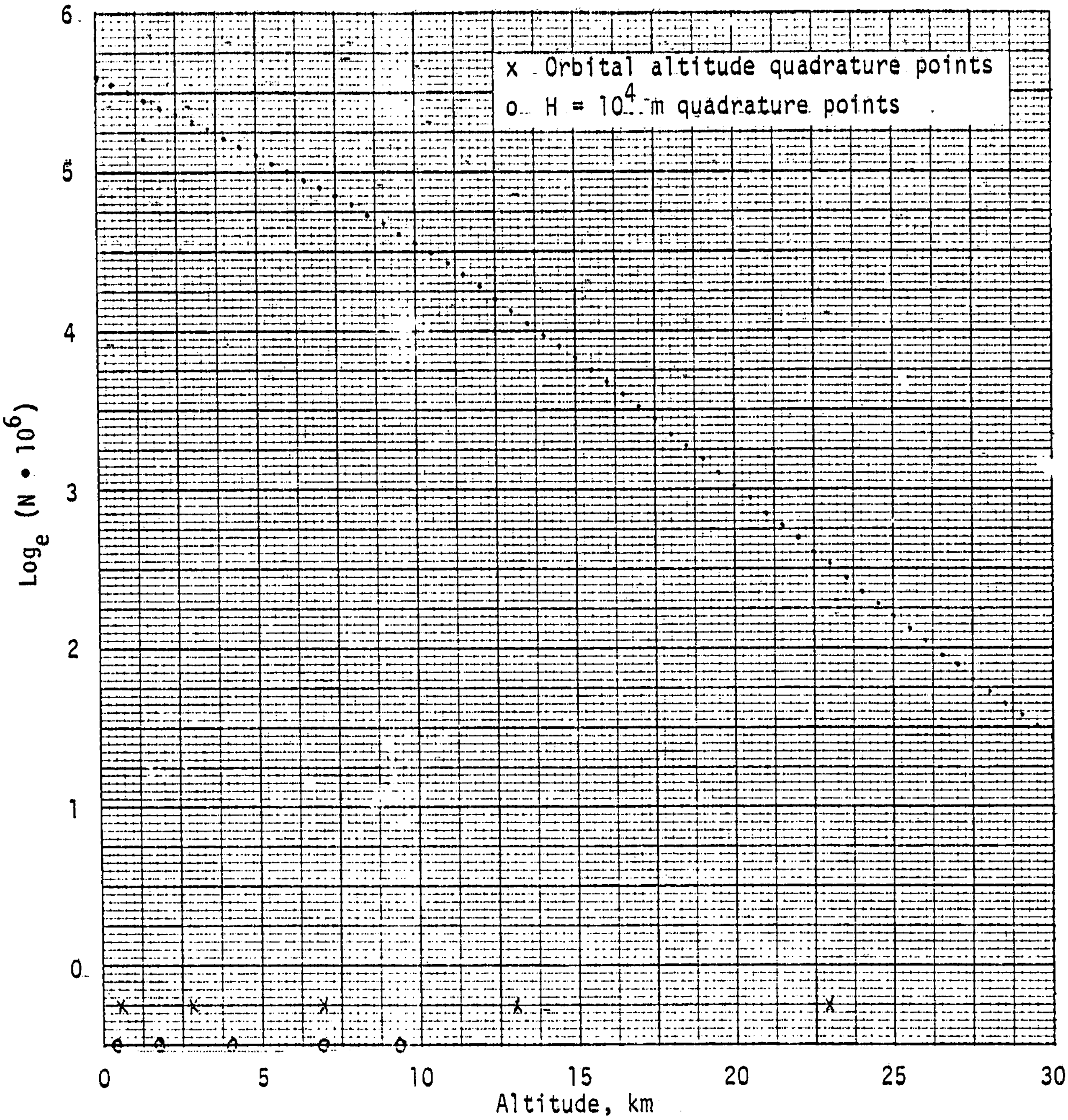

Figure B-1.- Log_e ($N \cdot 10^6$) versus altitude for March optical atmosphere at White Sands.

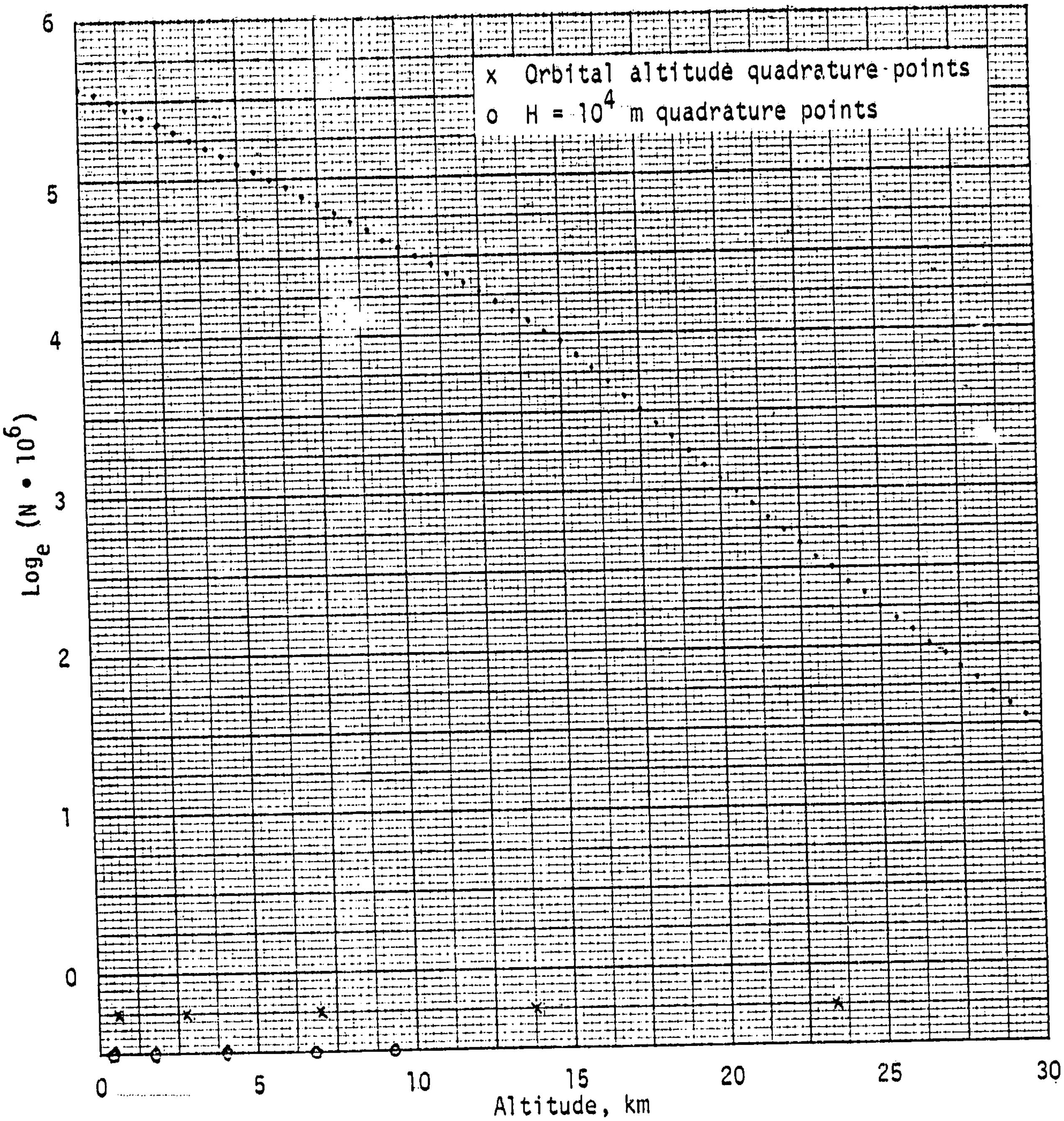

Figure B-2.- $\log_e (N \cdot 10^6)$ versus altitude for August optical atmosphere at Cape Canaveral.

APPENDIX C

TABLES OF REFRACTION CORRECTIONS FOR RADIO ATMOSPHERES

This appendix contains tables of refraction corrections for the 30 radio atmospheres shown in appendix A.

E_M = measured elevation angle

E = straight-line, geometric elevation angle

$\Delta E = E_M - E$ is elevation angle refraction correction

$\Delta E_{18} = \Delta E$ computed by the 18th algorithm in reference 4 (appendix E)

ρ_M = measured range

ρ = geometric range

$\Delta\rho = \rho_M - \rho$ is the range refraction correction

$\Delta\rho_7 = \Delta\rho$ computed by the 7th algorithm in reference 4 (appendix E)

$H = 10^6$ m and 10^4 m is altitude of target above the tracking site, which is at sea level

The column labeled ρ is the geometric range computed by the refraction correction algorithm. It is the range determined by the quantities E_M, H, and ΔE_{18}. Differences in the computed range, ρ, are due to errors in ΔE_{18}.

TABLE C-1.- REFRACTION CORRECTIONS FOR WHITE SANDS MARCH RADIO ATMOSPHERE, H = 10^6 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3707.1	79.6	8.442
.5	H_{S1} = 7273	3713.0	75.4	9.364
.5	H_{S2} = 7068	3713.9	74.4	9.506
.5	H_{S3} = 8333	3708.9	80.2	8.719
.5	H_{S4} = 8613	3707.9	81.4	8.569
.5	H_{S5} = 8874	3707.1	82.6	8.436
.5	H_{S6} = 8592	3708.0	81.3	8.580
1	Ref. atm.	3644.1	65.5	7.199
1	H_{S1} = 7273	3647.7	61.0	7.764
1	H_{S2} = 7068	3648.2	60.0	7.856
1	H_{S3} = 8333	3645.0	65.9	7.336
1	H_{S4} = 8613	8644.4	67.2	7.235
1	H_{S5} = 8874	3643.8	68.4	7.144
1	H_{S6} = 8592	3644.4	67.1	7.242
3	Ref. atm.	3415.0	36.4	4.264
3	H_{S1} = 7273	3415.7	33.0	4.393
3	H_{S2} = 7068	3415.9	32.3	4.418
3	H_{S3} = 8333	3415.0	36.9	4.272
3	H_{S4} = 8613	3414.8	37.9	4.242
3	H_{S5} = 8874	3414.7	38.8	4.214
3	H_{S6} = 8592	3414.8	37.8	4.244
5	Ref. atm.	3210.4	24.4	2.933
5	H_{S1} = 7273	3210.7	22.1	2.978
5	H_{S2} = 7068	3210.7	21.5	2.988
5	H_{S3} = 8333	3210.4	24.9	2.930
5	H_{S4} = 8613	3210.3	25.7	2.917
5	H_{S5} = 8874	3210.3	26.4	2.906
5	H_{S6} = 8592	3210.3	25.6	2.918

TABLE C-2.- REFRACTION CORRECTIONS FOR WHITE SANDS MARCH RADIO ATMOSPHERE, H = 10^4 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	330.4	67.5	4.341
.5	H_{S1} = 7273	335.8	64.5	5.247
.5	H_{S2} = 7068	336.6	64.0	5.378
.5	H_{S3} = 8333	332.3	66.8	4.660
.5	H_{S4} = 8613	331.5	67.3	4.526
.5	H_{S5} = 8874	330.8	67.8	4.408
.5	H_{S6} = 8592	331.6	67.3	4.536
1	Ref. atm.	279.7	54.8	3.593
1	H_{S1} = 7273	282.8	51.5	4.240
1	H_{S2} = 7068	283.3	51.0	4.337
1	H_{S3} = 8333	280.7	53.9	3.801
1	H_{S4} = 8613	280.2	54.4	3.699
1	H_{S5} = 8874	279.8	54.9	3.610
1	H_{S6} = 8592	280.2	54.4	3.707
3	Ref. atm.	159.2	29.0	1.941
3	H_{S1} = 7273	159.8	26.6	2.221
3	H_{S2} = 7068	159.9	26.3	2.265
3	H_{S3} = 8333	159.3	28.3	2.018
3	H_{S4} = 8613	159.2	28.7	1.971
3	H_{S5} = 8874	159.1	29.1	1.928
3	H_{S6} = 8592	159.2	28.7	1.974
5	Ref. atm.	106.2	19.0	1.273
5	H_{S1} = 7273	106.4	17.3	1.447
5	H_{S2} = 7068	106.4	17.1	1.474
5	H_{S3} = 8333	106.3	18.5	1.320
5	H_{S4} = 8613	106.2	18.8	1.290
5	H_{S5} = 8874	106.2	19.1	1.263
5	H_{S6} = 8592	106.2	18.8	1.292

TABLE C-3.- REFRACTION CORRECTIONS FOR WHITE SANDS AUGUST RADIO ATMOSPHERE, H = 10^6 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3725.7	93.0	11.349
.5	H_{S1} = 6296	3731.4	87.0	12.230
.5	H_{S2} = 6796	3728.1	89.7	11.726
.5	H_{S3} = 7475	3724.3	93.2	11.132
.5	H_{S4} = 7410	3724.7	92.9	11.185
.5	H_{S5} = 7239	3725.6	92.0	11.328
.5	H_{S6} = 6930	2727.3	90.4	11.602
1	Ref. atm.	3657.3	74.6	9.303
1	H_{S1} = 6296	3661.1	68.2	9.909
1	H_{S2} = 6796	3659.2	71.2	9.593
1	H_{S3} = 7475	3656.8	75.0	9.212
1	H_{S4} = 7410	3657.0	74.7	9.247
1	H_{S5} = 7239	3657.6	73.7	9.339
1	H_{S6} = 6930	3658.7	71.9	9.514
3	Ref. atm.	3420.5	40.0	5.213
3	H_{S1} = 6296	3421.5	35.1	5.381
3	H_{S2} = 6796	3421.0	37.3	5.303
3	H_{S3} = 7475	3420.5	40.4	5.202
3	H_{S4} = 7410	3420.7	40.1	5.212
3	H_{S5} = 7239	3420.7	39.3	5.236
3	H_{S6} = 6930	3420.9	37.9	5.282
5	Ref. atm.	3213.7	26.6	3.529
5	H_{S1} = 6296	3214.0	23.0	3.594
5	H_{S2} = 6796	3213.8	24.7	3.564
5	H_{S3} = 7475	3213.6	26.9	3.526
5	H_{S4} = 7410	3213.7	26.7	3.529
5	H_{S5} = 7239	3213.7	26.1	3.539
5	H_{S6} = 6930	3213.8	25.1	3.557

TABLE C-4.- REFRACTION CORRECTIONS FOR WHITE SANDS AUGUST RADIO ATMOSPHERE, H = 10^4 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	343.1	78.6	6.454
.5	H_{S1} = 6296	347.7	75.6	7.197
.5	H_{S2} = 6796	344.8	77.0	6.731
.5	H_{S3} = 7475	341.5	78.8	6.188
.5	H_{S4} = 7410	341.8	78.6	6.236
.5	H_{S5} = 7239	342.6	78.2	6.366
.5	H_{S6} = 6930	344.1	77.4	6.616
1	Ref. atm.	287.2	62.3	5.126
1	H_{S1} = 6296	290.2	59.1	5.711
1	H_{S2} = 6796	288.5	60.7	5.378
1	H_{S3} = 7475	286.5	62.6	4.982
1	H_{S4} = 7410	286.7	62.5	5.018
1	H_{S5} = 7239	287.2	62.0	5.113
1	H_{S6} = 6930	288.1	61.1	5.295
3	Ref. atm.	160.6	31.9	2.631
3	H_{S1} = 6296	161.2	29.5	2.912
3	H_{S2} = 6796	160.9	30.7	2.769
3	H_{S3} = 7475	160.6	32.2	2.594
3	H_{S4} = 7410	160.6	32.0	2.610
3	H_{S5} = 7239	160.7	31.7	2.653
3	H_{S6} = 6930	160.9	31.0	2.733
5	Ref. atm.	106.7	20.7	1.707
5	H_{S1} = 6296	106.9	19.1	1.884
5	H_{S2} = 6796	106.8	19.9	1.796
5	H_{S3} = 7475	106.7	20.9	1.687
5	H_{S4} = 7410	106.7	20.8	1.697
5	H_{S5} = 7239	106.7	20.5	1.723
5	H_{S6} = 6930	106.7	20.1	1.773

TABLE C-5.- REFRACTION CORRECTIONS FOR WHITE SANDS ANNUAL RADIO ATMOSPHERE, H = 10^6 METERS

E_M, deg	$\bar{H}_S$, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3710.3	81.3	8.932
.5	H_{S1} = 7141	3715.3	77.1	9.726
.5	H_{S2} = 7025	3715.9	76.5	9.811
.5	H_{S3} = 8145	3711.2	81.7	9.074
.5	H_{S4} = 8148	3711.2	81.8	9.073
.5	H_{S5} = 8345	3710.4	82.6	8.959
.5	H_{S6} = 8357	3710.4	82.7	8.952
1	Ref. atm.	3646.2	66.6	7.537
1	H_{S1} = 7141	3649.4	62.1	8.042
1	H_{S2} = 7025	3649.8	61.5	8.097
1	H_{S3} = 8145	3646.7	67.0	7.612
1	H_{S4} = 8148	3646.7	67.0	7.611
1	H_{S5} = 8345	3646.2	67.9	7.535
1	H_{S6} = 8357	3646.2	68.0	7.530
3	Ref. atm.	3415.8	36.8	4.404
3	H_{S1} = 7141	3416.5	33.4	4.528
3	H_{S2} = 7025	3416.6	33.0	4.542
3	H_{S3} = 8145	3415.8	37.2	4.407
3	H_{S4} = 8148	3415.8	37.2	4.407
3	H_{S5} = 8345	3415.7	38.0	4.385
3	H_{S6} = 8357	3415.7	38.0	4.383
5	Ref. atm.	3210.9	24.7	3.018
5	H_{S1} = 7141	3211.1	22.3	3.063
5	H_{S2} = 7025	3211.1	21.9	3.069
5	H_{S3} = 8145	3210.9	25.1	3.016
5	H_{S4} = 8148	3210.9	25.1	3.015
5	H_{S5} = 8345	3210.8	25.6	3.006
5	H_{S6} = 8357	3210.8	25.7	3.006

TABLE C-6.- REFRACTION CORRECTIONS FOR WHITE SANDS ANNUAL RADIO ATMOSPHERE, H = 10^4 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	333.1	68.8	4.792
.5	H_{S1} = 7147	337.2	66.1	5.481
.5	H_{S2} = 7025	337.7	65.8	5.563
.5	H_{S3} = 8145	333.7	68.3	4.890
.5	H_{S4} = 8148	333.7	68.3	4.888
.5	H_{S5} = 8345	333.1	68.7	4.787
.5	H_{S6} = 8357	333.0	68.7	4.780
1	Ref. atm.	281.2	55.5	3.907
1	H_{S1} = 7147	283.7	52.7	4.420
1	H_{S2} = 7025	284.0	52.4	4.480
1	H_{S3} = 8145	281.6	55.0	3.980
1	H_{S4} = 8148	281.5	55.0	3.978
1	H_{S5} = 8345	281.2	55.4	3.902
1	H_{S6} = 8357	281.2	55.5	3.897
3	Ref. atm.	159.4	29.1	2.068
3	H_{S1} = 7147	159.9	27.1	2.308
3	H_{S2} = 7025	160.0	26.9	2.335
3	H_{S3} = 8145	159.5	28.8	2.106
3	H_{S4} = 8148	159.5	28.8	2.106
3	H_{S5} = 8345	159.4	29.1	2.070
3	H_{S6} = 8357	159.4	29.1	2.068
5	Ref. atm.	106.3	19.1	1.351
5	H_{S1} = 7147	106.5	17.6	1.502
5	H_{S2} = 7025	106.5	17.5	1.519
5	H_{S3} = 8145	106.3	18.8	1.376
5	H_{S4} = 8148	106.3	18.8	1.376
5	H_{S5} = 8345	106.3	19.0	1.353
5	H_{S6} = 8357	106.3	19.0	1.352

TABLE C-7.- REFRACTION CORRECTIONS FOR EDWARDS AFB
MAY RADIO ATMOSPHERE, H = 10^6 METERS

$\bar{E}_M$, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3713.1	82.3	9.377
.5	H_{S1} = 7008	3717.7	78.7	10.098
.5	H_{S2} = 6800	3718.8	77.7	10.261
.5	H_{S3} = 7844	3714.0	82.7	9.512
.5	H_{S4} = 8042	3713.2	83.6	9.387
.5	H_{S5} = 8088	3713.0	83.9	9.359
.5	H_{S6} = 8125	3712.8	84.0	9.336
1	Ref. atm.	3648.5	67.1	7.897
1	H_{S1} = 7008	3651.2	63.2	8.325
1	H_{S2} = 6800	3651.8	62.1	8.430
1	H_{S3} = 7844	3648.8	67.4	7.942
1	H_{S4} = 8042	3648.3	68.3	7.859
1	H_{S5} = 8088	3648.1	68.6	7.840
1	H_{S6} = 8125	3648.1	68.7	7.825
3	Ref. atm.	3416.7	36.7	4.555
3	H_{S1} = 7008	3417.3	33.8	4.662
3	H_{S2} = 6800	3417.5	33.0	4.690
3	H_{S3} = 7844	3416.7	37.1	4.557
3	H_{S4} = 8042	3416.5	37.8	4.534
3	H_{S5} = 8088	3416.5	38.0	4.528
3	H_{S6} = 8125	3416.5	38.1	4.524
5	Ref. atm.	3211.4	24.5	3.109
5	H_{S1} = 7008	3211.6	22.5	3.148
5	H_{S2} = 6800	3211.6	21.9	3.159
5	H_{S3} = 7844	3211.4	24.9	3.107
5	H_{S4} = 8042	3211.3	25.4	3.098
5	H_{S5} = 8088	3211.3	25.6	3.095
5	H_{S6} = 8125	3211.3	25.7	3.094

TABLE C-8.- REFRACTION CORRECTIONS FOR EDWARDS AFB
MAY RADIO ATMOSPHERE, H = 10^4 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	334.4	70.0	5.009
.5	H_{S1} = 7008	338.7	67.7	5.731
.5	H_{S2} = 6800	339.6	67.1	5.883
.5	H_{S3} = 7844	335.5	69.6	5.195
.5	H_{S4} = 8042	334.8	70.0	5.082
.5	H_{S5} = 8088	334.7	70.1	5.057
.5	H_{S6} = 8125	334.5	70.2	5.036
1	Ref. atm.	282.2	56.3	4.114
1	H_{S1} = 7008	284.7	53.8	4.611
1	H_{S2} = 6800	285.2	53.2	4.722
1	H_{S3} = 7844	282.7	55.8	4.214
1	H_{S4} = 8042	282.3	56.3	4.130
1	H_{S5} = 8088	282.2	56.4	4.111
1	H_{S6} = 8125	282.1	56.5	4.095
3	Ref. atm.	159.7	29.5	2.177
3	H_{S1} = 7008	160.1	27.6	2.399
3	H_{S2} = 6800	160.2	27.2	2.449
3	H_{S3} = 7844	159.8	29.1	2.220
3	H_{S4} = 8042	159.7	29.4	2.181
3	H_{S5} = 8088	159.7	29.5	2.172
3	H_{S6} = 8125	195.6	29.5	2.165
5	Ref. atm.	106.4	19.2	1.419
5	H_{S1} = 7008	106.5	17.9	1.560
5	H_{S2} = 6800	106.6	17.6	1.591
5	H_{S3} = 7844	106.4	19.0	1.448
5	H_{S4} = 8042	106.4	19.2	1.424
5	H_{S5} = 8088	106.4	19.2	1.418
5	H_{S6} = 8125	106.4	19.3	1.414

TABLE C-9.- REFRACTION CORRECTIONS FOR EDWARDS AFB JULY RADIO ATMOSPHERE, H = 10^6 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3707.3	78.9	8.469
.5	H_{S1} = 7312	3712.3	74.9	9.258
.5	H_{S2} = 6891	3714.2	72.9	9.551
.5	H_{S3} = 8797	3706.9	81.5	8.404
.5	H_{S4} = 8760	3707.0	81.3	8.422
.5	H_{S5} = 8845	3706.7	81.7	8.380
.5	H_{S6} = 8662	3707.3	80.9	8.472
1	Ref. atm.	3644.2	64.9	7.203
1	H_{S1} = 7312	3647.2	60.6	7.682
1	H_{S2} = 6891	3648.3	58.6	7.873
1	H_{S3} = 8797	3643.6	67.4	7.112
1	H_{S4} = 8760	3643.7	67.3	7.124
1	H_{S5} = 8845	3643.5	67.6	7.095
1	H_{S6} = 8662	3643.9	66.8	7.158
3	Ref. atm.	3414.8	36.1	4.234
3	H_{S1} = 7312	3415.5	32.9	4.354
3	H_{S2} = 6391	3415.8	31.4	4.405
3	H_{S3} = 8797	3414.5	38.2	4.189
3	H_{S4} = 8760	3414.5	38.1	4.192
3	H_{S5} = 8845	3414.5	38.4	4.184
3	H_{S6} = 8662	3414.6	37.8	4.203
5	Ref. atm.	3210.3	24.3	2.909
5	H_{S1} = 7312	3210.5	22.0	2.953
5	H_{S2} = 6891	3210.6	20.8	2.973
5	H_{S3} = 8797	3210.2	26.0	2.886
5	H_{S4} = 8760	3210.2	25.9	2.888
5	H_{S5} = 8845	3210.1	26.1	2.884
5	H_{S6} = 8662	3210.2	25.6	2.892

TABLE C-10.- REFRACTION CORRECTIONS FOR EDWARDS AFB
JULY RADIO ATMOSPHERE, H = 10^4 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	330.3	67.1	4.327
.5	H_{S1} = 7312	335.4	64.0	5.178
.5	H_{S2} = 6891	337.0	63.1	5.449
.5	H_{S3} = 8797	330.8	67.1	4.405
.5	H_{S4} = 8760	330.9	67.0	4.421
.5	H_{S5} = 8845	330.7	67.1	4.384
.5	H_{S6} = 8662	331.2	66.8	4.465
1	Ref. atm.	279.6	54.4	3.574
1	H_{S1} = 7312	282.6	51.2	4.187
1	H_{S2} = 6891	283.6	50.1	4.387
1	H_{S3} = 8797	279.7	54.3	3.606
1	H_{S4} = 8760	279.8	54.3	3.618
1	H_{S5} = 8845	279.7	54.4	3.589
1	H_{S6} = 8662	280.0	54.1	3.652
3	Ref. atm.	159.1	28.8	1.917
3	H_{S1} = 7312	159.7	26.5	2.195
3	H_{S2} = 6891	159.9	25.7	2.285
3	H_{S3} = 8797	159.1	28.8	1.925
3	H_{S4} = 8760	159.1	28.7	1.931
3	H_{S5} = 8845	159.1	28.8	1.918
3	H_{S6} = 8662	159.2	28.6	1.947
5	Ref. atm.	106.2	18.9	1.256
5	H_{S1} = 7312	106.4	17.3	1.431
5	H_{S2} = 6891	106.4	16.7	1.487
5	H_{S3} = 8797	106.2	18.8	1.261
5	H_{S4} = 8760	106.2	18.8	1.264
5	H_{S5} = 8845	106.2	18.9	1.256
5	H_{S6} = 8662	106.2	18.7	1.274

TABLE C-11.- REFRACTION CORRECTIONS FOR EDWARDS AFB ANNUAL RADIO ATMOSPHERE, H = 10^6 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3710.7	80.7	8.997
.5	H_{S1} = 7144	3715.3	77.1	9.720
.5	H_{S2} = 6839	3716.7	75.6	9.947
.5	H_{S3} = 8212	3710.9	82.0	9.031
.5	H_{S4} = 8381	3710.3	82.8	8.935
.5	H_{S5} = 8296	3710.6	82.4	8.983
.5	H_{S6} = 8361	3710.4	82.7	8.946
1	Ref. atm.	3646.7	66.0	7.609
1	H_{S1} = 7144	3649.4	62.1	8.037
1	H_{S2} = 6839	3650.3	60.6	8.183
1	H_{S3} = 8212	3646.5	67.2	7.583
1	H_{S4} = 8381	3646.1	68.0	7.518
1	H_{S5} = 8296	3646.3	67.6	7.550
1	H_{S6} = 8361	3646.2	67.9	7.525
3	Ref. atm.	3415.9	36.4	4.416
3	H_{S1} = 7144	3416.5	33.4	4.525
3	H_{S2} = 6839	3416.7	32.3	4.564
3	H_{S3} = 8212	3415.7	37.5	4.398
3	H_{S4} = 8381	3415.6	38.1	4.379
3	H_{S5} = 8296	3415.7	37.8	4.388
3	H_{S6} = 8361	3415.6	38.0	4.381
5	Ref. atm.	3210.9	24.4	3.022
5	H_{S1} = 7144	3211.1	22.3	3.062
5	H_{S2} = 6839	3211.2	21.4	3.077
5	H_{S3} = 8212	3210.8	25.3	3.011
5	H_{S4} = 8381	3210.8	25.7	3.003
5	H_{S5} = 8296	3210.8	25.5	3.007
5	H_{S6} = 8361	3210.8	25.7	3.004

