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THE ORBITS OF THE SATELLITES 1959 $\alpha 1$ AND 1959 $\alpha 2$ AND THE PERTURBATIONS ON THE PERIGEE DISTANCE OF 1959 $\alpha 1$

by

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THE ORBITS OF THE SATELLITES 1959 $\alpha 1$ AND 1959 $\alpha 2$ AND THE PERTURBATIONS ON THE PERIGEE DISTANCE OF 1959 $\alpha 1$

By

Rajendra C. Nigam[1]

The orbits of the Satellites 1959 $\alpha 1$ and 1959 $\alpha 2$ starting from launch on February 17, 1959, through March 31, 1960, have already been published (Nigam, 1960). Herein is given the orbital information for the two Satellites for the period April 2, 1960, through August 1, 1961. Other parameters related to the perturbing effects of the atmospheric drag such as the angle between the sun and the perigee (φ), the latitude of perigee (Φ), etc., are also given. The various perturbations on the perigee distance of Satellite 1959 $\alpha 1$ have been taken into account for a period of two years and five months beginning from launch on February 18, 1959, through August 1, 1961; they show that the radiation pressure produces a variation in the perigee distance of this satellite with a period of 450 days and an amplitude of 1.5 km.

SAO Mean Elements

The SAO mean elements have already been explained (Nigam, 1960, p. 2). I should add that these elements are derived from field-reduced Baker-Nunn observations which have an accuracy of 3' of arc in position and 0.1 second in time. The elements were computed every two days from observations ±4 days from the epoch.

The arrangement of the tables is as follows. The first column gives the Modified Julian Day (MJD) of the epoch of the elements, which is actual Julian Day minus 2,400,000.5. The following six columns give the argument of the perigee (ω), the right ascension of the ascending node (Ω), the inclination (i), the eccentricity (e), the mean anomaly (M), and the anomalistic mean motion (n) of the Satellite. The single digit placed at the right of each value represents the standard error and corresponds to the last digit of the orbital element. The next column, which is the coefficient of the quadratic term in the equation for mean anomaly, is actually half the value of the rate of change of the anomalistic mean motion and is a measure of the drag perturbation on the mean motion of the satellite. The last four columns contain the geocentric distance of the perigee (q) in megameters, the number of observations (N) used, the number of days (D) along which these observations were distributed, and the standard deviation (σ) or mean quadratic error of a single observation whose weight is unity.

Satellite 1959 $\alpha 1$

A total of 3191 observations were used to derive the SAO mean elements in table 1, and are valid from April 2, 1960, through August 1, 1961.

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Satellite 1959 $\alpha 2$

A total of 3270 observations were used to derive the SAO mean elements in table 3, and are valid from April 2, 1960, through July 24, 1961. This Satellite was removed from the observing list of the Smithsonian Astrophysical Observatory on July 29, 1961, and hence no further elements will appear for this Satellite in the Special Reports.

SAO Smoothed Elements

The smoothed elements have already been explained (Nigam, 1960, p. 3). These elements were computed for every month and the major perturbations taken care of, including the long-periodic perturbations due to the third harmonic term in the potential of the earth. The orbits given below were obtained after many differential corrections to satisfy the observed positions of the Satellite during the interval under consideration. The elements that are provided with values of standard errors have been varied, while the other elements have been kept constant.

Satellite 1959 $\alpha 1$ (Vanguard II)

SAO smoothed elements

The following elements are based on 333 field-reduced Baker-Nunn and other types of observations and are valid for the period from April 1 through April 30, 1960.

$$T_0 = 37040.0 \text{ MJD}$$

$$\omega = (207^\circ.202 \pm 7) + (5^\circ.2825 \pm 7)t + {}^\circ.18 \times 10^{-4} t^2 + {}^\circ.14 \cos \omega$$

$$\Omega = (137^\circ.928 \pm 3) - (3^\circ.5108 \pm 4)t - {}^\circ.14 \times 10^{-4} t^2 + {}^\circ.012 \cos \omega$$

$$i = (32^\circ.8774 \pm 8) - {}^\circ.6 \times 10^{-2} \sin \omega$$

$$e = (.164832 \pm 17) - .12 \times 10^{-5} t + .424 \times 10^{-3} \sin \omega$$

$$M = (.101856 \pm 23) + (11.463942 \pm 2)t + (.1692 \pm 5) \times 10^{-4} t^2 + (.26 \pm 5) \times 10^{-7} t^3 - .29 \times 10^{-3} \cos \omega$$

Standard error of one observation : $\sigma = \pm 2''.19$.

The following elements are based on 248 field-reduced Baker-Nunn and other types of observations and are valid for the period from May 1 through May 30, 1960.

$$T_0 = 37070.0 \text{ MJD}$$

$$\omega = (5^\circ.428 \pm 21) + (5^\circ.2925 \pm 20)t + {}^\circ.18 \times 10^{-4} t^2 + {}^\circ.14 \cos \omega$$

$$\Omega = (32^\circ.598 \pm 7) - (3^\circ.5099 \pm 7)t - {}^\circ.14 \times 10^{-4} t^2 + {}^\circ.012 \cos \omega$$

$$i = (32^\circ.8925 \pm 27) - {}^\circ.6 \times 10^{-2} \sin \omega$$

$$e = (.165089 \pm 33) - .12 \times 10^{-5} t + .424 \times 10^{-3} \sin \omega$$

$$M = (.036731 \pm 63) + (11.464979 \pm 6)t + (.1912 \pm 11) \times 10^{-4} t^2 - (.33 \pm 12) \times 10^{-7} t^3 - .29 \times 10^{-3} \cos \omega$$

Standard error of one observation : $\sigma = \pm 5''.76$.

The following elements are based on 209 field-reduced Baker-Nunn and other types of observations and are valid for the period from June 1 through June 30, 1960.

$T_0 = 37100.0$ MJD

$\omega = (163^\circ.940 \pm 8) + (5^\circ.28357 \pm 86)t + {}^\circ.18 \times 10^{-4}t^2 + {}^\circ.14 \cos \omega$

$\Omega = (287^\circ.268 \pm 3) - (3^\circ.51331 \pm 27)t - {}^\circ.14 \times 10^{-4}t^2 + {}^\circ.012 \cos \omega$

$i = (32^\circ.8625 \pm 11) - {}^\circ.6 \times 10^{-2} \sin \omega$

$e = (.164644 \pm 13) - .12 \times 10^{-5}t + .424 \times 10^{-3} \sin \omega$

$M = (.004555 \pm 24) + (11.466271 \pm 3)t + (.2162 \pm 6) \times 10^{-4}t^2 - (.226 \pm 5) \times 10^{-6}t^3$

$- .29 \times 10^{-3} \cos \omega$

Standard error of one observation : $\sigma = \pm 2^{\prime}.16$.

The following elements are based on 400 field-reduced Baker-Nunn and other types of observations and are valid for the period from July 1 through July 31, 1960.

$T_0 = 37130.0$ MJD

$\omega = (322^\circ.440 \pm 6) + (5^\circ.2828 \pm 5)t + {}^\circ.18 \times 10^{-4}t^2 + {}^\circ.14 \cos \omega$

$\Omega = (181^\circ.857 \pm 2) - (3^\circ.5128 \pm 3)t - {}^\circ.14 \times 10^{-4}t^2 + {}^\circ.012 \cos \omega$

$i = (32^\circ.8776 \pm 8) - {}^\circ.6 \times 10^{-2} \sin \omega$

$e = (.164648 \pm 12) - .12 \times 10^{-5}t + .424 \times 10^{-3} \sin \omega$

$M = (.008759 \pm 19) + (11.467349 \pm 2)t + (.1936 \pm 3) \times 10^{-4}t^2 + (.46 \pm 4) \times 10^{-7}t^3$

$- .29 \times 10^{-3} \cos \omega$

Standard error of one observation : $\sigma = \pm 2^{\prime}.04$.

The following elements are based on 135 field-reduced Baker-Nunn and other types of observations and are valid for the period from August 1 through August 31, 1960.

$T_0 = 37160.0$ MJD

$\omega = (120^\circ.759 \pm 17) + (5^\circ.2748 \pm 17)t + {}^\circ.18 \times 10^{-4}t^2 + {}^\circ.14 \cos \omega$

$\Omega = (76^\circ.504 \pm 8) - (3^\circ.5110 \pm 11)t - {}^\circ.14 \times 10^{-4}t^2 + {}^\circ.012 \cos \omega$

$i = (32^\circ.8934 \pm 41) - {}^\circ.6 \times 10^{-2} \sin \omega$

$e = (.164614 \pm 81) - .12 \times 10^{-5}t + .424 \times 10^{-3} \sin \omega$

$M = (.046878 \pm 55) + (11.468560 \pm 4)t + (.278 \pm 1) \times 10^{-4}t^2 + (.29 \pm 1) \times 10^{-6}t^3$

$- .29 \times 10^{-3} \cos \omega$

Standard error of one observation : $\sigma = \pm 6^{\prime}.24$.

The following elements are based on 140 field-reduced Baker-Nunn and other types of observations and are valid for the period from September 1 through September 30, 1960.

$$T_0 = 37190.0 \text{ MJD}$$

$$\omega = (279^\circ.373 \pm 11) + (5^\circ.2911 \pm 13)t + {}^\circ.18 \times 10^{-4}t^2 + {}^\circ.14 \cos \omega$$

$$\Omega = (331^\circ.052 \pm 7) - (3^\circ.5178 \pm 8)t - {}^\circ.14 \times 10^{-4}t^2 + {}^\circ.012 \cos \omega$$

$$i = (32^\circ.8820 \pm 21) - {}^\circ.6 \times 10^{-2} \sin \omega$$

$$e = (.164692 \pm 56) - .12 \times 10^{-5}t + .424 \times 10^{-3} \sin \omega$$

$$M = (.129025 \pm 22) + (11.470179 \pm 4)t + (.305 \pm 1) \times 10^{-4}t^2 + (.224 \pm 9) \times 10^{-6}t^3 - .29 \times 10^{-3} \cos \omega$$

Standard error of one observation : $\sigma = \pm 4''.38$.

The following elements are based on 125 field-reduced Baker-Nunn and other types of observations and are valid for the period from October 1 through October 31, 1960.

$$T_0 = 37220.0 \text{ MJD}$$

$$\omega = (77^\circ.868 \pm 12) + (5^\circ.2827 \pm 11)t + {}^\circ.18 \times 10^{-4}t^2 + {}^\circ.14 \cos \omega$$

$$\Omega = (225^\circ.603 \pm 4) - (3^\circ.5151 \pm 5)t - {}^\circ.14 \times 10^{-4}t^2 + {}^\circ.012 \cos \omega$$

$$i = (32^\circ.8769 \pm 16) - {}^\circ.6 \times 10^{-2} \sin \omega$$

$$e = (.164683 \pm 32) - .12 \times 10^{-5}t + .424 \times 10^{-3} \sin \omega$$

$$M = (.262653 \pm 23) + (11.471886 \pm 2)t + (.2170 \pm 4) \times 10^{-4}t^2 - (.236 \pm 4) \times 10^{-6}t^3 - .29 \times 10^{-3} \cos \omega$$

Standard error of one observation : $\sigma = \pm 3''.90$.

The following elements are based on 137 field-reduced Baker-Nunn and other types of observations and are valid for the period from November 1 through November 30, 1960.

$$T_0 = 37254.0 \text{ MJD}$$

$$\omega = (257^\circ.619 \pm 9) + (5^\circ.2799 \pm 8)t + {}^\circ.18 \times 10^{-4}t^2 + {}^\circ.14 \cos \omega$$

$$\Omega = (106^\circ.044 \pm 3) - (3^\circ.5162 \pm 5)t - {}^\circ.14 \times 10^{-4}t^2 + {}^\circ.012 \cos \omega$$

$$i = (32^\circ.882 \pm 1) - {}^\circ.6 \times 10^{-2} \sin \omega$$

$$e = (.164646 \pm 20) - .12 \times 10^{-5}t + .424 \times 10^{-3} \sin \omega$$

$$M = (.324491 \pm 18) + (11.472962 \pm 2)t + (.1579 \pm 5) \times 10^{-4}t^2 - (.278 \pm 5) \times 10^{-6}t^3 - .29 \times 10^{-3} \cos \omega$$

Standard error of one observation : $\sigma = \pm 2''.58$.

The following elements are based on 87 field-reduced Baker-Nunn and other types of observations and are valid for the period from December 1 through December 31, 1960.

$T_0 = 37284.0$ MJD

$\omega = (56^\circ.168 \pm 12) + (5^\circ.2861 \pm 13)t + {}^\circ.18 \times 10^{-4} t^2 + {}^\circ.14 \cos \omega$

$\Omega = ({}^\circ.553 \pm 4) - (3^\circ.5156 \pm 9)t - {}^\circ.14 \times 10^{-4} t^2 + {}^\circ.012 \cos \omega$

$i = (32^\circ.8836 \pm 25) - {}^\circ.6 \times 10^{-2} \sin \omega$

$e = (.164596 \pm 20) - .12 \times 10^{-5} t + .424 \times 10^{-3} \sin \omega$

$M = (.523159 \pm 30) + (11.473621 \pm 3)t + (.884 \pm 4) \times 10^{-5} t^2 - (.209 \pm 6) \times 10^{-6} t^3$
$- .29 \times 10^{-3} \cos \omega$

Standard error of one observation : $\sigma = \pm 2''.25$.

The following elements are based on 122 field-reduced Baker-Nunn and other types of observations and are valid for the period from January 1 through January 31, 1961.

$T_0 = 37314.0$ MJD

$\omega = (214^\circ.784 \pm 9) + (5^\circ.291 \pm 1)t + {}^\circ.18 \times 10^{-4} t^2 + {}^\circ.14 \cos \omega$

$\Omega = (255.061 \pm 3) - (3^\circ.5171 \pm 3)t - {}^\circ.14 \times 10^{-4} t^2 + {}^\circ.012 \cos \omega$

$i = (32^\circ.8779 \pm 6) - {}^\circ.6 \times 10^{-2} \sin \omega$

$e = (.164510 \pm 7) - .12 \times 10^{-5} t + .424 \times 10^{-3} \sin \omega$

$M = (.736337 \pm 18) + (11.473889 \pm 2)t + (.321 \pm 3) \times 10^{-5} t^2 - (.37 \pm 2) \times 10^{-7} t^3$
$- .29 \times 10^{-3} \cos \omega$

Standard error of one observation : $\sigma = \pm 1''.53$.

The following elements are based on 123 field-reduced Baker-Nunn and other types of observations and are valid for the period from February 1 through February 28, 1961.

$T_0 = 37344.0$ MJD

$\omega = (13^\circ.452 \pm 9) + (5^\circ.2891 \pm 12)t + {}^\circ.18 \times 10^{-4} t^2 + {}^\circ.14 \cos \omega$

$\Omega = (149^\circ.535 \pm 3) - (3^\circ.5167 \pm 3)t - {}^\circ.14 \times 10^{-4} t^2 + {}^\circ.012 \cos \omega$

$i = (32^\circ.8796 \pm 7) - {}^\circ.6 \times 10^{-2} \sin \omega$

$e = (.164490 \pm 7) - {}^\circ.12 \times 10^{-5} t + .424 \times 10^{-3} \sin \omega$

$M = (.955766 \pm 18) + (11.474079 \pm 3)t + (.322 \pm 2) \times 10^{-5} t^2 - (.34 \pm 3) \times 10^{-7} t^3$
$- .29 \times 10^{-3} \cos \omega$

Standard error of one observation : $\sigma = \pm 1''.80$.

The following elements are based on 120 field-reduced Baker-Nunn and other types of observations and are valid for the period from March 1 through March 31, 1961.

$T_0 = 37374.0$ MJD

$\omega = (172^\circ.019 \pm 8) + (5^\circ.2890 \pm 5)t + {}^\circ.18 \times 10^{-4} t^2 + {}^\circ.14 \cos \omega$

$\Omega = (44^\circ.023 \pm 3) - (3^\circ.5168 \pm 3)t - {}^\circ.14 \times 10^{-4} t^2 + {}^\circ.012 \cos \omega$

$i = (32^\circ.88248 \pm 76) - {}^\circ.6 \times 10^{-2} \sin \omega$

$e = (.164534 \pm 14) - .12 \times 10^{-5} t + .424 \times 10^{-3} \sin \omega$

$M = (.180391 \pm 18) + (11.474188 \pm 1)t + (.915 \pm 26) \times 10^{-6} t^2 - .29 \times 10^{-3} \cos \omega$

Standard error of one observation : $\sigma = \pm 1'.59$.

The following elements are based on 73 field-reduced Baker-Nunn and other types of observations and are valid for the period from April 1 through April 30, 1961.

$T_0 = 37405.0$ MJD

$\omega = (335^\circ.96 \pm 1) + (5^\circ.288 \pm 1)t + {}^\circ.11 \times 10^{-4} t^2 + {}^\circ.14 \cos \omega$

$\Omega = (294^\circ.992 \pm 4) - (3^\circ.5181 \pm 7)t - {}^\circ.7 \times 10^{-5} t^2 + {}^\circ.012 \cos \omega$

$i = (32^\circ.876 \pm 2) - {}^\circ.60 \times 10^{-2} \sin \omega$

$e = (.164488 \pm 32) - .11 \times 10^{-5} t + .30 \times 10^{-3} \sin \omega$

$M = (.88133 \pm 2) + (11.474271 \pm 3)t + (.210 \pm 7) \times 10^{-5} t^2$

Standard error of one observation : $\sigma = \pm 1'.89$.

The following elements are based on 210 field-reduced Baker-Nunn and other types of observations and are valid for the period from May 1 through May 31, 1961.

