

**TABLE 2.1**

**ELEMENTS OF THE ANNULAR SOLAR ECLIPSE OF 2010 JANUARY 15**

<u>Equatorial Conjunction:</u> (Sun & Moon in R.A.)	07:21:27.24 TDT (=07:20:21.20 UT)	J.D. = 2455211.806565
<u>Ecliptic Conjunction:</u> (Sun & Moon in Ec. Lo.)	07:12:28.46 TDT (=07:11:22.41 UT)	J.D. = 2455211.800329
<u>Instant of Greatest Eclipse:</u>	07:07:39.03 TDT (=07:06:32.99 UT)	J.D. = 2455211.796980

Geocentric Coordinates of Sun & Moon at Greatest Eclipse (JPL DE200/LE200):

<u>Sun:</u>	R.A. = 19h47m51.053s Dec. = -21°07'38.69"	<u>Moon:</u>	R.A. = 19h47m25.329s Dec. = -20°46'54.79"
Semi-Diameter =	16'15.54"	Semi-Diameter =	14'44.35"
Eq.Hor.Par. =	08.94"	Eq.Hor.Par. =	0°54'05.35"
Δ R.A. =	10.744s/h	Δ R.A. =	122.609s/h
Δ Dec. =	27.56"/h	Δ Dec. =	480.39"/h

<u>Lunar Radius</u>	k1 = 0.2725076 (Penumbra)	<u>Shift in</u>	Δb = 0.00"
<u>Constants:</u>	k2 = 0.2722810 (Umbra)	<u>Lunar Position:</u>	Δl = 0.00"

<u>Geocentric Libration:</u> (Optical + Physical)	l = 1.5° b = -0.5° c = -8.8°	Brown Lun. No. = 1077 Saros Series = 141 (23/70) nDot = -26.00 "/cy**2
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<u>Eclipse Magnitude</u> = 0.91903	<u>Gamma</u> = 0.40016	<u>ΔT</u> = 66.0 s
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Polynomial Besselian Elements for: 2010 Jan 15 07:00:00 TDT (=t<sub>0</sub>)

n	x	y	d	l <sub>1</sub>	l <sub>2</sub>	μ
0	-0.1732440	0.3664046	-21.1292992	0.5746956	0.0283960	282.671112
1	0.4845213	0.1404923	0.0073072	0.0000372	0.0000370	14.997591
2	-0.0000371	0.0001170	0.0000056	-0.0000099	-0.0000099	0.000002
3	-0.0000054	-0.0000017	0.0000000	0.0000000	0.0000000	0.000000

$$\text{Tan } f_1 = 0.0047545 \quad \text{Tan } f_2 = 0.0047308$$

At time t<sub>1</sub> (decimal hours), each Besselian element is evaluated by:

$$a = a_0 + a_1*t + a_2*t^2 + a_3*t^3 \quad (\text{or } a = \sum [a_n*t^n]; n = 0 \text{ to } 3)$$

where: a = x, y, d, l<sub>1</sub>, l<sub>2</sub>, or μ  
t = t<sub>1</sub> - t<sub>0</sub> (decimal hours) and t<sub>0</sub> = 7.00 TDT

The Besselian elements were derived from a least-squares fit to elements calculated at five uniformly spaced times over a 6-hour period centered at t<sub>0</sub>. Thus, they are valid over the period 4.00 ≤ t<sub>1</sub> ≤ 10.00 TDT.

All times are expressed in Terrestrial Dynamical Time (TDT).

Saros Series 141: Member 23 of 70 eclipses in series.