TABLE C-12.- REFRACTION CORRECTIONS FOR EDWARDS AFB ANNUAL RADIO ATMOSPHERE, H = 10^4 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	333.0	68.5	4.770
.5	H_{S1} = 7144	337.2	66.1	5.480
.5	H_{S2} = 6839	338.5	65.3	5.691
.5	H_{S3} = 8212	333.4	68.4	4.852
.5	H_{S4} = 8381	332.9	68.8	4.766
.5	H_{S5} = 8296	333.2	68.6	4.809
.5	H_{S6} = 8361	333.0	68.7	4.776
1	Ref. atm.	281.3	55.3	3.927
1	H_{S1} = 7144	283.7	52.6	4.419
1	H_{S2} = 6839	284.5	51.8	4.573
1	H_{S3} = 8212	281.4	55.1	3.951
1	H_{S4} = 8381	281.1	55.5	3.886
1	H_{S5} = 8296	281.3	55.3	3.919
1	H_{S6} = 8361	281.1	55.4	3.894
3	Ref. atm.	159.5	29.1	2.079
3	H_{S1} = 7144	159.9	27.1	2.307
3	H_{S2} = 6839	160.1	26.5	2.377
3	H_{S3} = 8212	159.5	28.9	2.093
3	H_{S4} = 8381	159.4	29.2	2.063
3	H_{S5} = 8296	159.5	29.0	2.078
3	H_{S6} = 8361	159.4	29.1	2.066
5	Ref. atm.	106.3	19.0	1.357
5	H_{S1} = 7144	106.5	17.6	1.502
5	H_{S2} = 6839	106.5	17.2	1.545
5	H_{S3} = 8212	106.3	18.9	1.368
5	H_{S4} = 8381	106.3	19.1	1.349
5	H_{S5} = 8296	106.3	19.0	1.358
5	H_{S6} = 8361	106.3	19.0	1.351

C-13.- REFRACTION CORRECTIONS FOR EGLIN AFB
JANUARY RADIO ATMOSPHERE, $H = 10^6$ METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3717.4	84.0	10.043
.5	H_{S1} = 6881	3720.0	80.2	10.456
.5	H_{S2} = 6954	3719.6	80.6	10.397
.5	H_{S3} = 7291	3418.0	82.3	10.138
.5	H_{S4} = 7538	3716.8	83.5	9.960
.5	H_{S5} = 7498	3717.0	83.3	9.988
.5	H_{S6} = 7908	3715.2	85.2	9.709
1	Ref. atm.	3651.0	68.0	8.293
1	H_{S1} = 6881	3652.9	64.2	8.596
1	H_{S2} = 6954	3652.7	64.5	8.558
1	H_{S3} = 7291	3651.6	66.3	8.390
1	H_{S4} = 7538	3650.9	67.6	8.274
1	H_{S5} = 7498	3651.0	67.4	8.292
1	H_{S6} = 7908	3649.8	69.4	8.109
3	Ref. atm.	3417.5	37.1	4.692
3	H_{S1} = 6881	3418.0	34.1	4.789
3	H_{S2} = 6954	3418.0	34.4	4.780
3	H_{S3} = 7291	3417.7	35.7	4.735
3	H_{S4} = 7538	3417.5	36.7	4.703
3	H_{S5} = 7498	3417.6	36.6	4.708
3	H_{S6} = 7908	3417.3	38.2	4.657
5	Ref. atm.	3211.8	24.8	3.189
5	H_{S1} = 6881	3212.0	22.6	3.228
5	H_{S2} = 6954	3212.0	22.8	3.224
5	H_{S3} = 7291	3211.9	23.8	3.207
5	H_{S4} = 7538	3211.8	24.6	3.194
5	H_{S5} = 7498	3211.8	24.4	3.196
5	H_{S6} = 7908	3211.7	25.6	3.176

TABLE C-14.- REFRACTION CORRECTIONS FOR EGLIN AFB JANUARY RADIO ATMOSPHERE, H = 10^4 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	338.2	71.2	5.642
.5	H_{S1} = 6881	340.2	69.1	5.972
.5	H_{S2} = 6954	339.8	69.3	5.918
.5	H_{S3} = 7291	338.4	70.1	5.679
.5	H_{S4} = 7538	337.4	70.7	5.516
.5	H_{S5} = 7498	337.6	70.6	5.541
.5	H_{S6} = 7908	336.0	71.5	5.288
1	Ref. atm.	284.1	56.9	4.495
1	H_{S1} = 6881	285.6	54.8	4.794
1	H_{S2} = 6954	285.4	55.0	4.754
1	H_{S3} = 7291	284.5	55.9	4.579
1	H_{S4} = 7538	283.9	56.5	4.459
1	H_{S5} = 7498	284.0	56.4	4.478
1	H_{S6} = 7908	283.1	57.4	4.289
3	Ref. atm.	160.0	29.5	2.315
3	H_{S1} = 6881	160.3	28.0	2.486
3	H_{S2} = 6954	160.3	28.1	2.469
3	H_{S3} = 7291	160.1	28.8	2.390
3	H_{S4} = 7538	160.0	29.2	2.336
3	H_{S5} = 7498	160.0	29.1	2.345
3	H_{S6} = 7908	159.8	29.9	2.259
5	Ref. atm.	106.5	19.2	1.502
5	H_{S1} = 6881	106.6	18.2	1.616
5	H_{S2} = 6954	106.6	18.3	1.605
5	H_{S3} = 7291	106.5	18.7	1.556
5	H_{S4} = 7538	106.5	19.0	1.522
5	H_{S5} = 7498	106.5	19.0	1.527
5	H_{S6} = 7908	106.4	19.5	1.473

TABLE C-15.- REFRACTION CORRECTIONS FOR EGLIN AFB
AUGUST RADIO ATMOSPHERE, H = 10^6 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3734.3	97.3	12.686
.5	H_{S1} = 5949	3738.9	91.1	13.405
.5	H_{S2} = 6723	3733.2	95.3	12.517
.5	H_{S3} = 6585	3734.1	94.5	12.663
.5	H_{S4} = 6589	3734.1	94.5	12.658
.5	H_{S5} = 6739	3733.1	95.4	12.501
.5	H_{S6} = 6357	3735.8	93.3	12.914
1	Ref. atm.	3662.9	76.9	10.190
1	H_{S1} = 5949	3666.5	70.4	10.753
1	H_{S2} = 6723	3663.0	75.2	10.205
1	H_{S3} = 6585	3663.6	74.3	10.296
1	H_{S4} = 6589	3663.6	74.4	10.294
1	H_{S5} = 6739	3662.9	75.3	10.195
1	H_{S6} = 6357	3664.6	72.9	10.453
3	Ref. atm.	3422.6	40.5	5.573
3	H_{S1} = 5949	3423.6	35.4	5.741
3	H_{S2} = 6723	3422.8	39.1	5.609
3	H_{S3} = 6585	3423.0	38.5	5.632
3	H_{S4} = 6589	3423.0	38.5	5.631
3	H_{S5} = 6739	3422.8	39.2	5.607
3	H_{S6} = 6357	3423.2	37.4	5.670
5	Ref. atm.	3214.8	26.8	3.746
5	H_{S1} = 5949	3215.2	23.1	3.812
5	H_{S2} = 6723	3214.9	25.8	3.763
5	H_{S3} = 6585	3215.0	25.3	3.772
5	H_{S4} = 6589	3215.0	25.3	3.772
5	H_{S5} = 6739	3214.9	25.8	3.762
5	H_{S6} = 6357	3215.1	24.5	3.786

TABLE C-16.- REFRACTION CORRECTIONS FOR EGLIN AFB AUGUST RADIO ATMOSPHERE, H = 10^4 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	348.4	82.5	7.313
.5	H_{S1} = 5949	352.9	79.4	8.035
.5	H_{S2} = 6723	347.8	81.7	7.214
.5	H_{S3} = 6585	348.6	81.3	7.347
.5	H_{S4} = 6589	348.6	81.3	7.344
.5	H_{S5} = 6739	347.7	81.7	7.199
.5	H_{S6} = 6357	350.1	80.7	7.580
1	Ref. atm.	290.1	64.6	5.702
1	H_{S1} = 5949	293.3	61.4	6.326
1	H_{S2} = 6723	290.3	64.1	5.745
1	H_{S3} = 6585	290.8	63.7	5.841
1	H_{S4} = 6589	290.8	63.7	5.838
1	H_{S5} = 6739	290.3	64.2	5.734
1	H_{S6} = 6357	291.7	62.9	6.006
3	Ref. atm.	161.2	32.6	2.907
3	H_{S1} = 5949	161.8	30.3	3.189
3	H_{S2} = 6723	161.3	32.3	2.944
3	H_{S3} = 6585	161.4	31.9	2.985
3	H_{S4} = 6589	161.4	31.9	2.984
3	H_{S5} = 6739	161.3	32.3	2.939
3	H_{S6} = 6357	161.5	31.4	3.055
5	Ref. atm.	106.9	21.1	1.881
5	H_{S1} = 5949	107.0	19.5	2.057
5	H_{S2} = 6723	106.9	20.8	1.907
5	H_{S3} = 6585	106.9	20.6	1.932
5	H_{S4} = 6589	106.9	20.6	1.931
5	H_{S5} = 6739	106.9	20.9	1.904
5	H_{S6} = 6357	107.0	20.2	1.975

TABLE C-17.- REFRACTION CORRECTIONS FOR EGLIN AFB
ANNUAL RADIO ATMOSPHERE, $H = 10^6$ METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3722.4	90.2	10.838
.5	H_{S1} = 6375	3729.7	86.1	11.975
.5	H_{S2} = 6822	3726.9	88.5	11.539
.5	H_{S3} = 6737	3727.4	88.0	11.618
.5	H_{S4} = 6784	3727.2	88.3	11.574
.5	H_{S5} = 7405	3723.7	91.5	11.035
.5	H_{S6} = 7062	3725.5	89.7	11.323
1	Ref. atm.	3656.5	72.7	9.172
1	H_{S1} = 6375	3660.0	67.7	9.723
1	H_{S2} = 6822	3658.2	70.3	9.448
1	H_{S3} = 6737	3658.6	69.8	9.499
1	H_{S4} = 6784	3658.4	70.1	9.471
1	H_{S5} = 7405	3656.2	73.6	9.125
1	H_{S6} = 7062	3657.4	71.7	9.311
3	Ref. atm.	3420.3	38.9	5.169
3	H_{S1} = 6375	3421.0	35.0	5.300
3	H_{S2} = 6822	3420.6	37.0	5.231
3	H_{S3} = 6737	3420.7	36.6	5.244
3	H_{S4} = 6784	3420.7	36.8	5.237
3	H_{S5} = 7405	3420.1	39.5	5.146
3	H_{S6} = 7062	3420.4	38.0	5.195
5	Ref. atm.	3213.5	25.9	3.493
5	H_{S1} = 6375	3213.7	23.0	3.544
5	H_{S2} = 6822	3213.6	24.4	3.518
5	H_{S3} = 6737	3213.6	24.2	3.523
5	H_{S4} = 6784	3213.6	24.3	3.520
5	H_{S5} = 7405	3213.4	26.3	3.485
5	H_{S6} = 7062	3213.5	25.2	3.504

TABLE C-18.- REFRACTION CORRECTIONS FOR EGLIN AFB ANNUAL RADIO ATMOSPHERE, H = 10^4 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	339.9	76.3	5.936
.5	H_{S1} = 6375	346.6	74.7	7.018
.5	H_{S2} = 6822	344.1	76.0	6.614
.5	H_{S3} = 6737	344.5	75.8	6.687
.5	H_{S4} = 6784	344.3	75.9	6.646
.5	H_{S5} = 7405	341.3	77.5	6.153
.5	H_{S6} = 7062	342.9	76.6	6.416
1	Ref. atm.	286.7	60.8	5.012
1	H_{S1} = 6375	289.5	58.5	5.579
1	H_{S2} = 6822	288.0	59.9	5.289
1	H_{S3} = 6737	288.3	59.7	5.341
1	H_{S4} = 6784	288.2	59.8	5.312
1	H_{S5} = 7405	286.4	61.6	4.953
1	H_{S6} = 7062	287.3	60.6	5.145
3	Ref. atm.	160.7	31.1	2.642
3	H_{S1} = 6375	161.1	29.4	2.852
3	H_{S2} = 6822	160.8	30.4	2.727
3	H_{S3} = 6737	160.9	30.2	2.750
3	H_{S4} = 6784	160.9	30.3	2.737
3	H_{S5} = 7405	160.5	31.6	2.578
3	H_{S6} = 7062	160.7	30.9	2.663
5	Ref. atm.	106.7	20.2	1.714
5	H_{S1} = 6375	105.8	19.0	1.846
5	H_{S2} = 6822	106.7	19.7	1.769
5	H_{S3} = 6737	106.8	19.5	1.783
5	H_{S4} = 6784	106.7	19.6	1.775
5	H_{S5} = 7405	106.6	20.5	1.676
5	H_{S6} = 7062	106.7	20.0	1.730

TABLE C-19.- REFRACTION CORRECTIONS FOR ASCENSION FEBRUARY RADIO ATMOSPHERE, H = 10 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3734.0	96.9	12.641
.5	H_{S1} = 5939	3739.1	91.2	13.440
.5	H_{S2} = 6698	3733.5	95.3	12.563
.5	H_{S3} = 6256	3736.6	92.9	13.052
.5	H_{S4} = 6271	3736.5	93.0	13.035
.5	H_{S5} = 6111	3737.8	92.1	13.225
.5	H_{S6} = 6341	3736.0	93.4	12.954
1	Ref. atm.	3663.1	76.6	10.218
1	H_{S1} = 5939	3666.6	70.4	10.778
1	H_{S2} = 6698	3663.2	75.2	10.237
1	H_{S3} = 6256	3665.1	72.4	10.541
1	H_{S4} = 6271	3665.1	72.5	10.530
1	H_{S5} = 6111	3665.8	71.5	10.647
1	H_{S6} = 6341	3664.7	73.0	10.480
3	Ref. atm.	3422.7	40.2	5.593
3	H_{S1} = 5939	3423.7	35.4	5.752
3	H_{S2} = 6698	3422.9	39.1	5.622
3	H_{S3} = 6256	3423.3	36.9	5.696
3	H_{S4} = 6271	3423.2	37.0	5.693
3	H_{S5} = 6111	3423.5	36.2	5.721
3	H_{S6} = 6341	3423.3	37.3	5.681
5	Ref. atm.	3214.9	26.6	3.756
5	H_{S1} = 5939	3215.2	23.1	3.819
5	H_{S2} = 6698	3215.0	25.7	3.770
5	H_{S3} = 6256	3215.1	24.2	3.798
5	H_{S4} = 6271	3215.1	24.2	3.797
5	H_{S5} = 6111	3215.2	23.7	3.807
5	H_{S6} = 6341	3215.1	24.5	3.793

TABLE C-20.--REFRACTION CORRECTIONS FOR ASCENSION
FEBRUARY RADIO ATMOSPHERE, H = 10^4 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	353.9	80.6	8.191
.5	H_{S1} = 5939	353.1	79.6	8.061
.5	H_{S2} = 6698	348.0	81.8	7.249
.5	H_{S3} = 6256	350.8	80.5	7.700
.5	H_{S4} = 6271	350.7	80.5	7.684
.5	H_{S5} = 6111	351.8	80.1	7.861
.5	H_{S6} = 6341	350.2	80.8	7.609
1	Ref. atm.	293.8	62.5	6.413
1	H_{S1} = 5939	293.4	61.5	6.344
1	H_{S2} = 6698	290.4	64.1	5.771
1	H_{S3} = 6256	292.1	62.6	6.091
1	H_{S4} = 6271	292.0	62.7	6.080
1	H_{S5} = 6111	292.7	62.1	6.204
1	H_{S6} = 6341	291.8	62.9	6.027
3	Ref. atm.	161.7	31.1	3.142
3	H_{S1} = 5939	161.9	30.3	3.197
3	H_{S2} = 6698	161.3	32.2	2.956
3	H_{S3} = 6256	161.6	31.1	3.092
3	H_{S4} = 6271	161.6	31.2	3.087
3	H_{S5} = 6111	161.7	30.8	3.139
3	H_{S6} = 6341	161.6	31.4	3.065
5	Ref. atm.	107.0	20.1	2.009
5	H_{S1} = 5939	107.0	19.5	2.062
5	H_{S2} = 6698	106.9	20.8	1.914
5	H_{S3} = 6256	107.0	20.1	1.998
5	H_{S4} = 6271	107.0	20.1	1.995
5	H_{S5} = 6111	107.0	19.8	2.027
5	H_{S6} = 6341	107.0	20.2	1.98

TABLE C-21.- REFRACTION CORRECTIONS FOR ASCENSION SEPTEMBER RADIO ATMOSPHERE, H = 10^6 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3729.7	92.1	11.969
.5	H_{S1} = 6236	3732.6	87.7	12.424
.5	H_{S2} = 6766	3729.1	90.6	11.877
.5	H_{S3} = 6330	3732.0	88.2	12.322
.5	H_{S4} = 6302	3732.1	88.1	12.352
.5	H_{S5} = 6647	3729.9	89.9	11.994
.5	H_{S6} = 6831	3728.7	90.9	11.815
1	Ref. atm.	3660.1	73.2	9.748
1	H_{S1} = 6236	3662.0	68.6	10.050
1	H_{S2} = 6766	3659.9	71.8	9.708
1	H_{S3} = 6330	3661.6	69.2	9.986
1	H_{S4} = 6302	3661.8	69.0	10.005
1	H_{S5} = 6647	3660.3	71.1	9.782
1	H_{S6} = 6831	3659.6	72.1	9.669
3	Ref. atm.	3421.2	38.8	5.333
3	H_{S1} = 6236	3421.9	35.1	5.442
3	H_{S2} = 6766	3421.4	37.6	5.358
3	H_{S3} = 6330	3421.8	35.6	5.427
3	H_{S4} = 6302	3421.8	35.4	5.432
3	H_{S5} = 6647	3421.5	37.0	5.376
3	H_{S6} = 6831	3421.3	37.9	5.348
5	Ref. atm.	3214.0	25.8	3.585
5	H_{S1} = 6236	3214.2	23.0	3.631
5	H_{S2} = 6766	3214.0	24.8	3.600
5	H_{S3} = 6330	3214.2	23.3	3.625
5	H_{S4} = 6302	3214.2	23.2	3.627
5	H_{S5} = 6647	3214.1	24.4	3.607
5	H_{S6} = 6831	3214.0	25.0	3.596

TABLE C-22.- REFRACTION CORRECTIONS FOR ASCENSION SEPTEMBER RADIO ATMOSPHERE, H = 10^4 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	346.1	77.5	6.940
.5	H_{S1} = 6236	348.5	76.3	7.334
.5	H_{S2} = 6766	345.4	77.8	6.828
.5	H_{S3} = 6330	347.9	76.6	7.239
.5	H_{S4} = 6302	348.1	76.5	7.267
.5	H_{S5} = 6647	346.1	77.4	6.935
.5	H_{S6} = 6831	345.0	77.9	6.771
1	Ref. atm.	289.5	61.0	5.572
1	H_{S1} = 6236	290.7	59.5	5.813
1	H_{S2} = 6766	288.9	61.2	5.451
1	H_{S3} = 6330	290.3	59.8	5.745
1	H_{S4} = 6302	290.4	59.7	5.765
1	H_{S5} = 6647	289.2	60.8	5.528
1	H_{S6} = 6831	288.7	61.4	5.410
3	Ref. atm.	161.1	30.8	2.840
3	H_{S1} = 6236	161.3	29.7	2.959
3	H_{S2} = 6766	161.0	30.9	2.804
3	H_{S3} = 6330	161.3	29.9	2.930
3	H_{S4} = 6302	161.3	29.8	2.938
3	H_{S5} = 6647	161.1	30.7	2.837
3	H_{S6} = 6831	161.0	31.1	2.786
5	Ref. atm.	106.8	20.0	1.831
5	H_{S1} = 6236	106.9	19.1	1.913
5	H_{S2} = 6766	106.8	20.0	1.818
5	H_{S3} = 6330	106.9	19.3	1.896
5	H_{S4} = 6302	106.9	19.3	1.901
5	H_{S5} = 6647	106.8	19.8	1.838
5	H_{S6} = 6831	106.8	20.1	1.806

TABLE C-23.- REFRACTION CORRECTIONS FOR ASCENSION ANNUAL RADIO ATMOSPHERE, H = 10^6 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3732.7	93.6	12.441
.5	H_{S1} = 6118	3735.1	89.1	12.817
.5	H_{S2} = 6738	3730.8	92.4	12.148
.5	H_{S3} = 6164	3734.8	89.3	12.764
.5	H_{S4} = 6100	3735.3	89.0	12.838
.5	H_{S5} = 6445	3732.8	90.8	12.451
.5	H_{S6} = 6637	3731.5	91.9	12.250
1	Ref. atm.	3662.0	74.0	10.051
1	H_{S1} = 6118	3663.8	69.3	10.333
1	H_{S2} = 6738	3661.2	73.1	9.917
1	H_{S3} = 6164	3663.6	69.6	10.300
1	H_{S4} = 6100	3663.9	69.2	10.346
1	H_{S5} = 6445	3662.4	71.3	10.107
1	H_{S6} = 6637	3661.6	72.5	9.981
3	Ref. atm.	3421.9	39.0	5.454
3	H_{S1} = 6118	3422.6	35.2	5.564
3	H_{S2} = 6738	3422.0	38.2	5.462
3	H_{S3} = 6164	3422.5	35.5	5.556
3	H_{S4} = 6100	3422.6	35.2	5.567
3	H_{S5} = 6445	3422.3	36.8	5.509
3	H_{S6} = 6637	3422.1	37.7	5.478
5	Ref. atm.	3214.4	25.9	3.658
5	H_{S1} = 6118	3214.6	23.0	3.705
5	H_{S2} = 6738	3214.4	25.2	3.667
5	H_{S3} = 6164	3214.6	23.2	3.702
5	H_{S4} = 6100	3214.6	23.0	3.706
5	H_{S5} = 6445	3214.5	24.2	3.685
5	H_{S6} = 6637	3214.4	24.8	3.673

TABLE C-24.- REFRACTION CORRECTIONS FOR ASCENSION ANNUAL RADIO ATMOSPHERE, H = 10^4 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	348.6	78.9	7.343
.5	H_{S1} = 6118	350.3	77.6	7.614
.5	H_{S2} = 6738	346.4	79.3	6.994
.5	H_{S3} = 6164	350.0	77.7	7.564
.5	H_{S4} = 6100	350.4	77.5	7.633
.5	H_{S5} = 6445	348.2	78.5	7.274
.5	H_{S6} = 6637	347.0	79.1	7.088
1	Ref. atm.	290.7	61.7	5.825
1	H_{S1} = 6118	291.7	60.3	6.018
1	H_{S2} = 6738	289.5	62.4	5.578
1	H_{S3} = 6164	291.6	60.5	5.983
1	H_{S4} = 6100	291.8	60.2	6.032
1	H_{S5} = 6445	290.5	61.4	5.777
1	H_{S6} = 6637	289.9	62.0	5.645
3	Ref. atm.	161.3	31.0	2.938
3	H_{S1} = 6118	161.5	29.9	3.051
3	H_{S2} = 6738	161.1	31.5	2.864
3	H_{S3} = 6164	161.5	30.1	3.037
3	H_{S4} = 6100	161.6	29.9	3.057
3	H_{S5} = 6445	161.3	30.8	2.950
3	H_{S6} = 6637	161.2	31.2	2.893
5	Ref. atm.	106.9	20.1	1.890
5	H_{S1} = 6118	106.9	19.3	1.971
5	H_{S2} = 6738	106.8	20.3	1.856
5	H_{S3} = 6164	106.9	19.4	1.962
5	H_{S4} = 6100	107.0	19.3	1.975
5	H_{S5} = 6445	106.9	19.9	1.909
5	H_{S6} = 6637	106.8	20.2	1.874

TABLE C-25.- REFRACTION CORRECTIONS FOR KWAJALEIN MAY RADIO ATMOSPHERE, $H = 10^6$ METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3744.3	101.6	14.274
.5	H_{S1} = 5644	3746.2	94.7	14.544
.5	H_{S2} = 6643	3737.9	100.2	13.251
.5	H_{S3} = 6335	3740.2	98.5	13.612
.5	H_{S4} = 6294	3740.6	98.3	13.662
.5	H_{S5} = 6027	3742.8	96.8	14.004
.5	H_{S6} = 5853	3744.3	95.9	14.242
1	Ref. atm.	3669.0	78.8	11.150
1	H_{S1} = 5644	3671.5	72.1	11.551
1	H_{S2} = 6643	3666.5	78.7	10.766
1	H_{S3} = 6335	3668.0	76.7	10.989
1	H_{S4} = 6294	3668.1	76.4	11.020
1	H_{S5} = 6027	3669.5	74.7	11.228
1	H_{S6} = 5853	3670.4	73.5	11.371
3	Ref. atm.	3424.5	40.8	5.901
3	H_{S1} = 5644	3425.5	35.5	6.068
3	H_{S2} = 6643	3424.4	40.6	5.884
3	H_{S3} = 6335	3424.8	39.0	5.939
3	H_{S4} = 6294	3424.8	38.8	5.946
3	H_{S5} = 6027	3425.1	37.5	5.995
3	H_{S6} = 5853	3425.3	36.6	6.027
5	Ref. atm.	3215.9	26.9	3.940
5	H_{S1} = 5644	3216.3	23.0	4.008
5	H_{S2} = 6643	3215.9	26.7	3.941
5	H_{S3} = 6335	3216.0	25.5	3.961
5	H_{S4} = 6294	3216.0	25.4	3.964
5	H_{S5} = 6027	3216.1	24.4	3.981
5	H_{S6} = 5853	3216.2	23.8	3.993

TABLE C-26.- REFRACTION CORRECTIONS FOR KWAJALEIN
MAY RADIO ATMOSPHERE, H = 10^4 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{10}, mrad
0.5	Ref. atm.	357.0	85.9	8.682
.5	H_{S1} = 5644	358.2	82.9	8.864
.5	H_{S2} = 6643	350.6	85.8	7.670
.5	H_{S3} = 6335	352.7	85.0	8.001
.5	H_{S4} = 6294	353.0	84.9	8.048
.5	H_{S5} = 6027	355.0	84.1	8.364
.5	H_{S6} = 5853	356.4	83.5	8.583
1	Ref. atm.	294.8	66.2	6.609
1	H_{S1} = 5644	296.4	63.4	6.922
1	H_{S2} = 6643	292.1	67.1	6.089
1	H_{S3} = 6335	293.3	66.0	6.324
1	H_{S4} = 6294	293.5	65.9	6.356
1	H_{S5} = 6027	294.6	64.9	6.577
1	H_{S6} = 5853	295.4	64.2	6.729
3	Ref. atm.	161.9	32.9	3.222
3	H_{S1} = 5644	162.4	30.8	3.450
3	H_{S2} = 6643	161.7	33.6	3.106
3	H_{S3} = 6335	161.9	32.8	3.205
3	H_{S4} = 6294	161.9	32.7	3.218
3	H_{S5} = 6027	162.1	31.9	3.310
3	H_{S6} = 5853	162.2	31.4	3.372
5	Ref. atm.	107.0	21.2	2.066
5	H_{S1} = 5644	107.2	19.7	2.220
5	H_{S2} = 6643	107.0	21.7	2.009
5	H_{S3} = 6335	107.1	21.1	2.070
5	H_{S4} = 6294	107.1	21.0	2.078
5	H_{S5} = 6027	107.1	20.5	2.134
5	H_{S6} = 5853	107.2	20.2	2.172