$T_0 = 37435.0$ MJD

$\omega = (134^\circ.535 \pm 4) + (5^\circ.2860 \pm 5)t + {}^\circ.11 \times 10^{-4} t^2 + {}^\circ.14 \cos \omega$

$\Omega = (189^\circ.474 \pm 2) - (3^\circ.5165 \pm 3)t - {}^\circ.7 \times 10^{-5} t^2 + {}^\circ.012 \cos \omega$

$i = (32^\circ.8772 \pm 6) - .60 \times 10^{-2} \sin \omega$

$e = (.16466 \pm 2) - .11 \times 10^{-5} t + .30 \times 10^{-3} \sin \omega$

$M = (.111666 \pm 7) + (11.474387 \pm 1)t + (.60 \pm 3) \times 10^{-6} t^2$

Standard error of one observation : $\sigma = \pm 1'.95$.

The following elements are based on 154 field-reduced Baker-Nunn and other types of observations and are valid for the period from June 1 through June 30, 1961.

$T_0 = 37465.0$ MJD

$\omega = (293^\circ.175 \pm 5) + (5^\circ.2894 \pm 7)t + {}^\circ.11 \times 10^{-4} t^2 + {}^\circ.14 \cos \omega$

$\Omega = (83^\circ.956 \pm 4) - (3^\circ.5176 \pm 4)t - {}^\circ.7 \times 10^{-5} t^2 + .012 \cos \omega$

$i = (32^\circ.879 \pm 1) - {}^\circ.60 \times 10^{-2} \sin \omega$

$e = (.16437 \pm 3) - .11 \times 10^{-5} t + .30 \times 10^{-3} \sin \omega$

$M = (.343422 \pm 9) + (11.474409 \pm 2)t + (.179 \pm 4) \times 10^{-5} t^2$

Standard error of one observation : $\sigma = \pm 2''.16$.

The following elements are based on 157 field-reduced Baker-Nunn and other types of observations and are valid for the period from July 1 through July 31, 1961.

$T_0 = 37495.0$ MJD

$\omega = (91^\circ.809 \pm 6) + (5^\circ.2853 \pm 6)t + {}^\circ.11 \times 10^{-4} t^2 + {}^\circ.14 \cos \omega$

$\Omega = (338^\circ.438 \pm 2) - (3^\circ.5167 \pm 2)t - {}^\circ.7 \times 10^{-5} t^2 + {}^\circ.012 \cos \omega$

$i = (32^\circ.875 \pm 1) - {}^\circ.60 \times 10^{-2} \sin \omega$

$e = (.16443 \pm 1) - .11 \times 10^{-5} t + .30 \times 10^{-3} \sin \omega$

$M = (.57846 \pm 2) + (11.474633 \pm 2)t + (.549 \pm 4) \times 10^{-5} t^2$

Standard error of one observation : $\sigma = \pm 1''.50$.

Satellite 1959 $\alpha 2$ (Vanguard II Rocket)

SAO smoothed elements

The following elements are based on 117 field-reduced Baker-Nunn and other types of observations and are valid for the period from April 1 through April 30, 1960.

$T_0 = 37040.0$ MJD

$\omega = (66^\circ.415 \pm 7) + (4^\circ.9393 \pm 9)t + {}^\circ.17 \times 10^{-4} t^2 + {}^\circ.123 \cos \omega$

$\Omega = (230^\circ.986 \pm 5) - (3^\circ.2907 \pm 5)t - {}^\circ.132 \times 10^{-4} t^2 + {}^\circ.013 \cos \omega$

$i = (32^\circ.9049 \pm 15) - {}^\circ.7 \times 10^{-2} \sin \omega$

$e = (.183449 \pm 40) - .82 \times 10^{-6} t + .415 \times 10^{-3} \sin \omega$

$M = (.535679 \pm 12) + (11.089031 \pm 3)t + (.940 \pm 8) \times 10^{-5} t^2 + (.151 \pm 8) \times 10^{-6} t^3$
$- .68 \times 10^{-3} \cos \omega$

Standard error of one observation : $\sigma = \pm 2'.01$.

The following elements are based on 366 field-reduced Baker-Nunn and other types of observations and are valid for the period from May 1 through May 31, 1960.

$T_0 = 37070.0$ MJD

$\omega = (214^\circ.713 \pm 3) + (4^\circ.9412 \pm 4)t + {}^\circ.17 \times 10^{-4} t^2 + {}^\circ.123 \cos \omega$

$\Omega = (132^\circ.263 \pm 2) - (3^\circ.2891 \pm 3)t - {}^\circ.132 \times 10^{-4} t^2 + {}^\circ.013 \cos \omega$

$i = (32^\circ.9281 \pm 7) - {}^\circ.7 \times 10^{-2} \sin \omega$

$e = (.183283 \pm 20) - .82 \times 10^{-6} t + .415 \times 10^{-3} \sin \omega$

$M = (.216031 \pm 10) + (11.089633 \pm 1)t + (.773 \pm 2) \times 10^{-5} t^2 - (.94 \pm 3) \times 10^{-7} t^3$
$- .68 \times 10^{-3} \cos \omega$

Standard error of one observation : $\sigma = \pm 1'.50$.

The following elements are based on 114 field-reduced Baker-Nunn and other types of observations and are valid for the period from June 1 through June 30, 1960.

$T_0 = 37100.0$ MJD

$\omega = (2^\circ.962 \pm 9) + (4^\circ.9427 \pm 8)t + {}^\circ.17 \times 10^{-4} t^2 + {}^\circ.123 \cos \omega$

$\Omega = (335^\circ.836 \pm 4) - (3^\circ.2894 \pm 4)t - {}^\circ.132 \times 10^{-4} t^2 + {}^\circ.013 \cos \omega$

$i = (32^\circ.9245 \pm 14) - {}^\circ.7 \times 10^{-2} \sin \omega$

$e = (.183229 \pm 41) - .82 \times 10^{-6} t + .415 \times 10^{-3} \sin \omega$

$M = (.910831 \pm 26) + (11.090047 \pm 2)t + (.784 \pm 5) \times 10^{-5} t^2 - (.34 \pm 6) \times 10^{-7} t^3 - .68 \times 10^{-3} \cos \omega$

Standard error of one observation : $\sigma = \pm 2'.34$.

The following elements are based on 239 field-reduced Baker-Nunn and other types of observations and are valid for the period from July 1 through July 31, 1960.

$$T_0 = 37130.0 \text{ MJD}$$

$$\omega = (151^\circ.301 \pm 5) + (4^\circ.9459 \pm 5)t + {}^\circ.17 \times 10^{-4}t^2 + {}^\circ.123 \cos \omega$$

$$\Omega = (294^\circ.836 \pm 2) - (3^\circ.2915 \pm 3)t - {}^\circ.132 \times 10^{-4}t^2 + {}^\circ.013 \cos \omega$$

$$i = (32^\circ.8974 \pm 8) - {}^\circ.7 \times 10^{-2} \sin \omega$$

$$e = (.183045 \pm 9) - .82 \times 10^{-6}t + .415 \times 10^{-3} \sin \omega$$

$$M = (.621443 \pm 18) + (11.090777 \pm 2)t + (.1337 \pm 6) \times 10^{-4}t^2 - (.132 \pm 4) \times 10^{-6}t^3 - .68 \times 10^{-3} \cos \omega$$

Standard error of one observation : $\sigma = \pm 1'.35$.

The following elements are based on 283 field-reduced Baker-Nunn and other types of observations and are valid for the period from August 1 through August 31, 1960.

$$T_0 = 37160.0 \text{ MJD}$$

$$\omega = (299^\circ.730 \pm 9) + (4^\circ.9513 \pm 11)t + {}^\circ.17 \times 10^{-4}t^2 + {}^\circ.123 \cos \omega$$

$$\Omega = (196^\circ.093 \pm 3) - (3^\circ.2922 \pm 4)t - {}^\circ.132 \times 10^{-4}t^2 + {}^\circ.013 \cos \omega$$

$$i = (32^\circ.9072 \pm 10) - {}^\circ.7 \times 10^{-2} \sin \omega$$

$$e = (.182951 \pm 14) - .82 \times 10^{-6}t + .415 \times 10^{-3} \sin \omega$$

$$M = (.353960 \pm 28) + (11.091411 \pm 4)t + (.1897 \pm 4) \times 10^{-4}t^2 + (.426 \pm 6) \times 10^{-6}t^3 - .68 \times 10^{-3} \cos \omega$$

Standard error of one observation : $\sigma = \pm 1'.68$.

The following elements are based on 169 field-reduced Baker-Nunn and other types of observations and are valid for the period from September 1 through September 30, 1960.

$$T_0 = 37190.0 \text{ MJD}$$

$$\omega = (88^\circ.062 \pm 27) + (4^\circ.9441 \pm 25)t + {}^\circ.17 \times 10^{-4}t^2 + {}^\circ.123 \cos \omega$$

$$\Omega = (97^\circ.340 \pm 8) - (3^\circ.2924 \pm 10)t - {}^\circ.132 \times 10^{-4}t^2 + {}^\circ.013 \cos \omega$$

$$i = (32^\circ.9136 \pm 39) - {}^\circ.7 \times 10^{-2} \sin \omega$$

$$e = (.182904 \pm 40) - .82 \times 10^{-6}t + .415 \times 10^{-3} \sin \omega$$

$$M = (.118016 \pm 87) + (11.092851 \pm 8)t + (.361 \pm 1) \times 10^{-4}t^2 + (.38 \pm 2) \times 10^{-6}t^3 - .68 \times 10^{-3} \cos \omega$$

Standard error of one observation : $\sigma = \pm 5'.91$.

The following elements are based on 145 field-reduced Baker-Nunn and other types of observations and are valid for the period from October 1 through October 31, 1960.

$T_0 = 37220.0$ MJD

$\omega = (236^\circ.504 \pm 11) + (4^\circ.9499 \pm 8)t + {}^\circ.17 \times 10^{-4} t^2 + {}^\circ.123 \cos \omega$

$\Omega = (358^\circ.546 \pm 4) - (3^\circ.2935 \pm 5)t - {}^\circ.132 \times 10^{-4} t^2 + {}^\circ.013 \cos \omega$

$i = (32^\circ.9180 \pm 17) - {}^\circ.7 \times 10^{-2} \sin \omega$

$e = (.182885 \pm 38) - .82 \times 10^{-6} t + .415 \times 10^{-3} \sin \omega$

$M = (.938274 \pm 39) + (11.095030 \pm 2)t + (.3344 \pm 6) \times 10^{-4} t^2 - (.191 \pm 8) \times 10^{-6} t^3$
$- .68 \times 10^{-3} \cos \omega$

Standard error of one observation : $\sigma = \pm 2''.46$.

The following elements are based on 118 field-reduced Baker-Nunn and other types of observations and are valid for the period from November 1 through November 30, 1960.

$T_0 = 37254.0$ MJD

$\omega = (44^\circ.927 \pm 19) + (4^\circ.9618 \pm 21)t + {}^\circ.17 \times 10^{-4} t^2 + {}^\circ.123 \cos \omega$

$\Omega = (246^\circ.536 \pm 12) - (3^\circ.2948 \pm 11)t - {}^\circ.132 \times 10^{-4} t^2 + {}^\circ.013 \cos \omega$

$i = (32^\circ.9141 \pm 36) - {}^\circ.7 \times 10^{-2} \sin \omega$

$e = (.182911 \pm 78) - .82 \times 10^{-6} t + .415 \times 10^{-3} \sin \omega$

$M = (.202360 \pm 49) + (11.097003 \pm 6)t + (.290 \pm 1) \times 10^{-4} t^2 - (.31 \pm 2) \times 10^{-6} t^3$
$- .68 \times 10^{-3} \cos \omega$

Standard error of one observation : $\sigma = \pm 4''.41$.

The following elements are based on 103 field-reduced Baker-Nunn and other types of observations and are valid for the period from December 1 through December 31, 1960.

$T_0 = 37284.0$ MJD

$\omega = (193^\circ.333 \pm 8) + (4^\circ.9585 \pm 12)t + {}^\circ.17 \times 10^{-4} t^2 + {}^\circ.123 \cos \omega$

$\Omega = (147^\circ.665 \pm 4) - (3^\circ.2972 \pm 4)t - {}^\circ.132 \times 10^{-4} t^2 + {}^\circ.013 \cos \omega$

$i = (32^\circ.9122 \pm 14) - {}^\circ.7 \times 10^{-2} \sin \omega$

$e = (.182939 \pm 35) - .82 \times 10^{-6} t + .415 \times 10^{-3} \sin \omega$

$M = (.133534 \pm 26) + (11.098340 \pm 4)t + (.212 \pm 1) \times 10^{-4} t^2 - (.291 \pm 8) \times 10^{-6} t^3$
$- .68 \times 10^{-3} \cos \omega$

Standard error of one observation : $\sigma = \pm 1''.74$.

The following elements are based on 138 field-reduced Baker-Nunn and other types of observations and are valid for the period from January 1 through January 31, 1961.

$T_0 = 37314.0$ MJD

$\omega = (341^\circ.868 \pm 6) + (4^\circ.9552 \pm 6)t + {}^\circ.17 \times 10^{-4} t^2 + {}^\circ.123 \cos \omega$

$\Omega = (48^\circ.782 \pm 4) - (3^\circ.2968 \pm 5)t - {}^\circ.132 \times 10^{-4} t^2 + {}^\circ.013 \cos \omega$

$i = (32^\circ.9261 \pm 13) - {}^\circ.7 \times 10^{-2} \sin \omega$

$e = (.182931 \pm 28) - .82 \times 10^{-6} t + .415 \times 10^{-3} \sin \omega$

$M = (.098834 \pm 16) + (11.099223 \pm 2)t + (.798 \pm 5) \times 10^{-5} t^2 - (.180 \pm 7) \times 10^{-6} t^3$
$- .68 \times 10^{-3} \cos \omega$

Standard error of one observation : $\sigma = \pm 1''.83$.

The following elements are based on 84 field-reduced Baker-Nunn and other types of observations and are valid for the period from February 1 through February 28, 1961.

$T_0 = 37344.0$ MJD

$\omega = (130^\circ.377 \pm 6) + (4^\circ.9487 \pm 8)t + {}^\circ.17 \times 10^{-4} t^2 + {}^\circ.123 \cos \omega$

$\Omega = (309^\circ.886 \pm 3) - (3^\circ.2958 \pm 3)t - {}^\circ.132 \times 10^{-4} t^2 + {}^\circ.013 \cos \omega$

$i = (32^\circ.9184 \pm 6) - {}^\circ.7 \times 10^{-2} \sin \omega$

$e = (.183035 \pm 12) - .82 \times 10^{-6} t + .415 \times 10^{-3} \sin \omega$

$M = (.081146 \pm 12) + (11.099623 \pm 1)t + (.800 \pm 2) \times 10^{-5} t^2 + (.24 \pm 4) \times 10^{-7} t^3$
$- .68 \times 10^{-3} \cos \omega$

Standard error of one observation : $\sigma = \pm 1''.62$.

The following elements are based on 114 field-reduced Baker-Nunn and other types of observations and are valid for the period from March 1 through March 31, 1961.

$T_0 = 37374.0$ MJD

$\omega = (278^\circ.980 \pm 10) + (4^\circ.9502 \pm 10)t + {}^\circ.17 \times 10^{-4} t^2 + {}^\circ.123 \cos \omega$

$\Omega = (210^\circ.963 \pm 3) - (3^\circ.2978 \pm 5)t - {}^\circ.132 \times 10^{-4} t^2 + {}^\circ.013 \cos \omega$

$i = (32^\circ.9189 \pm 9) - {}^\circ.7 \times 10^{-2} \sin \omega$

$e = (.182969 \pm 18) - .82 \times 10^{-6} t + .415 \times 10^{-3} \sin \omega$

$M = (.076635 \pm 20) + (11.100037 \pm 2)t + (.389 \pm 7) \times 10^{-5} t^2 - (.29 \pm 5) \times 10^{-7} t^3$
$- .68 \times 10^{-3} \cos \omega$

Standard error of one observation : $\sigma = \pm 1''.80$.

The following elements are based on 143 field-reduced Baker-Nunn and other types of observations and are valid for the period from April 1 through April 30, 1961.

$T_0 = 37405.0$ MJD

$\omega = (72^\circ.515 \pm 6) + (4^\circ.9515 \pm 6)t + {}^\circ.62 \times 10^{-4} t^2 + {}^\circ.12 \cos \omega$

$\Omega = (108^\circ.744 \pm 2) - (3^\circ.2966 \pm 3)t - {}^\circ.72 \times 10^{-5} t^2 + {}^\circ.013 \cos \omega$

$i = (32^\circ.9191 \pm 8) - {}^\circ.70 \times 10^{-2} \sin \omega$

$e = (.182952 \pm 8) - {}^\circ.13 \times 10^{-5} t + .415 \times 10^{-3} \sin \omega$

$M = (.18037 \pm 1) + (11.100265 \pm 1)t + (.374 \pm 2) \times 10^{-5} t^2 - .383 \times 10^{-3} \cos \omega$

Standard error of one observation : $\sigma = \pm 1'.65$.

The following elements are based on 90 field-reduced Baker-Nunn observations and are valid for the period from May 1, through May 31 1961.

