A transit of Mercury over the disk of the Sun will occur on May 9.

A correction of $+1''.00$ has been applied to the tabular true orbital longitude of Mercury, $+1''.30$ to the longitude of the node, and $-0.000\ 0008$ to the logarithm of the radius vector.

ELEMENTS OF THE TRANSIT

E.T. of conjunction in apparent geocentric longitude, May $9^d\ 08^h\ 22^m\ 07^s.9$

	° ′ ″		′ ″
Apparent longitude of Sun	48 17 56.25	Hourly motion	+2 25.07
Apparent longitude of Mercury	48 17 56.25	Hourly motion	−1 31.62
Latitude of Sun	+0 00.32	Hourly motion	0 00.00
Latitude of Mercury	−1 55.29	Hourly motion	−0 43.60
Equatorial hor. par. of Sun	8.71	True semidiameter of Sun	15 50.47
Equatorial hor. par. of Mercury	15.78	True semidiameter of Mercury	5.99

GEOCENTRIC PHASES

	E.T.	Position Angle P	Mercury being in the Zenith in Ephemeris Longitude	Latitude
	d h m s	°	° ′	° ′
Ingress, exterior contact	May 9 04 20 04.3	70.3	−114 21	+17 20
Ingress, interior contact	9 04 23 04.8	70.3	−113 36	+17 20
Least angular distance	9 08 16 54.6		− 54 53	+17 15
Egress, interior contact	9 12 10 35.2	236.6	+ 3 47	+17 11
Egress, exterior contact	9 12 13 35.8	236.7	+ 4 32	+17 11

Least angular distance $1'53''.7$

The Universal Times of the four contacts for any point on the surface of the Earth may be computed from the four following formulae, in which ρ denotes the radius of the Earth at that point, ϕ' the geocentric latitude, and λ the longitude west from Greenwich; T^{I} and T^{II} are respectively the times of exterior and interior contacts at ingress, T^{III} and T^{IV} at egress.

$$T^{I} = 4^h\ 20^m\ 04^s.3 - 34^s.11\ \rho \sin\phi' - 100^s.55\ \rho\cos\phi' \cos(210^\circ\ 25'.6 + \lambda + 1.0027\Delta T) - \Delta T$$

$$T^{II} = 4\ 23\ 04.8 - 33.98\ \rho \sin\phi' - 100.62\ \rho\cos\phi' \cos(209\ 38.7 + \lambda + 1.0027\Delta T) - \Delta T$$

$$T^{III} = 12\ 10\ 35.2 - 56.28\ \rho \sin\phi' + 90.79\ \rho\cos\phi' \cos(277\ 16.5 + \lambda + 1.0027\Delta T) - \Delta T$$

$$T^{IV} = 12\ 13\ 35.8 - 56.14\ \rho \sin\phi' + 90.86\ \rho\cos\phi' \cos(276\ 29.3 + \lambda + 1.0027\Delta T) - \Delta T$$

The position angle P of the point of contact, reckoned from the north point of the limb of the Sun toward the east, may be taken as equal to its geocentric value given above. The position angle V of the point of contact, reckoned from the vertex of the limb of the Sun toward the east, is found by

$$V = P - C,$$

where C, the parallactic angle, is given by

$$\tan C = \frac{\cos\phi \sin h}{\sin\phi \cos\delta - \cos\phi \sin\delta \cos h},$$

in which ϕ is the latitude of the place, δ is the declination of the Sun and h is the local hour angle of the Sun; $\sin C$ has the same algebraic sign as $\sin h$.

E.T. ≡ ephemeris time ≡ GCT

Accurate local circumstances may be calculated as follows.

Let the quantities u, u', v, v' and L be expressed in the form

$$A+B\rho \sin \phi'+\rho \cos \phi' \ (C \sin t+D \cos t),$$

where A, B, C, D and t are tabulated below, with subscripts 1, 2, 3, 4 for the four contacts.

Let T_0 be the Ephemeris Time of geocentric contact. The corresponding Universal Time T of local contact will be given by