TABLE C-27.- REFRACTION CORRECTIONS FOR KWAJALEIN
DECEMBER RADIO ATMOSPHERE, H = 10^6 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3734.2	96.8	12.675
.5	H_{S1} = 5915	3739.7	91.5	13.526
.5	H_{S2} = 6701	3733.8	95.7	12.610
.5	H_{S3} = 6298	3736.7	93.5	13.055
.5	H_{S4} = 6315	3736.5	93.6	13.036
.5	H_{S5} = 6614	3734.4	95.3	12.702
.5	H_{S6} = 6302	3736.6	93.6	13.051
1	Ref. atm.	3663.7	76.5	10.313
1	H_{S1} = 5915	3667.0	70.6	10.838
1	H_{S2} = 6701	3663.4	75.5	10.275
1	H_{S3} = 6298	3665.2	73.0	10.551
1	H_{S4} = 6315	3665.1	73.1	10.539
1	H_{S5} = 6614	3663.8	74.9	10.332
1	H_{S6} = 6302	3665.2	73.0	10.548
3	Ref. atm.	3422.9	40.1	5.624
3	H_{S1} = 5915	3423.8	35.4	5.777
3	H_{S2} = 6701	3423.0	39.2	5.641
3	H_{S3} = 6298	3423.4	37.3	5.709
3	H_{S4} = 6315	3423.4	37.3	5.706
3	H_{S5} = 6614	3423.1	38.8	5.656
3	H_{S6} = 6302	3423.4	37.3	5.709
5	Ref. atm.	3215.0	26.6	3.773
5	H_{S1} = 5915	3215.3	23.0	3.834
5	H_{S2} = 6701	3215.0	25.8	3.784
5	H_{S3} = 6298	3215.2	24.4	3.809
5	H_{S4} = 6315	3215.2	24.5	3.808
5	H_{S5} = 6614	3215.1	25.5	3.789
5	H_{S6} = 6302	3215.2	24.4	3.809

TABLE C-28.- REFRACTION CORRECTIONS FOR KWAJALEIN DECEMBER RADIO ATMOSPHERE, H = 10^4 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	348.9	82.0	7.393
.5	H_{S1} = 5915	353.5	79.8	8.122
.5	H_{S2} = 6701	348.2	82.1	7.276
.5	H_{S3} = 6298	350.7	81.0	7.686
.5	H_{S4} = 6315	350.6	81.0	7.668
.5	H_{S5} = 6614	348.7	81.9	7.360
.5	H_{S6} = 6302	350.7	81.0	7.681
1	Ref. atm.	291.0	64.3	5.883
1	H_{S1} = 5915	293.6	61.6	6.389
1	H_{S2} = 6701	290.6	64.4	5.791
1	H_{S3} = 6298	292.1	63.0	6.082
1	H_{S4} = 6315	292.0	63.1	6.070
1	H_{S5} = 6614	290.9	64.1	5.852
1	H_{S6} = 6302	292.0	63.0	6.080
3	Ref. atm.	161.4	32.3	2.985
3	H_{S1} = 5915	161.9	30.3	3.217
3	H_{S2} = 6701	161.4	32.4	2.965
3	H_{S3} = 6298	161.6	31.4	3.089
3	H_{S4} = 6315	161.6	31.4	3.084
3	H_{S5} = 6614	161.4	32.2	2.991
3	H_{S6} = 6302	161.6	31.4	3.088
5	Ref. atm.	106.9	20.9	1.927
5	H_{S1} = 5915	107.1	19.5	2.074
5	H_{S2} = 6701	106.9	20.9	1.920
5	H_{S3} = 6298	107.0	20.2	1.996
5	H_{S4} = 6315	107.0	20.2	1.993
5	H_{S5} = 6614	106.9	20.8	1.936
5	H_{S6} = 6302	107.0	20.2	1.996

TABLE C-29.- REFRACTION CORRECTIONS FOR KWAJALEIN ANNUAL RADIO ATMOSPHERE, H = 10^6 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3735.1	97.7	12.808
.5	H_{S1} = 5879	3740.5	91.9	13.656
.5	H_{S2} = 6693	3734.3	96.3	12.694
.5	H_{S3} = 6404	3736.4	94.7	13.012
.5	H_{S4} = 6394	3736.5	94.7	13.024
.5	H_{S5} = 6598	3735.0	95.8	12.796
.5	H_{S6} = 6243	3737.6	93.9	13.200
1	Ref. atm.	3664.1	77.1	10.371
1	H_{S1} = 5879	3667.6	70.8	10.930
1	H_{S2} = 6693	3663.9	75.9	10.339
1	H_{S3} = 6404	3665.1	74.1	10.537
1	H_{S4} = 6394	3665.1	74.0	10.544
1	H_{S5} = 6598	3664.3	75.3	10.403
1	H_{S6} = 6243	3665.8	73.1	10.653
3	Ref. atm.	3423.1	40.4	5.652
3	H_{S1} = 5879	3424.0	35.4	5.815
3	H_{S2} = 6693	3423.2	39.4	5.674
3	H_{S3} = 6404	3423.5	38.0	5.722
3	H_{S4} = 6394	3423.5	37.9	5.724
3	H_{S5} = 6598	3423.3	38.9	5.689
3	H_{S6} = 6243	3423.7	37.2	5.750
5	Ref. atm.	3215.1	26.7	3.792
5	H_{S1} = 5879	3215.4	23.0	3.857
5	H_{S2} = 6693	3215.2	25.9	3.804
5	H_{S3} = 6404	3215.3	24.9	3.823
5	H_{S4} = 6394	3215.3	24.9	3.823
5	H_{S5} = 6598	3215.2	25.6	3.810
5	H_{S6} = 6243	3215.3	24.3	3.833

TABLE C-30.- REFRACTION CORRECTIONS FOR KWAJALEIN ANNUAL RADIO ATMOSPHERE, $H = 10^4$ METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	349.7	82.9	7.518
.5	H_{S1} = 5879	354.1	80.2	8.217
.5	H_{S2} = 6693	348.5	82.6	7.328
.5	H_{S3} = 6404	350.3	81.8	7.620
.5	H_{S4} = 6394	350.4	81.8	7.630
.5	H_{S5} = 6598	349.1	82.3	7.421
.5	H_{S6} = 6243	351.4	81.3	7.793
1	Ref. atm.	291.3	64.9	5.929
1	H_{S1} = 5979	294.0	61.9	6.457
1	H_{S2} = 6693	290.8	64.7	5.831
1	H_{S3} = 6404	291.8	63.8	6.039
1	H_{S4} = 6394	291.9	63.7	6.046
1	H_{S5} = 6598	291.1	64.4	5.897
1	H_{S6} = 6243	292.5	63.2	6.161
3	Ref. atm.	161.4	32.6	2.988
3	H_{S1} = 5879	162.0	30.4	3.247
3	H_{S2} = 6693	161.4	32.5	2.984
3	H_{S3} = 6404	161.6	31.8	3.073
3	H_{S4} = 6394	161.6	31.8	3.076
3	H_{S5} = 6598	161.5	32.3	3.012
3	H_{S6} = 6243	161.7	31.4	3.124
5	Ref. atm.	106.9	21.1	1.927
5	H_{S1} = 5879	107.1	19.5	2.093
5	H_{S2} = 6693	106.9	21.0	1.932
5	H_{S3} = 6404	107.0	20.5	1.986
5	H_{S4} = 6394	107.0	20.5	1.988
5	H_{S5} = 6598	107.0	20.9	1.949
5	H_{S6} = 6243	107.0	20.2	2.018

TABLE C-31.- REFRACTION CORRECTIONS FOR WALLOPS MARCH RADIO ATMOSPHERE, H = 10^6 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3711.5	81.8	9.121
.5	H_{S1} = 7061	3716.8	78.1	9.949
.5	H_{S2} = 7004	3717.0	77.8	9.992
.5	H_{S3} = 8089	3712.3	82.9	9.258
.5	H_{S4} = 8223	3711.8	83.5	9.178
.5	H_{S5} = 8376	3711.3	84.2	9.090
.5	H_{S6} = 8217	3711.9	83.5	9.182
1	Ref. atm.	3647.4	66.8	7.723
1	H_{S1} = 7061	3650.5	62.8	8.212
1	H_{S2} = 7004	3650.7	62.5	8.239
1	H_{S3} = 8089	3647.6	67.8	7.758
1	H_{S4} = 8223	3647.3	68.5	7.704
1	H_{S5} = 8376	3646.9	69.2	7.645
1	H_{S6} = 8217	3647.3	68.4	7.707
3	Ref. atm.	3416.3	36.7	4.495
3	H_{S1} = 7061	3417.0	33.7	4.609
3	H_{S2} = 7004	3417.0	33.4	4.616
3	H_{S3} = 8089	3416.2	37.6	4.483
3	H_{S4} = 8223	3416.1	38.1	4.467
3	H_{S5} = 8376	3416.0	38.7	4.450
3	H_{S6} = 8217	3416.2	38.1	4.468
5	Ref. atm.	3211.2	24.5	3.074
5	H_{S1} = 7061	3211.4	22.4	3.114
5	H_{S2} = 7004	3211.4	22.2	3.117
5	H_{S3} = 8089	3211.1	25.3	3.065
5	H_{S4} = 8223	3211.1	25.7	3.058
5	H_{S5} = 8376	3211.1	26.1	3.051
5	H_{S6} = 8217	3211.1	25.7	3.059

TABLE C-32.- REFRACTION CORRECTIONS FOR WALLOPS MARCH RADIO ATMOSPHERE, H = 10^4 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	333.0	69.7	4.775
.5	H_{S1} = 7061	338.1	67.0	5.632
.5	H_{S2} = 7004	338.3	66.9	5.672
.5	H_{S3} = 8089	334.3	69.4	5.002
.5	H_{S4} = 8223	333.9	69.6	4.930
.5	H_{S5} = 8376	333.4	69.9	4.850
.5	H_{S6} = 8217	333.9	69.6	4.933
1	Ref. atm.	281.4	56.3	3.941
1	H_{S1} = 7061	284.3	53.3	4.535
1	H_{S2} = 7004	284.4	53.2	4.564
1	H_{S3} = 8089	282.0	55.8	4.067
1	H_{S4} = 8223	281.7	56.1	4.013
1	H_{S5} = 8376	281.4	56.4	3.953
1	H_{S6} = 8217	281.7	56.1	4.016
3	Ref. atm.	159.5	29.5	2.108
3	H_{S1} = 7061	160.1	27.4	2.363
3	H_{S2} = 7004	160.1	27.3	2.376
3	H_{S3} = 8089	159.6	29.2	2.150
3	H_{S4} = 8223	159.6	29.4	2.125
3	H_{S5} = 8376	159.5	29.6	2.097
3	H_{S6} = 8217	159.6	29.4	2.126
5	Ref. atm.	106.3	19.3	1.378
5	H_{S1} = 7061	106.5	17.8	1.537
5	H_{S2} = 7004	106.5	17.7	1.546
5	H_{S3} = 8089	106.4	19.0	1.404
5	H_{S4} = 8223	106.3	19.2	1.388
5	H_{S5} = 8376	106.3	19.3	1.370
5	H_{S6} = 8217	106.3	19.2	1.389

TABLE C-33.- REFRACTION CORRECTIONS FOR WALLOPS
JULY RADIO ATMOSPHERE, H = 10^6 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3741.8	98.7	13.861
.5	H_{S1} = 5863	3740.9	92.1	13.716
.5	H_{S2} = 6701	3734.5	96.7	12.722
.5	H_{S3} = 6313	3737.3	94.5	13.154
.5	H_{S4} = 6313	3737.3	94.5	13.154
.5	H_{S5} = 5997	3739.8	92.8	13.541
.5	H_{S6} = 6215	3738.0	94.0	13.271
1	Ref. atm.	3666.2	76.7	10.719
1	H_{S1} = 5863	3667.8	70.9	10.973
1	H_{S2} = 6701	3664.0	76.2	10.362
1	H_{S3} = 6313	3665.7	73.7	10.631
1	H_{S4} = 6313	3665.7	73.7	10.631
1	H_{S5} = 5997	3667.2	71.7	10.867
1	H_{S6} = 6215	3666.1	73.1	10.702
3	Ref. atm.	3423.3	40.0	5.693
3	H_{S1} = 5863	3424.1	35.4	5.833
3	H_{S2} = 6701	3423.3	39.5	5.687
3	H_{S3} = 6313	3423.7	37.6	5.752
3	H_{S4} = 6313	3423.7	37.6	5.752
3	H_{S5} = 5997	3424.0	36.1	5.808
3	H_{S6} = 6215	3423.8	37.2	5.770
5	Ref. atm.	3215.2	26.5	3.809
5	H_{S1} = 5863	3215.5	23.0	3.867
5	H_{S2} = 6701	3215.2	26.0	3.813
5	H_{S3} 6313	3215.3	24.7	3.838
5	H_{S4} = 6313	3215.3	24.7	3.838
5	H_{S5} = 5997	3215.5	23.5	3.858
5	H_{S6} = 6215	3215.4	24.3	3.844

TABLE C-34.- REFRACTION CORRECTIONS FOR WALLOPS
JULY RADIO ATMOSPHERE, H = 10^4 METERS

E_M, deg	H_S, m.	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	356.5	83.4	8.594
.5	H_{S1} = 5863	354.3	80.4	8.260
.5	H_{S2} = 6701	348.6	82.9	7.340
.5	H_{S3} = 6313	351.1	81.8	7.739
.5	H_{S4} = 6313	351.1	81.8	7.739
.5	H_{S5} = 5997	353.3	80.8	8.097
.5	H_{S6} = 6215	351.7	81.5	7.846
1	Ref. atm.	293.7	64.2	6.401
1	H_{S1} = 5873	294.1	62.0	6.488
1	H_{S2} = 6701	290.8	65.0	5.841
1	H_{S3} = 6313	292.3	63.6	6.124
1	H_{S4} = 6313	292.3	63.6	6.124
1	H_{S5} = 5997	293.6	62.5	6.375
1	H_{S6} = 6215	292.7	63.3	6.200
3	Ref. atm.	161.6	32.0	3.097
3	H_{S1} = 5863	162.0	30.4	3.261
3	H_{S2} = 6701	161.4	32.6	2.989
3	H_{S3} = 6313	161.7	31.7	3.109
3	H_{S4} = 6313	161.7	31.7	3.109
3	H_{S5} = 5997	161.9	30.8	3.214
3	H_{S6} = 6215	161.7	31.4	3.141
5	Ref. atm.	107.0	20.7	1.987
5	H_{S1} = 5863	107.1	19.6	2.102
5	H_{S2} = 6701	106.9	21.1	1.935
5	H_{S3} = 6313	107.0	20.4	2.009
5	H_{S4} = 6313	107.0	20.4	2.009
5	H_{S5} = 5997	107.1	19.8	2.074
5	H_{S6} = 6215	107.0	20.2	2.029

TABLE C-35.- REFRACTION CORRECTIONS FOR WALLOPS ANNUAL RADIO ATMOSPHERE, H = 10^6 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3718.2	86.4	10.172
.5	H_{S1} = 6746	3722.5	81.8	10.847
.5	H_{S2} = 6914	3721.6	82.7	10.704
.5	H_{S3} = 7500	3718.7	85.6	10.247
.5	H_{S4} = 7564	3718.4	85.9	10.201
.5	H_{S5} = 7696	3717.8	86.6	10.107
.5	H_{S6} = 7680	3717.8	86.5	10.118
1	Ref. atm.	3651.7	69.9	8.414
1	H_{S1} = 6746	3654.7	65.2	8.889
1	H_{S2} = 6914	3654.2	66.1	8.798
1	H_{S3} = 7500	3652.3	69.2	8.502
1	H_{S4} = 7564	3652.1	69.5	8.472
1	H_{S5} = 7696	3651.7	70.2	8.410
1	H_{S6} = 7680	3651.8	70.1	8.418
3	Ref. atm.	3418.1	38.0	4.798
3	H_{S1} = 6746	3418.8	34.4	4.925
3	H_{S2} = 6914	3418.7	35.1	4.901
3	H_{S3} = 7500	3418.2	37.5	4.822
3	H_{S4} = 7564	3418.2	37.7	4.814
3	H_{S5} = 7696	3418.1	38.3	4.797
3	H_{S6} = 7680	3418.1	38.2	4.799
5	Ref. atm.	3212.2	25.3	3.265
5	H_{S1} = 6746	3212.5	22.7	3.312
5	H_{S2} = 6914	3212.4	23.3	3.303
5	H_{S3} = 7500	3212.3	25.0	3.273
5	H_{S4} = 7564	3212.2	25.2	3.269
5	H_{S5} = 7696	3212.2	25.6	3.263
5	H_{S6} = 7680	3212.2	25.6	3.264

TABLE C-36.- REFRACTION CORRECTIONS FOR WALLOPS ANNUAL RADIO ATMOSPHERE, H = 10^4 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	337.9	73.2	5.593
.5	H_{S1} = 6746	341.8	70.6	6.237
.5	H_{S2} = 6914	341.0	71.1	6.105
.5	H_{S3} = 7500	338.4	72.5	5.686
.5	H_{S4} = 7564	338.2	72.7	5.643
.5	H_{S5} = 7696	337.7	73.0	5.558
.5	H_{S6} = 7680	337.7	72.9	5.568
1	Ref. atm.	284.0	58.5	4.486
1	H_{S1} = 6746	286.6	55.8	4.995
1	H_{S2} = 6914	286.1	56.3	4.899
1	H_{S3} = 7500	284.6	57.9	4.591
1	H_{S4} = 7564	284.4	58.0	4.560
1	H_{S5} = 7696	284.1	58.3	4.496
1	H_{S6} = 7680	284.1	58.3	4.504
3	Ref. atm.	160.0	30.3	2.346
3	H_{S1} = 6746	160.5	28.4	2.581
3	H_{S2} = 6914	160.4	28.7	2.539
3	H_{S3} = 7500	160.1	29.9	2.401
3	H_{S4} = 7564	160.1	30.0	2.387
3	H_{S5} = 7696	160.1	30.2	2.358
3	H_{S6} = 7680	160.1	30.2	2.362
5	Ref. atm.	106.5	19.8	1.528
5	H_{S1} = 6746	106.6	18.4	1.675
5	H_{S2} = 6914	106.6	18.6	1.649
5	H_{S3} = 7500	106.5	19.4	1.563
5	H_{S4} = 7564	106.5	19.5	1.555
5	H_{S5} = 7696	106.5	19.7	1.537
5	H_{S6} = 7680	106.5	19.7	1.539

TABLE C-37.- REFRACTION CORRECTIONS FOR CAPE CANAVERAL JANUARY RADIO ATMOSPHERE, H = 10^6 METERS.

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3731.3	91.2	12.223
.5	H_{S1} = 6281	3731.7	87.2	12.278
.5	H_{S2} = 6789	3728.4	89.9	11.764
.5	H_{S3} = 6256	3731.8	87.1	12.305
.5	H_{S4} = 6126	3732.8	86.4	12.449
.5	H_{S5} = 6389	3730.9	87.8	12.163
.5	H_{S6} = 6905	3727.7	90.5	11.655
1	Ref. atm.	3660.5	72.1	9.810
1	H_{S1} = 6281	3661.4	68.3	9.944
1	H_{S2} = 6789	3659.3	71.3	9.622
1	H_{S3} = 6256	3661.5	68.2	9.961
1	H_{S4} = 6126	3662.0	67.4	10.049
1	H_{S5} = 6389	3660.9	69.0	9.872
1	H_{S6} = 6905	3658.9	72.0	9.553
3	Ref. atm.	3421.1	38.2	5.312
3	H_{S1} = 6281	3421.6	35.1	5.397
3	H_{S2} = 6789	3421.1	37.4	5.316
3	H_{S3} = 6256	3421.6	35.0	5.401
3	H_{S4} = 6126	3421.7	34.4	5.422
3	H_{S5} = 6389	3421.5	35.6	5.379
3	H_{S6} = 6905	3421.0	37.9	5.299
5	Ref. atm.	3213.8	25.4	3.565
5	H_{S1} = 6281	3214.1	23.0	3.603
5	H_{S2} = 6789	3213.9	24.7	3.573
5	H_{S3} = 6256	3214.1	22.9	3.605
5	H_{S4} = 6126	3214.1	22.5	3.613
5	H_{S5} = 6389	3214.0	23.4	3.597
5	H_{S6} = 6905	3213.9	25.1	3.566

TABLE C-38.- REFRACTION CORRECTIONS FOR CAPE CANAVERAL JANUARY RADIO ATMOSPHERE, $H_{-} = 10^4$ METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	348.2	77.0	7.280
.5	H_{S1} = 6281	347.9	75.8	7.231
.5	H_{S2} = 6789	344.9	77.2	6.755
.5	H_{S3} = 6256	348.0	75.7	7.256
.5	H_{S4} = 6126	348.9	75.3	7.390
.5	H_{S5} = 6389	347.2	76.1	7.124
.5	H_{S6} = 6905	344.3	77.5	6.655
1	Ref. atm.	290.3	60.3	5.727
1	H_{S1} = 6281	290.3	59.2	5.737
1	H_{S2} = 6789	288.6	60.8	5.396
1	H_{S3} = 6256	290.4	59.1	5.754
1	H_{S4} = 6126	290.9	58.7	5.849
1	H_{S5} = 6389	289.9	59.5	5.661
1	H_{S6} = 6905	288.2	61.2	5.324
3	Ref. atm.	161.1	30.4	2.850
3	H_{S1} = 6281	161.3	29.6	2.924
3	H_{S2} = 6789	161.0	30.8	2.777
3	H_{S3} = 6256	161.3	29.5	2.932
3	H_{S4} = 6126	161.4	29.2	2.972
3	H_{S5} = 6389	161.2	29.8	2.892
3	H_{S6} = 6905	160.9	31.0	2.746
5	Ref. atm.	106.8	19.7	1.831
5	H_{S1} = 6281	106.9	19.1	1.891
5	H_{S2} = 6789	106.8	19.9	1.801
5	H_{S3} = 6256	106.9	19.0	1.896
5	H_{S4} = 6126	106.9	18.8	1.921
5	H_{S5} = 6389	106.8	19.3	1.872
5	H_{S6} = 6905	106.8	20.1	1.782

TABLE C-39.- REFRACTION CORRECIONS FOR CAPE CANAVERAL AUGUST RADIO ATMOSPHERE, H = 10^6 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3755.8	106.8	16.034
.5	H_{S1} = 5366	3753.6	98.3	15.692
.5	H_{S2} = 6591	3742.2	105.0	13.922
.5	H_{S3} = 5943	3747.7	101.4	14.778
.5	H_{S4} = 5866	3748.5	101.0	14.891
.5	H_{S5} = 5501	3752.2	99.0	15.463
.5	H_{S6} = 5388	3753.4	98.4	15.654
1	Ref. atm.	3674.8	80.9	12.081
1	H_{S1} = 5366	3676.5	73.7	12.336
1	H_{S2} = 6591	3669.8	82.0	11.279
1	H_{S3} = 5943	3673.1	77.7	11.800
1	H_{S4} = 5866	3673.5	77.2	11.867
1	H_{S5} = 5501	3675.6	74.6	12.203
1	H_{S6} = 5388	3676.3	73.8	12.314
3	Ref. atm.	3426.3	41.2	6.205
3	H_{S1} = 5366	3427.3	35.5	6.376
3	H_{S2} = 6591	3425.9	42.0	6.136
3	H_{S3} = 5943	3426.6	38.6	6.259
3	H_{S4} = 5866	3426.7	38.2	6.274
3	H_{S5} = 5501	3427.2	36.2	6.348
3	H_{S6} = 5388	3427.3	35.6	6.371
5	Ref. atm.	3216.9	27.1	4.118
5	H_{S1} = 5366	3217.3	22.8	4.190
5	H_{S2} = 6591	3216.8	27.6	4.103
5	H_{S3} = 5943	3217.0	25.1	4.148
5	H_{S4} = 5866	3217.1	24.8	4.154
5	H_{S5} = 5501	3217.2	23.4	4.180
5	H_{S6} = 5388	3217.3	22.9	4.189

TABLE C-40.- REFRACTION CORRECTIONS FOR CAPE CANAVERAL AUGUST RADIO ATMOSPHERE, H = 10^4 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	366.2	90.1	10.113
.5	H_{S1} = 5366	363.7	86.1	9.714
.5	H_{S2} = 6591	353.2	89.8	8.082
.5	H_{S3} = 5943	358.2	87.9	8.868
.5	H_{S4} = 5866	358.9	87.7	8.972
.5	H_{S5} = 5501	362.3	86.6	9.501
.5	H_{S6} = 5388	363.4	86.2	9.679
1	Ref. atm.	298.8	68.0	7.384
1	H_{S1} = 5366	299.5	65.1	7.522
1	H_{S2} = 6591	293.7	70.0	6.399
1	H_{S3} = 5943	296.5	67.5	6.947
1	H_{S4} = 5866	296.9	67.2	7.019
1	H_{S5} = 5501	298.8	65.7	7.379
1	H_{S6} = 5388	299.4	65.2	7.498
3	Ref. atm.	162.5	33.2	3.491
3	H_{S1} = 5366	163.0	31.2	3.706
3	H_{S2} = 6591	162.0	34.8	3.250
3	H_{S3} = 5943	162.5	33.0	3.478
3	H_{S4} = 5866	162.5	32.8	3.507
3	H_{S5} = 5501	162.8	31.6	3.650
3	H_{S6} = 5388	162.9	31.2	3.697
5	Ref. atm.	107.2	21.4	2.227
5	H_{S1} = 5366	107.4	19.9	2.378
5	H_{S2} = 6591	107.1	22.4	2.100
5	H_{S3} = 5943	107.2	21.2	2.239
5	H_{S4} = 5866	107.2	21.0	2.257
5	H_{S5} = 5501	107.3	20.2	2.344
5	H_{S6} = 5388	107.4	20.0	2.372

TABLE C-41.- REFRACTION CORRECTIONS FOR CAPE CANAVERAL ANNUAL RADIO ATMOSPHERE, $H = 10^6$

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3745.0	98.9	14.350
.5	H_{S1} = 5794	3742.6	92.9	13.971
.5	H_{S2} = 6679	3435.6	97.8	12.891
.5	H_{S3} = 5908	3741.6	93.5	13.816
.5	H_{S4} = 5777	3742.7	92.8	13.994
.5	H_{S5} = 5774	3742.7	92.8	13.998
.5	H_{S6} = 6101	3739.9	94.6	13.566
1	Ref. atm.	3668.4	76.3	11.067
1	H_{S1} = 5794	3669.0	71.3	11.152
1	H_{S2} = 6679	3664.8	76.9	10.491
1	H_{S3} = 5908	3668.4	72.0	11.059
1	H_{S4} = 5777	3669.1	71.2	11.166
1	H_{S5} = 5774	3669.1	71.1	11.168
1	H_{S6} = 6101	3667.4	73.3	10.907
3	Ref. atm.	3423.9	39.5	5.795
3	H_{S1} = 5794	3424.6	35.4	5.906
3	H_{S2} = 6679	3423.7	39.8	5.749
3	H_{S3} = 5908	3424.5	36.0	5.885
3	H_{S4} = 5777	3424.6	35.4	5.909
3	H_{S5} = 5774	3424.6	35.3	5.910
3	H_{S6} = 6101	3424.2	37.0	5.850
5	Ref. atm.	3215.5	26.1	3.861
5	H_{S1} = 5794	3215.7	23.0	3.911
5	H_{S2} = 6679	3215.4	26.2	3.854
5	H_{S3} = 5908	3215.7	23.4	3.904
5	H_{S4} = 5777	3215.7	23.0	3.912
5	H_{S5} = 5774	3215.7	23.0	3.913
5	H_{S6} = 6101	3215.6	24.1	3.891