$T_0 = 37435.0$ MJD

$\omega = (221^\circ.153 \pm 7) + (4^\circ.9542 \pm 8)t + {}^\circ.62 \times 10^{-4} t^2 + {}^\circ.12 \cos \omega$

$\Omega = (9^\circ.837 \pm 3) - (3^\circ.2972 \pm 3)t - {}^\circ.72 \times 10^{-5} t^2 + {}^\circ.013 \cos \omega$

$i = (32^\circ.9206 \pm 9) - {}^\circ.70 \times 10^{-2} \sin \omega$

$e = (.182829 \pm 7) - .13 \times 10^{-5} t + .415 \times 10^{-3} \sin \omega$

$M = (.19054 \pm 2) + (11.100398 \pm 2)t + (.60 \pm 3) \times 10^{-6} t^2 - .383 \times 10^{-3} \cos \omega$

Standard error of one observation : $\sigma = \pm 1'.53$.

The following elements are based on 91 field-reduced Baker-Nunn and other types of observations and are valid for the period from June 1 through June 30, 1961.

$T_0 = 37465.0$ MJD

$\omega = (9^\circ.76 \pm 1) + (4^\circ.954 \pm 1)t + {}^\circ.62 \times 10^{-4} t^2 + {}^\circ.12 \cos \omega$

$\Omega = (270^\circ.914 \pm 4) - (3^\circ.2974 \pm 5)t - {}^\circ.72 \times 10^{-5} t^2 + {}^\circ.013 \cos \omega$

$i = (32^\circ.916 \pm 1) - {}^\circ.70 \times 10^{-2} \sin \omega$

$e = (.18289 \pm 1) - .13 \times 10^{-5} t + .415 \times 10^{-3} \sin \omega$

$M = (.20337 \pm 2) + (11.100451 \pm 2)t + (.95 \pm 5) \times 10^{-6} t^2 - .383 \times 10^{-3} \cos \omega$

Standard error of one observation : $\sigma = \pm 1'.95$.

The following elements are based on 124 field-reduced Baker-Nunn and other types of observations and are valid for the period from July 1 through July 31, 1961.

$$T_0 = 37495.0 \text{ MJD}$$

$$\omega = (158^\circ.324 \pm 6) + (4^\circ.9567 \pm 6)t + {}^\circ.62 \times 10^{-4} t^2 + {}^\circ.12 \cos \omega$$

$$\Omega = (172^\circ.000 \pm 2) - (3^\circ.2973 \pm 3)t - {}^\circ.72 \times 10^{-5} t^2 + {}^\circ.013 \cos \omega$$

$$i = (32^\circ.9106 \pm 6) - {}^\circ.70 \times 10^{-2} \sin \omega$$

$$e = (.182869 \pm 8) - .13 \times 10^{-5} t^2 + .415 \times 10^{-3} \sin \omega$$

$$M = (.21815 \pm 1) + (11.100490 \pm 1)t - (.54 \pm 2) \times 10^{-6} t^2 - .383 \times 10^{-3} \cos \omega$$

Standard error of one observation : $\sigma = \pm 1^{\prime}.62$.

Geocentric Perigee Distance

The geocentric perigee distance of a satellite is a very important parameter. Apart from luni-solar perturbations and the one due to the third harmonic term in the earth's potential (figure 1), the perigee distance is also perturbed by solar radiation pressure, as shown by Musen, Bryant, and Bailie (1960), and by Zadunaisky, Shapiro, and Jones (1961). The perturbation due to drag, though significant on apogee distance, is negligible on the perigee distance of satellites with sufficiently high perigee.

Musen et al. showed that the solar radiation pressure produces a variation in the perigee height of 1958 $\beta 2$ (Vanguard I) with a period of $\sim$ 850 days and an amplitude of 1 or 2 km. We have tried to evaluate this effect on the perigee of 1959 $\alpha 1$ (Vanguard II). Our treatment differs from that of Musen et al. in that we consider various perturbation effects on the geocentric perigee distance rather than on the perigee height. In other words, we have assumed in this paper that, if all the perturbations were removed, the geocentric perigee distance will remain constant. This, however, is not true for the perigee height over the international ellipsoid, which may differ by as much as 20 km for a polar satellite during a quarter revolution of the perigee from equator to pole. In addition, we took account of the shadowing by the earth, the effect of which was taken as negligible by Musen et al. while considering the perturbations on the perigee of Vanguard I.

First, we used the equations given by Kozai (1959a, p. 2) to compute the perturbation on the perigee distance q of the Satellite 1959 $\alpha 1$ (Vanguard II) due to the third harmonic in the earth's potential. Next, a program written by Kozai for IBM-7090 using his own equations (Kozai 1959b, p. 10) was employed to evaluate the luni-solar perturbation on q.

Both these effects were subtracted from the observed values of the geocentric perigee distance q. The values of the perigee distance so obtained are shown by dots in figure 2. The smooth line in the figure shows the effect of the radiation pressure on the perigee distance. This was computed from a program written by Kozai and later improved by Conant using equations published by Kozai (1961, p. 26) for the effects of the solar radiation pressure on the motion of an artificial Satellite. The computations are based on an estimated acceleration of 9.25×10^{-6} cm/sec^2, which is obtained by assuming specular reflection, a solar constant of 1.94 Cal/cm^2/min, and mass-area ratio as 4.865 gms/cm^2.

In figure 1 the observed values of the perigee distance are plotted against a curve which represents the effect of the third harmonic on the perigee distance. This clearly shows that the major perturbation on the perigee distance of 1959 $\alpha 1$ (Vanguard II) arises from the third harmonic in the earth's potential.

Figure 2 shows the periodic effect of the radiation pressure on the perigee height of 1959 $\alpha 1$, which has a period of 450 days and an amplitude of 1.5 km. The residuals in the perigee distance shown by dots do appear to suggest a higher amplitude than given by the theoretical curve.

This can be easily explained if we note that the assumption of specular reflection is far from true. Any diffuseness in the reflection tends to increase the scattering coefficient K (which we have taken as unity), and will consequently increase the amplitude of the oscillation due to radiation pressure. We can therefore say that the scattering coefficient for an imperfect and not completely reflecting sphere has to be greater than unity, and an exact determination of this coefficient is not difficult as better data become available.

Other Data

The program of P.E. Zadunaisky was used to compute the rate of change of period ($\dot{P}$), the actual height of the perigee over the international ellipsoid (Z), the latitude of the perigee (Φ), the difference in the right ascension of perigee and sun (D.R.A.), and the angle between the sun and the perigee (ψ). The accelerations ($\dot{P}$), defined as the rate of change of period, are evaluated from

$$\dot{P} = - \frac{\dot{n}}{n^2} ,$$

where n, defined as mean motion, is the number of revolutions made by the satellite from one perigee to another in one day, and $\dot{n}$ is the rate of change in mean motion. The actual altitude (Z) is derived from

$$Z = q - a_e + C ,$$

where q is the geocentric perigee distance, a_e is the earth's equatorial radius, and

$$C = \frac{a_\oplus}{297} \sin^2 \Phi ,$$

where $a_\oplus$ is the earth's mean radius.

Satellite 1959 *a*1

In table 2, the elements $\dot{P}$, Z, Φ, D.R.A., and ψ are given at two-day intervals starting from April 2, 1960, through August 1, 1961. The quantities Φ, ψ, $\dot{n}$, and the 20-cm solar flux data are plotted in figures 3, 4, 5, and 6, respectively, for the interval under consideration.

Satellite 1959 *a*2

In table 4, the elements P, Z, Φ, D.R.A., and ψ are given at two-day intervals from April 2, 1960, through March 24, 1961. The quantities $\dot{n}$, Φ, and ψ, are plotted in figures 7, 8, and 9, respectively.

Acknowledgements

The author wishes to thank Dr. Luigi G. Jacchia for pointing out that the observed values of the perigee distance appear to suggest a higher value for the scattering constant K, which was taken as unity in our computation. It is a pleasure to acknowledge the conscientious assistance of Miss Maria C. Gutierrez in computing and making graphs.

References

KOZAI, Y.

1959a. The earth's gravitational potential derived from the motion of Satellite 1958 β2, Smithsonian Astrophys. Obs., Special Report No. 22, pp. 1-6.

1959b. On the effects of the sun and the moon upon the motion of a close earth satellite. Smithsonian Astrophys. Obs., Special Report No. 22, pp. 7-10.

1961. Effects of solar radiation pressure on the motion of an artificial satellite. Smithsonian Astrophys. Obs., Special Report No. 56, pp. 25-34.

NIGAM, R.C.

1960. The orbits and the accelerations of Satellites 1959 α1 and 1959 α2. Smithsonian Astrophys. Obs., Special Report No. 53, pp. 1-42.

MUSEN, P., BRYANT, R., and BAILIE, A.

1960. Perturbations in perigee height of Vanguard I. Science, vol. 131, pp. 935-936.

ZADUNAISKY, P.E., SHAPIRO, I.I., and JONES, H.M.

1961. Experimental and theoretical results on the orbit of Echo I. Smithsonian Astrophys. Obs., Special Report No. 61, pp. 1-22.

Table 1

MEAN ORBITAL ELEMENTS OF SATELLITE 1959 α1
APRIL 2, 1960 THROUGH AUGUST 1, 1961

T (MJD)	ω	Ω	i	e	M	n	n′/2	q	N	D	σ
37026.0	133.21 1	187.030 5	32.866 2	.16531 4	.61004 3	11.463491 8	.271E-4 9	6.933845	72	8	.64
37028.0	143.75 1	180.010 5	32.871 1	.16520 3	1.53714 3	11.463582 7	.161E-4 7	6.934707	80	8	.60
37030.0	154.282 9	172.995 5	32.873 1	.16513 3	2.46438 3	11.463645 8	.149E-4 6	6.935244	71	8	.53
37032.0	164.835 9	165.973 5	32.875 1	.16502 1	3.39169 3	11.463703 9	.140E-4 9	6.936195	67	8	.53
37034.0	175.39 1	158.952 6	32.878 1	.16491 2	4.31912 3	11.463745 8	.140E-4 5	6.937058	56	8	.53
37036.0	185.98 1	151.926 6	32.882 1	.16478 2	5.24661 3	11.46379 1	.147E-4 8	6.938134	55	8	.55
37038.0	196.56 1	144.900 5	32.886 2	.16469 2	6.17426 3	11.46386 1	.149E-4 7	6.938791	61	8	.57
37040.0	207.13 1	137.883 5	32.891 2	.16458 3	7.10208 4	11.46395 1	.171E-4 9	6.939727	90	8	.74
37042.0	217.71 1	130.871 5	32.893 2	.16449 3	8.02994 4	11.46401 1	.173E-4 9	6.940427	124	8	.83
37044.0	228.27 1	123.857 5	32.896 2	.16447 4	8.95805 5	11.46406 2	.165E-4 9	6.940608	138	8	.84
37046.0	238.86 2	116.839 5	32.898 2	.16439 4	9.88622 5	11.46410 2	.15E-4 1	6.941219	144	8	.88
37048.0	249.45 2	109.821 5	32.900 2	.16442 5	10.81453 6	11.46416 2	.14E-4 1	6.940958	125	8	.86
37050.0	260.07 2	102.798 7	32.902 2	.16443 5	11.74287 7	11.46417 3	.19E-4 1	6.940898	96	8	.75
37052.0	270.73 4	95.781 9	32.902 2	.16445 5	12.6712 1	11.46416 5	.16E-4 2	6.940679	82	8	.73
37054.0	281.31 7	88.77 1	32.903 2	.16453 6	13.5999 3	11.46430 9	.17E-4 1	6.939999	80	8	.71
37056.0	291.97 9	81.75 1	32.903 2	.1646 1	14.5285 4	11.46464 8	.16E-4 2	6.939008	73	8	.61
37058.0	302.270 9	74.740 4	32.902 2	.16437 3	15.45864 3	11.46454 1	.153E-4 8	6.941340	93	8	.58
37060.0	312.85 1	67.720 4	32.901 2	.16440 3	16.38778 3	11.46461 1	.157E-4 7	6.940917	80	8	.59
37062.0	323.46 1	60.694 5	32.899 2	.16444 3	17.31700 4	11.46466 1	.187E-4 8	6.940580	58	8	.58
37064.0	334.02 2	53.676 5	32.898 2	.16453 2	18.24644 5	11.46476 1	.245E-4 9	6.939804	46	8	.61
37066.0	344.47 4	46.67 1	32.894 4	.16478 7	19.1765 1	11.46492 3	.26E-4 2	6.937625	42	8	1.35
37068.0	355.02 3	39.65 1	32.887 4	.16488 5	20.10634 9	11.46495 3	.24E-4 2	6.936823	50	8	1.26
37070.0	5.59 3	32.63 1	32.885 3	.16494 4	21.03633 8	11.46505 3	.19E-4 2	6.936253	59	8	1.21
37072.0	16.13 2	25.603 9	32.880 3	.16499 3	21.96653 7	11.46510 2	.20E-4 1	6.935861	57	8	1.03
37074.0	26.69 3	18.582 9	32.877 3	.16503 3	22.89681 8	11.46524 3	.19E-4 1	6.935444	53	8	.97
37076.0	37.23 3	11.568 9	32.872 4	.16509 3	23.82728 9	11.46525 3	.16E-4 2	6.934952	50	8	1.05
37078.0	47.77 6	4.54 1	32.873 7	.16511 6	24.7579 2	11.46521 6	.21E-4 3	6.934807	54	8	1.81
37080.0	58.36 2	357.533 6	32.868 3	.16513 3	25.68843 7	11.46539 3	.19E-4 1	6.934569	46	8	.68
37082.0	68.92 2	350.503 5	32.867 3	.16514 2	26.61926 7	11.46550 3	.18E-4 1	6.934396	45	8	.64
37084.0	79.45 2	343.476 4	32.864 3	.16514 2	27.55030 6	11.46556 2	.19E-4 1	6.934442	44	8	.56

Table 1 (cont.)

MEAN ORBITAL ELEMENTS OF SATELLITE 1959 α1

T (MJD)	ω	Ω	i	e	M	n	n′/2	q	N	D	σ
37086.0	90.00 2	336.449 3	32.863 2	.16512 1	28.48147 5	11.46561 2	.209E-4 8	6.934520	44	8	.50
37088.0	100.55 2	329.422 3	32.864 2	.16510 1	29.41278 5	11.46570 2	.209E-4 8	6.934654	41	8	.49
37090.0	111.07 2	322.392 4	32.862 4	.16507 2	30.34435 7	11.46580 4	.20E-4 2	6.934887	37	8	.70
37092.0	121.60 3	315.360 8	32.863 4	.16503 3	31.27608 9	11.46592 4	.25E-4 1	6.935183	28	8	.77
37094.0	132.14 4	308.33 1	32.859 4	.16497 3	32.2080 1	11.46597 5	.27E-4 2	6.935658	24	8	.80
37096.0	142.66 7	301.34 2	32.867 5	.16489 5	33.1401 2	11.46625 8	.22E-4 3	6.936182	22	8	1.11
37098.0	153.13 4	294.31 1	32.866 4	.16479 4	34.0726 1	11.46611 7	.21E-4 3	6.937104	25	8	.94
37100.0	163.73 2	287.273 7	32.862 2	.16474 3	35.00500 7	11.46621 2	.22E-4 1	6.937456	39	8	.66
37102.0	174.34 2	280.248 7	32.858 2	.16468 3	35.93749 7	11.46631 2	.22E-4 1	6.937915	44	8	.73
37104.0	184.98 2	273.200 5	32.858 2	.16463 3	36.87014 5	11.46646 1	.151E-4 9	6.938277	58	8	.68
37106.0	195.52 1	266.178 4	32.860 1	.16454 2	37.80317 4	11.46651 9	.134E-4 7	6.939044	69	8	.57
37108.0	206.09 1	259.152 5	32.863 2	.16445 3	38.73624 5	11.46655 1	.130E-4 9	6.939741	73	8	.72
37110.0	216.671 8	252.126 3	32.865 1	.16442 2	39.66940 3	11.466614 6	.133E-4 5	6.939949	84	8	.48
37112.0	227.256 9	245.099 3	32.868 2	.16435 3	40.60267 3	11.466679 8	.158E-4 6	6.940512	96	8	.62
37114.0	237.843 8	238.067 3	32.869 2	.16432 3	41.53609 3	11.466747 9	.169E-4 7	6.940777	117	8	.65
37116.0	248.429 8	231.034 4	32.869 2	.16428 3	42.46965 3	11.466817 9	.181E-4 8	6.941068	116	8	.67
37118.0	259.021 8	224.009 4	32.869 2	.16429 3	43.40332 3	11.466894 9	.200E-4 8	6.940943	100	8	.60
37120.0	269.59 1	216.976 6	32.869 2	.16425 4	44.33726 4	11.46698 2	.19E-4 1	6.941265	88	8	.81
37122.0	280.19 2	209.949 8	32.870 3	.16425 5	45.27123 6	11.46703 2	.18E-4 1	6.941221	62	8	.86
37124.0	290.79 1	202.931 4	32.871 1	.16429 3	46.20529 4	11.46707 1	.189E-4 8	6.940835	60	8	.46
37126.0	301.39 1	195.910 4	32.874 1	.16427 3	47.13955 5	11.46718 2	.177E-4 8	6.940944	69	8	.52
37128.0	311.98 1	188.884 4	32.877 1	.16434 2	48.07394 4	11.46725 1	.181E-4 7	6.940363	99	8	.57
37130.0	322.56 1	181.856 4	32.879 1	.16438 2	49.00850 3	11.46732 1	.219E-4 7	6.940031	126	8	.58
37132.0	333.145 9	174.828 3	32.881 1	.16442 2	49.94325 3	11.46740 1	.219E-4 6	6.939608	140	8	.56
37134.0	343.726 9	167.805 3	32.880 1	.16449 2	50.87815 3	11.46749 1	.218E-4 6	6.938999	139	8	.56
37136.0	354.30 1	160.782 4	32.879 1	.16456 1	51.81323 3	11.46758 1	.221E-4 6	6.938376	135	8	.54
37138.0	4.86 1	153.758 4	32.882 1	.16466 2	52.74850 4	11.46770 2	.23E-4 1	6.937561	87	8	.56
37140.0	15.43 1	146.735 4	32.883 1	.16478 2	53.68390 3	11.46780 1	.20E-4 1	6.936520	81	8	.50
37142.0	25.97 1	139.712 4	32.883 1	.16484 2	54.61955 3	11.46785 1	.17E-4 1	6.935999	68	8	.47
37144.0	36.52 1	132.693 4	32.885 2	.16493 3	55.55528 3	11.46793 1	.21E-4 1	6.935206	59	8	.46
37146.0	47.05 2	125.666 6	32.888 2	.16495 4	56.49125 5	11.46802 1	.18E-4 2	6.935019	45	8	.57

Table 1 (cont.)