$$T=T_0+\tau-\Delta T,$$

where

$$\tau=3600\left[\frac{L \cos \psi}{n}-\frac{uu'+vv'}{n^2}\right],$$

$$n^2=u'^2+v'^2,$$

$$\sin \psi=\frac{1}{nL}(uv'-u'v);$$

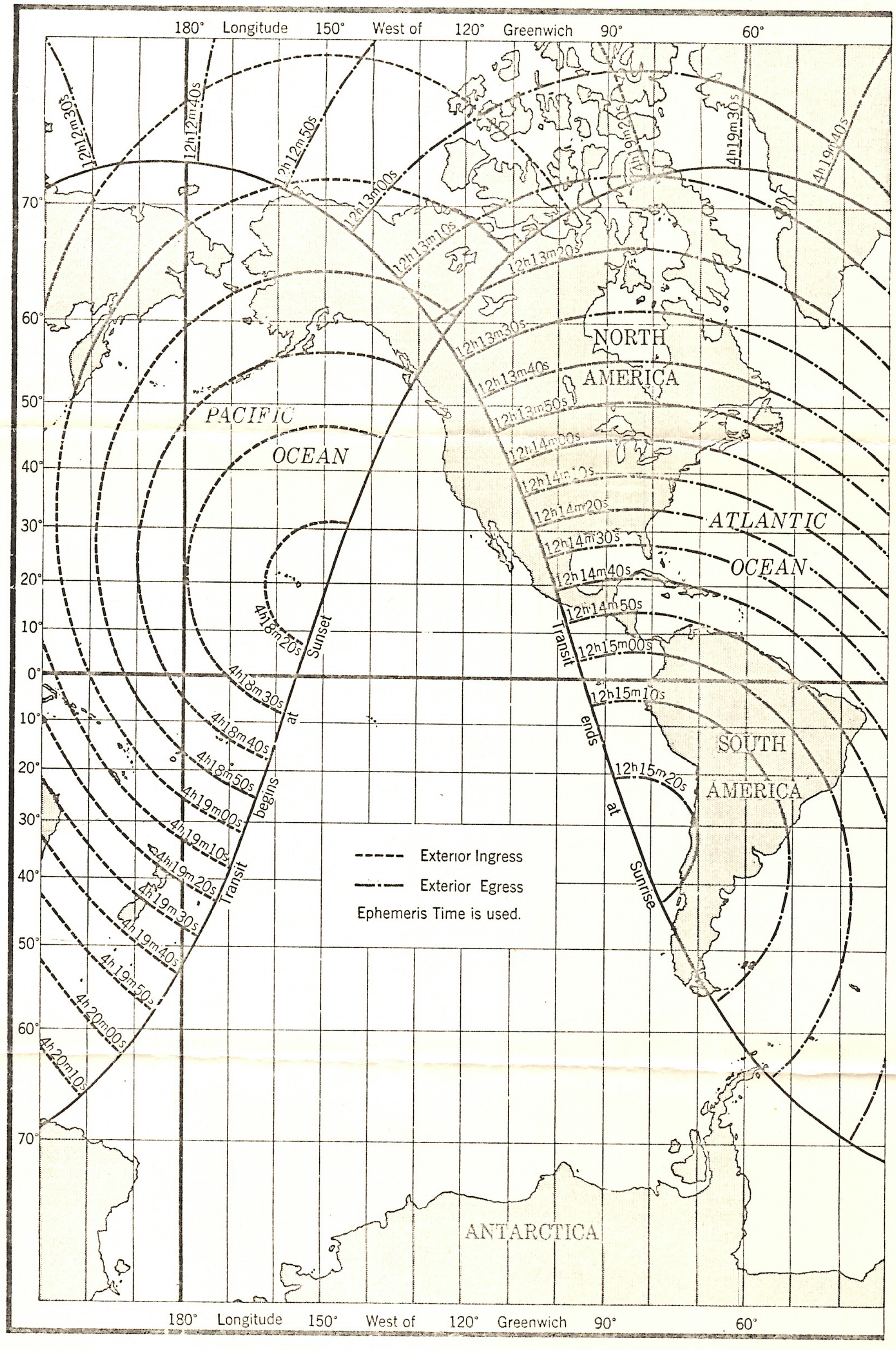
$\cos \psi$ is negative for ingress, positive for egress; τ is in seconds.

	u	u'	v	v'	L
A_1	−0.35993	+0.26066	−5.71272	+1.41823	+5.72406
B_1	+0.03874	0	+0.01121	−0.00001	−0.00006
C_1	−0.01680	0	+0.02585	+0.00824	−0.00013
D_1	0	−0.00441	−0.03145	+0.00677	−0.00013
A_2	−0.34686	+0.26065	−5.64160	+1.41817	+5.65225
B_2	+0.03874	0	+0.01121	−0.00001	−0.00006
C_2	−0.01680	0	+0.02585	+0.00824	−0.00013
D_2	0	−0.00441	−0.03145	+0.00677	−0.00013
A_3	+1.67995	+0.25959	+5.37539	+1.40982	+5.63207
B_3	+0.03874	0	+0.01114	−0.00001	−0.00006
C_3	−0.01680	0	+0.02569	+0.00828	−0.00013
D_3	0	−0.00441	−0.03161	+0.00672	−0.00013
A_4	+1.69297	+0.25958	+5.44642	+1.40977	+5.70347
B_4	+0.03874	0	+0.01114	−0.00001	−0.00006
C_4	−0.01680	0	+0.02569	+0.00828	−0.00013
D_4	0	−0.00441	−0.03161	+0.00672	−0.00013