TABLE C-42.- REFRACTION CORRECTIONS FOR CAPE CANAVERAL ANNUAL RADIO ATMOSPHERE, H = 10^4 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	358.5	83.6	8.918
.5	H_{S1} = 5794	355.5	81.2	8.445
.5	H_{S2} = 6679	349.2	83.8	7.447
.5	H_{S3} = 5908	354.6	81.5	8.301
.5	H_{S4} = 5777	355.6	81.1	8.467
.5	H_{S5} = 5774	355.7	81.1	8.471
.5	H_{S6} = 6101	353.1	82.1	8.069
1	Ref. atm.	295.1	64.1	6.673
1	H_{S1} = 5794	294.8	62.4	6.622
1	H_{S2} = 6679	291.2	65.6	5.921
1	H_{S3} = 5908	294.3	62.9	6.522
1	H_{S4} = 5777	294.9	62.4	6.637
1	H_{S5} = 5774	294.9	62.4	6.639
1	H_{S6} = 6101	293.5	63.6	6.361
3	Ref. atm.	161.9	31.7	3.211
3	H_{S1} = 5794	162.1	30.5	3.319
3	H_{S2} = 6679	161.5	32.9	3.027
3	H_{S3} = 5908	162.0	30.9	3.279
3	H_{S4} = 5777	162.1	30.5	3.326
3	H_{S5} = 5774	162.1	30.5	3.327
3	H_{S6} = 6101	161.9	31.4	3.212
5	Ref. atm.	107.0	20.5	2.053
5	H_{S1} = 5794	107.1	19.6	2.138
5	H_{S2} = 6679	106.9	21.3	1.959
5	H_{S3} = 5908	107.1	19.8	2.114
5	H_{S4} = 5777	107.1	19.6	2.142
5	H_{S5} = 5774	107.1	19.6	2.143
5	H_{S6} = 6101	107.1	20.2	2.073

TABLE C-43.- REFRACTION CORRECTIONS FOR HAWAII FEBRUARY RADIO ATMOSPHERE, H = 10^6 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3725.6	89.9	11.325
.5	H_{S1} = 6386	3729.5	86.0	11.941
.5	H_{S2} = 6820	3726.8	88.3	11.519
.5	H_{S3} = 6522	3728.6	86.7	11.804
.5	H_{S4} = 6534	3728.6	86.8	11.792
.5	H_{S5} = 6831	3726.7	88.3	11.509
.5	H_{S6} = 7079	3725.3	89.6	11.288
1	Ref. atm.	3657.5	71.9	9.327
1	H_{S1} = 6386	3659.8	67.6	9.698
1	H_{S2} = 6820	3658.2	70.2	9.433
1	H_{S3} = 6522	3659.3	68.4	9.613
1	H_{S4} = 6534	3659.2	68.5	9.605
1	H_{S5} = 6831	3658.1	70.2	9.426
1	H_{S6} = 7079	3657.2	71.6	9.285
3	Ref. atm.	3420.3	38.4	5.181
3	H_{S1} = 6386	3421.0	35.0	5.289
3	H_{S2} = 6820	3420.6	36.9	5.222
3	H_{S3} = 6522	3420.8	35.6	5.268
3	H_{S4} = 6534	3420.8	35.6	5.266
3	H_{S5} = 6831	3420.6	36.9	5.221
3	H_{S6} = 7079	3420.3	38.0	5.184
5	Ref. atm.	3213.5	25.5	3.494
5	H_{S1} = 6386	3213.7	23.0	3.537
5	H_{S2} = 6820	3213.6	24.4	3.512
5	H_{S3} = 6522	3213.7	23.4	3.529
5	H_{S4} = 6534	3213.7	23.5	3.529
5	H_{S5} = 6831	3213.6	24.4	3.512
5	H_{S6} = 7079	3213.5	25.2	3.498

TABLE C-44.- REFRACTION CORRECTIONS FOR HAWAII
FEBRUARY RADIO ATMOSPHERE, H = 10^4 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	344.2	75.9	6.641
.5	H_{S1} = 6386	346.4	74.6	6.994
.5	H_{S2} = 6820	344.0	75.8	6.603
.5	H_{S3} = 6522	345.6	75.0	6.867
.5	H_{S4} = 6534	345.6	75.1	6.856
.5	H_{S5} = 6831	344.0	75.9	6.594
.5	H_{S6} = 7079	342.7	76.5	6.390
1	Ref. atm.	288.3	59.9	5.345
1	H_{S1} = 6386	289.4	58.4	5.561
1	H_{S2} = 6820	288.0	59.8	5.280
1	H_{S3} = 6522	289.0	58.9	5.470
1	H_{S4} = 6534	288.9	58.9	5.462
1	H_{S5} = 6831	288.0	59.8	5.274
1	H_{S6} = 7079	287.2	60.6	5.126
3	Ref. atm.	160.8	30.5	2.725
3	H_{S1} = 6386	161.1	29.3	2.844
3	H_{S2} = 6820	160.8	30.3	2.722
3	H_{S3} = 6522	161.0	29.7	2.805
3	H_{S4} = 6534	161.0	29.7	2.801
3	H_{S5} = 6831	160.8	30.3	2.720
3	H_{S6} = 7079	160.7	30.9	2.655
5	Ref. atm.	106.7	19.8	1.758
5	H_{S1} = 6386	106.8	18.9	1.841
5	H_{S2} = 6820	106.7	19.6	1.766
5	H_{S3} = 6522	106.8	19.2	1.817
5	H_{S4} = 6534	106.8	19.2	1.815
5	H_{S5} = 6831	106.7	19.7	1.764
5	H_{S6} = 7079	106.7	20.0	1.724

TABLE C-45.- REFRACTION CORRECTIONS FOR HAWAII
JULY RADIO ATMOSPHERE, $H = 10^6$ METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3734.0	94.2	12.643
.5	H_{S1} = 6069	3736.2	89.7	12.985
.5	H_{S2} = 6746	3731.4	93.3	12.242
.5	H_{S3} = 6066	3736.2	89.6	12.988
.5	H_{S4} = 5844	3738.0	88.4	13.263
.5	H_{S5} = 6320	3734.3	91.0	12.694
.5	H_{S6} = 6556	3732.7	92.3	12.437
1	Ref. atm.	3662.8	74.2	10.171
1	H_{S1} = 6069	3664.6	69.6	10.453
1	H_{S2} = 6746	3661.7	73.8	9.993
1	H_{S3} = 6066	3664.6	69.6	10.455
1	H_{S4} = 5844	3665.6	68.2	10.622
1	H_{S5} = 6320	3663.4	71.2	10.274
1	H_{S6} = 6556	3662.4	72.6	10.115
3	Ref. atm.	3422.2	39.1	5.506
3	H_{S1} = 6069	3422.9	35.3	5.615
3	H_{S2} = 6746	3422.2	38.5	5.503
3	H_{S3} = 6066	3422.9	35.3	5.616
3	H_{S4} = 5844	3423.1	34.2	5.654
3	H_{S5} = 6320	3422.6	36.5	5.572
3	H_{S6} = 6556	3422.4	37.6	5.533
5	Ref. atm.	3214.5	25.9	3.689
5	H_{S1} = 6069	3214.8	23.1	3.736
5	H_{S2} = 6746	3214.6	25.4	3.694
5	H_{S3} = 6066	3214.8	23.0	3.736
5	H_{S4} = 5844	3214.9	22.3	3.750
5	H_{S5} = 6320	3214.7	23.9	3.720
5	H_{S6} = 6556	3214.6	24.7	3.706

TABLE C-46.- REFRACTION CORRECTIONS FOR HAWAII
JULY RADIO ATMOSPHERE, $H = 10^4$ METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	350.5	79.7	7.644
.5	H_{S1} = 6069	351.0	78.1	7.733
.5	H_{S2} = 6746	346.7	80.1	7.046
.5	H_{S3} = 6066	351.0	78.1	7.736
.5	H_{S4} = 5844	352.7	77.4	7.993
.5	H_{S5} = 6320	349.3	78.9	7.463
.5	H_{S6} = 6556	347.9	79.5	7.226
1	Ref. atm.	291.5	62.1	5.972
1	H_{S1} = 6069	292.2	60.6	6.106
1	H_{S2} = 6746	289.7	62.9	5.618
1	H_{S3} = 6066	292.2	60.6	6.108
1	H_{S4} = 5844	293.1	59.8	6.287
1	H_{S5} = 6320	291.2	61.5	5.915
1	H_{S6} = 6556	290.4	62.3	5.747
3	Ref. atm.	161.4	31.2	2.978
3	H_{S1} = 6069	161.6	30.0	3.091
3	H_{S2} = 6746	161.2	31.7	2.883
3	H_{S3} = 6066	161.6	30.0	3.092
3	H_{S4} = 5844	161.8	29.4	3.166
3	H_{S5} = 6320	161.5	30.7	3.011
3	H_{S6} = 6556	161.3	31.3	2.939
5	Ref. atm.	106.9	20.2	1.914
5	H_{S1} = 6069	107.0	19.3	1.996
5	H_{S2} = 6746	106.8	20.5	1.868
5	H_{S3} = 6066	107.0	19.3	1.996
5	H_{S4} = 5844	107.0	18.9	2.042
5	H_{S5} = 6320	106.9	19.8	1.947
5	H_{S6} = 6556	106.9	20.2	1.902

TABLE C-47.- REFRACTION CORRECTIONS FOR HAWAII
ANNUAL RADIO ATMOSPHERE, H = 10^6 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3729.4	92.0	11.925
.5	H_{S1} = 6227	3732.8	87.8	12.454
.5	H_{S2} = 6782	3729.1	90.8	11.881
.5	H_{S3} = 6297	3732.3	88.2	12.377
.5	H_{S4} = 6209	3732.9	87.7	12.474
.5	H_{S5} = 6629	3730.1	90.0	12.031
.5	H_{S6} = 6816	3728.9	91.0	11.848
1	Ref. atm.	3660.1	73.2	9.742
1	H_{S1} = 6227	3662.2	68.7	10.072
1	H_{S2} = 6782	3659.9	72.0	9.713
1	H_{S3} = 6297	3661.9	69.1	10.024
1	H_{S4} = 6209	3662.2	68.6	10.084
1	H_{S5} = 6629	3660.5	71.1	9.808
1	H_{S6} = 6816	3659.8	72.2	9.693
3	Ref. atm.	3421.3	38.8	5.343
3	H_{S1} = 6227	3421.9	35.1	5.452
3	H_{S2} = 6782	3421.4	37.7	5.363
3	H_{S3} = 6297	3421.8	35.5	5.440
3	H_{S4} = 6209	3421.9	35.1	5.455
3	H_{S5} = 6629	3421.5	37.0	5.387
3	H_{S6} = 6816	3421.4	37.9	5.358
5	Ref. atm.	3214.0	25.7	3.591
5	H_{S1} = 6227	3214.2	23.0	3.637
5	H_{S2} = 6782	3214.1	24.9	3.604
5	H_{S3} = 6297	3214.2	23.3	3.633
5	H_{S4} = 6209	3214.2	23.0	3.638
5	H_{S5} = 6629	3214.1	24.4	3.613
5	H_{S6} = 6816	3214.1	25.0	3.602

TABLE C-48.- REFRACTION CORRECTIONS FOR HAWAII ANNUAL RADIO ATMOSPHERE, $H_s = 10^4$ METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	346.6	77.7	7.021
.5	H_{S1} = 6227	348.7	76.4	7.356
.5	H_{S2} = 6782	345.4	77.9	6.825
.5	H_{S3} = 6297	348.2	76.6	7.284
.5	H_{S4} = 6209	348.8	76.3	7.374
.5	H_{S5} = 6629	346.2	77.5	6.963
.5	H_{S6} = 6816	345.2	78.0	6.795
1	Ref. atm.	239.6	61.1	5.606
1	H_{S1} = 6227	290.8	59.6	5.829
1	H_{S2} = 6782	288.9	61.4	5.449
1	H_{S3} = 6297	290.5	59.8	5.778
1	H_{S4} = 6209	290.8	59.5	5.842
1	H_{S5} = 6629	289.4	60.9	5.549
1	H_{S6} = 6816	288.7	61.5	5.428
3	Ref. atm.	161.1	30.9	2.842
3	H_{S1} = 6227	161.4	29.7	2.966
3	H_{S2} = 6782	161.0	31.0	2.803
3	H_{S3} = 6297	161.3	29.9	2.944
3	H_{S4} = 6209	161.4	29.7	2.971
3	H_{S5} = 6629	161.1	30.7	2.846
3	H_{S6} = 6816	161.0	31.1	2.794
5	Ref. atm.	106.8	20.0	1.832
5	H_{S1} = 6227	106.9	19.2	1.918
5	H_{S2} = 6782	106.8	20.1	1.817
5	H_{S3} = 6297	106.9	19.3	1.904
5	H_{S4} = 6209	106.9	19.1	1.921
5	H_{S5} = 6629	106.8	19.8	1.844
5	H_{S6} = 6816	106.8	20.1	1.812

TABLE C-49.- REFRACTION CORRECTIONS FOR POINT ARGUELLO JULY RADIO ATMOSPHERE, H = 10^6 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3737.7	89.7	13.212
.5	H_{S1} = 6448	3728.3	85.3	11.747
.5	H_{S2} = 6824	3726.0	87.3	11.389
.5	H_{S3} = 6713	3726.6	86.7	11.491
.5	H_{S4} = 6776	3726.3	87.0	11.433
.5	H_{S5} = 5884	3732.2	82.3	12.353
.5	H_{S6} = 6657	3727.0	86.4	11.544
1	Ref. atm.	3662.1	70.0	10.060
1	H_{S1} = 6448	3658.9	67.2	9.556
1	H_{S2} = 6824	3657.5	69.4	9.330
1	H_{S3} = 6713	3657.9	68.8	9.395
1	H_{S4} = 6776	3657.7	69.1	9.358
1	H_{S5} = 5884	3661.3	63.9	9.930
1	H_{S6} = 6657	3658.1	68.4	9.428
3	Ref. atm.	3420.4	37.2	5.186
3	H_{S1} = 6448	3420.6	34.9	5.226
3	H_{S2} = 6824	3420.3	36.5	5.169
3	H_{S3} = 6713	3420.4	36.0	5.186
3	H_{S4} = 6776	3420.3	36.3	5.176
3	H_{S5} = 5884	3421.1	32.3	5.316
3	H_{S6} = 7758	3420.4	35.8	5.194
5	Ref. atm.	3213.3	24.8	3.471
5	H_{S1} = 6448	3213.5	22.9	3.499
5	H_{S2} = 6824	3213.4	24.2	3.477
5	H_{S3} = 6713	3213.4	23.8	3.483
5	H_{S4} = 6776	3213.4	24.0	3.480
5	H_{S5} = 5884	3213.7	21.1	3.532
5	H_{S6} = 6657	3213.4	23.6	3.487

TABLE C-50.- REFRACTION CORRECTIONS FOR POINT ARGUELLO
JULY RADIO ATMOSPHERE, H = 10^4 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	352.1	75.5	7.906
.5	H_{S1} = 6448	345.6	74.0	6.858
.5	H_{S2} = 6824	343.5	75.0	6.527
.5	H_{S3} = 6713	344.1	74.7	6.621
.5	H_{S4} = 6776	343.8	74.9	6.567
.5	H_{S5} = 5884	349.1	72.3	7.425
.5	H_{S6} = 6657	344.4	74.5	6.670
1	Ref. atm.	291.2	58.6	5.919
1	H_{S1} = 6448	288.9	58.0	5.460
1	H_{S2} = 6824	287.7	59.2	5.222
1	H_{S3} = 6713	288.0	58.8	5.290
1	H_{S4} = 6776	287.9	59.0	5.251
1	H_{S5} = 5884	290.9	56.1	5.862
1	H_{S6} = 6657	288.2	58.7	5.325
3	Ref. atm.	161.0	29.6	2.795
3	H_{S1} = 6448	161.0	29.2	2.797
3	H_{S2} = 6824	160.8	30.0	2.694
3	H_{S3} = 6713	160.8	29.8	2.724
3	H_{S4} = 6776	160.8	29.9	2.707
3	H_{S5} = 5884	161.4	27.8	2.967
3	H_{S6} = 6657	160.9	29.7	2.739
5	Ref. atm.	106.8	19.2	1.784
5	H_{S1} = 6448	106.8	18.9	1.812
5	H_{S2} = 6824	106.7	19.4	1.748
5	H_{S3} = 6713	106.7	19.3	1.766
5	H_{S4} = 6776	106.7	19.4	1.756
5	H_{S5} = 5884	106.9	17.9	1.916
5	H_{S6} = 6657	106.7	19.2	1.776

TABLE C-51.- REFRACTION CORRECTIONS FOR POINT ARGUELLO DECEMBER RADIO ATMOSPHERE, H = 10^6 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3718.0	83.8	10.144
.5	H_{S1} = 6883	3720.0	80.2	10.452
.5	H_{S2} = 6939	3719.7	80.5	10.407
.5	H_{S3} = 7619	3716.4	83.8	9.900
.5	H_{S4} = 7814	3715.6	84.8	9.766
.5	H_{S5} = 7250	3718.1	82.0	10.166
.5	H_{S6} = 7611	3716.5	83.8	9.906
1	Ref. atm.	3651.5	67.9	8.394
1	H_{S1} = 6883	3652.9	64.2	8.592
1	H_{S2} = 6939	3652.7	64.5	8.563
1	H_{S3} = 7619	3650.6	68.0	8.235
1	H_{S4} = 7814	3650.1	68.9	8.148
1	H_{S5} = 7250	3651.7	66.1	8.408
1	H_{S6} = 7611	3650.6	67.9	8.238
3	Ref. atm.	3417.5	37.0	4.696
3	H_{S1} = 6883	3418.0	34.1	4.788
3	H_{S2} = 6939	3418.0	34.3	4.780
3	H_{S3} = 7619	3417.5	37.0	4.691
3	H_{S4} = 7814	3417.3	37.8	4.667
3	H_{S5} = 7250	3417.7	35.6	4.739
3	H_{S6} = 7611	3417.5	37.0	4.692
5	Ref. atm.	3211.8	24.8	3.189
5	H_{S1} = 6883	3212.0	22.6	3.227
5	H_{S2} = 6939	3212.0	22.8	3.224
5	H_{S3} = 7619	3211.8	24.8	3.189
5	H_{S4} = 7814	3211.8	25.4	3.180
5	H_{S5} = 7250	3211.9	23.7	3.208
5	H_{S6} = 7611	3211.8	24.8	3.190

TABLE C-52.- REFRACTION CORRECTIONS FOR POINT ARGUELLO
DECEMBER RADIO ATMOSPHERE, $H = 10^4$ METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	339.6	70.9	5.875
.5	H_{S1} = 6883	340.1	69.1	5.969
.5	H_{S2} = 6939	339.9	69.2	5.927
.5	H_{S3} = 7619	337.1	70.9	5.463
.5	H_{S4} = 7814	336.4	71.3	5.343
.5	H_{S5} = 7250	338.5	70.0	5.705
.5	H_{S6} = 7611	337.1	70.9	5.468
1	Ref. atm.	285.0	56.6	4.683
1	H_{S1} = 6883	285.6	54.8	4.792
1	H_{S2} = 6939	285.4	54.9	4.761
1	H_{S3} = 7619	283.7	56.7	4.419
1	H_{S4} = 7814	283.3	57.1	4.330
1	H_{S5} = 7250	284.6	55.7	4.598
1	H_{S6} = 7611	283.7	56.7	4.423
3	Ref. atm.	160.0	29.3	2.350
3	H_{S1} = 6883	160.3	28.0	2.485
3	H_{S2} = 6939	160.3	28.1	2.472
3	H_{S3} = 7619	160.0	29.4	2.318
3	H_{S4} = 7814	159.9	29.7	2.277
3	H_{S5} = 7250	160.1	28.7	2.399
3	H_{S6} = 7611	160.0	29.3	2.320
5	Ref. atm.	106.5	19.1	1.517
5	H_{S1} = 6883	106.6	18.1	1.615
5	H_{S2} = 6939	106.6	18.2	1.607
5	H_{S3} = 7619	106.5	19.1	1.511
5	H_{S4} = 7814	106.4	19.3	1.485
5	H_{S5} = 7250	106.5	18.6	1.561
5	H_{S6} = 7611	106.5	19.1	1.512

TABLE C-53.- REFRACTION CORRECTIONS FOR POINT ARGUELLO
ANNUAL RADIO ATMOSPHERE, H = 10^6 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3727.1	86.7	11.568
.5	H_{S1} = 6617	3725.0	83.4	11.230
.5	H_{S2} = 6867	3723.5	84.6	11.007
.5	H_{S3} = 6993	3722.8	85.3	10.899
.5	H_{S4} = 7143	3722.0	86.0	10.775
.5	H_{S5} = 6444	3726.0	82.5	11.393
.5	H_{S6} = 7025	3722.7	85.4	10.873
1	Ref. atm.	3657.2	69.1	9.285
1	H_{S1} = 6617	3656.5	66.1	9.175
1	H_{S2} = 6867	3655.6	67.5	9.033
1	H_{S3} = 6993	3655.2	68.2	8.964
1	H_{S4} = 7143	3654.7	69.0	8.884
1	H_{S5} = 6444	3657.2	65.1	9.277
1	H_{S6} = 7025	3655.1	68.3	8.947
3	Ref. atm.	3419.2	37.1	4.995
3	H_{S1} = 6617	3419.6	34.6	5.055
3	H_{S2} = 6867	3419.4	35.7	5.019
3	H_{S3} = 6993	3419.3	36.2	5.001
3	H_{S4} = 7143	3419.2	36.9	4.980
3	H_{S5} = 6444	3419.7	33.9	5.081
3	H_{S6} = 7025	3419.2	36.4	4.996
5	Ref. atm.	3212.7	24.8	3.363
5	H_{S1} = 6617	3212.9	22.8	3.393
5	H_{S2} = 6867	3212.8	23.6	3.379
5	H_{S3} = 6993	3212.8	24.0	3.373
5	H_{S4} = 7143	3212.8	24.5	3.365
5	H_{S5} = 6444	3213.0	22.3	3.403
5	H_{S6} = 7025	3212.8	24.1	3.371

TABLE C-54.- REFRACTION CORRECTIONS FOR POINT ARGUELLO ANNUAL RADIO ATMOSPHERE, $H = 10^4$ METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	346.2	73.4	6.969
.5	H_{S1} = 6617	343.4	72.1	6.500
.5	H_{S2} = 6867	342.1	72.8	6.293
.5	H_{S3} = 6993	341.5	73.1	6.194
.5	H_{S4} = 7143	340.8	73.5	6.080
.5	H_{S5} = 6444	344.3	71.6	6.651
.5	H_{S6} = 7025	341.4	73.2	6.169
1	Ref. atm.	288.6	57.8	5.408
1	H_{S1} = 6617	287.6	56.8	5.192
1	H_{S2} = 6867	286.8	57.5	5.043
1	H_{S3} = 6993	286.4	57.9	4.971
1	H_{S4} = 7143	286.0	58.3	4.887
1	H_{S5} = 6444	288.1	56.2	5.301
1	H_{S6} = 7025	286.4	58.0	4.953
3	Ref. atm.	160.6	29.5	2.624
3	H_{S1} = 6617	160.7	28.7	2.673
3	H_{S2} = 6867	160.6	29.3	2.608
3	H_{S3} = 6993	160.5	29.5	2.576
3	H_{S4} = 7143	160.4	29.8	2.539
3	H_{S5} = 6444	160.8	28.4	2.721
3	H_{S6} = 7025	160.5	29.6	2.568
5	Ref. atm.	106.6	19.2	1.682
5	H_{S1} = 6617	106.7	18.6	1.734
5	H_{S2} = 6867	106.7	19.0	1.693
5	H_{S3} = 6993	106.6	19.2	1.674
5	H_{S4} = 7143	106.6	19.4	1.651
5	H_{S5} = 6444	106.7	18.3	1.763
5	H_{S6} = 7025	106.6	19.2	1.669

TABLE C-55.--REFRACTION CORRECTIONS FOR PATRICK AFB
AUGUST RADIO ATMOSPHERE, H = 10^6 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3738.6	99.6	13.364
.5	H_{S1} = 5746	3743.7	93.5	14.150
.5	H_{S2} = 6451	3737.9	97.3	13.248
.5	H_{S3} = 6360	3738.6	96.8	13.355
.5	H_{S4} = 6351	3738.7	96.8	13.366
.5	H_{S5} = 6328	3738.8	96.7	13.393
.5	H_{S6} = 6023	3741.3	95.0	13.774
1	Ref. atm.	3666.4	78.1	10.749
1	H_{S1} = 5746	3669.8	71.5	11.277
1	H_{S2} = 6451	3666.3	76.1	10.729
1	H_{S3} = 6360	3666.7	75.5	10.795
1	H_{S4} = 6351	3666.8	75.5	10.802
1	H_{S5} = 6328	3666.9	75.3	10.819
1	H_{S6} = 6023	3668.3	73.4	11.051
3	Ref. atm.	3423.9	40.7	5.788
3	H_{S1} = 5746	3424.9	35.4	5.957
3	H_{S2} = 6451	3424.1	39.0	5.829
3	H_{S3} = 6360	3424.2	38.6	5.845
3	H_{S4} = 6351	3424.2	38.5	5.847
3	H_{S5} = 6328	3424.3	38.4	5.851
3	H_{S6} = 6023	3424.6	36.9	5.906
5	Ref. atm.	3215.5	26.9	3.874
5	H_{S1} = 5746	3215.9	23.0	3.942
5	H_{S2} = 6451	3215.6	25.6	3.895
5	H_{S3} = 6360	3215.7	25.3	3.901
5	H_{S4} = 6351	3215.7	25.2	3.902
5	H_{S5} = 6328	3215.7	25.1	3.903
5	H_{S6} = 6023	3215.8	24.0	3.923

TABLE C-56.- REFRACTION CORRECTIONS FOR PATRICK AFB
AUGUST RADIO ATMOSPHERE, H = 10^4 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	352.7	84.2	8.007
.5	H_{S1} = 5746	356.3	81.7	8.576
.5	H_{S2} = 6451	351.1	83.8	7.741
.5	H_{S3} = 6360	351.7	83.6	7.839
.5	H_{S4} = 6351	351.7	83.5	7.849
.5	H_{S5} = 6328	351.9	83.5	7.874
.5	H_{S6} = 6023	354.1	82.6	8.226
1	Ref. atm.	293.1	65.5	6.295
1	H_{S1} = 5746	295.3	62.7	6.715
1	H_{S2} = 6451	292.3	65.3	6.133
1	H_{S3} = 6360	292.7	65.0	6.203
1	H_{S4} = 6351	292.7	65.0	6.210
1	H_{S5} = 6328	292.8	64.9	6.227
1	H_{S6} = 6023	294.1	63.8	6.474
[illegible]	Ref. atm.	161.7	32.7	3.128
3	H_{S1} = 5746	162.2	30.6	3.360
3	H_{S2} = 6451	161.7	32.6	3.119
3	H_{S3} = 6360	161.8	32.3	3.148
3	H_{S4} = 6351	161.8	32.3	3.151
3	H_{S5} = 6328	161.8	32.3	3.159
3	H_{S6} = 6023	162.0	31.4	3.262
5	Ref. atm.	107.0	21.1	2.011
5	H_{S1} = 5746	107.2	19.7	2.164
5	H_{S2} = 6451	107.0	21.0	2.016
5	H_{S3} = 6360	107.0	20.8	2.034
5	H_{S4} = 6351	107.0	20.8	2.036
5	H_{S5} = 6328	107.0	20.8	2.041
5	H_{S6} = 6023	107.1	20.2	2.104

TABLE C-57.- REFRACTION CORRECTIONS FOR PATRICK AFB
DECEMBER RADIO ATMOSPHERE, H = 10^6 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3726.1	89.4	11.404
.5	H_{S1} = 6483	3727.6	84.9	11.638
.5	H_{S2} = 6607	3726.8	85.5	11.519
.5	H_{S3} = 7010	3724.5	87.6	11.154
.5	H_{S4} = 7102	3724.0	88.1	11.075
.5	H_{S5} = 6845	3725.4	86.8	11.299
.5	H_{S6} = 7239	3723.2	88.8	10.961
1	Ref. atm.	3656.8	71.4	9.215
1	H_{S1} = 6483	3658.4	67.0	9.476
1	H_{S2} = 6607	3657.9	67.7	9.401
1	H_{S3} = 7010	3656.5	70.0	9.169
1	H_{S4} = 7102	3656.2	70.5	9.119
1	H_{S5} = 6845	3657.1	69.1	9.262
1	H_{S6} = 7239	3655.7	71.2	9.045
3	Ref. atm.	3419.7	38.3	5.082
3	H_{S1} = 6483	3420.4	34.8	5.191
3	H_{S2} = 6607	3420.3	35.4	5.172
3	H_{S3} = 7010	3419.9	37.1	5.112
3	H_{S4} = 7102	3419.8	37.5	5.099
3	H_{S5} = 6845	3420.1	36.4	5.136
3	H_{S6} = 7239	3419.7	38.1	5.079
5	Ref. atm.	3213.1	25.5	3.433
5	H_{S1} = 6483	3213.4	22.9	3.477
5	H_{S2} = 6607	3213.3	23.3	3.470
5	H_{S3} = 7010	3213.2	24.6	3.447
5	H_{S4} = 7102	3213.2	24.9	3.442
5	H_{S5} = 6845	3213.3	24.1	3.456
5	H_{S6} = 7239	3213.1	25.3	3.435