MEAN ORBITAL ELEMENTS OF SATELLITE 1959 α1

T (MJD)	ω	Ω	i	e	M	n	n′/2	q	N	D	σ
37148.0	57.59 4	118.646 2	32.888 5	.1650 1	57.4273 1	11.46800 4	.13E-4 4	6.934352	37	8	1.50
37150.0	68.16 4	111.62 2	32.887 6	.1651 1	58.3634 1	11.46809 4	.13E-4 7	6.933901	34	8	1.57
37152.0	78.63 4	104.60 2	32.885 7	.1650 1	59.3000 1	11.46834 5	.28E-4 7	6.934764	25	8	1.63
37154.0	89.18 2	97.58 1	32.887 4	.16503 8	60.23638 7	11.46819 3	.4E-5 4	6.934304	18	8	.76
37156.0	99.70 1	90.539 5	32.871 2	.16507 5	61.17303 4	11.468332 8	.17E-4 1	6.933883	21	8	.38
37158.0	110.22 1	83.506 8	32.874 3	.16502 8	62.10978 5	11.46840 3	.24E-5 2	6.934223	25	8	.48
37160.0	120.8 1	76.479 8	32.875 3	.16505 8	63.04639 5	11.4684 2	.29E-4 2	6.933998	28	8	.47
37162.0	131.5 2	69.46 1	32.873 6	.16510 7	63.9832 6	11.4689 3	.37E-4 1	6.933427	31	8	.49
37164.0	141.88 3	62.435 7	32.894 4	.16512 9	64.9211 1	11.4689 4	.38E-4 3	6.933179	24	8	.49
37166.0	152.37 1	55.42 1	32.887 6	.1651 2	65.85905 8	11.46908 3	.46E-4 5	6.933594	25	8	.99
37168.0	162.95 3	48.40 2	32.89 1	.1646 2	66.7972 1	11.46933 4	.3E-5 5	6.937356	31	8	2.26
37170.0	173.477 9	41.375 5	32.892 3	.16466 5	67.73559 2	11.46924 1	.24E-4 1	6.936905	37	8	.68
37172.0	184.05 1	34.353 8	32.893 4	.16461 5	68.67416 1	11.46933 2	.22E-4 2	6.937255	30	8	.70
37174.0	194.63 1	27.31 1	32.886 3	.16459 5	69.61292 3	11.46942 1	.21E-4 1	6.937438	25	8	.67
37176.0	205.21 2	20.29 1	32.888 4	.16450 7	70.55188 4	11.46950 2	.21E-4 2	6.938118	22	8	.88
37178.0	215.79 2	13.25 1	32.884 3	.16449 8	71.49099 4	11.46957 2	.14E-4 2	6.938211	26	8	1.00
37180.0	226.39 2	6.23 1	32.884 3	.16446 9	72.43017 4	11.46966 2	.21E-4 3	6.938426	28	8	1.23
37182.0	237.00 2	359.20 1	32.881 2	.16443 6	73.36958 3	11.46974 2	.22E-4 2	6.938596	24	8	.92
37184.0	247.56 2	352.17 1	32.878 2	.16440 7	74.30915 3	11.46986 2	.23E-4 3	6.938823	21	8	.96
37186.0	258.14 1	345.15 1	32.877 3	.16442 7	75.24891 2	11.46992 1	.21E-4 2	6.938629	21	8	.89
37188.0	268.74 2	338.11 1	32.880 3	.16444 8	76.18881 3	11.47002 2	.30E-4 2	6.938409	25	8	1.00
37190.0	279.31 1	331.11 1	32.880 2	.16442 5	77.12897 3	11.47014 2	.32E-4 3	6.938561	30	8	.57
37192.0	289.88 1	324.07 1	32.876 2	.16440 6	78.06952 4	11.47036 2	.42E-4 3	6.938639	33	8	.58
37194.0	300.49 7	317.033 7	32.872 2	.16429 6	79.01024 2	11.470441 6	.34E-4 2	6.939477	34	8	.51
37196.0	311.08 1	310.003 7	32.873 2	.16437 6	79.95126 2	11.47059 3	.40E-4 3	6.938738	28	8	.50
37198.0	321.67 1	302.970 1	32.871 4	.16443 8	80.89260 6	11.47075 4	.40E-4 3	6.938205	27	8	.70
37200.0	332.27 1	295.925 9	32.889 4	.16456 8	81.83423 3	11.470885 7	.32E-4 1	6.937090	45	8	.82
37202.0	342.86 3	288.89 2	32.888 6	.1646 1	82.77614 8	11.47099 7	.32E-4 2	6.936948	36	8	.81
37204.0	353.46 1	281.861 8	32.884 5	.16458 8	83.71823 3	11.47111 1	.30E-4 2	6.936844	38	8	.81
37206.0	4.05 2	274.830 8	32.884 6	.16461 9	84.66057 3	11.47121 1	.27E-4 2	6.936570	33	8	.97

Table 1 (cont.)

MEAN ORBITAL ELEMENTS OF SATELLITE 1959 α1

T (MJD)	ω	Ω	i	e	M	n	n′/2	q	N	D	σ
37208.0	14.64 2	267.797 6	32.881 7	.1647 1	85.60308 3	11.47129 3	.28E-4 4	6.936142	24	8	.92
37210.0	25.27 3	260.78 1	32.88 1	.1647 1	86.54569 7	11.47134 3	.24E-4 2	6.935924	26	8	1.62
37212.0	35.9 2	253.5 5	32.89 2	.1648 2	87.4885 4	11.4715 1	.32E-4 6	6.935131	17	8	1.96
37214.0	46.8 2	246.7 1	32.87 3	.1645 3	88.4309 2	11.47144 9	.29E-4 3	6.937231	23	8	4.66
37216.0	57.5 1	239.64 7	32.86 2	.1646 2	89.3740 2	11.47217 9	.24E-4 2	6.935866	28	8	4.03
37218.0	67.35 2	232.64 1	32.871 2	.16523 5	90.31889 3	11.47183 1	.159E-4 4	6.931118	28	8	.77
37220.0	77.87 1	225.612 8	32.871 2	.16524 3	91.26263 2	11.471907 7	.216E-4 5	6.930980	37	8	.67
37222.0	88.40 1	218.584 8	32.871 2	.16525 3	92.20653 2	11.471992 7	.231E-4 5	6.930895	41	8	.72
37224.0	98.92 2	211.54 1	32.868 2	.16530 5	93.15065 3	11.47208 1	.21E-4 2	6.930434	30	8	.93
37226.0	109.50 2	204.51 1	32.868 3	.16524 6	94.09482 4	11.47214 3	.20E-4 2	6.930911	26	8	.96
37228.0	120.07 7	197.48 2	32.875 6	.1651 2	95.0392 1	11.47219 3	.10E-4 4	6.931793	27	8	2.09
37230.0	130.67 7	190.87 2	32.874 7	.1651 2	95.9835 1	11.472205 3	.16E-4 4	6.931859	26	8	2.18
37232.0	141.26 5	183.40 2	32.870 7	.1649 1	96.92804 9	11.47239 3	.18E-4 3	6.933753	29	8	2.36
37234.0	151.78 2	176.36 3	32.874 3	.1649 3	97.87282 4	11.47242 1	.11E-4 1	6.933935	30	8	1.02
37236.0	162.30 1	169.322 5	32.877 2	.16477 3	98.81766 3	11.47241 1	.8E-5 1	6.934699	28	8	.57
37238.0	172.84 1	162.311 4	32.878 2	.16463 2	99.76252 2	11.472442 7	.85E-5 5	6.935853	33	8	.55
37240.0	183.40 2	155.288 4	32.879 2	.16456 2	100.70743 3	11.47248 1	.92E-5 6	6.936442	24	8	.53
37242.0	194.00 3	148.246 9	32.882 3	.16448 4	101.65234 6	11.47249 2	.10E-4 1	6.937132	14	8	.60
37244.0	204.73 7	141.17 3	32.886 8	.1642 2	102.5972 1	11.47263 5	.11E-4 3	6.939646	15	8	1.19
37246.0	215.30 9	134.09 5	32.92 3	.1635 9	103.5426 5	11.4725 1	.6E-5 5	6.945486	13	8	1.79
37248.0	225.77 3	127.126 8	32.887 6	.16429 6	104.48783 7	11.47263 3	.19E-4 2	6.938624	21	8	.79
37250.0	236.39 9	121.098 9	32.886 5	.16427 6	105.43316 5	11.47271 3	.18E-4 2	6.938773	22	8	.93
37252.0	246.97 5	113.09 2	32.889 8	.1642 1	106.3788 1	11.47286 3	.18E-4 4	6.939656	26	8	2.17
37254.0	257.58 2	106.049 7	32.886 3	.16418 4	107.32452 4	11.472938 8	.179E-4 9	6.939435	32	8	.85
37256.0	268.15 1	99.021 5	32.886 2	.16421 3	108.27052 2	11.473008 8	.10E-4 1	6.939139	37	8	.63
37258.0	278.74 1	91.986 4	32.886 1	.16421 3	109.21657 2	11.473049 6	.115E-4 5	6.939108	48	8	.58
37260.0	289.351 8	84.948 3	32.8879 8	.16418 2	110.16268 2	11.473075 4	.106E-4 4	6.939378	57	8	.50
37262.0	299.945 8	77.913 3	32.8868 8	.16423 2	111.10889 2	11.473116 4	.90E-5 3	6.938930	63	8	.49
37264.0	310.545 8	70.882 3	32.8866 8	.16425 2	112.05516 2	11.473148 4	.94E-5 3	6.938716	63	8	.46
37266.0	321.14 1	63.847 3	32.8865 8	.16430 2	113.00150 2	11.473184 5	.80E-5 6	6.938317	53	8	.46
37268.0	331.74 1	56.815 5	32.886 1	.16438 3	113.94791 3	11.473205 9	.83E-5 8	6.937664	44	8	.58

Table 1 (cont.)

MEAN ORBITAL ELEMENTS OF SATELLITE 1959 α1

T (MJD)	ω	Ω	i	e	M	n	n'/2	q	N	D	σ
37270.0	342.32 1	49.782 6	32.887 1	.16441 2	114.89441 3	11.473267 7	.117E-4 7	6.937402	29	8	.47
37272.0	353.03 7	42.74 3	32.882 7	.1641 1	115.8407 2	11.47338 4	.18E-4 2	6.939874	19	8	1.45
37274.0	3.52 5	35.72 3	32.885 6	.16448 9	116.78757 9	11.47333 4	.17E-4 2	6.936735	21	8	.80
37276.0	14.10 5	28.68 3	32.886 9	.1645 1	117.73446 9	11.47344 3	.13E-4 2	6.936900	23	8	.82
37278.0	24.68 6	21.66 3	32.88 1	.1645 7	118.6813 1	11.47354 5	.14E-4 2	6.936342	25	8	.80
37280.0	35.19 5	14.63 3	32.88 1	.1650 6	119.6284 1	11.47358 4	.11E-4 1	6.932590	24	8	.70
37282.0	45.73 3	7.599 6	32.876 5	.16462 6	120.57573 6	11.47363 3	.8E-5 1	6.935444	24	8	.47
37284.0	56.15 7	.55 2	32.87 1	.1649 1	121.5233 2	11.47354 8	.8E-5 3	6.933244	27	8	1.73
37286.0	66.70 4	353.51 1	32.872 9	.16497 5	122.4706 1	11.47353 4	.12E-4 3	6.932584	29	8	1.30
37288.0	77.33 3	346.48 1	32.870 9	.16503 4	123.41778 9	11.47355 3	.12E-4 2	6.932060	29	8	1.22
37290.0	87.96 5	339.47 2	32.88 2	.16502 7	124.3650 1	11.47372 6	.1E-5 3	6.932124	24	8	1.74
37292.0	98.49 6	332.44 3	32.88 2	.16499 6	125.3125 1	11.47373 6	.6E-5 2	6.932370	19	8	1.44
37294.0	109.1 5	325.40 7	32.88 2	.165 1	126.2599 8	11.47383 6	.8E-5 2	6.930964	18	8	1.44
37296.0	119.4 3	318.37 4	32.879 8	.1647 7	127.2078 4	11.47383 5	-.9E-6 9	6.934439	19	8	.79
37298.0	130.1 1	311.31 2	32.874 2	.1651 4	128.1552 2	11.47377 3	.39E-5 6	6.931210	27	8	.54
37300.0	140.56 2	304.277 8	32.875 1	.16476 2	129.10296 4	11.47378 1	.48E-5 4	6.934235	36	8	.48
37302.0	151.17 2	297.241 7	32.874 1	.16485 2	130.05049 4	11.47378 2	.35E-5 4	6.933514	41	8	.46
37304.0	161.73 2	290.216 6	32.878 1	.16467 1	130.99810 3	11.47380 2	.51E-5 4	6.934962	50	8	.49
37306.0	172.34 2	283.178 6	32.880 1	.16463 1	131.94569 4	11.47382 2	.30E-5 8	6.935320	47	8	.50
37308.0	182.99 3	276.157 9	32.878 2	.16460 2	132.89321 7	11.47374 3	.3E-5 1	6.935636	50	8	1.10
37310.0	193.48 2	269.114 5	32.882 2	.16438 1	133.84113 4	11.47388 1	.12E-5 5	6.937346	42	8	.50
37312.0	204.09 2	262.082 5	32.880 1	.16434 1	134.78882 3	11.47387 1	.10E-5 4	6.937731	40	8	.44
37314.0	214.69 2	255.052 3	32.879 1	.16428 1	135.73654 3	11.47386 1	.24E-5 5	6.938204	42	8	.46
37316.0	225.29 2	248.019 3	32.880 1	.16423 1	136.68428 3	11.47386 1	.19E-5 4	6.938643	41	8	.49
37318.0	235.88 1	240.987 4	32.879 1	.16418 1	137.63207 3	11.473901 9	.22E-5 4	6.939002	33	8	.46
37320.0	246.46 2	233.957 5	32.880 2	.16412 2	138.57992 4	11.47391 1	.17E-5 5	6.939517	25	8	.56
37322.0	257.05 2	226.917 6	32.883 2	.16408 2	139.52777 4	11.47393 2	.12E-5 6	6.939797	18	8	.55
37324.0	267.64 5	219.887 1	32.884 6	.16407 4	140.4756 1	11.47398 5	.4E-5 1	6.939865	14	8	1.55
37326.0	278.26 4	212.857 7	32.884 4	.16405 3	141.42344 8	11.47394 4	.4E-5 1	6.940085	10	8	.59
37328.0	288.83 6	205.818 2	32.884 6	.16410 4	142.37141 1	11.47393 5	.3E-5 1	6.939650	11	8	.98
37330.0	299.42 3	198.79 1	32.885 4	.16414 2	143.31934 7	11.47390 4	.02E-5 2	6.939329	16	8	.78

Table 1 (cont.)