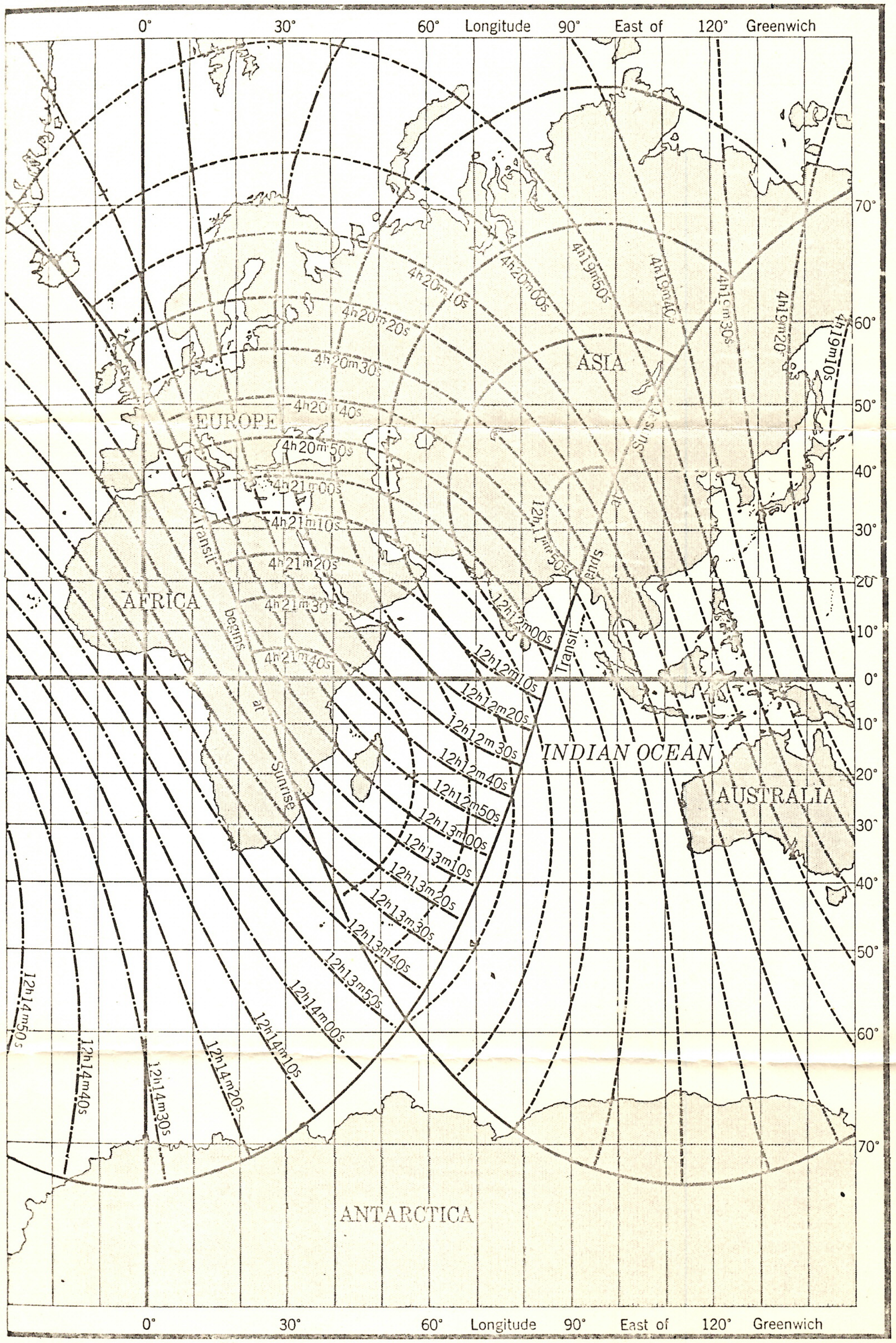
$$t_1=291^\circ\ 35'.4-\lambda-1.0027\ \Delta T$$
$$t_2=292\ \ 20.6-\lambda-1.0027\ \Delta T$$
$$t_3=\ \ 49\ \ 32.4-\lambda-1.0027\ \Delta T$$
$$t_4=\ \ 50\ \ 17.7-\lambda-1.0027\ \Delta T$$

In general, the times of local contacts computed with this table will differ very little from those obtained with the formulae on the preceding page. However, for transits in which the least angular distance of Mercury and the Sun is almost equal to the semidiameter of the Sun, the difference may amount to several seconds.

TRANSIT OF MERCURY



OF 1970 MAY 9


0° 30° 60° Longitude 90° East of 120° Greenwich
70°
60°
50°
40°
30°
20°
10°
0°
10°
20°
30°
40°
50°
60°
70°
EUROPE
ASIA
AFRICA
INDIAN OCEAN
AUSTRALIA
ANTARCTICA
Transit begins at Sunrise
Transit ends at Sunset
4h19m10s
4h19m20s
4h19m30s
4h19m40s
4h19m50s
4h20m00s
4h20m10s
4h20m20s
4h20m30s
4h20m40s
4h20m50s
4h21m00s
4h21m10s
4h21m20s
4h21m30s
4h21m40s
12h11m50s
12h12m00s
12h12m10s
12h12m20s
12h12m30s
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12h13m40s
12h13m50s
12h14m00s
12h14m10s
12h14m20s
12h14m30s
12h14m40s
12h14m50s
0° 30° 60° Longitude 90° East of 120° Greenwich