TABLE C-58.- REFRACTION CORRECTIONS FOR PATRICK AFB
DECEMBER RADIO ATMOSPHERE, H = 10^4 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	344.5	75.7	6.680
.5	H_{S1} = 6483	345.1	73.6	6.783
.5	H_{S2} = 6607	344.4	73.9	6.671
.5	H_{S3} = 7010	342.4	75.0	6.335
.5	H_{S4} = 7102	341.9	75.2	6.262
.5	H_{S5} = 6845	343.2	74.6	6.468
.5	H_{S6} = 7239	341.3	75.6	6.158
1	Ref. atm.	287.6	59.7	5.211
1	H_{S1} = 6483	288.6	57.8	5.404
1	H_{S2} = 6607	288.2	58.1	5.324
1	H_{S3} = 7010	387.0	59.3	5.080
1	H_{S4} = 7102	286.7	59.6	5.028
1	H_{S5} = 6845	287.5	58.9	5.177
1	H_{S6} = 7239	286.4	60.0	4.951
3	Ref. atm.	160.6	30.5	2.618
3	H_{S1} = 6483	160.9	29.1	2.771
3	H_{S2} = 6607	160.9	29.4	2.737
3	H_{S3} = 7010	160.6	30.2	2.630
3	H_{S4} = 7102	160.6	30.4	2.607
3	H_{S5} = 6845	160.7	29.9	2.673
3	H_{S6} = 7239	160.5	30.7	2.573
5	Ref. atm.	106.7	19.8	1.690
5	H_{S1} = 6483	106.8	18.8	1.796
5	H_{S2} = 6607	106.7	19.0	1.774
5	H_{S3} = 7010	106.7	19.6	1.708
5	H_{S4} = 7102	106.7	19.7	1.694
5	H_{S5} = 6845	106.7	19.4	1.735
5	H_{S6} = 7239	106.6	19.9	1.673

TABLE C-59.- REFRACTION CORRECTIONS FOR PATRICK AFB
ANNUAL RADIO ATMOSPHERE, H = 10^6 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3732.2	93.6	12.365
.5	H_{S1} = 6167	3734.1	88.5	12.653
.5	H_{S2} = 6537	3731.5	90.5	12.250
.5	H_{S3} = 6652	3730.7	91.1	12.133
.5	H_{S4} = 6662	3730.7	91.2	12.123
.5	H_{S5} = 6525	3731.6	90.4	12.263
.5	H_{S6} = 6718	3730.3	91.5	12.067
1	Ref. atm.	3661.2	74.0	9.919
1	H_{S1} = 6167	3663.1	69.0	10.215
1	H_{S2} = 6537	3661.5	71.3	9.965
1	H_{S3} = 6652	3661.0	72.0	9.892
1	H_{S4} = 6662	3661.0	72.0	9.885
1	H_{S5} = 6525	3661.5	71.2	9.973
1	H_{S6} = 6718	3660.8	72.3	9.850
3	Ref. atm.	3421.6	39.2	5.391
3	H_{S1} = 6167	3422.3	35.2	5.514
3	H_{S2} = 6537	3421.9	36.9	5.453
3	H_{S3} = 6652	3421.8	37.5	5.434
3	H_{S4} = 6662	3421.8	37.5	5.433
3	H_{S5} = 6525	3421.9	36.9	5.455
3	H_{S6} = 6718	3421.8	37.8	5.424
5	Ref. atm.	3214.2	26.0	3.624
5	H_{S1} = 6167	3214.4	23.0	3.674
5	H_{S2} = 6537	3214.3	24.3	3.652
5	H_{S3} = 6652	3214.3	24.7	3.645
5	H_{S4} = 6662	3214.3	24.7	3.644
5	H_{S5} = 6525	3214.3	24.3	3.653
5	H_{S6} = 6718	3214.3	24.9	3.641

TABLE C-60.- REFRACTION CORRECTIONS FOR PATRICK AFB
ANNUAL RADIO ATMOSPHERE, H = 10^4 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	348.5	79.2	7.336
.5	H_{S1} = 6167	349.5	77.0	7.496
.5	H_{S2} = 6537	347.2	78.1	7.123
.5	H_{S3} = 6652	346.5	78.4	7.015
.5	H_{S4} = 6662	346.5	78.5	7.005
.5	H_{S5} = 6525	347.3	78.1	7.135
.5	H_{S6} = 6718	346.2	78.6	6.954
1	Ref. atm.	290.2	62.0	5.719
1	H_{S1} = 6167	291.3	60.0	5.932
1	H_{S2} = 6537	289.9	61.2	5.667
1	H_{S3} = 6652	289.6	61.6	5.589
1	H_{S4} = 6662	289.5	61.6	5.583
1	H_{S5} = 6525	290.0	61.2	5.675
1	H_{S6} = 6718	289.3	61.8	5.546
3	Ref. atm.	161.1	31.4	2.850
3	H_{S1} = 6167	161.5	29.8	3.013
3	H_{S2} = 6537	161.2	30.7	2.900
3	H_{S3} = 6652	161.1	31.0	2.867
3	H_{S4} = 6662	161.1	31.0	2.864
3	H_{S5} = 6525	161.2	30.7	2.904
3	H_{S6} = 6718	161.1	31.2	2.848
5	Ref. atm.	106.8	20.3	1.835
5	H_{S1} = 6167	106.9	19.2	1.947
5	H_{S2} = 6537	106.9	19.9	1.878
5	H_{S3} = 6652	106.8	20.1	1.857
5	H_{S4} = 6662	106.8	20.1	1.855
5	H_{S5} = 6525	106.9	19.8	1.880
5	H_{S6} = 6718	106.8	20.2	1.845

APPENDIX D

TABLES OF REFRACTION CORRECTIONS FOR OPTICAL ATMOSPHERES

This appendix contains tables of refraction corrections for the 27 optical atmospheres shown in appendix B.

E_M = measured elevation angle

E = straight-line, geometric elevation angle

$\Delta E = E_M - E$ is elevation angle refraction correction

ΔE_{18} = ΔE computed by the 18th algorithm in reference 4 (appendix E)

ρ_M = measured range

ρ = geometric range

$\Delta\rho = \rho_M - \rho$ is the range refraction correction

$\Delta\rho_7$ = $\Delta\rho$ computed by the 7th algorithm in reference 4 (appendix E)

$H = 10^6$ m and 10^4 m is altitude of target above the tracking site, which is at sea level

The column labeled ρ is the geometric range computed by the refraction correction algorithm. It is the range determined by the quantities E_M, H, and ΔE_{18}. Differences in the computed range, ρ, are due to errors in ΔE_{18}.

TABLE D-1.- REFRACTION CORRECTIONS FOR WHITE SANDS
MARCH OPTICAL ATMOSPHERE, $H = 10^6$ METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3698.8	75.2	7.140
.5	H_{S1} = 7 671	3706.1	69.9	8.286
.5	H_{S2} = 7 244	3707.7	68.1	8.535
.5	H_{S3} = 10 300	3698.7	80.4	7.114
5	H_{S4} = 10 008	3699.4	79.3	7.221
.5	H_{S5} = 10 355	3698.6	80.7	7.095
5	H_{S6} = 10 094	3699.2	79.7	7.189
1	Ref. atm.	3638.0	62.7	6.219
1	H_{S1} = 7 671	3642.4	57.1	6.925
1	H_{S2} = 7 244	3643.4	55.2	7.089
1	H_{S3} = 10 300	3637.4	67.8	6.122
1	H_{S4} = 10 008	3637.9	66.7	6.197
1	H_{S5} = 10 355	3637.3	68.0	6.108
1	H_{S6} = 10 094	3637.7	67.0	6.175
3	Ref. atm.	3412.3	35.6	3.816
3	H_{S1} = 7 671	3413.3	31.5	3.976
3	H_{S2} = 7 244	3413.6	30.1	4.022
3	H_{S3} = 10 300	3411.8	40.0	3.729
3	H_{S4} = 10 008	3412.0	39.1	3.754
3	H_{S5} = 10 355	3411.8	40.1	3.725
3	H_{S6} = 10 094	3411.9	39.3	3.747
5	Ref. atm.	3208.9	24.0	2.655
5	H_{S1} = 7 671	3209.2	21.2	2.711
5	H_{S2} = 7 244	3209.3	20.1	2.729
5	H_{S3} = 10 300	3208.6	27.6	2.608
5	H_{S4} = 10 008	3208.7	26.9	2.619
5	H_{S5} = 10 355	3208.6	27.7	2.606
5	H_{S6} = 10 094	3208.7	27.1	2.616

TABLE D-2.- REFRACTION CORRECTIONS FOR WHITE SANDS MARCH OPTICAL ATMOSPHERE, $H = 10^4$ METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	325.0	63.6	3.404
.5	H_{S1} = 7 671	331.7	59.4	4.556
.5	H_{S2} = 7 244	333.0	58.5	4.786
.5	H_{S3} = 10 300	325.6	63.8	3.517
.5	H_{S4} = 10 008	326.1	63.4	3.608
.5	H_{S5} = 10 355	325.5	63.9	3.500
.5	H_{S6} = 10 094	326.0	63.5	3.581
1	Ref. atm.	276.2	52.1	2.868
1	H_{S1} = 7 671	280.2	47.8	3.704
1	H_{S2} = 7 244	281.0	46.8	3.876
1	H_{S3} = 10 300	276.4	52.3	2.909
1	H_{S4} = 10 008	276.7	51.9	2.980
1	H_{S5} = 10 355	276.3	52.4	2.896
1	H_{S6} = 10 094	276.6	52.0	2.959
3	Ref. atm.	158.4	28.1	1.586
3	H_{S1} = 7 671	159.2	25.0	1.959
3	H_{S2} = 7 244	159.4	24.3	2.038
3	H_{S3} = 10 300	158.4	28.2	1.578
3	H_{S4} = 10 008	158.5	27.9	1.613
3	H_{S5} = 10 355	158.4	28.2	1.572
3	H_{S6} = 10 094	158.5	28.0	1.603
5	Ref. atm.	106.0	18.5	1.047
5	H_{S1} = 7 671	106.2	16.3	1.279
5	H_{S2} = 7 244	106.3	15.9	1.329
5	H_{S3} = 10 300	106.0	18.6	1.038
5	H_{S4} = 10 008	106.0	18.3	1.061
5	H_{S5} = 10 355	106.0	18.6	1.034
5	H_{S6} = 10 094	106.0	18.4	1.054

TABLE D-3.- REFRACTION CORRECTIONS FOR WHITE SANDS
AUGUST OPTICAL ATMOSPHERE, H = 10^6 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3694.5	72.8	6.461
.5	H_{S1} = 7 889	3702.3	66.4	7.684
.5	H_{S2} = 7 344	3704.1	64.2	7.971
.5	H_{S3} = 11 267	3694.1	79.0	6.397
.5	H_{S4} = 10 535	3695.6	76.4	6.623
.5	H_{S5} = 11 218	3694.2	78.9	6.412
.5	H_{S6} = 11 049	3694.5	78.3	6.462
1	Ref. atm.	3634.6	61.2	5.681
1	H_{S1} = 7 889	3639.4	54.5	6.448
1	H_{S2} = 7 344	3640.6	52.3	6.639
1	H_{S3} = 11 267	3633.8	67.2	5.555
1	H_{S4} = 10 535	3634.8	64.6	5.716
1	H_{S5} = 11 218	3633.9	67.1	5.565
1	H_{S6} = 11 049	3634.1	66.5	5.601
3	Ref. atm.	3410.8	35.2	3.548
3	H_{S1} = 7 889	3411.9	30.4	3.731
3	H_{S2} = 7 344	3412.2	28.9	3.786
3	H_{S3} = 11 267	3410.2	40.5	3.447
3	H_{S4} = 10 535	3410.5	38.4	3.502
3	H_{S5} = 11 218	3410.2	40.3	3.450
3	H_{S6} = 11 049	3410.3	39.9	3.463
5	Ref. atm.	3208.0	23.9	2.486
5	H_{S1} = 7 889	3208.3	20.5	2.551
5	H_{S2} = 7 344	3208.4	19.2	2.573
5	H_{S3} = 11 267	3207.7	28.2	2.431
5	H_{S4} = 10 535	3207.8	26.5	2.455
5	H_{S5} = 11 218	3207.7	28.1	2.432
5	H_{S6} = 11 049	3207.7	27.7	2.438

TABLE D-4.- REFRACTION CORRECTIONS FOR WHITE SANDS.
AUGUST OPTICAL ATMOSPHERE, H = 10^4 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	322.4	60.8	2.960
.5	H_{S1} = 7 889	329.5	56.2	4.182
.5	H_{S2} = 7 344	331.0	55.2	4.447
.5	H_{S3} = 11 267	323.0	61.2	3.056
.5	H_{S4} = 10 535	324.0	60.4	3.245
.5	H_{S5} = 11 218	323.0	61.2	3.068
.5	H_{S6} = 11 049	323.3	61.0	3.110
1	Ref. atm.	274.5	50.1	2.517
1	H_{S1} = 7 889	278.8	45.4	3.411
1	H_{S2} = 7 344	279.8	44.3	3.610
1	H_{S3} = 11 267	274.6	50.4	2.542
1	H_{S4} = 10 535	275.3	49.6	2.690
1	H_{S5} = 11 218	274.7	50.4	2.551
1	H_{S6} = 11 049	274.8	50.2	2.584
3	Ref. atm.	158.1	27.2	1.413
3	H_{S1} = 7 889	158.9	23.9	1.813
3	H_{S2} = 7 344	159.1	23.1	1.905
3	H_{S3} = 11 267	159.0	27.5	1.390
3	H_{S4} = 10 535	158.2	26.8	1.465
3	H_{S5} = 11 218	158.0	27.4	1.395
3	H_{S6} = 11 049	158.1	27.3	1.412
5	Ref. atm.	105.9	17.9	.937
5	H_{S1} = 7 889	106.1	15.6	1.186
5	H_{S2} = 7 344	106.2	15.1	1.244
5	H_{S3} = 11 267	105.9	18.1	.917
5	H_{S4} = 10 535	105.9	17.7	.964
5	H_{S5} = 11 218	105.9	18.1	.920
5	H_{S6} = 11 049	105.9	18.0	.930

TABLE D-5.- REFRACTION CORRECTIONS FOR WHITE SANDS ANNUAL OPTICAL ATMOSPHERE, H = 10^6 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3696.5	74.1	6.775
.5	H_{S1} = 7 776	3704.3	68.3	7.998
.5	H_{S2} = 7 290	3706.0	66.2	8.268
.5	H_{S3} = 10 730	3696.5	79.7	6.774
.5	H_{S4} = 10 268	3697.5	78.0	6.930
.5	H_{S5} = 10 870	3696.2	80.2	6.728
.5	H_{S6} = 10 545	3696.9	79.1	6.835
1	Ref. atm.	3636.3	62.0	5.945
1	H_{S1} = 7 776	3641.0	55.9	6.697
1	H_{S2} = 7 290	3642.1	53.8	6.876
1	H_{S3} = 10 730	3635.7	67.5	5.853
1	H_{S4} = 10 268	3636.4	65.8	5.964
1	H_{S5} = 10 870	3635.5	68.0	5.821
1	H_{S6} = 10 545	3636.0	66.8	5.897
3	Ref. atm.	3411.6	35.4	3.688
3	H_{S1} = 7 776	3412.6	31.0	3.860
3	H_{S2} = 7 290	3412.9	29.4	3.911
3	H_{S3} = 10 730	3411.1	40.2	3.596
3	H_{S4} = 10 268	3411.3	38.8	3.633
3	H_{S5} = 10 870	3411.0	40.6	3.585
3	H_{S6} = 10 545	3411.1	39.6	3.611
5	Ref. atm.	3208.5	24.0	2.575
5	H_{S1} = 7 776	3208.8	20.9	2.635
5	H_{S2} = 7 290	3208.9	19.7	2.655
5	H_{S3} = 10 730	3208.2	27.8	2.525
5	H_{S4} = 10 268	3208.3	26.8	2.541
5	H_{S5} = 10 870	3208.2	28.1	2.520
5	H_{S6} = 10 545	3208.2	27.4	2.531

TABLE D-6.- REFRACTION CORRECTIONS FOR WHITE SANDS ANNUAL OPTICAL ATMOSPHERE, H = 10^4 METERS

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	323.4	62.3	3.139
.5	H_{S1} = 7 776	330.6	57.9	4.376
.5	H_{S2} = 7 290	332.1	56.9	4.625
.5	H_{S3} = 10 730	324.3	62.6	3.297
.5	H_{S4} = 10 268	325.1	62.0	3.429
.5	H_{S5} = 10 870	324.1	62.8	3.259
.5	H_{S6} = 10 545	324.6	62.4	3.349
1	Ref. atm.	275.2	51.2	2.670
1	H_{S1} = 7 776	279.5	46.7	3.563
1	H_{S2} = 7 290	280.4	45.6	3.750
1	H_{S3} = 10 730	275.5	51.4	2.734
1	H_{S4} = 10 268	276.0	50.8	2.837
1	H_{S5} = 10 870	275.4	51.6	2.704
1	H_{S6} = 10 545	275.7	51.2	2.775
3	Ref. atm.	158.2	27.7	1.495
3	H_{S1} = 7 776	159.1	24.5	1.889
3	H_{S2} = 7 290	159.2	23.7	1.975
3	H_{S3} = 10 730	158.2	27.9	1.489
3	H_{S4} = 10 268	158.3	27.4	1.540
3	H_{S5} = 10 870	158.2	28.0	1.474
3	H_{S6} = 10 545	158.3	27.7	1.509
5	Ref. atm.	105.9	18.2	.990
5	H_{S1} = 7 776	106.2	16.0	1.234
5	H_{S2} = 7 290	106.2	15.5	1.289
5	H_{S3} = 10 730	105.9	18.4	.981
5	H_{S4} = 10 268	106.0	18.0	1.013
5	H_{S5} = 10 870	105.9	18.4	.971
5	H_{S6} = 10 545	106.0	18.2	.994

TABLE D-7.- REFRACTION CORRECTIONS FOR EDWARDS AFB MAY OPTICAL ATMOSPHERE, H = 10^6 METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3701.0	75.9	7.479
.5	H_{S1} = 7 588	3707.6	71.1	8.510
.5	H_{S2} = 7 013	3709.8	68.6	8.866
.5	H_{S3} = 9 896	3700.6	80.6	7.415
.5	H_{S4} = 9 695	3701.1	79.8	7.495
.5	H_{S5} = 9 863	3700.7	80.5	7.428
.5	H_{S6} = 9 752	3701.0	80.0	7.472
1	Ref. atm.	3639.5	63.0	6.463
1	H_{S1} = 7 588	3643.5	58.0	7.101
1	H_{S2} = 7 013	3645.0	55.4	7.334
1	H_{S3} = 9 896	3638.8	67.6	6.355
1	H_{S4} = 9 695	3639.2	66.8	6.411
1	H_{S5} = 9 863	3638.9	67.5	6.364
1	H_{S6} = 9 752	3639.1	67.1	6.395
3	Ref. atm.	3412.9	35.5	3.920
3	H_{S1} = 7 588	3413.8	31.9	4.065
3	H_{S2} = 7 013	3414.2	29.9	4.130
3	H_{S3} = 9 896	3412.5	39.5	3.839
3	H_{S4} = 9 695	3412.6	38.9	3.857
3	H_{S5} = 9 863	3412.5	39.4	3.842
3	H_{S6} = 9 752	3412.6	39.0	3.852
5	Ref. atm.	3209.2	23.9	2.718
5	H_{S1} = 7 588	3209.5	21.4	2.768
5	H_{S2} = 7 013	3209.6	19.9	2.793
5	H_{S3} = 9 896	3209.0	27.1	2.675
5	H_{S4} = 9 695	3209.0	26.6	2.683
5	H_{S5} = 9 863	3209.0	27.1	2.676
5	H_{S6} = 9 752	3209.0	26.8	2.680

TABLE D-8.- REFRACTION CORRECTIONS FOR EDWARDS AFB
MAY OPTICAL ATMOSPHERE, $H = 10^4$ METERS

($\lambda = 0.555$ micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	326.4	64.3	3.659
.5	H_{S1} = 7 588	332.5	60.5	4.697
.5	H_{S2} = 7 013	334.5	59.3	5.026
.5	H_{S3} = 9 896	326.8	64.6	3.721
.5	H_{S4} = 9 695	327.2	64.3	3.790
.5	H_{S5} = 9 863	326.9	64.5	3.732
.5	H_{S6} = 9 752	327.1	64.4	3.770
1	Ref. atm.	277.1	52.6	3.056
1	H_{S1} = 7 588	280.7	48.6	3.814
1	H_{S2} = 7 013	281.9	47.3	4.059
1	H_{S3} = 9 896	277.2	52.3	3.071
1	H_{S4} = 9 695	277.4	52.5	3.124
1	H_{S5} = 9 863	277.2	52.7	3.079
1	H_{S6} = 9 752	277.3	52.6	3.109
3	Ref. atm.	158.6	28.2	1.671
3	H_{S1} = 7 588	159.3	25.4	2.013
3	H_{S2} = 7 013	159.6	24.4	2.125
3	H_{S3} = 9 896	158.6	28.3	1.660
3	H_{S4} = 9 695	158.6	28.1	1.686
3	H_{S5} = 9 863	158.6	28.3	1.664
3	H_{S6} = 9 752	158.6	28.2	1.678
5	Ref. atm.	106.0	18.5	1.101
5	H_{S1} = 7 588	106.3	16.5	1.314
5	H_{S2} = 7 013	106.3	15.9	1.384
5	H_{S3} = 9 896	106.0	18.6	1.091
5	H_{S4} = 9 695	106.1	18.5	1.107
5	H_{S5} = 9 863	106.0	18.6	1.093
5	H_{S6} = 9 752	106.0	18.5	1.102

TABLE D-9.- REFRACTION CORRECTIONS FOR EDWARDS AFB
JULY OPTICAL ATMOSPHERE, H = 10^6 METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3698.5	74.3	7.090
.5	H_{S1} = 7 730	3705.1	69.0	8.126
.5	H_{S2} = 7 069	3707.6	66.2	8.510
.5	H_{S3} = 10 340	3697.9	79.3	6.992
.5	H_{S4} = 10 057	3698.6	78.3	7.093
.5	H_{S5} = 10 217	3698.2	78.9	7.036
.5	H_{S6} = 10 342	3697.9	79.3	6.992
1	Ref. atm.	3637.5	62.2	6.146
1	H_{S1} = 7 730	3641.6	56.5	6.798
1	H_{S2} = 7 069	3643.2	53.6	7.052
1	H_{S3} = 10 340	3636.8	66.9	6.021
1	H_{S4} = 10 057	3637.2	65.8	6.092
1	H_{S5} = 10 217	3636.9	66.4	6.051
1	H_{S6} = 10 342	3636.7	66.9	6.020
3	Ref. atm.	3412.0	35.3	3.756
3	H_{S1} = 7 730	3412.9	31.3	3.912
3	H_{S2} = 7 069	3413.3	29.1	3.983
3	H_{S3} = 10 340	3411.5	39.5	3.672
3	H_{S4} = 10 057	3411.6	38.6	3.695
3	H_{S5} = 10 217	3411.6	39.1	3.682
3	H_{S6} = 10 342	3411.5	39.5	3.671
5	Ref. atm.	3208.7	23.8	2.614
5	H_{S1} = 7 730	3209.0	21.0	2.669
5	H_{S2} = 7 069	3209.1	19.4	2.697
5	H_{S3} = 10 340	3208.4	27.3	2.569
5	H_{S4} = 10 057	3208.5	26.6	2.579
5	H_{S5} = 10 217	3208.4	27.0	2.573
5	H_{S6} = 10 342	3208.4	27.3	2.569

TABLE D-10.- REFRACTION CORRECTIONS FOR EDWARDS AFB
JULY OPTICAL ATMOSPHERE, $H = 10^4$ METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	325.1	62.6	3.426
.5	H_{S1} = 7 730	331.1	58.6	4.455
.5	H_{S2} = 7 069	333.2	57.2	4.810
.5	H_{S3} = 10 340	325.2	62.9	3.451
.5	H_{S4} = 10 057	325.7	62.5	3.538
.5	H_{S5} = 10 217	325.4	62.7	3.488
.5	H_{S6} = 10 342	325.2	62.9	3.451
1	Ref. atm.	276.2	51.3	2.864
1	H_{S1} = 7 730	279.8	47.2	3.626
1	H_{S2} = 7 069	281.1	45.7	3.891
1	H_{S3} = 10 340	276.1	51.5	2.856
1	H_{S4} = 10 057	276.5	51.2	2.924
1	H_{S5} = 10 217	276.3	51.4	2.885
1	H_{S6} = 10 342	276.1	51.5	2.856
3	Ref. atm.	158.4	27.6	1.569
3	H_{S1} = 7 730	159.1	24.7	1.920
3	H_{S2} = 7 069	159.4	23.7	2.041
3	H_{S3} = 10 340	158.4	27.8	1.551
3	H_{S4} = 10 057	158.4	27.5	1.584
3	H_{S5} = 10 217	158.4	27.7	1.565
3	H_{S6} = 10 342	158.3	27.8	1.551
5	Ref. atm.	106.0	18.2	1.035
5	H_{S1} = 7 730	106.2	16.1	1.254
5	H_{S2} = 7 069	106.3	15.4	1.331
5	H_{S3} = 10 340	106.0	18.3	1.020
5	H_{S4} = 10 057	106.0	18.1	1.042
5	H_{S5} = 10 217	106.0	18.2	1.029
5	H_{S6} = 10 342	106.0	18.3	1.020

TABLE D-11.- REFRACTION CORRECTIONS FOR EDWARDS AFB ANNUAL OPTICAL ATMOSPHERE, $H = 10^6$ METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3701.4	76.1	7.545
.5	H_{S1} = 7 576	3707.8	71.3	8.544
.5	H_{S2} = 7 009	3710.0	68.8	8.896
.5	H_{S3} = 9 793	3701.0	80.5	7.478
.5	H_{S4} = 9 653	3710.4	79.9	7.535
.5	H_{S5} = 9 751	3701.1	80.3	7.495
.5	H_{S6} = 9 701	3401.2	80.1	7.515
1	Ref. atm.	3639.8	63.2	6.505
1	H_{S1} = 7 576	3643.7	58.1	7.127
1	H_{S2} = 7 009	3645.1	55.5	7.358
1	H_{S3} = 9 793	3639.1	67.4	6.403
1	H_{S4} = 9 653	3639.4	66.9	6.442
1	H_{S5} = 9 751	3639.2	67.3	6.414
1	H_{S6} = 9 701	3639.3	67.1	6.428
3	Ref. atm.	3413.0	35.6	3.933
3	H_{S1} = 7 576	3413.9	31.9	4.079
3	H_{S2} = 7 009	3414.3	30.0	4.142
3	H_{S3} = 9 793	3412.6	39.3	3.860
3	H_{S4} = 9 653	3412.7	38.8	3.872
3	H_{S5} = 9 751	3412.6	39.2	3.863
3	H_{S6} = 9 701	3412.6	39.0	3.868
5	Ref. atm.	3209.3	24.0	2.726
5	H_{S1} = 7 576	3209.6	21.4	2.777
5	H_{S2} = 7 009	3209.7	20.0	2.801
5	H_{S3} = 9 793	3209.1	27.0	2.687
5	H_{S4} = 9 653	3209.1	26.6	2.692
5	H_{S5} = 9 751	3209.1	26.9	2.688
5	H_{S6} = 9 701	3209.1	26.7	2.690