MEAN ORBITAL ELEMENTS OF SATELLITE 1959 α1

T (MJD)	ω	Ω	i	e	M	n	n′/2	q	N	D	σ
37332.0	310.06 3	191.75 1	32.884 3	.16418 2	144.26718 6	11.47394 4	.3E-5 1	6.938979	19	8	.78
37334.0	320.69 3	184.70 1	32.882 3	.16419 2	145.21505 7	11.47397 3	.49E-5 9	6.938907	23	8	.84
37336.0	331.24 4	177.68 1	32.879 3	.16425 3	146.16312 9	11.47403 4	.6E-5 1	6.938422	28	8	1.15
37338.0	341.82 5	170.64 1	32.879 3	.16431 2	147.11120 1	11.47403 5	.6E-5 1	6.937926	31	8	1.26
37340.0	352.41 3	163.608 9	32.877 2	.16439 2	148.05929 7	11.47404 3	.40E-5 9	6.937248	39	8	1.02
37342.0	3.03 2	156.573 8	32.877 2	.16449 2	149.00733 5	11.47406 2	.42E-5 7	6.936414	47	8	.88
37344.0	13.60 1	149.538 5	32.878 1	.164580 9	149.95549 3	11.47409 1	.28E-5 4	6.935618	52	8	.57
37346.0	24.17 1	142.504 6	32.877 1	.16466 1	150.90365 3	11.47412 1	.42E-5 4	6.934947	52	8	.58
37348.0	34.73 1	135.463 6	32.876 1	.16474 1	151.85189 2	11.47414 1	.46E-5 5	6.934297	49	8	.53
37350.0	45.29 1	128.436 7	32.875 1	.16480 1	152.80014 3	11.47414 1	.46E-5 5	6.933763	42	8	.52
37352.0	55.84 2	121.39 1	32.877 2	.16492 2	153.74845 3	11.47415 1	.25E-5 5	6.932813	31	8	.48
37354.0	66.38 2	114.37 1	32.874 3	.16497 4	154.69677 3	11.47416 2	.26E-5 8	6.932321	29	8	.48
37356.0	76.85 9	107.35 1	32.869 4	.1651 2	155.64527 2	11.47421 2	.10E-5 4	6.931092	26	8	.51
37358.0	87.3 1	100.32 1	32.865 5	.1652 2	156.59372 2	11.47424 3	.18E-5 8	6.930850	19	8	.48
37360.0	97.99 2	93.27 1	32.866 7	.16489 5	157.54190 4	11.47423 2	.2E-5 1	6.932973	17	8	.48
37362.0	108.54 2	86.224 4	32.866 8	.16493 3	158.49027 5	11.47416 2	.4E-6 8	6.932666	17	8	.41
37364.0	119.20 6	79.22 2	32.907 1	.1660 6	159.43863 7	11.47418 5	.1E-5 2	6.923926	21	8	.55
37366.0	129.76 5	72.16 2	32.880 1	.1657 1	160.38701 7	11.47420 3	.7E-6 9	6.926148	29	8	.64
37368.0	140.32 4	65.10 2	32.871 7	.1658 4	161.33544 6	11.47425 3	.1E-6 8	6.926479	31	8	.60
37370.0	150.82 4	58.09 2	32.880 6	.1656 4	162.28393 8	11.47425 3	.14E-5 7	6.927254	30	8	.63
37372.0	161.30 2	51.045 7	32.877 2	.16461 3	163.23230 3	11.47422 2	-.14E-5 7	6.935328	28	8	.42
37374.0	171.86 2	44.009 7	32.879 2	.16455 3	164.18075 4	11.47421 2	-.16E-5 6	6.935848	25	8	.43
37376.0	182.44 1	36.979 5	32.882 2	.16449 2	165.12910 2	11.474183 6	-.4E-6 5	6.936344	39	8	.36
37378.0	193.01 1	29.950 4	32.884 1	.16442 1	166.07749 2	11.474153 6	-.0E-6 4	6.936917	44	8	.32
37380.0	203.609 9	22.926 4	32.886 1	.16434 2	167.02582 2	11.47418 1	-.5E-6 6	6.937590	37	8	.35
37382.0	214.21 2	15.885 6	32.886 1	.16428 3	167.97419 3	11.474179 9	-.5E-6 8	6.938107	39	8	.59
37384.0	225.51 2	8.844 8	32.887 1	.16423 3	168.92257 4	11.474188 8	.3E-6 8	6.938517	36	8	.67
37386.0	235.40 3	1.808 8	32.889 2	.16416 5	169.87098 6	11.47419 2	.1E-5 2	6.939099	23	8	.76
37388.0	246.00 3	354.77 1	32.888 2	.16417 6	170.81936 7	11.47422 3	.2E-5 2	6.938967	19	8	.82

Table 1 (cont.)

MEAN ORBITAL ELEMENTS OF SATELLITE 1959 α1

T (MJD)	ω	Ω	i	e	M	n	n′/2	q	N	D	σ
37390.0	256.68 3	347.74 6	32.892 2	.16413 6	171.76752 8	11.47414 3	.3E-5 1	6.939361	20	8	.51
37392.0	267.4 1	340.68 3	32.91 2	.163 1	172.7155 6	11.47420 7	.2E-5 2	6.94667	19	8	.69
37394.0	277.9 1	333.68 3	32.89 3	.1639 9	173.6642 6	11.47424 8	.01E-5 2	6.94148	18	8	.68
37396.0	288.41 8	326.26 1	32.88 2	.1649 6	174.6133 4	11.47424 5	.3E-5 2	6.93310	20	8	.64
37398.0	299.02 2	319.621 7	32.882 4	.16420 5	175.56155 3	11.474235 9	.1E-5 1	6.93876	20	8	.70
37400.0	309.61 1	312.584 5	32.882 4	.16422 4	176.51005 2	11.474248 8	.1E-5 1	6.93858	23	8	.57
37402.0	320.20 1	305.550 4	32.884 3	.16424 4	177.45856 2	11.47426 1	.2E-5 1	6.93838	23	7	.56
37404.0	330.76 2	298.518 4	32.885 4	.16426 5	178.40716 4	11.47430 2	.4E-5 2	6.93819	18	7	.51
37406.0	341.41 2	291.500 7	32.887 6	.1642 1	179.35540 8	11.47421 4	.4E-5 2	6.93844	18	8	.52
37408.0	351.93 8	284.50 2	32.90 1	.1645 4	180.3042 4	11.47422 6	.2E-5 2	6.93629	17	8	.61
37410.0	2.54 9	277.45 2	32.888 7	.1647 4	181.2527 4	11.47433 6	.2E-5 2	6.93463	19	8	.58
37412.0	13.2 1	270.36 2	32.874 7	.1646 5	182.2012 5	11.47431 8	.2E-5 2	6.93556	22	8	.81
37414.0	23.8 2	263.32 3	32.870 7	.1644 8	183.1494 9	11.4742 1	.2E-5 3	6.93685	24	8	1.10
37416.0	34.6 3	256.30 4	32.868 5	.1642 9	184.097 1	11.4741 2	-.1E-5 3	6.93904	20	8	1.02
37418.0	44.2 4	249.29 4	32.866 5	.167 1	185.050 2	11.4746 2	.6E-5 3	6.91305	19	8	.96
37420.0	55.3 2	242.26 2	32.866 3	.1650 5	185.9959 8	11.47425 9	-.1E-5 2	6.93207	22	8	.71
37422.0	65.91 1	235.185 6	32.870 2	.16508 4	186.94470 2	11.474372 7	.22E-5 7	6.93139	29	8	.69
37424.0	76.448 8	228.151 5	32.870 2	.16509 4	187.89344 1	11.474368 7	.4E-5 1	6.93123	39	8	.66
37426.0	86.983 7	221.116 4	32.870 1	.16508 3	188.84221 1	11.474379 5	.25E-5 7	6.93138	42	8	.56
37428.0	97.519 7	214.087 5	32.871 1	.16510 3	189.79099 1	11.474382 5	-.03E-5 5	6.93118	44	8	.56
37430.0	108.067 6	207.052 5	32.872 1	.16503 4	190.73975 1	11.474386 5	-.11E-5 6	6.93173	50	8	.57
37432.0	118.606 7	200.020 5	32.873 1	.16493 4	191.68852 1	11.474378 5	-.04E-5 4	6.93258	52	8	.65
37434.0	129.153 6	192.985 4	32.875 1	.16489 3	192.63729 1	11.474389 5	.13E-5 4	6.93293	60	8	.59
37436.0	139.703 6	185.950 4	32.873 1	.16482 3	193.58607 1	11.474398 4	.11E-5 4	6.93348	73	8	.60
37438.0	150.252 5	178.919 3	32.8740 9	.16475 2	194.53486 1	11.474397 5	.02E-5 3	6.93411	77	8	.54
37440.0	160.823 5	171.883 3	32.8750 8	.16464 2	195.48361 1	11.474383 5	.09E-5 3	6.93499	85	8	.54
37442.0	171.393 6	164.846 3	32.8760 9	.16456 3	196.43238 1	11.474386 5	.16E-5 3	6.93563	83	8	.57
37444.0	181.969 9	157.809 4	32.877 5	.16447 5	197.38115 2	11.474392 8	.20E-5 5	6.93641	67	8	.61
37446.0	192.54 1	150.776 6	32.878 1	.16439 7	198.32995 2	11.47441 1	.18E-5 7	6.93709	51	8	.63
37448.0	203.14 2	143.735 8	32.880 2	.1644 1	199.27877 4	11.47440 2	.01E-5 1	6.93704	39	8	.64
37450.0	213.72 1	136.706 6	32.881 1	.16434 6	200.22758 3	11.474405 8	-.11E-5 8	6.93751	46	8	.51

Table 1 (cont.)

MEAN ORBITAL ELEMENTS OF SATELLITE 1959 α1

T (MJD)	ω	Ω	i	e	M	n	n′/2	q	N	D	σ
37452.0	224.316 9	129.668 6	32.882 5	.16429 5	201.17639 2	11.47440 2	-.2E-5 1	6.93793	65	8	.48
37454.0	234.913 7	122.639 5	32.883 1	.16422 4	202.12517 2	11.474385 8	-.30E-5 6	6.93851	81	8	.47
37456.0	245.520 6	115.612 4	32.884 1	.16408 3	203.07386 1	11.474374 6	.05E-5 7	6.93962	81	8	.51
37458.0	256.128 6	108.578 4	32.885 1	.16404 3	204.02262 1	11.474386 8	.06E-5 9	6.93999	71	8	.55
37460.0	266.725 6	101.541 4	32.886 1	.16402 3	204.97144 1	11.474400 4	.01E-5 6	6.94018	60	8	.57
37462.0	277.335 7	94.501 5	32.887 1	.16414 4	205.92023 1	11.474398 5	.11E-5 6	6.93914	46	8	.52
37464.0	287.931 8	87.470 6	32.885 1	.16420 5	206.86904 1	11.47439 1	.2E-5 1	6.93867	43	8	.50
37466.0	298.526 7	80.435 6	32.884 1	.16424 5	207.81785 1	11.474414 6	.2E-5 1	6.93829	38	8	.48
37468.0	309.12 2	73.41 1	32.882 2	.16423 7	208.76667 3	11.47441 1	.2E-5 1	6.93838	31	8	.86
37470.0	319.73 2	66.37 2	32.880 4	.1642 1	209.71546 4	11.47443 2	.5E-5 1	6.93853	26	8	1.07
37472.0	330.32 2	59.35 1	32.881 3	.16439 8	210.66434 3	11.47441 2	.5E-5 2	6.93710	20	7	.71
37474.0	340.94 3	52.310 1	32.882 4	.1645 1	211.61318 5	11.47442 3	.4E-5 1	6.93637	18	8	.83
37476.0	351.55 5	45.26 2	32.885 5	.1645 1	212.56207 9	11.47444 3	-.1E-5 2	6.93632	13	7	.70
37478.0	2.08 5	38.20 3	32.90 2	.1643 2	213.51109 8	11.47433 6	-.4E-5 4	6.93809	11	8	.71
37480.0	12.68 3	31.20 1	32.875 9	.1644 1	214.45996 6	11.47446 3	.6E-5 2	6.93663	14	8	.86
37482.0	23.26 3	24.164 8	32.866 8	.1645 1	215.40901 7	11.47442 5	-.8E-5 5	6.93616	16	8	.71
37484.0	33.81 2	17.126 7	32.867 6	.16459 8	216.35805 6	11.47455 2	.3E-5 2	6.93531	23	8	.66
37486.0	44.35 1	10.092 5	32.868 4	.16471 5	217.30720 4	11.474564 9	.3E-5 1	6.93436	36	8	.54
37488.0	54.88 1	3.064 4	32.868 3	.16478 4	218.25636 3	11.474556 9	.3E-5 1	6.93381	39	8	.40
37490.0	65.440 9	356.028 3	32.865 2	.16476 3	219.20545 3	11.474575 6	.52E-5 6	6.93392	44	8	.40
37492.0	75.97 1	348.994 4	32.868 2	.16480 3	220.15465 3	11.474598 9	.5E-5 1	6.93357	44	8	.43
37494.0	86.52 1	341.956 6	32.869 2	.16477 4	221.10389 5	11.47473 4	.4E-5 1	6.93380	36	8	.39
37496.0	97.00 3	334.90 1	32.869 2	.16473 4	222.0534 1	11.47479 4	.6E-5 1	6.93408	33	8	.38
37498.0	107.62 1	327.872 5	32.869 2	.16475 2	223.00242 4	11.47467 2	.7E-5 1	6.93395	49	8	.42
37500.0	118.17 1	320.843 4	32.869 1	.16471 2	223.95175 3	11.47470 1	.66E-5 8	6.93431	54	8	.40
37502.0	128.72 1	313.812 4	32.871 2	.16467 2	224.90117 4	11.47471 1	.41E-5 7	6.93463	56	8	.45
37504.0	139.27 1	306.776 4	32.872 2	.16461 2	225.85062 4	11.47475 1	.44E-5 8	6.93509	52	8	.44
37506.0	149.84 1	299.750 4	32.875 2	.16452 2	226.80003 4	11.47477 1	.57E-5 8	6.93581	45	8	.46
37508.0	160.39 2	292.708 6	32.875 2	.16449 2	227.74959 6	11.47476 2	.6E-5 1	6.93606	41	8	.59
37510.0	170.95 2	285.677 4	32.877 2	.16438 2	228.69919 6	11.47481 2	.2E-5 1	6.93702	44	8	.43
37512.0	181.49 2	278.643 4	32.878 1	.16431 2	229.64884 7	11.47484 3	-.1E-5 1	6.93754	44	8	.42

Table 2

DATA RELATED TO SOLAR EFFECTS ON ACCELERATION OF SATELLITE 1959 $\alpha 1$

PERIGEE IN SUNLIGHT

T (MJD)	Z	φ	ψ	D.R.A.	$\dot{P}$
37026.	559.	23.3	48.0	313.9	-0.412E-06
37028.	559.	18.7	45.5	315.3	-0.245E-06
37030.	558.	13.6	43.8	316.0	-0.227E-06
37032.	558.	8.2	43.2	316.4	-0.213E-06
37034.	559.	2.5	43.6	316.5	-0.213E-06
37036.	560.	-3.2	44.9	316.5	-0.224E-06
37038.	561.	-8.9	46.9	316.6	-0.227E-06
37040.	563.	-14.3	49.1	317.0	-0.260E-06
37042.	564.	-19.4	51.3	317.9	-0.263E-06
37044.	566.	-23.9	53.2	319.3	-0.251E-06
37046.	567.	-27.7	54.6	321.4	-0.228E-06
37048.	568.	-30.6	55.4	324.2	-0.213E-06
37050.	569.	-32.3	55.3	327.6	-0.289E-06
37052.	569.	-32.9	54.4	331.3	-0.243E-06
37054.	568.	-32.2	52.7	334.9	-0.259E-06
37056.	566.	-30.2	50.1	338.3	-0.243E-06
37058.	567.	-27.3	47.2	340.6	-0.233E-06
37060.	566.	-23.5	43.4	342.6	-0.239E-06
37062.	564.	-18.9	39.3	343.9	-0.285E-06
37064.	563.	-13.8	34.9	344.5	-0.373E-06
37066.	560.	-8.4	30.5	344.7	-0.396E-06
37068.	558.	-2.7	26.1	344.7	-0.365E-06
37070.	558.	3.0	22.0	344.5	-0.289E-06
37072.	558.	8.7	18.5	344.5	-0.304E-06
37074.	558.	14.1	15.7	344.7	-0.289E-06
37076.	559.	19.2	13.8	345.4	-0.243E-06
37078.	560.	23.7	12.8	346.5	-0.320E-06
37080.	561.	27.5	12.3	348.5	-0.289E-06
37082.	562.	30.4	12.1	351.0	-0.274E-06
37084.	562.	32.2	11.7	354.1	-0.289E-06

Table 2 (cont.)

DATA RELATED TO SOLAR EFFECTS ON ACCELERATION OF SATELLITE 1959 α1

T (MJD)	Z	φ	ψ	D.R.A.	$\dot{P}$
37086.	562.	32.9	11.1	357.5	-0.318E-06
37088.	562.	32.2	10.0	1.0	-0.318E-06
37090.	562.	30.4	8.7	4.0	-0.304E-06
37092.	561.	27.5	7.6	6.5	-0.380E-06
37094.	561.	23.7	7.7	8.3	-0.411E-06
37096.	560.	19.2	9.6	9.5	-0.335E-06
37098.	560.	14.2	13.0	10.0	-0.319E-06
37100.	560.	8.7	17.5	10.1	-0.335E-06
37102.	560.	3.1	22.5	10.1	-0.335E-06
37104.	560.	-2.7	27.8	9.9	-0.230E-06
37106.	561.	-8.3	33.2	9.7	-0.204E-06
37108.	563.	-13.8	38.5	9.8	-0.198E-06
37110.	564.	-18.9	43.5	10.4	-0.202E-06
37112.	566.	-23.5	48.1	11.5	-0.240E-06
37114.	567.	-27.4	52.2	13.4	-0.257E-06
37116.	568.	-30.3	55.6	15.9	-0.275E-06
37118.	569.	-32.2	58.1	19.0	-0.304E-06
37120.	569.	-32.9	59.6	22.4	-0.289E-06
37122.	569.	-32.3	60.2	25.9	-0.274E-06
37124.	568.	-30.5	59.8	29.1	-0.287E-06
37126.	567.	-27.6	58.4	31.7	-0.269E-06
37128.	565.	-23.8	56.1	33.6	-0.275E-06
37130.	564.	-19.3	53.2	34.8	-0.333E-06
37132.	563.	-14.2	49.7	35.5	-0.333E-06
37134.	561.	-8.8	45.9	35.7	-0.332E-06
37136.	560.	-3.1	42.2	35.7	-0.336E-06
37138.	559.	2.6	38.8	35.5	-0.350E-06
37140.	559.	8.3	36.2	35.5	-0.304E-06
37142.	559.	13.8	34.6	35.7	-0.259E-06
37144.	559.	18.9	34.3	36.3	-0.319E-06
37146.	560.	23.4	35.3	37.5	-0.274E-06
37148.	560.	27.3	37.4	39.4	-0.198E-06

Table 2 (cont.)