TABLD D-12.- REFRACTION CORRECTIONS FOR EDWARDS AFB
ANNUAL OPTICAL ATMOSPHERE, H = 10^4 METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ_-, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	326.8	64.4	3.722
.5	H_{S1} = 7 576	332.6	60.7	4.719
.5	H_{S2} = 7 009	334.6	59.4	5.045
.5	H_{S3} = 9 793	327.1	64.6	3.768
.5	H_{S4} = 9 653	327.4	64.4	3.816
.5	H_{S5} = 9 751	327.2	64.6	3.782
.5	H_{S6} = 9 701	327.3	64.5	3.799
1	Ref. atm.	277.3	52.6	3.099
1	H_{S1} = 7 576	280.8	48.7	3.831
1	H_{S2} = 7 009	282.0	47.4	4.073
1	H_{S3} = 9 793	277.3	52.8	3.107
1	H_{S4} = 9 653	277.5	52.6	3.145
1	H_{S5} = 9 751	277.4	52.7	3.118
1	H_{S6} = 9 701	277.4	52.6	3.132
3	Ref. atm.	158.6	28.2	1.687
3	H_{S1} = 7 576	159.3	25.4	2.021
3	H_{S2} = 7 009	159.6	24.5	2.132
3	H_{S3} = 9 793	158.6	28.3	1.678
3	H_{S4} = 9 653	158.7	28.2	1.696
3	H_{S5} = 9 751	158.6	28.3	1.683
3	H_{S6} = 9 701	158.6	28.2	1.690
5	Ref. atm.	106.1	18.5	1.110
5	H_{S1} = 7 576	106.3	16.6	1.319
5	H_{S2} = 7 009	106.3	15.9	1.389
5	H_{S3} = 9 793	106.0	18.6	1.102
5	H_{S4} = 9 653	106.1	18.5	1.114
5	H_{S5} = 9 751	106.1	18.6	1.106
5	H_{S6} = 9 701	106.1	18.5	1.110

TABLE D-13.- REFRACTION CORRECTIONS FOR EGLIN AFB
JANUARY OPTICAL ATMOSPHERE, H = 10^6 METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3704.8	77.7	8.076
.5	H_{S1} = 7 459	3709.8	72.9	8.861
.5	H_{S2} = 7 167	3711.0	71.6	9.047
.5	H_{S3} = 9 200	3704.0	80.4	7.943
.5	H_{S4} = 9 297	3703.7	80.8	7.900
.5	H_{S5} = 9 073	3704.3	79.9	8.001
.5	H_{S6} = 9 233	3703.9	80.5	7.929
1	Ref. atm.	3642.0	64.2	6.854
1	H_{S1} = 7 459	3645.2	59.3	7.374
1	H_{S2} = 7 167	3646.0	57.9	7.497
1	H_{S3} = 9 200	3641.4	66.9	6.756
1	H_{S4} = 9 297	3641.2	67.3	6.727
1	H_{S5} = 9 073	3641.6	66.4	6.796
1	H_{S6} = 9 233	3641.3	67.1	6.746
3	Ref. atm.	3413.8	36.0	4.067
3	H_{S1} = 7 459	3414.6	32.4	4.202
3	H_{S2} = 7 167	3414.8	31.4	4.236
3	H_{S3} = 9 200	3413.5	38.4	4.020
3	H_{S4} = 9 297	3413.5	38.7	4.010
3	H_{S5} = 9 073	3413.6	38.0	4.032
3	H_{S6} = 9 233	3413.5	38.5	4.016
5	Ref. atm.	3209.7	24.3	2.807
5	H_{S1} = 7 459	3210.0	21.7	2.856
5	H_{S2} = 7 167	3210.1	20.9	2.869
5	H_{S3} = 9 200	3209.6	26.2	2.781
5	H_{S4} = 9 297	3209.6	26.4	2.778
5	H_{S5} = 9 073	3209.6	25.9	2.787
5	H_{S6} = 9 233	3209.6	26.3	2.781

TABLE D-14.- REFRACTION CORRECTIONS FOR EGLIN AFB
JANUARY OPTICAL ATMOSPHERE, $H = 10^4$ METERS

($\lambda = 0.555$ micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	329.3	65.5	4.156
.5	H_{S1} = 7 459	333.8	62.2	4.921
.5	H_{S2} = 7 167	334.9	61.6	5.093
.5	H_{S3} = 9 200	329.0	65.5	4.095
.5	H_{S4} = 9 297	328.8	65.7	4.058
.5	H_{S5} = 9 073	329.3	65.3	4.146
.5	H_{S6} = 9 233	328.9	65.6	4.083
1	Ref. atm.	278.7	53.3	3.399
1	H_{S1} = 7 459	281.6	49.9	3.988
1	H_{S2} = 7 167	282.2	49.2	4.116
1	H_{S3} = 9 200	278.6	53.3	3.364
1	H_{S4} = 9 297	278.4	53.5	3.335
1	H_{S5} = 9 073	278.8	53.1	3.403
1	H_{S6} = 9 233	278.5	53.4	3.354
3	Ref. atm.	158.9	28.4	1.810
3	H_{S1} = 7 459	159.5	25.9	2.098
3	H_{S2} = 7 167	159.6	25.4	2.157
3	H_{S3} = 9 200	158.9	28.4	1.805
3	H_{S4} = 9 297	158.9	28.5	1.791
3	H_{S5} = 9 073	158.9	28.2	1.824
3	H_{S6} = 9 233	158.9	28.4	1.801
5	Ref. atm.	106.1	18.6	1.185
5	H_{S1} = 7 459	106.3	16.9	1.369
5	H_{S2} = 7 167	106.4	16.6	1.405
5	H_{S3} = 9 200	106.1	18.6	1.184
5	H_{S4} = 9 297	106.1	18.7	1.175
5	H_{S5} = 9 073	106.1	18.5	1.196
5	H_{S6} = 9 233	106.1	18.6	1.181

TABLE D-15.- REFRACTION CORRECTIONS FOR EGLIN AFB
AUGUST OPTICAL ATMOSPHERE, H = 10^6 METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3700.0	75.1	7.324
.5	H_{S1} = 7 697	3705.6	69.4	8.203
.5	H_{S2} = 7 262	3707.2	67.6	8.454
.5	H_{S3} = 10 046	3698.9	78.8	7.148
.5	H_{S4} = 9 864	3699.3	78.1	7.216
.5	H_{S5} = 9 881	3699.4	78.3	7.221
.5	H_{S6} = 10 202	3698.6	79.5	7.102
1	Ref. atm.	3638.2	62.5	6.256
1	H_{S1} = 7 697	3642.0	56.7	6.859
1	H_{S2} = 7 262	3643.0	54.8	7.025
1	H_{S3} = 10 046	3637.5	66.3	6.138
1	H_{S4} = 9 864	3637.8	65.6	6.186
1	H_{S5} = 9 881	3637.8	65.7	6.190
1	H_{S6} = 10 202	3637.3	67.0	6.107
3	Ref. atm.	3412.2	35.6	3.784
3	H_{S1} = 7 697	3413.1	31.4	3.943
3	H_{S2} = 7 262	3413.4	29.9	3.989
3	H_{S3} = 10 046	3411.8	38.9	3.722
3	H_{S4} = 9 864	3411.9	38.3	3.737
3	H_{S5} = 9 881	3411.9	38.4	3.741
3	H_{S6} = 10 202	3411.7	39.4	3.714
5	Ref. atm.	3208.8	24.1	2.631
5	H_{S1} = 7 697	3209.1	21.1	2.689
5	H_{S2} = 7 262	3209.2	20.0	2.707
5	H_{S3} = 10 046	3208.6	26.8	2.597
5	H_{S4} = 9 864	3208.6	26.3	2.604
5	H_{S5} = 9 881	3208.6	26.4	2.607
5	H_{S6} = 10 202	3208.6	27.2	2.595

TABLE D-16.--REFRACTION CORRECTIONS FOR EGLIN AFB
AUGUST OPTICAL ATMOSPHERE, H = 10^4 METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	326.3	62.8	3.629
.5	H_{S1} = 7 697	331.4	59.0	4.505
.5	H_{S2} = 7 262	332.8	58.0	4.736
.5	H_{S3} = 10 046	325.9	62.9	3.567
.5	H_{S4} = 9 864	326.2	62.7	3.625
.5	H_{S5} = 9 881	326.2	62.8	3.625
.5	H_{S6} = 10 202	325.7	63.2	3.523
1	Ref. atm.	276.7	51.4	2.968
1	H_{S1} = 7 697	280.0	47.4	3.664
1	H_{S2} = 7 262	280.9	46.5	3.837
1	H_{S3} = 10 046	276.6	51.5	2.947
1	H_{S4} = 9 864	276.8	51.2	2.992
1	H_{S5} = 9 881	276.8	51.3	2.992
1	H_{S6} = 10 202	276.4	51.8	2.913
3	Ref. atm.	158.5	27.6	1.607
3	H_{S1} = 7 697	159.2	24.8	1.939
3	H_{S2} = 7 262	159.3	24.2	2.018
3	H_{S3} = 10 046	158.4	27.7	1.596
3	H_{S4} = 9 864	158.5	27.5	1.618
3	H_{S5} = 9 881	158.5	27.6	1.619
3	H_{S6} = 10 202	158.4	27.9	1.580
5	Ref. atm.	106.0	18.2	1.058
5	H_{S1} = 7 697	106.2	16.2	1.267
5	H_{S2} = 7 262	106.3	15.7	1.317
5	H_{S3} = 10 046	106.0	18.2	1.049
5	H_{S4} = 9 864	106.0	18.1	1.064
5	H_{S5} = 9 881	106.0	18.1	1.064
5	H_{S6} = 10 202	106.0	18.4	1.039

TABLE D-17.- REFRACTION CORRECTIONS FOR EGLIN AFB ANNUAL OPTICAL ATMOSPHERE, H = 10^6 METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3702.5	76.3	7.714
.5	H_{S1} = 7 595	3707.5	71.0	8.492
.5	H_{S2} = 7 220	3708.9	69.4	8.718
.5	H_{S3} = 9 662	3701.1	79.6	7.496
.5	H_{S4} = 9 640	3701.2	79.5	7.505
.5	H_{S5} = 9 441	3701.7	78.7	7.586
.5	H_{S6} = 9 779	3700.8	80.0	7.449
1	Ref. atm.	3640.0	63.2	6.537
1	H_{S1} = 7 595	3643.4	57.9	7.087
1	H_{S2} = 7 220	3644.4	56.2	7.236
1	H_{S3} = 9 662	3639.2	66.6	6.410
1	H_{S4} = 9 640	3639.2	66.5	6.416
1	H_{S5} = 9 441	3639.6	65.7	6.472
1	H_{S6} = 9 779	3639.0	67.1	6.377
3	Ref. atm.	3412.9	35.8	3.912
3	H_{S1} = 7 595	3413.8	31.9	4.058
3	H_{S2} = 7 220	3414.0	30.6	4.100
3	H_{S3} = 9 662	3412.6	38.7	3.854
3	H_{S4} = 9 640	3412.6	38.6	3.856
3	H_{S5} = 9 441	3412.7	38.0	3.874
3	H_{S6} = 9 779	3412.5	39.1	3.844
5	Ref. atm.	3209.2	24.2	2.711
5	H_{S1} = 7 595	3209.5	21.4	2.763
5	H_{S2} = 7 220	3209.6	20.4	2.780
5	H_{S3} = 9 662	3209.0	26.5	2.680
5	H_{S4} = 9 640	3209.0	26.5	2.680
5	H_{S5} = 9 441	3209.1	26.0	2.638
5	H_{S6} = 9 779	3209.0	26.8	2.675

TABLE D-18.- REFRACTION CORRECTIONS FOR EGLIN AFB
ANNUAL OPTICAL ATMOSPHERE, H = 10^4 METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	327.9	64.1	3.908
.5	H_{S1} = 7 595	332.5	60.4	4.686
.5	H_{S2} = 7 220	333.7	59.6	4.895
.5	H_{S3} = 9 662	327.2	64.1	3.795
.5	H_{S4} = 9 640	327.3	64.1	3.803
.5	H_{S5} = 9 441	327.7	63.8	3.874
.5	H_{S6} = 9 779	327.0	64.3	3.755
1	Ref. atm.	277.6	52.2	3.169
1	H_{S1} = 7 595	280.7	48.5	3.805
1	H_{S2} = 7 220	281.5	47.7	3.961
1	H_{S3} = 9 662	277.4	52.3	3.128
1	H_{S4} = 9 640	277.5	52.3	3.134
1	H_{S5} = 9 441	277.7	52.0	3.188
1	H_{S6} = 9 779	277.3	52.5	3.096
3	Ref. atm.	158.7	28.0	1.696
3	H_{S1} = 7 595	159.3	25.3	2.009
3	H_{S2} = 7 220	159.5	24.7	2.080
3	H_{S3} = 9 662	158.6	28.0	1.687
3	H_{S4} = 9 640	158.6	28.0	1.690
3	H_{S5} = 9 441	158.7	27.8	1.717
3	H_{S6} = 9 779	158.6	28.2	1.672
5	Ref. atm.	106.1	18.4	1.113
5	H_{S1} = 7 595	106.3	16.5	1.311
5	H_{S2} = 7 220	106.3	16.1	1.356
5	H_{S3} = 9 662	106.1	18.4	1.108
5	H_{S4} = 9 640	106.1	18.4	1.110
5	H_{S5} = 9 441	106.1	18.2	1.127
5	H_{S6} = 9 779	106.0	18.5	1.098

TABLE D-19.- REFRACTION CORRECTIONS FOR ASCENSION FEBRUARY OPTICAL ATMOSPHERE, H = 10^6 METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	$\Delta\dot{E}_{18}$, mrad
0.5	Ref. atm.	3698.4	74.8	7.070
.5	H_{S1} = 7 717	3705.3	69.2	8.161
.5	H_{S2} = 7 244	3707.1	67.2	8.432
.5	H_{S3} = 10 109	3698.6	78.7	7.099
.5	H_{S4} = 9 867	3699.2	77.8	7.188
.5	H_{S5} = 10 529	3697.6	80.3	6.951
.5	H_{S6} = 10 287	3698.2	79.4	7.035
1	Ref. atm.	3637.6	62.4	6.158
1	H_{S1} = 7 717	3641.8	56.6	6.826
1	H_{S2} = 7 244	3642.9	54.5	7.006
1	H_{S3} = 10 109	3637.2	66.3	6.099
1	H_{S4} = 9 867	3637.6	65.3	6.162
1	H_{S5} = 10 529	3636.6	67.9	5.995
1	H_{S6} = 10 287	3637.0	66.9	6.054
3	Ref. atm.	3412.1	35.6	3.766
3	H_{S1} = 7 717	3413.0	31.3	3.926
3	H_{S2} = 7 244	3413.3	29.7	3.977
3	H_{S3} = 10 109	3411.7	38.9	3.703
3	H_{S4} = 9 867	3411.8	38.2	3.724
3	H_{S5} = 10 529	3411.5	40.2	3.668
3	H_{S6} = 10 287	3411.6	39.5	3.688
5	Ref. atm.	3208.7	24.1	2.621
5	H_{S1} = 7 717	3209.0	21.1	2.678
5	H_{S2} = 7 244	3209.1	19.9	2.698
5	H_{S3} = 10 109	3208.5	26.8	2.586
5	H_{S4} = 9 867	3208.6	26.2	2.594
5	H_{S5} = 10 529	3208.4	27.8	2.571
5	H_{S6} = 10 287	3208.5	27.2	2.579

TABLE D-20.- REFRACTION CORRECTIONS FOR ASCENSION FEBRUARY OPTICAL ATMOSPHERE, $H = 10^4$ METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	324.1	62.8	3.260
.5	H_{S1} = 7 717	331.2	58.8	4.478
.5	H_{S2} = 7 244	332.7	57.8	4.728
.5	H_{S3} = 10 109	325.7	62.8	3.534
.5	H_{S4} = 9 867	326.2	62.4	3.611
.5	H_{S5} = 10 529	325.0	63.3	3.408
.5	H_{S6} = 10 287	325.4	63.0	3.479
1	Ref. atm.	275.7	51.6	2.775
1	H_{S1} = 7 717	279.9	47.3	3.643
1	H_{S2} = 7 244	280.8	46.3	3.830
1	H_{S3} = 10 109	276.4	51.4	2.921
1	H_{S4} = 9 867	276.7	51.1	2.981
1	H_{S5} = 10 529	276.0	52.0	2.823
1	H_{S6} = 10 287	276.2	51.6	2.878
3	Ref. atm.	158.4	27.8	1.560
3	H_{S1} = 7 717	159.1	24.8	1.928
3	H_{S2} = 7 244	159.3	24.0	2.014
3	H_{S3} = 10 109	158.4	27.7	1.583
3	H_{S4} = 9 867	158.5	27.4	1.612
3	H_{S5} = 10 529	158.3	28.1	1.535
3	H_{S6} = 10 287	158.4	27.9	1.562
5	Ref. atm.	106.0	18.3	1.033
5	H_{S1} = 7 717	106.2	16.2	1.260
5	H_{S2} = 7 244	106.3	15.7	1.314
5	H_{S3} = 10 109	106.0	18.2	1.041
5	H_{S4} = 9 867	106.0	18.0	1.060
5	H_{S5} = 10 529	106.0	18.5	1.010
5	H_{S6} = 10 287	106.0	18.3	1.028

TABLE D-21.- REFRACTION CORRECTIONS FOR ASCENSION SEPTEMBER OPTICAL ATMOSPHERE, H = 10^6 METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3699.5	75.3	7.245
.5	H_{S1} = 7 666	3706.2	70.0	8.299
.5	H_{S2} = 7 223	3707.9	68.1	8.559
.5	H_{S3} = 9 867	3699.8	78.9	7.283
.5	H_{S4} = 9 714	3700.1	78.3	7.342
.5	H_{S5} = 10 034	3699.4	79.5	7.220
.5	H_{S6} = 10 074	3699.3	79.7	7.205
1	Ref. atm.	3638.5	62.8	6.298
1	H_{S1} = 7 666	3642.5	57.1	6.935
1	H_{S2} = 7 223	3643.5	55.2	7.106
1	H_{S3} = 9 867	3638.1	66.2	6.242
1	H_{S4} = 9 714	3638.4	65.6	6.283
1	H_{S5} = 10 034	3637.9	66.9	6.198
1	H_{S6} = 10 074	3637.8	67.0	6.187
3	Ref. atm.	3412.4	35.7	3.827
3	H_{S1} = 7 666	3413.3	31.6	3.982
3	H_{S2} = 7 223	3413.6	30.1	4.029
3	H_{S3} = 9 867	3412.1	38.7	3.771
3	H_{S4} = 9 714	3412.2	38.2	3.784
3	H_{S5} = 10 034	3412.0	39.2	3.756
3	H_{S6} = 10 074	3412.0	39.3	3.753
5	Ref. atm.	3208.9	24.1	2.658
5	H_{S1} = 7 666	3209.2	21.2	2.714
5	H_{S2} = 7 223	3209.3	20.1	2.733
5	H_{S3} = 9 867	3208.7	26.6	2.627
5	H_{S4} = 9 714	3208.8	26.2	2.633
5	H_{S5} = 10 034	3208.7	27.0	2.621
5	H_{S6} = 10 074	3208.7	27.1	2.619

TABLE D-22.- REFRACTION CORRECTIONS FOR ASCENSION
SEPTEMBER OPTICAL ATMOSPHERE, H = 10^4 METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	325.5	63.1	3.497
.5	H_{S1} = 7 666	331.7	59.5	4.564
.5	H_{S2} = 7 223	333.2	58.5	4.804
.5	H_{S3} = 9 867	326.4	63.3	3.659
.5	H_{S4} = 9 714	326.7	63.0	3.710
.5	H_{S5} = 10 034	326.1	63.5	3.604
.5	H_{S6} = 10 074	326.0	63.6	3.592
1	Ref. atm.	276.6	51.7	2.959
1	H_{S1} = 7 666	280.2	47.8	3.710
1	H_{S2} = 7 223	281.1	46.8	3.889
1	H_{S3} = 9 867	276.9	51.7	3.020
1	H_{S4} = 9 714	277.1	51.5	3.059
1	H_{S5} = 10 034	276.7	52.0	2.977
1	H_{S6} = 10 074	276.7	52.0	2.968
3	Ref. atm.	158.5	27.7	1.631
3	H_{S1} 7 666	159.2	25.0	1.962
3	H_{S2} = 7 223	159.4	24.3	2.044
3	H_{S3} = 9 867	158.5	27.8	1.633
3	H_{S4} = 9 714	158.6	27.6	1.652
3	H_{S5} = 10 034	158.5	28.0	1.612
3	H_{S6} = 10 074	158.5	28.0	1.607
5	Ref. atm.	106.0	18.2	1.075
5	H_{S1} = 7 666	106.2	16.3	1.281
5	H_{S2} = 7 223	106.3	15.8	1.333
5	H_{S3} = 9 867	106.0	18.3	1.073
5	H_{S4} = 9 714	106.0	18.2	1.085
5	H_{S5} = 10 034	106.0	18.4	1.060
5	H_{S6} = 10 074	106.0	18.4	1.057

TABLE D-23.- REFRACTION CORRECTIONS FOR ASCENSION ANNUAL OPTICAL ATMOSPHERE, H = 10^6 METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3698.7	75.0	7.116
.5	H_{S1} = 7 697	3705.7	69.5	8.216
.5	H_{S2} = 7 236	3707.4	67.6	8.482
.5	H_{S3} = 9 960	3699.2	78.6	7.191
.5	H_{S4} = 9 805	3699.5	78.0	7.250
.5	H_{S5} = 10 170	3698.7	79.4	7.114
.5	H_{S6} = 10 202	3698.6	79.5	7.102
1	Ref. atm.	3637.9	62.6	6.204
1	H_{S1} = 7 697	3642.1	56.8	6.870
1	H_{S2} = 7 236	3643.2	54.8	7.046
1	H_{S3} = 9 960	3637.7	66.0	6.169
1	H_{S4} = 9 805	3637.9	65.4	6.210
1	H_{S5} = 10 170	3637.3	66.8	6.115
1	H_{S6} = 10 202	3637.3	67.0	6.107
3	Ref. atm.	3412.2	35.6	3.789
3	H_{S1} = 7 697	3413.1	31.4	3.948
3	H_{S2} = 7 236	3413.4	29.9	3.998
3	H_{S3} = 9 960	3411.9	38.7	3.734
3	H_{S4} = 9 805	3411.9	38.2	3.748
3	H_{S5} = 10 170	3411.8	39.3	3.716
3	H_{S6} = 10 202	3411.7	39.4	3.714
5	Ref. atm.	3208.8	24.1	2.635
5	H_{S1} = 7 697	3209.1	21.1	2.692
5	H_{S2} = 7 236	3209.2	20.0	2.712
5	H_{S3} = 9 960	3208.6	26.6	2.604
5	H_{S4} = 9 805	3208.6	26.2	2.610
5	H_{S5} = 10 170	3208.6	27.1	2.596
5	H_{S6} = 10 202	3208.6	27.2	2.595

TABLE D-24.- REFRACTION CORRECTIONS FOR ASCENSION ANNUAL OPTICAL ATMOSPHERE, H = 10^4 METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	325.1	62.8	3.424
.5	H_{S1} = 7 697	331.4	59.0	4.512
.5	H_{S2} = 7 236	332.9	58.1	4.758
.5	H_{S3} = 9 960	326.1	62.9	3.600
.5	H_{S4} = 9 805	326.4	62.7	3.650
.5	H_{S5} = 10 170	325.7	63.2	3.533
.5	H_{S6} = 10 202	325.7	63.2	3.524
1	Ref. atm.	276.4	51.4	2.904
1	H_{S1} = 7 697	280.0	47.5	3.670
1	H_{S2} = 7 236	280.9	46.5	3.853
1	H_{S3} = 9 960	276.7	51.5	2.973
1	H_{S4} = 9 805	276.9	51.2	3.012
1	H_{S5} = 10 170	276.4	51.8	2.921
1	H_{S6} = 10 202	276.4	51.8	2.914
3	Ref. atm.	158.5	27.6	1.605
3	H_{S1} = 7 697	159.2	24.9	1.941
3	H_{S2} = 7 236	159.3	24.2	2.026
3	H_{S3} = 9 960	158.5	27.7	1.609
3	H_{S4} = 9 805	158.5	27.5	1.628
3	H_{S5} = 10 170	158.4	27.9	1.584
3	H_{S6} = 10 202	158.4	27.9	1.580
5	Ref. atm.	106.0	18.2	1.059
5	H_{S1} = 7 697	106.2	16.2	1.268
5	H_{S2} = 7 236	106.3	15.7	1.322
5	H_{S3} = 9 960	106.0	18.2	1.058
5	H_{S4} = 9 805	106.0	18.1	1.070
5	H_{S5} = 10 170	106.0	18.3	1.041
5	H_{S6} = 10 202	106.0	18.4	1.039

TABLE D-25.- REFRACTIONS CORRECTIONS FOR KWAJALEIN MAY OPTICAL ATMOSPHERE, H = 10^6 METERS

(λ = 0.555 micron)

$\bar{E}_M$, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3697.9	74.4	6.997
.5	H_{S1} = 7 748	3704.8	68.7	8.075
.5	H_{S2} = 7 267	3706.5	66.7	8.346
.5	H_{S3} = 10 186	3698.0	78.3	7.012
.5	H_{S4} = 9 946	3698.6	77.4	7.099
.5	H_{S5} = 10 284	3697.8	78.7	6.977
.5	H_{S6} = 10 423	3697.5	79.2	6.929
1	Ref. atm.	3637.2	62.2	6.087
1	H_{S1} = 7 748	3641.4	56.2	6.758
1	H_{S2} = 7 267	3642.5	54.2	6.938
1	H_{S3} = 10 186	3636.8	66.0	6.029
1	H_{S4} = 9 946	3637.2	65.1	6.076
1	H_{S5} = 10 284	3636.7	66.4	6.005
1	H_{S6} = 10 423	3636.4	66.9	5.971
3	Ref. atm.	3411.8	35.5	3.728
3	H_{S1} = 7 748	3412.8	31.2	3.891
3	H_{S2} = 7 267	3413.1	29.6	3.942
3	H_{S3} = 10 186	3411.5	38.8	3.667
3	H_{S4} = 9 946	3411.6	38.1	3.687
3	H_{S5} = 10 284	3411.4	39.1	3.659
3	H_{S6} = 10 423	3411.4	39.6	3.647
5	Ref. atm.	3208.6	24.0	2.597
5	H_{S1} = 7 748	3208.9	21.0	2.655
5	H_{S2} = 7 267	3209.0	19.8	2.675
5	H_{S3} = 10 186	3208.4	26.8	2.562
5	H_{S4} = 9 946	3208.4	26.2	2.571
5	H_{S5} = 10 284	3208.4	27.0	2.559
5	H_{S6} = 10 423	3208.3	27.3	2.554

TABLE D-26.- REFRACTION CORRECTIONS FOR KWAJALEIN
MAY OPTICAL ATMOSPHERE, $H = 10^4$ METERS

($\lambda = 0.555$ micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	324.7	62.2	3.362
.5	H_{S1} = 7 748	330.9	58.3	4.424
.5	H_{S2} = 7 267	332.4	57.3	4.674
.5	H_{S3} = 10 186	325.4	62.4	3.480
.5	H_{S4} = 9 946	325.8	62.0	3.555
.5	H_{S5} = 10 284	325.2	62.5	3.451
.5	H_{S6} = 10 423	325.0	62.7	3.410
1	Ref. atm.	276.0	51.0	2.835
1	H_{S1} = 7 748	279.7	47.0	3.601
1	H_{S2} = 7 267	280.6	45.9	3.788
1	H_{S3} = 10 186	276.2	51.1	2.878
1	H_{S4} = 9 946	276.5	50.7	2.936
1	H_{S5} = 10 284	276.1	51.2	2.855
1	H_{S6} = 10 423	276.0	51.4	2.823
3	Ref. atm.	158.4	27.4	1.565
3	H_{S1} = 7 748	159.1	24.6	1.907
3	H_{S2} = 7 267	159.3	23.9	1.994
3	H_{S3} = 10 186	158.4	27.5	1.561
3	H_{S4} = 9 946	158.4	27.3	1.590
3	H_{S5} = 10 284	158.3	27.6	1.550
3	H_{S6} = 10 423	158.3	27.8	1.534
5	Ref. atm.	106.0	18.1	1.033
5	H_{S1} = 7 748	106.2	16.1	1.246
5	H_{S2} = 7 267	106.3	15.6	1.301
5	H_{S3} = 10 186	106.0	18.1	1.027
5	H_{S4} = 9 946	106.0	18.0	1.045
5	H_{S5} = 10 284	106.0	18.1	1.020
5	H_{S6} = 10 423	106.0	18.3	1.009

TABLE D-27.- REFRACTION CORRECTIONS FOR KWAJALEIN DECEMBER OPTICAL ATMOSPHERE, H = 10^6 METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3697.9	74.3	6.993
.5	H_{S1} = 7 752	3704.7	68.7	8.065
.5	H_{S2} = 7 269	3706.5	66.6	8.337
.5	H_{S3} = 10 123	3698.1	78.0	7.027
.5	H_{S4} = 9 937	3698.6	77.3	7.095
.5	H_{S5} = 10 271	3697.8	78.6	6.975
.5	H_{S6} = 10 438	3697.4	79.2	6.917
1	Ref. atm.	3637.2	62.1	6.084
1	H_{S1} = 7 752	3641.3	56.2	6.750
1	H_{S2} = 7 269	3642.4	54.1	6.930
1	H_{S3} = 10 123	3636.9	65.7	6.039
1	H_{S4} = 9 937	3637.2	65.0	6.087
1	H_{S5} = 10 271	3636.6	66.2	6.002
1	H_{S6} = 10 438	3636.4	66.9	5.961
3	Ref. atm.	3411.8	35.5	3.726
3	H_{S1} = 7 752	3412.8	31.2	3.887
3	H_{S2} = 7 269	3413.1	29.6	3.938
3	H_{S3} = 10 123	3411.5	38.6	3.669
3	H_{S4} = 9 937	3411.6	38.1	3.684
3	H_{S5} = 10 271	3411.4	39.1	3.656
3	H_{S6} = 10 438	3411.3	39.6	3.643
5	Ref. atm.	3208.6	24.0	2.595
5	H_{S1} = 7 752	3208.9	21.0	2.653
5	H_{S2} = 7 269	3209.0	19.8	2.673
5	H_{S3} = 10 123	3208.4	26.6	2.562
5	H_{S4} = 9 937	3208.4	26.2	2.569
5	H_{S5} = 10 271	3208.4	26.9	2.557
5	H_{S6} = 10 438	3208.3	27.3	2.551

TABLE D-28.- REFRACTION CORRECTIONS FOR KWAJALEIN
DECEMBER OPTICAL ATMOSPHERE, $H = 10^4$ METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	324.7	62.1	3.362
.5	H_{S1} = 7 752	330.9	58.3	4.417
.5	H_{S2} = 7 269	332.4	57.3	4.668
.5	H_{S3} = 10 123	325.5	62.2	3.496
.5	H_{S4} = 9 937	325.8	61.9	3.554
.5	H_{S5} = 10 271	325.2	62.4	3.451
.5	H_{S6} = 10 438	324.9	62.6	3.402
1	Ref. atm.	276.0	50.9	2.835
1	H_{S1} = 7 752	279.7	46.9	3.596
1	H_{S2} = 7 269	280.6	45.9	3.784
1	H_{S3} = 10 123	276.3	50.9	2.891
1	H_{S4} = 9 937	276.5	50.7	2.936
1	H_{S5} = 10 271	276.1	51.1	2.856
1	H_{S6} = 10 438	275.9	51.4	2.817
3	Ref. atm.	158.4	27.4	1.566
3	H_{S1} = 7 752	159.1	24.6	1.905
3	H_{S2} = 7 269	159.3	23.9	1.992
3	H_{S3} = 10 123	158.4	27.5	1.567
3	H_{S4} = 9 937	158.4	27.3	1.589
3	H_{S5} = 10 271	158.3	27.6	1.550
3	H_{S6} = 10 438	158.3	27.8	1.531
5	Ref. atm.	106.0	18.0	1.033
5	H_{S1} = 7 752	106.2	16.1	1.245
5	H_{S2} = 7 269	106.3	15.6	1.299
5	H_{S3} = 10 123	106.0	18.1	1.031
5	H_{S4} = 9 937	106.0	17.9	1.045
5	H_{S5} = 10 271	106.0	18.2	1.020
5	H_{S6} = 10 438	106.0	18.3	1.007

TABLE D-29.- REFRACTION CORRECTIONS FOR KWAJALEIN – ANNUAL OPTICAL ATMOSPHERE, H = 10^6 METERS

(λ = 0.555 micron).

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3697.9	74.4	6.988
.5	H_{S1} = 7 751	3704.8	68.7	8.068
.5	H_{S2} = 7 268	3706.5	66.7	8.340
.5	H_{S3} = 10 175	3698.0	78.2	7.011
.5	H_{S4} = 9 942	3698.6	77.4	7.096
.5	H_{S5} = 10 300	3697.7	78.7	6.967
.5	H_{S6} = 10 433	3697.5	79.2	6.921
1	Ref. atm.	3637.1	62.1	6.082
1	H_{S1} = 7 751	3641.3	56.2	6.753
1	H_{S2} = 7 268	3642.5	54.1	6.933
1	H_{S3} = 10 175	3636.8	65.9	6.028
1	H_{S4} = 9 942	3637.2	65.0	6.088
1	H_{S5} = 10 300	3636.6	66.4	5.997
1	H_{S6} = 10 433	3636.4	66.9	5.965
3	Ref. atm.	3411.8	35.5	3.726
3	H_{S1} = 7 751	3412.8	31.2	3.889
3	H_{S2} = 7 268	3413.1	29.6	3.939
3	H_{S3} = 10 175	3411.5	38.8	3.665
3	H_{S4} = 9 942	3411.6	38.1	3.685
3	H_{S5} = 10 300	3411.4	39.2	3.655
3	H_{S6} = 10 433	3411.3	39.6	3.644
5	Ref. atm.	3208.6	24.0	2.595
5	H_{S1} = 7 751	3208.9	21.0	2.654
5	H_{S2} = 7 268	3209.0	19.8	2.674
5	H_{S3} = 10 175	3208.4	26.7	2.561
5	H_{S4} = 9 942	3208.4	26.2	2.569
5	H_{S5} = 10 300	3208.4	27.0	2.557
5	H_{S6} = 10 433	3208.3	27.3	2.552

TABLE D-30.- REFRACTION CORRECTIONS FOR KWAJALEIN ANNUAL OPTICAL ATMOSPHERE, H = 10^4 METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	324.7	62.1	3.352
.5	H_{S1} = 7 751	330.9	58.3	4.419
.5	H_{S2} = 7 268	332.4	57.3	4.671
.5	H_{S3} = 10 175	325.4	62.3	3.481
.5	H_{S4} = 9 942	325.8	62.0	3.554
.5	H_{S5} = 10 300	325.2	62.5	3.444
.5	H_{S6} = 10 433	325.0	62.6	3.405
1	Ref. atm.	276.0	50.9	2.828
1	H_{S1} = 7 751	279.7	46.9	3.597
1	H_{S2} = 7 268	280.6	45.9	3.785
1	H_{S3} = 10 175	276.2	51.0	2.879
1	H_{S4} = 9 942	276.5	50.7	2.935
1	H_{S5} = 10 300	276.1	51.2	2.850
1	H_{S6} = 10 433	276.0	51.4	2.819
3	Ref. atm.	158.4	27.4	1.563
3	H_{S1} = 7 751	159.1	24.6	1.906
3	H_{S2} = 7 268	159.3	23.9	1.992
3	H_{S3} = 10 175	158.4	27.5	1.562
3	H_{S4} = 9 942	158.4	27.3	1.589
3	H_{S5} = 10 300	158.3	27.6	1.547
3	H_{S6} = 10 433	158.3	27.8	1.532
5	Ref. atm.	106.0	18.0	1.032
5	H_{S1} = 7 751	106.2	16.1	1.245
5	H_{S2} = 7 268	106.3	15.6	1.300
5	H_{S3} = 10 175	106.0	18.1	1.027
5	H_{S4} = 9 942	106.0	17.9	1.045
5	H_{S5} = 10 300	106.0	18.2	1.018
5	H_{S6} = 10 433	106.0	18.3	1.008

TABLE D-31.- REFRACTION CORRECTIONS FOR WALLOPS
MARCH OPTICAL ATMOSPHERE, H = 10^6 METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3706.7	78.7	8.383
.5	H_{S1} = 7 346	3711.8	74.4	9.166
.5	H_{S2} = 7 124	3712.7	73.4	9.314
.5	H_{S3} = 8 997	3705.9	81.7	8.243
.5	H_{S4} = 9 053	3705.7	82.0	8.217
.5	H_{S5} = 8 883	3706.2	81.2	8.298
.5	H_{S6} = 8 796	3706.5	80.9	8.341
1	Ref. atm.	3643.5	64.8	7.100
1	H_{S1} = 7 346	3646.7	60.3	7.611
1	H_{S2} = 7 124	3647.3	59.3	7.708
1	H_{S3} = 8 997	3642.8	67.8	6.993
1	H_{S4} = 9 053	3642.7	68.0	6.974
1	H_{S5} = 8 883	3643.1	67.3	7.030
1	H_{S6} = 8 796	3643.3	66.9	7.060
3	Ref. atm.	3414.5	36.1	4.192
3	H_{S1} = 7 346	3415.3	32.8	4.319
3	H_{S2} = 7 124	3415.4	32.0	4.345
3	H_{S3} = 8 997	3414.2	38.7	4.138
3	H_{S4} = 9 053	3414.2	38.9	4.133
3	H_{S5} = 8 883	3414.3	38.3	4.150
3	H_{S6} = 8 796	3414.3	38.0	4.159
5	Ref. atm.	3210.2	24.2	2.886
5	H_{S1} = 7 346	3210.4	21.9	2.930
5	H_{S2} = 7 124	3210.4	21.3	2.941
5	H_{S3} = 8 997	3210.0	26.3	2.858
5	H_{S4} = 9 053	3210.0	26.5	2.855
5	H_{S5} = 8 883	3210.0	26.0	2.862
5	H_{S6} = 8 796	3210.0	25.8	2.866

TABLE D-32.- REFRACTION CORRECTIONS FOR WALLOPS MARCH OPTICAL ATMOSPHERE, $H = 10^4$ METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	330.4	66.9	4.339
.5	H_{S1} = 7 346	335.0	63.6	5.117
.5	H_{S2} = 7 124	335.8	63.1	5.225
.5	H_{S3} = 8 997	330.1	66.9	4.286
.5	H_{S4} = 9 053	330.0	67.0	4.262
.5	H_{S5} = 8 883	330.4	66.7	4.334
.5	H_{S6} = 8 796	330.6	66.5	4.372
1	Ref. atm.	279.4	54.3	3.537
1	H_{S1} = 7 346	282.3	50.9	4.140
1	H_{S2} = 7 124	282.8	50.3	4.242
1	H_{S3} = 8 997	279.3	54.3	3.513
1	H_{S4} = 9 053	279.2	54.4	3.495
1	H_{S5} = 8 883	279.5	54.1	3.550
1	H_{S6} = 8 796	279.6	53.9	3.579
3	Ref. atm.	159.1	28.8	1.885
3	H_{S1} = 7 346	159.7	26.4	2.173
3	H_{S2} = 7 124	159.8	26.0	2.219
3	H_{S3} = 8 997	159.0	28.8	1.880
3	H_{S4} = 9 053	159.0	29.9	1.872
3	H_{S5} = 8 883	159.1	28.7	1.898
3	H_{S6} = 8 796	159.1	28.6	1.912
5	Ref. atm.	106.2	18.9	1.234
5	H_{S1} = 7 346	106.4	17.2	1.416
5	H_{S2} = 7 124	106.4	16.9	1.445
5	H_{S3} = 8 997	106.2	18.9	1.232
5	H_{S4} = 9 053	106.2	18.9	1.227
5	H_{S5} = 8 883	106.2	18.8	1.243
5	H_{S6} = 8 796	106.2	18.7	1.252

TABLE D-33.- REFRACTION CORRECTIONS FOR WALLOPS JULY OPTICAL ATMOSPHERE, H = 10^6 METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3699.4	75.4	7.227
.5	H_{S1} = 7 678	3706.0	69.8	8.267
.5	H_{S2} = 7 251	3707.6	68.0	8.516
.5	H_{S3} = 10 057	3699.2	79.4	7.190
.5	H_{S4} = 9 813	3699.8	78.4	7.282
.5	H_{S5} = 10 092	3699.1	79.5	7.177
.5	H_{S6} = 10 123	3699.0	79.6	7.166
1	Ref. atm.	3638.2	62.9	6.250
1	H_{S1} = 7 678	3642.3	57.0	6.910
1	H_{S2} = 7 251	3643.3	55.1	7.074
1	H_{S3} = 10 057	3637.7	66.7	6.174
1	H_{S4} = 9 813	3638.1	65.8	6.238
1	H_{S5} = 10 092	3637.7	66.9	6.165
1	H_{S6} = 10 123	3637.6	67.0	6.157
3	Ref. atm.	3412.3	35.8	3.808
3	H_{S1} = 7 678	3413.2	31.5	3.969
3	H_{S2} = 7 251	3413.5	30.1	4.015
3	H_{S3} = 10 057	3411.9	39.2	3.743
3	H_{S4} = 9 813	3412.0	38.4	3.765
3	H_{S5} = 10 092	3411.9	39.3	3.740
3	H_{S6} = 10 123	3411.9	39.4	3.738
5	Ref. atm.	3208.9	24.2	2.648
5	H_{S1} = 7 678	3209.2	21.2	2.706
5	H_{S2} = 7 251	3209.3	20.1	2.724
5	H_{S3} = 10 057	3208.7	26.9	2.612
5	H_{S4} = 9 813	3208.7	26.4	2.621
5	H_{S5} = 10 092	3208.7	27.0	2.611
5	H_{S6} = 10 123	3208.6	27.1	2.610

TABLE D-34.- REFRACTION CORRECTIONS FOR WALLOPS
JULY OPTICAL ATMOSPHERE, $H = 10^4$ METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	325.5	63.2	3.500
.5	H_{S1} = 7 678	331.6	59.3	4.544
.5	H_{S2} = 7 251	333.0	58.4	4.773
.5	H_{S3} = 10 057	326.0	63.4	3.586
.5	H_{S4} = 9 813	326.5	63.0	3.665
.5	H_{S5} = 10 092	326.0	63.4	3.575
.5	H_{S6} = 10 123	325.9	63.4	3.565
1	Ref. atm.	276.5	51.7	2.931
1	H_{S1} = 7 678	280.2	47.7	3.695
1	H_{S2} = 7 251	281.0	46.8	3.866
1	H_{S3} = 10 057	276.6	51.8	2.963
1	H_{S4} = 9 813	276.9	51.5	3.024
1	H_{S5} = 10 092	276.6	51.9	2.954
1	H_{S6} = 10 123	276.6	51.9	2.947
3	Ref. atm.	158.5	27.8	1.610
3	H_{S1} = 7 678	159.2	25.0	1.954
3	H_{S2} = 7 251	159.4	24.3	2.033
3	H_{S3} = 10 057	158.5	27.9	1.605
3	H_{S4} = 9 813	158.5	27.6	1.635
3	H_{S5} = 10 092	158.5	27.9	1.600
3	H_{S6} = 10 123	158.4	28.0	1.597
5	Ref. atm.	106.0	18.3	1.062
5	H_{S1} = 7 678	106.2	16.3	1.276
5	H_{S2} = 7 251	106.3	15.8	1.326
5	H_{S3} = 10 057	106.0	18.4	1.055
5	H_{S4} = 9 813	106.0	18.2	1.074
5	H_{S5} = 10 092	106.0	18.4	1.052
5	H_{S6} = 10 123	106.0	18.4	1.050

TABLE D-35.- REFRACTION CORRECTONS FOR WALLOPS ANNUAL OPTICAL ATMOSPHERE, H = 10^6 METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3703.1	77.1	7.804
.5	H_{S1} = 7 513	3708.9	72.2	8.715
.5	H_{S2} = 7 184	3710.2	70.7	8.920
.5	H_{S3} = 9 437	3702.7	80.3	7.740
.5	H_{S4} = 9 453	3702.6	80.4	7.733
.5	H_{S5} = 9 422	3702.7	80.3	7.747
.5	H_{S6} = 9 447	3702.6	80.4	7.736
1	Ref. atm.	3640.8	63.9	6.674
1	H_{S1} = 7 513	3644.5	58.7	7.261
1	H_{S2} = 7 184	3645.4	57.2	7.396
1	H_{S3} = 9 437	3640.4	67.0	6.602
1	H_{S4} = 9 453	3640.4	67.1	6.597
1	H_{S5} = 9 422	3640.4	67.0	6.606
1	H_{S6} = 9 447	3640.4	67.1	6.599
3	Ref. atm.	3413.4	36.0	4.001
3	H_{S1} = 7 513	3414.3	32.2	4.145
3	H_{S2} = 7 184	3414.5	31.0	4.183
3	H_{S3} = 9 437	3413.1	38.7	3.949
3	H_{S4} = 9 453	3413.1	38.8	3.947
3	H_{S5} = 9 422	3413.1	38.7	3.950
3	H_{S6} = 9 447	3413.1	38.8	3.948
5	Ref. atm.	3209.5	24.2	2.768
5	H_{S1} = 7 513	3209.8	21.6	2.819
5	H_{S2} = 7 184	3209.9	20.7	2.834
5	H_{S3} = 9 437	3209.4	26.5	2.739
5	H_{S4} = 9 453	3209.3	26.5	2.739
5	H_{S5} = 9 422	3209.4	26.4	2.740
5	H_{S6} = 9 447	3209.4	26.5	2.739

TABLE D-36.- REFRACTION CORRECTIONS FOR WALLOPS ANNUAL OPTICAL ATMOSPHERE, H = 10^4 METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	328.0	65.0	3.927
.5	H_{S1} = 7 513	333.3	61.5	4.827
.5	H_{S2} = 7 184	334.4	60.8	5.017
.5	H_{S3} = 9 437	328.2	65.1	3.954
.5	H_{S4} = 9 453	328.1	65.1	3.948
.5	H_{S5} = 9 422	328.2	65.1	3.959
.5	H_{S6} = 9 447	328.1	65.1	3.950
1	Ref. atm.	278.0	53.0	3.244
1	H_{S1} = 7 513	281.2	49.3	3.915
1	H_{S2} = 7 184	281.9	48.6	4.057
1	H_{S3} = 9 437	278.0	53.0	3.253
1	H_{S4} = 9 453	278.0	53.0	3.248
1	H_{S5} = 9 422	278.1	53.0	3.257
1	H_{S6} = 9 447	278.0	53.0	3.250
3	Ref. atm.	158.8	28.3	1.750
3	H_{S1} = 7 513	159.4	25.7	2.063
3	H_{S2} = 7 184	159.6	25.2	2.127
3	H_{S3} = 9 437	158.8	28.3	1.750
3	H_{S4} = 9 453	158.8	28.3	1.748
3	H_{S5} = 9 422	158.8	28.3	1.752
3	H_{S6} = 9 447	158.8	28.3	1.749
5	Ref. atm.	106.1	18.6	1.149
5	H_{S1} = 7 513	106.3	16.8	1.346
5	H_{S2} = 7 184	106.3	16.4	1.386
5	H_{S3} = 9 437	106.1	18.6	1.149
5	H_{S4} = 9 453	106.1	18.6	1.147
5	H_{S5} = 9 422	106.1	18.6	1.150
5	H_{S6} = 9 447	106.1	18.6	1.148

TABLE D-37.- REFRACTION CORRECTIONS FOR CAPE CANAVERAL JANUARY OPTICAL ATMOSPHERE, H = 10^6 METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3702.1	76.6	7.657
.5	H_{S1} = 7 563	3708.0	71.5	8.579
.5	H_{S2} = 7 195	3709.4	69.9	8.804
.5	H_{S3} = 9 586	3701.7	79.9	7.585
.5	H_{S4} = 9 595	3701.7	79.9	7.582
.5	H_{S5} = 9 581	3701.7	79.9	7.587
.5	H_{S6} = 9 650	3701.5	80.2	7.559
1	Ref. atm.	3640.1	63.6	6.560
1	H_{S1} = 7 563	3643.8	58.2	7.154
1	H_{S2} = 7 195	3644.8	56.6	7.302
1	H_{S3} = 9 586	3639.6	66.8	6.480
1	H_{S4} = 9 595	3639.6	66.9	6.478
1	H_{S5} = 9 581	3639.6	66.8	6.482
1	H_{S6} = 9 650	3639.5	67.1	6.462
3	Ref. atm.	3413.1	35.9	3.944
3	H_{S1} = 7 563	3414.0	32.0	4.092
3	H_{S2} = 7 195	3414.2	30.7	4.133
3	H_{S3} = 9 586	3412.8	38.7	3.890
3	H_{S4} = 9 595	3412.8	38.8	3.889
3	H_{S5} = 9 581	3412.8	38.7	3.890
3	H_{S6} = 9 650	3412.7	39.0	3.884
5	Ref. atm.	3209.3	24.2	2.732
5	H_{S1} = 7 563	3209.6	21.5	2.785
5	H_{S2} = 7 195	3209.7	20.5	2.801
5	H_{S3} = 9 586	3209.2	26.5	2.702
5	H_{S4} = 9 595	3209.1	26.6	2.702
5	H_{S5} = 9 581	3209.2	26.5	2.703
5	H_{S6} = 9 650	3209.1	26.7	2.700

TABLE D-38.- REFRACTION CORRECTIONS FOR CAPE CANAVERAL JANUARY OPTICAL ATMOSPHERE, H = 10^4 METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	327.4	64.5	3.823
.5	H_{S1} = 7 563	332.8	60.9	4.741
.5	H_{S2} = 7 195	334.0	60.1	4.949
.5	H_{S3} = 9 586	327.6	64.5	3.852
.5	H_{S4} = 9 595	327.5	64.5	3.849
.5	H_{S5} = 9 581	327.6	64.5	3.854
.5	H_{S6} = 9 650	327.4	64.6	3.829
1	Ref. atm.	277.6	52.6	3.155
1	H_{S1} = 7 563	280.9	48.9	3.848
1	H_{S2} = 7 195	281.7	48.0	4.003
1	H_{S3} = 9 586	277.6	52.6	3.173
1	H_{S4} = 9 595	277.6	52.6	3.170
1	H_{S5} = 9 581	277.7	52.6	3.174
1	H_{S6} = 9 650	277.6	52.7	3.155
3	Ref. atm.	158.7	28.2	1.708
3	H_{S1} = 7 563	159.4	25.5	2.030
3	H_{S2} = 7 195	159.5	24.9	2.101
3	H_{S3} = 9 586	158.7	28.2	1.710
3	H_{S4} = 9 595	158.7	28.2	1.709
3	H_{S5} = 9 581	158.7	28.2	1.711
3	H_{S6} = 9 650	158.7	28.2	1.702
5	Ref. atm.	106.1	18.5	1.122
5	H_{S1} = 7 563	106.3	16.6	1.325
5	H_{S2} = 7 195	106.3	16.2	1.369
5	H_{S3} = 9 586	106.1	18.5	1.123
5	H_{S4} = 9 595	106.1	18.5	1.122
5	H_{S5} = 9 581	106.1	18.5	1.123
5	H_{S6} = 9 650	106.1	18.5	1.117

TABLE D-39.- REFRACTION CORRECTIONS FOR CAPE CANAVERAL
AUGUST OPTICAL ATMOSPHERE, H = 10^6 METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3697.7	74.8	6.966
.5	H_{S1} = 7 738	3705.0	68.9	8.103
.5	H_{S2} = 7 268	3706.7	66.9	8.369
.5	H_{S3} = 10 302	3697.9	79.0	6.990
.5	H_{S4} = 10 025	3698.5	78.0	7.089
.5	H_{S5} = 10 459	3697.5	79.6	6.935
.5	H_{S6} = 10 378	3697.7	79.3	6.963
1	Ref. atm.	3637.1	62.5	6.074
1	H_{S1} = 7 738	3641.5	56.4	6.780
1	H_{S2} = 7 268	3642.6	54.3	6.957
1	H_{S3} = 10 302	3636.7	66.6	6.017
1	H_{S4} = 10 025	3637.2	65.6	6.087
1	H_{S5} = 10 459	3636.5	67.2	5.978
1	H_{S6} = 10 378	3636.6	66.9	5.998
3	Ref. atm.	3411.9	35.7	3.733
3	H_{S1} = 7 738	3412.9	31.2	3.903
3	H_{S2} = 7 268	3413.1	29.7	3.952
3	H_{S3} = 10 302	3411.5	39.3	3.667
3	H_{S4} = 10 025	3411.6	38.5	3.690
3	H_{S5} = 10 459	3411.4	39.8	3.654
3	H_{S6} = 10 378	3411.4	39.5	3.661
5	Ref. atm.	3208.6	24.2	2.602
5	H_{S1} = 7 738	3208.9	21.0	2.663
5	H_{S2} = 7 268	3209.0	19.8	2.682
5	H_{S3} = 10 302	3208.4	27.1	2.565
5	H_{S4} = 10 025	3208.5	26.5	2.575
5	H_{S5} = 10 459	3208.4	27.5	2.559
5	H_{S6} = 10 378	3208.4	27.3	2.562

TABLE D-40.- REFRACTION CORRECTIONS FOR CAPE CANAVERAL AUGUST OPTICAL ATMOSPHERE, H ≐ 10^4 METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	324.4	62.5	3.299
.5	H_{S1} = 7 738	331.0	58.5	4.441
.5	H_{S2} = 7 268	332.5	57.5	4.687
.5	H_{S3} = 10 302	325.3	62.7	3.455
.5	H_{S4} = 10 025	325.7	62.3	3.540
.5	H_{S5} = 10 459	325.0	62.9	3.409
.5	H_{S6} = 10 378	325.1	62.8	3.432
1	Ref. atm.	275.9	51.3	2.798
1	H_{S1} = 7 738	279.8	47.1	3.614
1	H_{S2} = 7 268	280.7	46.1	3.798
1	H_{S3} = 10 302	276.1	51.4	2.859
1	H_{S4} = 10 025	276.5	51.0	2.925
1	H_{S5} = 10 459	276.0	51.6	2.823
1	H_{S6} = 10 378	276.1	51.5	2.841
3	Ref. atm.	158.4	27.6	1.554
3	H_{S1} = 7 738	159.1	24.7	1.914
3	H_{S2} = 7 268	159.3	24.0	1.999
3	H_{S3} = 10 302	158.4	27.7	1.552
3	H_{S4} = 10 025	158.4	27.5	1.584
3	H_{S5} = 10 459	158.3	27.9	1.534
3	H_{S6} = 10 378	158.3	27.8	1.543
5	Ref. atm.	106.0	18.2	1.027
5	H_{S1} = 7 738	106.2	16.1	1.251
5	H_{S2} = 7 268	106.3	15.6	1.304
5	H_{S3} = 10 302	106.0	18.3	1.021
5	H_{S4} = 10 025	106.0	18.1	1.042
5	H_{S5} = 10 459	106.0	18.4	1.010
5	H_{S6} = 10 378	106.0	18.3	1.015

TABLE D-41.- REFRACTION CORRECTIONS FOR CAPE CANAVERAL ANNUAL OPTICAL ATMOSPHERE, H = 10^6 METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3698.9	75.3	7.154
.5	H_{S1} = 7 682	3706.0	69.7	8.257
.5	H_{S2} = 7 244	3707.6	67.9	8.511
.5	H_{S3} = 10 070	3699.1	79.3	7.178
.5	H_{S4} = 9 893	3699.5	78.7	7.244
.5	H_{S5} = 10 228	3698.7	79.9	7.120
.5	H_{S6} = 10 139	3698.9	79.6	7.153
1	Ref. atm.	3638.0	62.8	6.220
1	H_{S1} = 7 682	3642.3	57.0	6.902
1	H_{S2} = 7 244	3643.3	55.1	7.070
1	H_{S3} = 10 070	3637.6	66.7	6.164
1	H_{S4} = 9 893	3637.9	66.0	6.211
1	H_{S5} = 10 228	3637.4	67.3	6.124
1	H_{S6} = 10 139	3637.5	67.0	6.146
3	Ref. atm.	3412.3	35.7	3.803
3	H_{S1} = 7 682	3413.2	31.5	3.965
3	H_{S2} = 7 244	3413.5	30.0	4.012
3	H_{S3} = 10 070	3411.9	39.2	3.739
3	H_{S4} = 9 893	3412.0	38.6	2.754
3	H_{S5} = 10 228	3411.8	39.6	3.725
3	H_{S6} = 10 139	3411.9	39.4	3.733
5	Ref. atm.	3208.8	24.2	2.646
5	H_{S1} = 7 682	3209.2	21.2	2.703
5	H_{S2} = 7 244	3209.3	20.1	2.722
5	H_{S3} = 10 070	3208.6	26.9	2.610
5	H_{S4} = 9 893	3208.7	26.5	2.616
5	H_{S5} = 10 228	3208.6	27.3	2.604
5	H_{S6} = 10 139	3208.6	27.1	2.607