DATA RELATED TO SOLAR EFFECTS ON ACCELERATION OF SATELLITE 1959 $\alpha 1$

T (MJD)	Z	φ	ψ	D.R.A.	$\dot{P}$
37150.	561.	30.3	40.3	42.0	-0.198E-06
37152.	562.	32.2	43.5	45.1	-0.426E-06
37154.	562.	32.9	46.9	48.7	-0.608E-07
37156.	562.	32.3	50.0	52.2	-0.259E-06
37158.	561.	30.6	52.9	55.5	-0.365E-07
37160.	560.	27.8	55.5	58.3	-0.441E-06
37162.	559.	24.0	57.7	60.5	-0.563E-06
37164.	557.	19.6	59.3	61.7	-0.578E-06
37166.	557.	14.6	60.6	62.5	-0.699E-06
37168.	560.	9.2	61.8	62.9	-0.456E-07
37170.	559.	3.5	62.9	63.0	-0.365E-06
37172.	559.	-2.2	64.0	63.0	-0.334E-06
37174.	559.	-7.9	65.3	63.1	-0.319E-06
37176.	561.	-13.4	66.9	63.5	-0.319E-06
37178.	562.	-18.5	68.8	64.3	-0.213E-06
37180.	563.	-23.1	71.1	65.6	-0.319E-06
37182.	565.	-27.1	73.7	67.7	-0.334E-06
37184.	566.	-30.1	76.4	70.4	-0.350E-06
37186.	566.	-32.1	79.2	73.7	-0.319E-06
37188.	566.	-32.9	82.0	77.4	-0.456E-06
37190.	566.	-32.4	84.7	81.2	-0.486E-06
37192.	566.	-30.7	86.9	84.6	-0.638E-06
37194.	566.	-27.9	88.9	87.5	-0.517E-06
37196.	564.	-24.2	90.4	89.7	-0.608E-06
37198.	562.	-19.7	91.4	91.2	-0.608E-06
37200.	560.	-14.6	92.1	92.1	-0.486E-06
37202.	559.	-9.2	92.4	92.6	-0.486E-06
37204.	559.	-3.5	92.7	92.8	-0.456E-06
37206.	558.	2.2	92.9	92.9	-0.410E-06
37208.	558.	7.9	93.4	93.0	-0.426E-06

Table 2 (cont.)

DATA RELATED TO SOLAR EFFECTS ON ACCELERATION OF SATELLITE 1959 α1

T (MJD)	Z	φ	ψ	D.R.A.	$\dot{P}$
37210.	559.	13.4	94.2	93.4	-0.365E-06
37212.	559.	18.6	95.2	94.0	-0.486E-06
37214.	562.	23.3	97.5	95.9	-0.441E-06
37216.	562.	27.2	99.9	98.0	-0.365E-06
37218.	558.	30.1	102.0	99.9	-0.242E-06
37220.	559.	32.0	105.2	103.1	-0.328E-06
37222.	559.	32.9	108.5	106.7	-0.351E-06
37224.	558.	32.4	112.0	110.3	-0.319E-06
		PERIGEE IN EARTH SHADOW			
37226.	558.	30.8	115.3	113.6	-0.304E-06
37228.	558.	28.0	118.2	116.4	-0.152E-06
37230.	557.	24.3	120.9	119.0	-0.243E-06
37232.	558.	19.9	122.1	120.0	-0.274E-06
37234.	557.	14.9	122.6	120.8	-0.167E-06
37236.	557.	9.5	122.2	121.0	-0.122E-06
37238.	558.	3.9	121.1	121.1	-0.129E-06
37240.	558.	-1.8	119.3	121.0	-0.140E-06
37242.	559.	-7.5	117.2	120.9	-0.152E-06
37244.	562.	-13.1	115.0	121.2	-0.167E-06
		PERIGEE IN SUNLIGHT			
37246.	569.	-18.3	112.9	121.7	-0.912E-07
37248.	563.	-22.9	111.2	122.8	-0.289E-06
37250.	565.	-26.9	110.9	125.6	-0.274E-06
37252.	567.	-30.0	109.9	127.0	-0.274E-06
37254.	567.	-32.0	110.3	130.1	-0.272E-06
37256.	567.	-32.9	111.6	133.5	-0.152E-06
		PERIGEE IN EARTH SHADOW			
37258.	567.	-32.5	113.6	137.0	-0.175E-06
37260.	567.	-30.8	116.3	140.1	-0.161E-06
37262.	565.	-28.1	119.5	142.7	-0.137E-06
37264.	564.	-24.4	123.2	144.7	-0.143E-06
37266.	562.	-19.9	127.0	145.9	-0.122E-06

Table 2 (cont.)

DATA RELATED TO SOLAR EFFECTS ON ACCELERATION OF SATELLITE 1959 $\alpha 1$

T (MJD)	Z	φ	ψ	D.R.A.	$\dot{P}$
37268.	561.	-14.9	130.9	146.5	-0.126E-06
37270.	560.	-9.5	134.6	146.6	-0.178E-06
37272.	562.	-3.8	138.2	146.5	-0.273E-06
37274.	558.	1.9	141.2	146.2	-0.258E-06
37276.	559.	7.6	143.9	145.9	-0.198E-06
37278.	559.	13.1	146.2	145.9	-0.213E-06
37280.	556.	18.2	148.0	146.2	-0.167E-06
37282.	560.	22.9	149.7	147.0	-0.122E-06
37284.	559.	26.8	151.3	148.4	-0.122E-06
37286.	560.	29.9	153.0	150.6	-0.182E-06
37288.	560.	32.0	155.1	153.5	-0.182E-06
37290.	560.	32.9	157.6	156.9	-0.152E-07
37292.	560.	32.5	160.3	160.1	-0.912E-07
37294.	558.	30.9	163.3	163.2	-0.122E-06
37296.	561.	28.2	166.0	165.4	0.137E-07
37298.	557.	24.5	168.3	167.3	-0.592E-07
37300.	558.	20.2	168.8	168.4	-0.729E-07
37302.	557.	15.2	167.0	169.0	-0.532E-07
37304.	557.	9.8	163.4	169.1	-0.775E-07
37306.	557.	4.1	158.8	168.9	-0.456E-07
37308.	557.	-1.6	153.7	168.6	-0.456E-07
37310.	559.	-7.3	148.7	168.3	-0.182E-07
37312.	560.	-12.8	143.8	168.3	-0.152E-07
37314.	562.	-18.0	139.3	168.7	-0.365E-07
37316.	563.	-22.7	135.3	169.6	-0.289E-07
37318.	565.	-26.7	132.1	171.3	-0.334E-07
37320.	566.	-29.8	129.8	173.6	-0.258E-07
37322.	567.	-31.9	128.4	176.6	-0.182E-07
37324.	568.	-32.9	128.1	179.9	-0.608E-07
37326.	568.	-32.5	128.8	183.4	-0.608E-07
37328.	567.	-30.9	130.6	186.6	-0.456E-07
37330.	566.	-28.2	133.4	189.3	-0.304E-08
37332.	564.	-24.6	137.0	191.4	-0.456E-07

Table 2 (cont.)

DATA RELATED TO SOLAR EFFECTS ON ACCELERATION OF SATELLITE 1959 α1

T (MJD)	Z	φ	ψ	D.R.A.	$\dot{P}$
37334.	563.	-20.1	141.4	192.8	-0.744E-07
37336.	561.	-15.1	146.4	193.5	-0.911E-07
37338.	560.	-9.8	151.6	193.8	-0.911E-07
37340.	559.	-4.1	156.9	193.8	-0.608E-07
37342.	558.	1.6	161.8	193.7	-0.638E-07
37344.	558.	7.3	165.3	193.7	-0.425E-07
37346.	558.	12.8	166.5	193.9	-0.638E-07
37348.	558.	18.0	164.7	194.4	-0.699E-07
37350.	559.	22.7	161.1	195.6	-0.699E-07
37352.	559.	26.7	156.9	197.4	-0.380E-07
37354.	559.	29.8	152.6	199.9	-0.395E-07
37356.	559.	31.9	148.7	202.9	-0.152E-07
37358.	559.	32.8	145.3	206.3	-0.273E-07
37360.	561.	32.5	142.4	210.1	-0.304E-07
37362.	560.	31.0	140.3	213.5	-0.608E-08
37364.	550.	28.3	138.8	216.5	-0.152E-07
37366.	552.	24.7	138.0	218.7	-0.106E-07
37368.	551.	20.3	137.8	220.2	-0.152E-08
37370.	550.	15.3	137.9	221.1	-0.213E-07
37372.	558.	10.0	138.2	221.4	0.213E-07
37374.	558.	4.4	138.4	221.6	0.243E-07
37376.	558.	-1.3	138.3	221.6	0.608E-08
37378.	559.	-7.0	137.8	221.7	-0.365E-09
37380.	560.	-12.6	136.6	222.0	0.760E-08
37382.	562.	-17.8	134.9	222.7	0.760E-08
37384.	563.	-22.8	132.0	224.7	-0.456E-08
37386.	565.	-26.5	130.1	225.9	-0.152E-07
37388.	566.	-29.7	127.2	228.5	-0.304E-07
37390.	567.	-31.9	124.3	231.8	-0.456E-07
37392.	575.	-32.9	121.4	235.6	-0.304E-07
37394.	569.	-32.5	118.9	239.3	-0.152E-08
37396.	560.	-31.0	117.1	242.3	-0.456E-07

Table 2 (cont.)

DATA RELATED TO SOLAR EFFECTS ON ACCELERATION OF SATELLITE 1959 α1

T (MJD)	Z	φ	ψ	D.R.A.	$\dot{P}$
37398.	565.	-28.3	114.9	245.6	-0.152E-07
37400.	564.	-24.7	113.4	247.9	-0.152E-07
		PERIGEE IN SUNLIGHT			
37402.	563.	-20.3	112.3	249.4	-0.304E-07
37404.	561.	-15.4	111.3	250.4	-0.608E-07
37406.	561.	-10.0	110.4	250.9	-0.608E-07
37408.	558.	-4.4	109.4	251.0	-0.304E-07
37410.	556.	1.4	108.3	251.0	-0.304E-07
37412.	558.	7.1	106.7	251.1	-0.304E-07
37414.	559.	12.7	104.7	251.4	-0.304E-07
37416.	563.	17.9	102.1	252.2	0.152E-07
37418.	538.	22.2	100.2	252.5	-0.911E-07
37420.	558.	26.5	96.4	254.8	0.152E-07
37422.	558.	29.7	93.0	257.3	-0.334E-07
37424.	559.	31.8	89.5	260.3	-0.608E-07
37426.	559.	32.8	86.1	263.8	-0.380E-07
37428.	559.	32.6	83.0	267.3	0.456E-08
37430.	559.	31.1	80.4	270.6	0.167E-07
37432.	559.	28.5	78.5	273.4	0.608E-08
37434.	558.	24.9	77.4	275.5	-0.197E-07
37436.	558.	20.6	77.1	277.0	-0.167E-07
37438.	557.	15.6	77.7	277.8	-0.304E-08
37440.	557.	10.3	79.0	278.1	-0.137E-07
37442.	557.	4.7	80.8	278.1	-0.243E-07
37444.	558.	-1.1	83.0	277.9	-0.304E-07
37446.	559.	-6.8	85.2	277.8	-0.273E-07
37448.	560.	-12.3	87.3	277.9	-0.152E-08
37450.	561.	-17.5	89.1	278.3	0.167E-07
37452.	563.	-22.3	90.2	279.3	0.304E-07
37454.	564.	-26.4	90.6	281.0	0.456E-07
37456.	566.	-29.6	90.3	283.4	-0.760E-08
37458.	568.	-31.8	89.1	286.3	-0.911E-08

Table 2 (cont.)

DATA RELATED TO SOLAR EFFECTS ON ACCELERATION OF SATELLITE 1959 α1

T (MJD)	Z	φ	ψ	D.R.A.	$\dot{P}$
37460.	568.	-32.8	87.2	289.7	-0.152E-08
37462.	567.	-32.6	84.6	293.2	-0.167E-07
37464.	566.	-31.1	81.5	296.5	-0.304E-07
37466.	565.	-28.5	78.2	299.2	-0.304E-07
37468.	564.	-24.9	74.6	301.3	-0.304E-07
37470.	563.	-20.5	71.1	302.6	-0.760E-07
37472.	560.	-15.6	67.7	303.4	-0.760E-07
37474.	559.	-10.2	64.5	303.7	-0.608E-07
37476.	558.	-4.6	61.6	303.6	0.152E-07
37478.	560.	1.1	59.2	303.3	0.608E-07
37480.	559.	6.8	56.8	303.2	-0.911E-07
37482.	559.	12.4	54.8	303.3	0.122E-06
37484.	559.	17.6	52.8	303.7	-0.456E-07
37486.	559.	22.3	50.9	304.6	-0.456E-07
37488.	560.	26.4	48.8	306.2	-0.456E-07
37490.	561.	29.6	46.5	308.5	-0.790E-07
37492.	561.	31.8	44.0	311.4	-0.759E-07
37494.	562.	32.8	41.4	314.8	-0.608E-07
37496.	562.	32.6	38.6	318.1	-0.911E-07
37498.	561.	31.1	35.8	321.5	-0.106E-06
37500.	561.	28.6	33.3	324.3	-0.100E-06
37502.	560.	25.1	31.3	326.4	-0.623E-07
37504.	559.	20.7	30.1	327.8	-0.668E-07
37506.	559.	15.8	30.0	328.7	-0.866E-07
37508.	558.	10.5	31.1	329.0	-0.911E-07
37510.	559.	4.9	33.2	329.1	-0.304E-07
37512.	559.	-0.8	35.9	329.0	0.152E-07

Table 3

MEAN ORBITAL ELEMENTS OF SATELLITE 1959 α2
APRIL 2, 1960 THROUGH JULY 24, 1961

T (MJD)	ω	Ω	i	e	M	n	n′/2	q	N	D	σ
37026.0	357.40 9	277.09 2	32.919 9	.1832 4	.2898 4	11.08883 5	.14E-4 1	6.937364	26	8	.47
37028.0	7.24 9	270.49 2	32.912 6	.1836 4	.4678 4	11.08898 7	.8E-5 1	6.933686	27	8	.46
37030.0	17.06 9	263.91 1	32.912 4	.1837 4	.6458 4	11.08897 6	.7E-5 1	6.937223	27	8	.41
37032.0	26.7 3	257.36 3	32.907 8	.185 1	.825 1	11.0889 1	.4E-5 3	6.919570	30	8	1.10
37034.0	35.8 5	250.82 5	32.902 9	.188 2	1.006 2	11.0896 3	.10E-4 5	6.897100	25	8	1.20
37036.0	45.6 4	244.26 4	32.900 5	.188 1	1.184 2	11.0895 2	.16E-4 4	6.897880	21	8	.92
37038.0	55.4 5	237.69 4	32.899 6	.187 2	1.362 2	11.0892 2	.14E-4 4	6.902685	18	8	.96
37040.0	66.45 4	230.98 3	32.905 4	.1837 1	1.53545 1	11.08909 4	.8E-5 3	6.933084	22	8	.72
37042.0	76.28 2	224.43 1	32.894 3	.18367 8	1.71363 2	11.08912 1	.16E-4 2	6.933178	34	8	.81
37044.0	86.18 3	217.84 2	32.881 6	.1836 2	1.89194 4	11.08915 3	-.10E-4 5	6.933590	41	8	1.49
37046.0	96.06 1	211.218 8	32.887 8	.18391 8	2.07034 2	11.08919 2	.4E-5 4	6.931094	38	8	.63
37048.0	106.00 1	204.622 9	32.887 3	.18395 9	2.24875 2	11.08923 2	.16E-5 5	6.930729	42	8	.69
37050.0	115.83 3	198.01 2	32.892 6	.1840 2	2.42734 6	11.08932 3	.24E-4 8	6.930540	32	8	1.58
37052.0	125.73 3	191.42 2	32.895 6	.1841 2	2.60599 6	11.08935 3	.4E-5 5	6.929715	35	8	1.75
37054.0	135.59 3	184.85 2	32.907 5	.1839 1	2.78469 7	11.08938 3	.15E-4 5	6.930826	44	8	1.78
37056.0	145.46 2	178.28 2	32.911 4	.1838 1	2.96350 6	11.08945 3	.2E-5 3	6.932207	45	8	1.42
37058.0	155.277 9	171.729 6	32.913 1	.18362 5	3.14245 3	11.08944 1	.3E-5 2	6.933430	48	8	.51
37060.0	165.18 1	165.144 7	32.914 2	.18352 7	3.32130 3	11.08942 1	.2E-5 2	6.934306	55	8	.52
37062.0	175.057 9	158.565 6	32.918 1	.18346 8	3.50025 3	11.08951 1	.9E-5 1	6.934739	69	8	.46
37064.0	184.940 7	151.992 4	32.992 1	.18330 6	3.67920 2	11.089533 9	.11E-4 1	6.936085	89	8	.47
37066.0	194.828 7	145.408 4	32.925 1	.18314 6	3.85826 2	11.08952 1	.6E-5 1	6.937452	81	8	.45
37068.0	204.755 9	138.820 5	32.926 1	.18316 7	4.03733 3	11.08953 1	.4E-5 1	6.937344	76	8	.48
37070.0	214.641 9	132.248 5	32.931 2	.18315 7	4.21653 4	11.08963 1	.8E-5 2	6.937359	64	8	.55
37072.0	224.522 7	125.668 5	32.935 2	.18304 5	4.39580 2	11.08966 1	.6E-5 2	6.938234	70	8	.49
37074.0	234.420 7	119.089 5	32.940 1	.18300 4	4.57509 2	11.089649 8	.4E-5 1	6.938622	83	8	.42
37076.0	244.328 6	112.498 6	32.943 1	.18296 4	4.75441 2	11.089653 8	.4E-5 2	6.938936	87	8	.37
37078.0	254.230 6	105.925 5	32.943 1	.18283 4	4.93373 2	11.08970 2	.2E-5 1	6.940065	89	8	.31
37080.0	264.124 6	99.343 6	32.944 2	.18279 4	5.11315 2	11.089705 8	.02E-5 2	6.940407	74	8	.33
37082.0	274.004 7	92.789 7	32.941 1	.18278 4	5.29255 2	11.08970 1	.10E-4 2	6.940445	72	8	.40
37084.0	283.899 6	86.224 4	32.938 1	.18283 5	5.47201 1	11.089747 7	.7E-5 1	6.939972	61	8	.52

Table 3 (cont.)