TABLE D-42.- REFRACTION CORRECTIONS FOR CAPE CANAVERAL ANNUAL OPTICAL ATMOSPHERE, H = 10^4 METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\overline{\Delta\rho_7}$, m	ΔE_{18}, mrad
0.5	Ref. atm.	325.1	63.2	3.428
.5	H_{S1} = 7 682	331.6	59.3	4.537
.5	H_{S2} = 7 244	333.0	58.3	4.772
.5	H_{S3} = 10 070	326.0	63.3	3.579
.5	H_{S4} = 9 893	326.3	63.1	3.635
.5	H_{S5} = 10 228	325.7	63.5	3.529
.5	H_{S6} = 10 139	325.8	63.4	3.557
1	Ref. atm.	276.3	51.8	2.896
1	H_{S1} = 7 682	280.1	47.7	3.690
1	H_{S2} = 7 244	281.0	46.7	3.865
1	H_{S3} = 10 070	276.6	51.8	2.957
1	H_{S4} = 9 893	276.8	51.6	3.001
1	H_{S5} = 10 228	276.4	52.0	2.918
1	H_{S6} = 10 139	276.5	51.9	2.940
3	Ref. atm.	158.5	27.8	1.600
3	H_{S1} = 7 682	159.2	24.9	1.951
3	H_{S2} = 7 244	159.4	24.3	2.032
3	H_{S3} = 10 070	158.5	27.9	1.602
3	H_{S4} = 9 893	158.5	27.7	1.623
3	H_{S5} = 10 228	158.4	28.0	1.583
3	H_{S6} = 10 139	158.4	28.0	1.593
5	Ref. atm.	106.0	18.3	1.055
5	H_{S1} = 7 682	106.2	16.3	1.275
5	H_{S2} = 7 244	106.3	15.8	1.325
5	H_{S3} = 10 070	106.0	18.3	1.053
5	H_{S4} = 9 893	106.0	18.2	1.067
5	H_{S5} = 10 228	106.0	18.5	1.041
5	H_{S6} = 10 139	106.0	18.4	1.048

TABLE D-43.- REFRACTION CORRECTIONS FOR HAWAII
FEBRUARY OPTICAL ATMOSPHERE, H = 10^6 METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3699.8	75.6	7.288
.5	H_{S1} = 7 647	3706.6	70.3	8.352
.5	H_{S2} = 7 236	3708.1	68.5	8.594
.5	H_{S3} = 9 888	3699.9	79.4	7.311
.5	H_{S4} = 9 771	3700.2	78.9	7.357
.5	H_{S5} = 10 061	3699.5	80.0	7.246
.5	H_{S6} = 9 992	3699.7	79.8	7.272
1	Ref. atm.	3638.6	62.9	6.321
1	H_{S1} = 7 647	3642.7	57.4	6.976
1	H_{S2} = 7 236	3643.7	55.5	7.136
1	H_{S3} = 9 888	3638.3	66.6	6.267
1	H_{S4} = 9 771	3638.5	66.2	6.299
1	H_{S5} = 10 061	3638.0	67.3	6.221
1	H_{S6} = 9 992	3638.1	67.0	6.239
3	Ref. atm.	3412.5	35.7	3.847
3	H_{S1} = 7 647	3413.4	31.6	4.003
3	H_{S2} = 7 236	3413.7	30.2	4.047
3	H_{S3} = 9 888	3412.2	38.9	3.787
3	H_{S4} = 9 771	3412.2	38.6	3.797
3	H_{S5} = 10 061	3412.1	39.5	3.772
3	H_{S6} = 9 992	3412.1	39.3	3.778
5	Ref. atm.	3209.9	24.1	2.672
5	H_{S1} = 7 647	3209.3	21.2	2.727
5	H_{S2} = 7 236	3209.4	20.2	2.745
5	H_{S3} = 9 888	3208.8	26.7	2.639
5	H_{S4} = 9 771	3208.8	26.5	2.643
5	H_{S5} = 10 061	3208.8	27.2	2.632
5	H_{S6} = 9 992	3208.8	27.0	2.635

TABLE D-44.- REFRACTION CORRECTIONS FOR HAWAII FEBRUARY OPTICAL ATMOSPHERE, $H = 10^4$ METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	325.6	63.5	3.518
.5	H_{S1} = 7 647	331.9	59.7	4.597
.5	H_{S2} = 7 236	333.3	58.9	4.821
.5	H_{S3} = 9 888	326.5	63.6	3.670
.5	H_{S4} = 9 771	326.7	63.4	3.709
.5	H_{S5} = 10 061	326.2	63.9	3.614
.5	H_{S6} = 9 992	326.3	63.8	3.636
1	Ref. atm.	276.6	52.0	2.960
1	H_{S1} = 7 647	280.4	48.0	3.736
1	H_{S2} = 7 236	281.2	47.1	3.903
1	H_{S3} = 9 888	277.0	52.0	3.029
1	H_{S4} = 9 771	277.1	51.8	3.059
1	H_{S5} = 10 061	276.7	52.3	2.985
1	H_{S6} = 9 992	276.8	52.2	3.003
3	Ref. atm.	158.5	27.9	1.632
3	H_{S1} = 7 647	159.2	25.1	1.974
3	H_{S2} = 7 236	159.4	24.5	2.051
3	H_{S3} = 9 888	158.5	27.9	1.638
3	H_{S4} = 9 771	158.6	27.8	1.653
3	H_{S5} = 10 061	158.5	28.1	1.616
3	H_{S6} = 9 992	158.5	28.0	1.625
5	Ref. atm.	106.0	18.4	1.076
5	H_{S1} = 7 647	106.2	16.4	1.290
5	H_{S2} = 7 236	106.3	15.9	1.338
5	H_{S3} = 9 888	106.0	18.4	1.076
5	H_{S4} = 9 771	106.0	18.3	1.086
5	H_{S5} = 10 061	106.0	18.5	1.063
5	H_{S6} = 9 992	106.0	18.4	1.068

TABLE D-45.- REFRACTION CORRECTIONS FOR HAWAII JULY OPTICAL ATMOSPHERE, H = 10^6 METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3698.9	75.3	7.146
.5	H_{S1} = 7 684	3705.9	69.7	8.251
.5	H_{S2} = 7 252	3707.5	67.9	8.502
.5	H_{S3} = 9 920	3699.4	78.7	7.230
.5	H_{S4} = 9 855	3699.6	78.5	7.255
.5	H_{S5} = 10 221	3698.7	79.9	7.119
.5	H_{S6} = 10 147	3698.9	79.6	7.146
1	Ref. atm.	3638.0	62.8	6.217
1	H_{S1} = 7 684	3642.2	57.0	6.897
1	H_{S2} = 7 252	3643.3	55.1	7.063
1	H_{S3} = 9 920	3637.9	66.1	6.200
1	H_{S4} = 9 855	3638.0	65.9	6.218
1	H_{S5} = 10 221	3637.4	67.3	6.122
1	H_{S6} = 10 147	3637.5	67.0	6.141
3	Ref. atm.	3412.3	35.8	3.800
3	H_{S1} = 7 684	3413.2	31.5	3.963
3	H_{S2} = 7 252	3413.5	30.0	4.009
3	H_{S3} = 9 920	3412.0	38.7	3.750
3	H_{S4} = 9 855	3412.0	38.5	3.755
3	H_{S5} = 10 221	3411.8	39.6	3.724
3	H_{S6} = 10 147	3411.8	39.4	3.730
5	Ref. atm.	3208.8	24.2	2.644
5	H_{S1} = 7 684	3209.1	21.2	2.702
5	H_{S2} = 7 252	3209.2	20.1	2.720
5	H_{S3} = 9 920	3208.7	26.6	2.614
5	H_{S4} = 9 855	3208.7	26.4	2.616
5	H_{S5} = 10 221	3208.6	27.3	2.603
5	H_{S6} = 10 147	3208.6	27.1	2.605

TABLE D-46.- REFRACTION CORRECTIONS FOR HAWAII JULY OPTICAL ATMOSPHERE, H = 10^4 METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	325.1	63.1	3.423
.5	H_{S1} = 7 684	331.6	59.2	4.534
.5	H_{S2} = 7 252	332.9	58.3	4.765
.5	H_{S3} = 9 920	326.2	63.1	3.625
.5	H_{S4} = 9 855	326.4	63.0	3.646
.5	H_{S5} = 10 221	325.7	63.5	3.530
.5	H_{S6} = 10 147	325.8	63.4	3.553
1	Ref. atm.	276.3	51.7	2.895
1	H_{S1} = 7 684	280.1	47.6	3.687
1	H_{S2} = 7 252	281.0	46.7	3.860
1	H_{S3} = 9 920	276.8	51.6	2.993
1	H_{S4} = 9 855	276.9	51.5	3.009
1	H_{S5} = 10 221	276.4	52.0	2.919
1	H_{S6} = 10 147	276.5	51.9	2.937
3	Ref. atm.	158.5	27.8	1.603
3	H_{S1} = 7 684	159.2	24.9	1.950
3	H_{S2} = 7 252	159.4	24.3	2.030
3	H_{S3} = 9 920	158.5	27.7	1.619
3	H_{S4} = 9 855	158.5	27.7	1.627
3	H_{S5} = 10 221	158.4	28.0	1.583
3	H_{S6} = 10 147	158.4	28.0	1.592
5	Ref. atm.	106.0	18.3	1.057
5	H_{S1} = 7 684	106.2	16.3	1.274
5	H_{S2} = 7 252	106.3	15.8	1.324
5	H_{S3} = 9 920	106.0	18.2	1.064
5	H_{S4} = 9 855	106.0	18.2	1.069
5	H_{S5} = 10 221	106.0	18.4	1.041
5	H_{S6} = 10 147	106.0	18.4	1.047

TABLE D-47.- REFRACTION CORRECTIONS FOR HAWAII ANNUAL OPTICAL ATMOSPHERE, H + 10^6 METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3699.2	75.4	7.198
.5	H_{S1} = 7 673	3706.1	69.9	8.280
.5	H_{S2} = 7 247	3707.1	68.0	8.529
.5	H_{S3} = 9 918	3699.6	78.9	7.251
.5	H_{S4} = 9 859	3699.7	78.7	7.273
.5	H_{S5} = 10 145	3699.0	79.8	7.166
.5	H_{S6} = 10 103	3699.1	79.6	7.182
1	Ref. atm.	3638.2	62.9	6.251
1	H_{S1} = 7 673	3642.4	57.1	6.920
1	H_{S2} = 7 247	3643.4	55.2	7.084
1	H_{S3} = 9 918	3638.0	66.3	6.218
1	H_{S4} = 9 859	3638.1	66.1	6.233
1	H_{S5} = 10 145	3637.6	67.2	6.158
1	H_{S6} = 10 103	3637.7	67.0	6.169
3	Ref. atm.	3412.3	35.8	3.813
3	H_{S1} = 7 673	3413.3	31.5	3.974
3	H_{S2} = 7 247	3413.5	30.1	4.020
3	H_{S3} = 9 918	3412.0	38.8	3.760
3	H_{S4} = 9 859	3412.0	38.6	3.765
3	H_{S5} = 10 145	3411.9	39.5	3.740
3	H_{S6} = 10 103	3411.9	39.3	3.744
5	Ref. atm.	3208.9	24.2	2.652
5	H_{S1} = 7 673	3209.2	21.2	2.709
5	H_{S2} = 7 247	3209.3	20.1	2.727
5	H_{S3} = 9 918	3208.7	26.6	2.621
5	H_{S4} = 9 859	3208.7	26.5	2.623
5	H_{S5} = 10 145	3208.7	27.2	2.612
5	H_{S6} = 10 103	3208.7	27.1	2.614

TABLE D-48.- REFRACTION CORRECTIONS FOR HAWAII ANNUAL OPTICAL ATMOSPHERE, H = 10^4 METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	325.3	63.2	3.464
.5	H_{S1} = 7 673	331.7	59.4	4.552
.5	H_{S2} = 7 247	333.0	58.5	4.781
.5	H_{S3} = 9 918	326.3	63.2	3.635
.5	H_{S4} = 9 859	326.4	63.1	3.655
.5	H_{S5} = 10 145	325.9	63.6	3.563
.5	H_{S6} = 10 103	326.0	63.5	3.576
1	Ref. atm.	276.4	51.8	2.922
1	H_{S1} = 7 673	280.2	47.8	3.701
1	H_{S2} = 7 247	281.0	46.8	3.872
1	H_{S3} = 9 918	276.8	51.7	3.001
1	H_{S4} = 9 859	276.9	51.6	3.016
1	H_{S5} = 10 145	276.6	52.0	2.945
1	H_{S6} = 10 103	276.6	52.0	2.955
3	Ref. atm.	158.5	27.8	1.613
3	H_{S1} = 7 673	159.2	25.0	1.957
3	H_{S2} = 7 247	159.4	24.3	2.036
3	H_{S3} = 9 918	158.5	27.8	1.624
3	H_{S4} = 9 859	158.5	27.7	1.631
3	H_{S5} = 10 145	158.4	28.0	1.596
3	H_{S6} = 10 103	158.5	28.0	1.601
5	Ref. atm.	106.0	18.3	1.064
5	H_{S1} = 7 673	106.2	16.3	1.278
5	H_{S2} = 7 247	106.3	15.8	1.328
5	H_{S3} = 9 918	106.0	18.3	1.067
5	H_{S4} = 9 859	106.0	18.2	1.072
5	H_{S5} = 10 145	106.0	18.4	1.049
5	H_{S6} = 10 103	106.0	18.4	1.053

TABLE D-49.- REFRACTION CORRECTIONS FOR POINT ARGUELLO
JULY OPTICAL ATMOSPHERE, H = 10^6 METERS

($\lambda \doteq$ 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3705.1	76.6	8.124
.5	H_{S1} = 7 529	3708.6	72.0	8.672
.5	H_{S2} = 7 176	3710.0	70.4	8.891
.5	H_{S3} = 9 175	3703.2	78.9	7.825
.5	H_{S4} = 9 353	3702.7	79.7	7.747
.5	H_{S5} = 8 644	3704.8	76.7	8.071
.5	H_{S6} = 9 511	3702.3	80.3	7.680
1	Ref. atm.	3641.8	63.3	6.828
1	H_{S1} = 7 529	3644.3	58.6	7.227
1	H_{S2} = 7 176	3645.2	57.0	7.371
1	H_{S3} = 9 175	3640.7	65.7	6.656
1	H_{S4} = 9 353	3640.4	66.4	6.602
1	H_{S5} = 8 644	3641.8	63.5	6.824
1	H_{S6} = 9 511	3640.1	67.1	6.555
3	Ref. atm.	3413.4	35.7	4.005
3	H_{S1} = 7 529	3414.2	32.1	4.129
3	H_{S2} = 7 176	3414.4	30.9	4.168
3	H_{S3} = 9 175	3413.2	37.7	3.959
3	H_{S4} = 9 353	3413.1	38.3	3.943
3	H_{S5} = 8 644	3413.5	36.0	4.011
3	H_{S6} = 9 511	3413.0	38.8	3.928
5	Ref. atm.	3209.5	24.1	2.762
5	H_{S1} = 7 529	3209.7	21.5	2.809
5	H_{S2} = 7 176	3209.8	20.6	2.824
5	H_{S3} = 9 175	3209.4	25.7	2.740
5	H_{S4} = 9 353	3209.3	26.2	2.733
5	H_{S5} = 8 644	3209.5	24.4	2.761
5	H_{S6} = 9 511	3209.3	26.6	2.727

TABLE D-50.- REFRACTION CORRECTIONS FOR POINT ARGUELLO
JULY OPTICAL ATMOSPHERE, H = 10^4 METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	330.6	64.2	4.374
.5	H_{S1} = 7 529	333.1	61.3	4.800
.5	H_{S2} = 7 176	334.3	60.5	5.002
.5	H_{S3} = 9 175	328.6	64.4	4.038
.5	H_{S4} = 9 353	328.2	64.7	3.970
.5	H_{S5} = 8 644	329.9	63.5	4.256
.5	H_{S6} = 9 511	327.9	64.9	3.911
1	Ref. atm.	279.3	52.0	3.525
1	H_{S1} = 7 529	281.1	49.2	3.894
1	H_{S2} = 7 176	281.9	48.4	4.045
1	H_{S3} = 9 175	278.3	52.4	3.317
1	H_{S4} = 9 353	278.1	52.7	3.265
1	H_{S5} = 8 644	279.1	51.4	3.484
1	H_{S6} = 9 511	277.9	52.9	3.220
3	Ref. atm.	158.9	27.7	1.821
3	H_{S1} = 7 529	159.4	25.6	2.052
3	H_{S2} = 7 176	159.6	25.0	2.121
3	H_{S3} = 9 175	158.8	27.9	1.781
3	H_{S4} = 9 353	158.8	28.1	1.756
3	H_{S5} = 8 644	159.0	27.2	1.860
3	H_{S6} = 9 511	158.7	28.3	1.734
5	Ref. atm.	106.1	18.2	1.186
5	H_{S1} = 7 529	106.3	16.7	1.339
5	H_{S2} = 7 176	106.3	16.3	1.382
5	H_{S3} = 9 175	106.1	18.3	1.168
5	H_{S4} = 9 353	106.1	18.5	1.152
5	H_{S5} = 8 644	106.2	17.8	1.218
5	H_{S6} = 9 511	106.1	18.6	1.138

TABLE D-51.- REFRACTION CORRECTIONS FOR POINT ARGUELLO
DECEMBER OPTICAL ATMOSPHERE, H = 10^6

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3706.3	77.9	8.305
.5	H_{S1} = 7 450	3710.0	73.1	8.885
.5	H_{S2} = 7 147	3711.2	71.7	9.080
.5	H_{S3} = 9 221	3704.0	80.7	7.950
.5	H_{S4} = 9 339	3703.7	81.2	7.898
.5	H_{S5} = 8 826	3705.2	79.0	8.134
.5	H_{S6} = 9 198	3704.1	80.6	7.961
1	Ref. atm.	3642.5	64.2	6.935
1	H_{S1} = 7 450	3645.3	59.3	7.393
1	H_{S2} = 7 147	3646.1	57.9	7.521
1	H_{S3} = 9 221	3641.4	67.1	6.763
1	H_{S4} = 9 339	3641.2	67.6	6.727
1	H_{S5} = 8 826	3642.2	65.5	6.889
1	H_{S6} = 9 198	3641.4	67.1	6.771
3	Ref. atm.	3413.9	36.0	4.080
3	H_{S1} = 7 450	3414.7	32.4	4.211
3	H_{S2} = 7 147	3414.9	31.4	4.246
3	H_{S3} = 9 221	3413.6	38.6	4.025
3	H_{S4} = 9 339	3413.5	38.9	4.014
3	H_{S5} = 8 826	3413.8	37.2	4.064
3	H_{S6} = 9 198	3413.6	38.5	4.028
5	Ref. atm.	3209.8	24.2	2.814
5	H_{S1} = 7 450	3210.0	21.7	2.862
5	H_{S2} = 7 147	3210.1	20.9	2.875
5	H_{S3} = 9 221	3209.6	26.3	2.786
5	H_{S4} = 9 339	3209.6	26.6	2.782
5	H_{S5} = 8 826	3209.7	25.3	2.803
5	H_{S6} = 9 198	3209.6	26.2	2.787

TABLE D-52.- REFRACTION CORRECTIONS FOR POINT ARGUELLO DECEMBER OPTICAL ATMOSPHERE, H = 10^4 METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	330.6	65.7	4.366
.5	H_{S1} = 7 450	333.9	62.3	4.936
.5	H_{S2} = 7 147	335.0	61.6	5.116
.5	H_{S3} = 9 221	329.0	65.7	4.096
.5	H_{S4} = 9 339	328.7	65.9	4.050
.5	H_{S5} = 8 826	329.9	65.0	4.257
.5	H_{S6} = 9 198	329.0	65.7	4.105
1	Ref. atm.	279.1	53.3	3.482
1	H_{S1} = 7 450	281.7	49.9	4.000
1	H_{S2} = 7 147	282.3	49.2	4.133
1	H_{S3} = 9 221	278.6	53.4	3.364
1	H_{S4} = 9 339	278.4	53.6	3.329
1	H_{S5} = 8 826	279.2	52.7	3.488
1	H_{S6} = 9 198	278.6	53.4	3.371
3	Ref. atm.	158.9	28.4	1.825
3	H_{S1} = 7 450	159.5	26.0	2.104
3	H_{S2} = 7 147	159.6	25.4	2.165
3	H_{S3} = 9 221	158.9	28.5	1.806
3	H_{S4} = 9 339	158.8	28.6	1.789
3	H_{S5} = 8 826	159.0	28.0	1.865
3	H_{S6} = 9 198	158.9	28.4	1.809
5	Ref. atm.	106.1	18.6	1.192
5	H_{S1} = 7 450	106.3	16.9	1.372
5	H_{S2} = 7 147	106.4	16.6	1.411
5	H_{S3} = 9 221	106.1	18.7	1.184
5	H_{S4} = 9 339	106.1	18.8	1.173
5	H_{S5} = 8 826	106.2	18.3	1.222
5	H_{S6} = 9 198	106.1	18.6	1.186

TABLE D-53.- REFRACTION CORRECTIONS FOR POINT ARGUELLO ANNUAL OPTICAL ATMOSPHERE, H = 10^6 METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	ΔE_{18}, mrad
0.5	Ref. atm.	3704.3	77.1	8.000
.5	H_{S1} = 7 494	3709.2	72.5	8.766
.5	H_{S2} = 7 163	3710.5	71.0	8.975
.5	H_{S3} = 9 224	3703.5	79.8	7.868
.5	H_{S4} = 9 360	3703.1	80.4	7.808
.5	H_{S5} = 9 053	3704.0	79.1	7.945
.5	H_{S6} = 9 372	3703.1	80.4	7.803
1	Ref. atm.	3641.6	63.7	6.797
1	H_{S1} = 7 494	3644.8	58.9	7.300
1	H_{S2} = 7 163	3645.6	57.4	7.437
1	H_{S3} = 9 224	3641.0	66.5	6.695
1	H_{S4} = 9 360	3640.7	67.0	6.654
1	H_{S5} = 9 053	3641.3	65.7	6.748
1	H_{S6} = 9 372	3640.7	67.1	6.650
3	Ref. atm.	3413.6	35.8	4.033
3	H_{S1} = 7 494	3414.4	32.3	4.165
3	H_{S2} = 7 163	3414.6	31.1	4.203
3	H_{S3} = 9 224	3413.3	38.2	3.986
3	H_{S4} = 9 360	3413.3	38.6	3.973
3	H_{S5} = 9 053	3413.4	37.6	4.003
3	H_{S6} = 9 372	3413.3	38.7	3.972
5	Ref. atm.	3209.6	24.2	2.784
5	H_{S1} = 7 494	3209.9	21.6	2.832
5	H_{S2} = 7 163	3209.9	20.8	2.847
5	H_{S3} = 9 224	3209.5	26.1	2.759
5	H_{S4} = 9 360	3209.4	26.4	2.754
5	H_{S5} = 9 053	3209.5	25.6	2.766
5	H_{S6} = 9 372	3209.4	26.4	2.754

TABLE D-54.- REFRACTION CORRECTIONS FOR POINT ARGUELLO ANNUAL OPTICAL ATMOSPHERE, $H = 10^4$ METERS

(λ = 0.555 micron)

E_M, deg	H_S, m	ρ, km	$\Delta\rho_7$, m	$\Delta\bar{E}_{18}$, mrad
0.5	Ref. atm.	329.2	65.0	4.133
.5	H_{S1} = 7 494	333.5	61.8	4.860
.5	H_{S2} = 7 163	334.6	61.0	5.053
.5	H_{S3} = 9 224	328.7	65.0	4.053
.5	H_{S4} = 9 360	328.4	65.2	4.000
.5	H_{S5} = 9 053	329.1	64.7	4.120
.5	H_{S6} = 9 372	328.4	65.3	3.996
1	Ref. atm.	278.7	52.8	3.389
1	H_{S1} = 7 494	281.4	49.5	3.941
1	H_{S2} = 7 163	282.1	48.8	4.084
1	H_{S3} = 9 224	278.4	52.9	3.329
1	H_{S4} = 9 360	278.2	53.1	3.289
1	H_{S5} = 9 053	278.6	52.6	3.381
1	H_{S6} = 9 372	278.2	53.1	3.286
3	Ref. atm.	158.9	28.1	1.798
3	H_{S1} = 7 494	159.5	25.8	2.075
3	H_{S2} = 7 163	159.6	25.2	2.141
3	H_{S3} = 9 224	158.8	28.2	1.788
3	H_{S4} = 9 360	158.8	28.3	1.768
3	H_{S5} = 9 053	158.9	28.0	1.813
3	H_{S6} = 9 372	158.8	28.4	1.767
5	Ref. atm.	106.1	18.5	1.176
5	H_{S1} = 7 494	106.3	16.8	1.354
5	H_{S2} = 7 163	106.3	16.4	1.395
5	H_{S3} = 9 224	106.1	18.5	1.173
5	H_{S4} = 9 360	106.1	18.6	1.160
5	H_{S5} = 9 053	106.1	18.3	1.188
5	H_{S6} = 9 372	106.1	18.6	1.159

APPENDIX E

REFRACTION CORRECTION EQUATIONS

These equations were obtained from reference 4. The equations have been simplified for use in this report. They provide highly precise answers for measured elevation angles greater than 0.5 degree. For elevation angles less than 0.5 degree (negative angles also), see reference 4. The following quantities are defined.

R_o = 6 378 165 meters

h = altitude above tracking site

H = altitude of target above the tracking site

N_o = modulus of refraction at the tracking site

N = modulus of refraction at the altitude h

N_H = modulus of refraction at $h = H$

$n = 1 + N$, the index of refraction at the altitude h

x = variable of integration, $0 \leq x \leq 1$

H_S = atmospheric scale height

E = geometric elevation angle

E_M = measured elevation angle

$\Delta E = E_M - E$ is the elevation angle refraction correction

ρ = geometric range to the target

ρ_M = measured range to the target

$\Delta\rho = \rho_M - \rho$ is the range refraction correction

Θ = Earth central angle between the tracking site and target

The equations for computing the refraction corrections are shown below. Note that the basic inputs to these equations are: N_o, E_M, H, and R_o. (N_H must also be determined from either a look-up table or by the assumption of an exponential atmosphere.)

$$N = N_o - (N_o - H_H)x$$

$$n = N + 1$$

Given N, determine h.

$$q = \frac{(N + 1)(R_o + h)}{(N_o + 1)R_o}$$

$$q_H = \frac{(N_H + 1)(R_o + h)}{(N_o + 1)R_o}$$

$$\Theta = \arc\cos\left(\frac{1}{q_H}\cos E_M\right) - E_M$$

$$+ (N_o - N_H)\cos E_M \int_0^1 \frac{dx}{n\sqrt{q^2 - \cos^2 E_M}}$$

$$\rho_M = \frac{\left((N_H + 1)H - (N_o - N_H)R_o\right)(q_H + 1)}{\sqrt{q_H{}^2 - \cos^2 E_M} + \sin E_M}$$

$$+ (N_o - N_H)\int_0^1 \frac{q(R_o + h)dx}{\sqrt{q^2 - \cos^2 E_M}}$$

$$T_1 = (R_o + H)\cos\Theta - R_o$$

$$T_2 = (R_o + H)\sin\Theta$$

$$\rho = \sqrt{T_1{}^2 + T_2{}^2}$$

$$E = \arctan(T_1/T_2)$$

$\Delta\rho_7 = \rho_M - \rho$ (7th algorithm, ref. 4)

$\Delta E_{18} = E_M - E$ (18th algorithm, ref. 4)

The integrals above may be accurately evaluated (for $E_M \geq 0.5$ degree) by using five point Gaussian quadrature. The quadrature points, x_i, and associated weights, w_i, are shown below.

i	x_i	w_i
1	0.04691 00770 30668	0.11846 34425 28095
2	.23076 53449 47158	.23931 43352 49683
3	.5	.28444 44444 44444
4	.76923 46550 52842	.23931 43352 49683
5	.95308 99229 69332	.11846 34425 28095

In the above equations, the step "Given N, determine h" may be performed by either using a look-up table of an actual atmosphere or by assuming an exponential atmosphere

$$h = H_S \ln(N_o/N)$$

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