MEAN ORBITAL ELEMENTS OF SATELLITE 1959 α2

T (MJD)	ω	Ω	i	e	M	n	n′/2	q	N	D	σ
37086.0	293.798 6	79.648 4	32.937 1	.18286 6	5.65153 2	11.089775 6	.85E-5 8	6.939763	57	8	.53
37088.0	303.705 9	73.069 6	32.936 2	.18292 9	5.83111 3	11.08980 1	.8E-5 1	6.939201	37	8	.58
37090.0	313.61 2	66.501 7	32.938 2	.1829 2	6.01071 6	11.08982 2	.5E-5 3	6.939529	21	8	.50
37092.0	323.48 8	59.90 4	32.93 1	.1833 4	6.1901 2	11.08994 6	.08E-4 1	6.936381	15	8	2.42
37094.0	333.30 4	53.36 3	32.917 7	.1833 2	6.37045 8	11.08975 3	.48E-4 5	6.935808	15	8	1.21
37096.0	343.28 1	46.76 1	32.923 4	.18332 9	6.55021 5	11.09001 2	.5E-5 3	6.935724	21	8	.73
37098.0	353.18 2	40.18 1	32.922 3	.18330 8	6.73016 5	11.09005 2	.11E-4 2	6.935917	21	8	.66
37100.0	3.06 1	33.599 6	32.921 3	.18338 6	6.91026 4	11.09005 1	.9E-5 2	6.935245	21	8	.48
37102.0	13.00 3	27.02 1	32.922 7	.1835 1	7.09032 9	11.09011 3	.11E-4 3	6.934501	22	8	1.12
37104.0	22.87 3	20.083 9	32.917 6	.1833 1	7.27045 8	11.09013 2	.13E-4 4	6.935625	25	8	.88
37106.0	32.74 3	13.857 9	32.921 6	.1834 1	7.45079 8	11.09015 2	.8E-5 3	6.934747	28	8	.83
37108.0	42.66 3	7.265 8	32.911 5	.18327 9	7.63099 8	11.09019 2	.9E-5 3	6.936067	28	8	.81
37110.0	52.57 7	.66 2	32.91 1	.1833 2	7.8113 2	11.09015 5	.7E-5 6	6.936305	29	8	1.97
37112.0	62.54 9	354.06 2	32.90 1	.1832 3	7.9915 3	11.09015 8	.1E-4 1	6.937075	25	8	2.20
37114.0	72.3 1	347.46 3	32.88 1	.1833 4	8.1725 4	11.09046 8	.02E-4 1	6.936145	19	8	2.23
37116.0	82.05 6	340.89 3	32.89 1	.1836 2	8.3537 3	11.09033 5	.29E-4 8	6.933094	16	8	1.42
37118.0	91.93 2	334.33 2	32.901 5	.18361 8	8.5344 1	11.09046 3	.22E-4 4	6.933098	13	8	.44
37120.0	101.77 2	327.73 2	32.897 4	.18370 6	8.71551 8	11.09055 2	.19E-4 5	6.932276	14	8	.45
37122.0	111.63 3	321.16 2	32.901 5	.18364 6	8.89662 9	11.09055 6	.17E-4 5	6.932757	13	8	.49
37124.0	121.50 2	314.581 8	32.897 3	.18356 5	9.07784 7	11.09069 2	.12E-4 3	6.933399	17	8	.48
37126.0	131.40 3	308.001 9	32.896 3	.18342 5	9.25909 9	11.09073 4	.17E-4 3	6.934624	18	8	.56
37128.0	141.32 3	301.41 3	32.895 3	.18332 5	9.44044 9	11.09074 3	.14E-4 3	6.935423	25	8	.67
37130.0	151.23 2	294.822 6	32.894 2	.18323 3	9.62192 7	11.09085 3	.16E-4 3	6.936181	32	8	.58
37132.0	161.06 2	288.237 6	32.894 2	.18318 3	9.80376 6	11.09094 2	.8E-5 2	6.936521	39	8	.56
37134.0	170.93 2	281.654 4	32.895 2	.18312 2	9.98554 5	11.09091 2	.10E-4 2	6.937036	50	8	.47
37136.0	180.81 1	275.070 4	32.894 2	.18304 2	10.16738 4	11.09091 2	.7E-5 1	6.937712	66	8	.47
37138.0	190.73 1	268.490 4	32.895 2	.18297 2	10.34916 4	11.09094 3	.8E-5 2	6.938325	77	8	.44
37140.0	200.64 1	261.907 4	32.896 2	.18289 2	10.53108 4	11.09096 2	.8E-5 2	6.939035	82	8	.45
37142.0	210.551 9	255.326 4	32.900 2	.18279 2	10.71304 3	11.09099 2	.4E-5 2	6.939839	84	8	.48
37144.0	220.470 9	248.740 4	32.901 2	.18272 2	10.89503 3	11.09100 2	.8E-5 1	6.940380	89	8	.45
37146.0	230.38 1	242.154 4	32.901 2	.18268 2	11.07714 4	11.09108 2	.9E-5 1	6.940687	86	8	.46

Table 3 (cont.)

MEAN ORBITAL ELEMENTS OF SATELLITE 1959 α2

T (MJD)	ω	Ω	i	e	M	n	n'/2	q	N	D	σ
37148.0	240.29 1	235.568 4	32.900 1	.18266 2	11.25934 4	11.09109 2	.9E-5 2	6.940871	79	8	.42
37150.0	254.22 2	228.986 5	32.901 1	.18259 3	11.44150 7	11.09108 4	.6E-5 2	6.941527	62	8	.41
37152.0	260.08 3	222.413 8	32.902 2	.18265 5	11.6240 1	11.09115 6	.11E-4 2	6.940987	54	8	.54
37154.0	270.01 3	214.824 7	32.898 2	.18255 4	11.8063 1	11.09098 8	.5E-5 2	6.941868	45	8	.41
37156.0	280.01 3	209.239 6	32.896 2	.18249 3	11.98839 9	11.09109 5	.15E-4 3	6.942300	64	8	.38
37158.0	290.00 3	202.653 7	32.896 2	.18250 3	12.1706 1	11.0912 1	.13E-4 8	6.942251	50	8	.37
37160.0	299.81 2	196.107 6	32.909 1	.18258 3	12.35349 8	11.09132 3	.20E-4 1	6.941473	111	8	.41
37162.0	309.9 1	189.55 4	32.90 1	.1827 1	12.5357 4	11.0917 7	.2E-4 9	6.940291	23	8	1.97
37164.0	319.66 2	182.900 9	32.912 2	.18262 3	12.71939 8	11.09146 6	.40E-4 5	6.941047	33	8	.54
37166.0	329.58 2	176.331 7	32.912 2	.18267 3	12.90265 8	11.09171 4	.39E-4 2	6.940544	38	8	.54
37168.0	339.43 2	169.733 6	32.911 2	.18277 2	13.08654 5	11.09187 1	.353E-4 7	6.939609	75	8	.60
37170.0	349.31 2	163.158 6	32.917 3	.18277 2	13.27044 8	11.09202 5	.19E-4 3	6.939609	53	8	.64
37172.0	359.20 2	156.575 6	32.918 2	.18284 2	13.45449 8	11.09207 4	.29E-4 2	6.938991	56	8	.61
37174.0	9.07 2	150.003 6	32.915 2	.18292 2	13.63880 7	11.09211 4	.18E-4 2	6.938218	53	8	.58
37176.0	19.01 2	143.414 7	32.918 2	.18301 2	13.82301 7	11.09216 5	.17E-4 3	6.937461	45	8	.62
37178.0	28.85 3	136.842 9	32.919 3	.18305 3	14.00759 9	11.09235 5	.16E-4 3	6.937025	35	8	.78
37180.0	38.75 3	130.25 1	32.926 3	.18315 3	14.19217 9	11.09243 4	.17E-4 3	6.936142	30	8	.78
37182.0	48.61 3	123.68 8	32.925 3	.18326 3	14.37693 8	11.09241 5	.16E-4 3	6.935271	22	8	.66
37184.0	58.49 7	117.09 2	32.925 9	.18330 8	14.5619 2	11.0926 1	.1E-4 1	6.934851	24	8	1.67
37186.0	68.35 8	110.49 2	32.92 1	.1833 1	14.7471 3	11.0925 1	.21E-4 9	6.935256	24	8	1.89
37188.0	78.20 8	103.91 2	32.92 1	.1833 1	14.9325 3	11.09259 9	.36E-4 8	6.935102	26	8	1.80
37190.0	88.11 2	97.331 6	32.927 4	.18338 4	15.11783 7	11.09291 3	.40E-4 3	6.934052	27	8	.60
37192.0	97.94 2	90.750 5	32.924 3	.18338 3	15.30381 5	11.09305 2	.45E-4 2	6.933977	34	8	.53
37194.0	107.78 2	84.169 5	32.920 3	.18333 3	15.49015 5	11.09325 3	.44E-4 2	6.934275	41	8	.62
37196.0	117.65 2	77.583 6	32.920 3	.18327 4	15.67672 7	11.09332 4	.56E-4 3	6.934776	38	8	.66
37198.0	127.56 2	70.995 6	32.918 4	.18316 4	15.86368 8	11.09348 3	.36E-4 3	6.935658	30	8	.65
37200.0	137.48 5	64.42 2	32.920 7	.18317 8	16.0508 2	11.09362 7	.48E-4 7	6.935504	28	8	1.30
37202.0	147.35 3	57.84 1	32.923 5	.18307 6	16.2385 1	11.09397 5	.47E-4 4	6.936192	34	8	1.19
37204.0	157.20 2	51.236 8	32.923 3	.18293 4	16.42671 7	11.09410 3	.31E-4 2	6.937322	43	8	.81
37206.0	167.06 1	44.651 5	32.924 2	.18290 2	16.61504 5	11.09418 2	.27E-4 2	6.937587	39	8	.48

Table 3 (cont.)

MEAN ORBITAL ELEMENTS OF SATELLITE 1959 α2

T (MJD)	ω	Ω	i	e	M	n	n′/2	q	N	D	σ
37208.0	176.95 2	38.063 6	32.924 3	.18280 4	16.80353 7	11.09428 4	.26E-4 3	6.938365	29	8	.49
37210.0	186.89 4	31.48 1	32.922 5	.18280 6	16.9921 1	11.09428 3	.12E-4 4	6.938388	18	8	.65
37212.0	196.82 3	24.89 1	32.923 4	.18273 7	17.1808 1	11.09453 5	.30E-4 4	6.938838	19	8	.64
37214.0	206.69 3	18.30 1	32.923 4	.18267 7	17.3700 1	11.09466 1	.34E-4 4	6.939349	16	8	.66
37216.0	216.54 5	11.72 2	32.925 5	.1825 1	17.5596 2	11.09473 3	.23E-4 4	6.940921	20	8	.95
37218.0	226.50 5	5.14 2	32.925 7	.1826 2	17.7489 2	11.09480 6	.32E-4 7	6.940060	27	8	1.54
37220.0	236.42 4	358.58 2	32.923 6	.1824 1	17.9386 1	11.09493 5	.12E-4 7	6.941174	31	8	1.40
37222.0	246.36 3	352.01 2	32.922 4	.1824 1	18.1285 1	11.09490 6	.21E-4 6	6.941638	32	8	1.05
37224.0	256.5 1	345.39 4	32.922 6	.1821 2	18.3181 4	11.0948 2	.37E-4 7	6.943978	26	8	1.17
37226.0	266.2 2	338.80 2	32.920 3	.1824 2	18.5096 7	11.0952 2	.36E-4 3	6.941704	28	8	.52
37228.0	275.98 2	332.21 1	32.917 4	.18232 8	18.70086 8	11.09545 3	.40E-4 4	6.941930	31	8	.80
37230.0	285.90 2	325.635 9	32.916 4	.18237 7	18.89194 5	11.09563 3	.37E-4 4	6.941501	30	8	.71
37232.0	295.88 2	319.047 8	32.914 4	.18227 8	19.08310 6	11.09557 3	.9E-5 4	6.942335	31	8	.68
37234.0	305.87 3	312.449 7	32.918 4	.18238 6	19.27431 8	11.09569 4	.33E-4 3	6.941372	35	8	.57
37236.0	315.78 2	305.865 6	32.914 3	.18251 3	19.46609 6	11.09590 2	.23E-4 2	6.940173	39	8	.59
37238.0	325.72 2	299.264 5	32.923 3	.18261 8	19.65795 5	11.096000 8	.24E-4 1	6.939311	41	8	.57
37240.0	335.65 2	292.676 6	32.924 5	.18270 9	19.84999 5	11.09609 1	.290E-4 9	6.938443	39	8	.88
37242.0	345.54 2	286.093 8	32.923 5	.18277 8	20.04233 4	11.09622 1	.30E-4 1	6.937861	33	8	.93
37244.0	355.45 2	279.51 1	32.921 5	.18285 8	20.23488 4	11.09634 1	.32E-4 1	6.937088	29	8	.92
37246.0	5.34 2	272.92 2	32.916 4	.18292 7	20.42772 4	11.09650 2	.35E-4 1	6.936441	36	8	.92
37248.0	15.247 9	266.317 7	32.913 2	.18309 4	20.62082 2	11.096645 6	.394E-4 5	6.934895	36	8	.44
37250.0	25.13 1	259.735 7	32.912 1	.18314 4	20.81428 2	11.096817 6	.439E-4 5	6.934434	42	8	.50
37252.0	35.018 8	251.135 6	32.910 1	.18322 4	21.00810 2	11.096992 6	.433E-4 6	6.933680	47	8	.49
37254.0	44.90 1	246.544 9	32.911 2	.18328 6	21.20226 2	11.09718 1	.38E-4 2	6.933072	43	8	.64
37256.0	57.24 8	239.98 2	32.911 3	.1828 1	21.3922 3	11.0972 1	.35E-4 2	6.937431	39	8	.69
37258.0	64.659 8	233.354 7	32.909 1	.18343 4	21.59131 1	11.097344 5	.205E-4 5	6.931790	47	8	.58
37260.0	74.522 9	226.773 7	32.907 2	.18349 4	21.78609 1	11.097422 6	.202E-4 7	6.931180	41	8	.58
37262.0	84.40 1	220.184 8	32.905 2	.18348 4	21.98102 2	11.097486 8	.153E-4 5	6.931260	40	8	.75
37264.0	94.283 8	213.594 6	32.905 2	.18347 4	22.17606 1	11.097542 5	.114E-4 7	6.931366	30	8	.54
37266.0	104.151 8	207.002 5	32.905 2	.18342 3	22.37123 1	11.097612 7	.141E-4 6	6.931747	30	8	.49
37268.0	114.03 1	200.410 6	32.906 2	.18337 4	22.56647 2	11.097657 8	.15E-4 1	6.932116	27	8	.58

Table 3 (cont.)

MEAN ORBITAL ELEMENTS OF SATELLITE 1959 α2

T (MJD)	ω	Ω	i	e	M	n	n′/2	q	N	D	σ
37270.0	123.92 [illegible]	193.814 7	32.906 2	.18331 5	22.76183 2	11.097711 9	.18E-4 1	6.932641	25	8	.[illegible]
37272.0	133.80 1	187.219 6	32.905 2	.18327 6	22.95735 2	11.097799 9	.207E-4 7	6.932959	29	8	.50
37274.0	143.68 1	180.627 6	32.907 2	.18321 8	23.15305 3	11.09790 1	.218E-4 8	6.933992	23	8	.49
37276.0	153.57 1	174.031 5	32.906 2	.18306 8	23.34892 3	11.097973 8	.255E-4 8	6.934626	25	8	.40
37278.0	163.463 8	167.442 5	32.908 1	.18293 7	23.54498 2	11.098056 8	.252E-4 5	6.935692	28	8	.38
37280.0	173.371 7	160.845 4	32.911 1	.18291 4	23.74121 2	11.098169 7	.241E-4 5	6.935848	32	8	.38
37282.0	183.282 6	154.248 4	32.912 1	.18285 3	23.93763 1	11.098264 6	.225E-4 8	6.936293	40	8	.42
37284.0	193.195 6	147.650 4	32.915 1	.18279 3	24.13425 1	11.098358 7	.209E-4 8	6.936770	40	8	.44
37286.0	203.100 6	141.062 4	32.918 2	.18269 3	24.33105 2	11.098427 6	.168E-4 9	6.937580	49	8	.52
37288.0	213.017 7	134.469 4	32.921 2	.18263 4	24.52796 2	11.09850 1	.17E-4 1	6.938026	42	8	.51
37290.0	222.932 8	127.875 5	32.921 2	.18251 6	24.72503 3	11.098552 8	.14E-4 1	6.939078	41	8	.57
37292.0	232.860 8	121.282 5	32.921 2	.18253 6	24.92215 3	11.098595 8	.12E-4 1	6.938890	41	8	.54
37294.0	242.790 8	114.692 6	32.921 2	.18256 6	25.11934 3	11.098643 6	.12E-4 1	6.938621	44	8	.54
37296.0	252.703 6	108.104 5	32.922 2	.18250 5	25.31670 3	11.098692 6	.12E-4 1	6.939045	43	8	.50
37298.0	262.620 5	101.521 6	32.926 2	.18261 6	25.51411 2	11.098783 5	.152E-4 5	6.938103	41	8	.41
37300.0	272.531 7	94.925 8	32.926 2	.18255 7	25.71172 2	11.098833 7	.182E-4 9	6.938624	35	8	.44
37302.0	282.45 1	88.34 1	32.926 2	.18258 7	25.90945 1	11.098899 7	.188E-4 9	6.938350	24	8	.39
37304.0	292.45 1	82.73 1	32.926 2	.18258 7	26.10730 3	11.09896 2	.16E-4 2	6.938824	25	8	.39
37306.0	302.37 7	75.53 2	32.926 2	.1827 1	26.3050 3	11.09894 7	.19E-4 3	6.937386	21	8	.41
37308.0	312.0 1	72.53 2	32.924 3	.1823 3	26.5042 7	11.0991 1	.10E-4 3	6.940835	28	8	.54
37310.0	322.0 1	62.97 2	32.921 3	.1824 4	26.7020 5	11.09916 7	.13E-4 1	6.939908	34	8	.53
37312.0	332.04 7	55.38 1	32.921 3	.1826 2	26.8999 3	11.09912 4	.13E-4 1	6.937819	40	8	.40
37314.0	341.91 6	52.81 1	32.914 4	.1827 2	27.1985 3	11.09915 5	.7E-5 1	6.937022	53	8	.43
37316.0	351.87 5	42.20 1	32.920 5	.1828 2	27.2968 3	11.09933 4	.6E-5 1	6.936136	57	8	.40
37318.0	1.76 4	35.616 8	32.912 5	.1830 2	27.4953 2	11.09938 4	.67E-5 8	6.934566	51	8	.35
37320.0	11.66 3	29.02 1	32.914 8	.1828 1	27.6940 1	11.09925 3	.08E-4 1	6.936479	51	8	.48
37322.0	21.61 1	22.421 6	32.922 5	.18303 4	27.89243 2	11.09933 1	.05E-4 2	6.934282	39	8	.54
37324.0	31.51 1	15.825 5	32.921 5	.18313 4	28.09113 2	11.099355 8	.54E-5 9	6.933460	31	8	.60
37326.0	41.40 1	9.230 5	32.920 6	.18320 4	28.28987 2	11.099380 8	.10E-5 2	6.932862	27	8	.60
37328.0	51.27 1	2.634 8	32.911 5	.18341 4	28.48871 2	11.099412 8	.86E-5 9	6.931062	18	8	.47
37330.0	61.16 1	356.039 9	32.913 3	.18342 2	28.68760 2	11.099457 6	.73E-5 6	6.930976	23	8	.46

MEAN ORBITAL ELEMENTS OF SATELLITE 1959 α2

T (MJD)	ω	Ω	i	e	M	n	n′/2	q	N	D	σ
37332.0	71.03 2	349.44 1	32.913 3	.18345 2	28.88656 2	11.099491 9	.89E-5 6	6.930692	20	8	.42
37334.0	80.92 3	342.83 1	32.910 2	.18346 2	29.08557 5	11.09953 5	.82E-5 4	6.930618	19	8	.46
37336.0	90.80 1	336.245 7	32.910 1	.18347 2	29.28466 2	11.099556 6	.83E-5 3	6.930483	26	8	.47
37338.0	100.66 1	329.658 8	32.911 1	.18349 2	29.48382 2	11.09960 2	.73E-5 5	6.930263	24	8	.54
37340.0	110.53 1	323.069 8	32.911 1	.18349 2	29.68305 2	11.099618 9	.40E-5 6	6.930252	35	8	.60
37342.0	120.40 1	316.481 7	32.912 1	.18346 2	29.88230 2	11.099638 7	.44E-5 5	6.930561	40	8	.59
37344.0	130.28 1	309.886 8	32.912 1	.18340 2	30.08161 2	11.09967 1	.68E-5 7	6.930998	38	8	.61
37346.0	140.18 3	303.30 2	32.914 3	.18332 5	30.28091 5	11.09971 1	.8E-5 1	6.931738	40	8	1.29
37348.0	150.18 5	296.66 2	32.912 4	.18300 9	30.48017 8	11.09969 2	.3E-5 2	6.934433	30	8	1.14
37350.0	160.06 4	290.07 2	32.915 4	.18297 7	30.67964 6	11.09974 2	.7E-5 1	6.934664	26	8	1.15
37352.0	169.93 3	283.484 8	32.916 4	.18295 6	30.87918 5	11.09977 1	.53E-5 9	6.934798	19	8	.85
37354.0	179.83 3	276.897 4	32.917 3	.18286 6	31.07871 6	11.099791 3	.8E-5 2	6.935572	10	6	.46
37356.0	189.77 3	270.314 4	32.918 2	.18273 5	31.27822 6	11.09979 1	.60E-5 9	6.936706	12	8	.40
37358.0	199.5 1	263.70 2	32.921 4	.1829 2	31.4782 3	11.09984 9	.4E-5 4	6.934981	7	8	.41
37360.0	209.64 5	257.128 9	32.924 6	.18246 9	31.6775 1	11.099857 3	.44E-5 8	6.938916	9	12	.70
37362.0	219.42 5	250.47 1	32.949 6	.1837 7	31.8773 2	11.099879 2	.47E-5 9	6.928564	7	12	.31
37364.0	229.37 7	243.89 1	32.947 7	.1829 1	32.0772 3	11.099899 5	.5E-5 2	6.935408	6	12	.34
37366.0	239.27 5	237.34 1	32.925 8	.1824 2	32.2771 2	11.099915 5	.47E-5 7	6.939102	10	12	.50
37368.0	249.22 1	230.747 6	32.927 1	.18262 5	32.47681 3	11.099936 3	.37E-5 7	6.937542	16	12	.36
37370.0	259.16 1	224.137 5	32.926 2	.1826 1	32.67670 2	11.099951 3	.37E-5 5	6.937602	35	12	.54
37372.0	269.09 1	217.542 5	32.924 1	.18258 2	32.87959 2	11.099965 1	.37E-5 5	6.937886	42	12	.53
37374.0	278.991 9	210.973 5	32.925 1	.18259 2	33.07655 2	11.099980 7	.3E-5 1	6.937776	41	8	.48
37376.0	288.93 1	204.368 5	32.924 2	.18259 3	33.27651 1	11.10000 1	.27E-5 8	6.937746	48	8	.63
37378.0	298.84 1	197.772 6	32.924 2	.18261 3	33.47653 3	11.10002 1	.49E-5 7	6.937625	61	8	.61
37380.0	308.77 2	191.177 5	32.922 2	.18263 3	33.67654 3	11.10003 6	.66E-5 9	6.937406	49	8	.59
37382.0	318.68 2	184.589 5	32.923 2	.18269 5	33.87666 4	11.10006 2	.34E-5 6	6.936901	53	8	.58
37384.0	328.62 2	177.993 4	32.922 1	.18268 3	34.07672 3	11.10005 1	.39E-5 6	6.936986	48	8	.43
37386.0	338.51 3	171.403 9	32.922 1	.18279 4	34.27693 6	11.10008 1	.61E-5 9	6.936048	40	8	.56
37388.0	348.43 2	164.81 1	32.921 1	.18289 4	34.47711 5	11.10008 1	.44E-5 6	6.935221	40	8	.55

Table 3 (cont.)

MEAN ORBITAL ELEMENTS OF SATELLITE 1959 α2

T (MJD)	ω	Ω	i	e	M	n	n′/2	q	N	D	σ
37390.0	358.39 2	158.21 7	32.919 2	.18286 2	34.67725 3	11.10012 1	.50E-5 9	6.935413	40	8	.62
37392.0	8.29 2	151.618 7	32.916 2	.18293	34.87752 3	11.10015 2	.59E-5 7	6.93484	41	8	.63
37394.0	18.19 2	145.026 7	32.915 2	.18299	35.07787 3	11.10019 2	.3E-5 1	6.93426	31	8	.59
37396.0	28.06 2	138.435 8	32.913 2	.18306	35.27828 4	11.10022 2	.42E-5 9	6.93371	29	8	.59
37398.0	37.93 5	138.86 2	32.907 5	.1832 3	35.47870 6	11.10021 2	.40E-5 7	6.93257	19	8	.50
37400.0	47.85 2	125.236 5	32.913 2	.18323 2	35.67913 4	11.10018 2	.32E-5 6	6.93230	20	8	.43
37402.0	57.74 2	118.640 3	32.915 2	.18330 2	35.87957 4	11.10023 1	.41E-5 6	6.93164	29	8	.52
37404.0	67.62 1	112.046 2	32.914 2	.18333 1	36.08006 3	11.10026 1	.55E-5 6	6.93136	30	8	.41
37406.0	77.50 1	108.452 2	32.914 2	.18336 1	36.28061 2	11.100287 7	.56E-5 4	6.93113	34	8	.36
37408.0	87.386 8	98.857 3	32.914 2	.18339 1	36.48119 2	11.100272 6	.23E-5 3	6.93091	40	8	.33
37410.0	97.280 8	92.260 4	32.912 1	.18337 1	36.68176 2	11.100288 6	.19E-5 3	6.93100	39	8	.31
37412.0	107.149 9	85.666 5	32.912 2	.18338 1	36.88240 2	11.100345 7	.43E-5 3	6.93091	46	8	.43
37414.0	117.01 1	79.070 4	32.911 1	.18336 1	37.08309 2	11.100359 7	.49E-5 3	6.93109	55	8	.42
37416.0	126.90 1	72.476 5	32.913 1	.18330 1	37.28379 2	11.100352 7	.33E-5 4	6.93158	53	8	.51
37418.0	136.78 1	65.882 5	32.914 1	.18324 1	37.48450 2	11.100360 7	.32E-5 4	6.93212	49	8	.52
37420.0	146.70 1	59.281 6	32.916 1	.18317 2	37.68519 3	11.100378 9	.23E-5 5	6.93268	52	8	.68
37422.0	156.611 8	52.688 3	32.9170 8	.18304 1	37.88591 2	11.100391 6	.12E-5 4	6.93376	39	8	.39
37424.0	166.51 1	46.092 3	32.9190 9	.18295 1	38.08667 2	11.100399 8	.14E-5 5	6.93455	37	8	.42
37426.0	176.41 1	39.501 4	32.921 1	.18288 1	38.28747 2	11.100400 8	.13E-5 5	6.93513	39	8	.43
37428.0	186.33 1	32.907 4	32.921 1	.18279 1	38.48823 3	11.10037 1	-.12E-5 4	6.93592	35	8	.42
37430.0	196.25 2	26.312 5	32.923 1	.18273 1	38.68897 4	11.10036 1	-.20E-5 7	6.93647	31	8	.46
37432.0	206.18 2	19.721 6	32.924 2	.18266 1	38.88971 4	11.10037 2	-.09E-5 5	6.93699	28	8	.44
37434.0	216.11 2	13.119 7	32.928 2	.18259 1	39.09045 4	11.10037 2	-.11E-5 6	6.93760	23	8	.41
37436.0	226.03 2	6.534 8	32.927 3	.18256 1	39.29120 4	11.10037 2	-.11E-5 6	6.93791	15	8	.38
37438.0	235.93 2	359.939 9	32.927 3	.18249 1	39.49199 5	11.10038 1	-.04E-5 5	6.93849	14	8	.34
37440.0	245.87 2	353.35 1	32.928 5	.18244 2	39.69272 4	11.10035 2	.01E-5 8	6.93889	15	8	.44
37442.0	255.83 2	346.72 1	32.944 8	.18241 2	39.89344 5	11.10030 4	-.1E-5 1	6.93919	14	8	.49
37444.0	265.77 3	340.16 1	32.94 1	.18242 4	40.09410 8	11.10031 4	.4E-5 2	6.93908	17	8	.89
37446.0	275.67 3	333.583 9	32.96 1	.18237 5	40.29489 8	11.10041 3	.4E-5 2	6.93951	15	8	.87
37448.0	285.61 3	327.01 1	32.95 1	.18250 7	40.49568 7	11.10047 3	-.4E-5 3	6.93832	14	8	.65
37450.0	295.5 2	320.40 7	32.93 5	.183 1	40.6965 2	11.10036 6	-.3E-5 2	6.93673	11	8	.27

Table 3 (cont.)

MEAN ORBITAL ELEMENTS OF SATELLITE 1959 α2

T (MJD)	ω	Ω	i	e	M	n	n′/2	q	N	D	σ
37452.0	305.58 6	313.82 1	32.940 7	.1838 4	40.89730 5	11.10047 2	.39E-5 7	6.92766	12	8	.30
37454.0	315.32 3	307.21 1	32.926 6	.18250 4	41.09827 5	11.10045 2	.18E-5 9	6.93835	12	8	.40
37456.0	325.27 5	300.61 2	32.922 6	.18261 4	41.2991 1	11.10045 4	.4E-5 2	6.93744	8	7	.37
37458.0	335.17 4	294.01 1	32.920 4	.18265 3	41.49996 6	11.10042 2	.04E-5 1	6.93709	14	8	.61
37460.0	345.11 2	287.411 8	32.917 2	.18273 2	41.70077 4	11.10043 1	.18E-5 7	6.93641	22	8	.53
37462.0	355.04 2	280.821 7	32.915 2	.18283 2	41.90161 3	11.10047 1	.15E-5 8	6.93555	31	7	.52
37464.0	4.93 2	274.220 6	32.913 2	.18290 2	42.10255 3	11.100472 8	.12E-5 5	6.93493	38	8	.52
37466.0	14.83 1	267.626 5	32.912 1	.18298 1	42.30347 2	11.100465 5	.22E-5 4	6.93425	43	8	.46
37468.0	24.72 1	261.034 4	32.911 1	.18308 1	42.50440 2	11.100470 5	.36E-5 4	6.93346	41	8	.48
37470.0	34.61 1	254.443 5	32.912 1	.18314 2	42.70535 2	11.100484 6	.33E-5 6	6.93294	36	8	.52
37472.0	44.51 1	247.845 4	32.912 1	.18319 1	42.90632 2	11.100502 7	.30E-5 7	6.93243	35	8	.41
37474.0	54.37 1	241.243 6	32.915 2	.18320 2	43.10742 3	11.100508 6	.32E-5 6	6.93240	27	8	.46
37476.0	64.28 1	234.651 5	32.912 1	.18330 3	43.30841 2	11.100537 7	.1E-5 1	6.93156	20	8	.33
37478.0	74.23 2	228.067 8	32.900 3	.18357 5	43.50930 4	11.10054 1	.03E-5 1	6.92922	20	8	.55
37480.0	84.09 3	221.47 1	32.903 4	.18352 6	43.71043 6	11.10053 2	.19E-5 8	6.92965	20	8	.94
37482.0	93.98 3	214.87 1	32.905 4	.18350 6	43.91152 6	11.10055 2	-.1E-5 2	6.92982	21	8	.96
37484.0	103.83 3	208.273 7	32.905 3	.18344 4	44.11266 6	11.10054 1	-.20E-5 9	6.93033	31	8	1.02
37486.0	113.71 2	201.676 4	32.904 2	.18336 3	44.31374 4	11.10054 1	-.01E-5 5	6.93101	40	8	.68
37488.0	123.58 1	195.077 3	32.906 1	.18328 2	44.51485 2	11.100528 9	-.13E-5 5	6.93172	44	8	.41
37490.0	133.47 1	188.475 3	32.906 1	.18320 2	44.71593 2	11.100515 8	-.17E-5 3	6.93239	56	8	.39
37492.0	143.36 1	181.875 6	32.907 1	.18313 4	44.91699 3	11.10052 1	-.19E-5 6	6.93299	59	8	.44
37494.0	153.25 1	175.284 6	32.910 2	.18308 2	45.11803 3	11.10054 1	-.20E-5 6	6.93342	54	8	.52
37496.0	163.15 1	168.691 6	32.912 1	.18302 2	45.11904 3	11.10050 1	-.27E-5 6	6.93395	55	8	.54
37498.0	173.05 1	162.096 5	32.914 1	.18293 1	45.52004 3	11.10047 1	-.24E-5 6	6.93466	52	8	.54
37500.0	182.97 1	155.502 5	32.915 1	.18286 1	45.72099 3	11.10046 1	-.27E-5 8	6.93531	45	8	.51
37502.0	192.90 1	148.903 4	32.915 1	.18277 1	45.92193 3	11.100481 8	-.09E-5 4	6.93602	36	8	.36
37504.0	202.80 2	142.312 6	32.915 1	.18270 2	46.12290 4	11.100483 7	-.14E-5 7	6.93661	26	8	.36

Table 4

DATA RELATED TO SOLAR EFFECTS ON ACCELERATION OF SATELLITE 1959 α2

PERIGEE IN SUNLIGHT

T (MJD)	Z	φ	ψ	D.R.A.	$\dot{P}$
37026.	559.	-1.4	96.5	263.6	-0.228E-06
37028.	555.	3.9	96.1	263.5	-0.130E-06
37030.	559.	9.2	95.4	263.4	-0.114E-06
37032.	542.	14.1	94.5	263.5	-0.651E-07
37034.	521.	18.5	93.7	263.4	-0.163E-06
37036.	523.	22.8	91.7	264.4	-0.260E-06
37038.	529.	26.6	89.4	266.0	-0.228E-06
37040.	560.	29.9	85.5	269.4	-0.130E-06
37042.	561.	31.8	82.5	272.2	-0.260E-06
37044.	562.	32.8	79.3	275.5	0.163E-06
37046.	559.	32.7	76.2	278.7	-0.651E-07
37048.	558.	31.5	73.3	281.9	-0.260E-07
37050.	557.	29.3	71.0	284.5	-0.390E-06
37052.	555.	26.2	69.1	286.7	-0.651E-07
37054.	556.	22.3	68.0	288.2	-0.244E-06
37056.	556.	17.9	67.6	289.1	-0.325E-07
37058.	556.	13.1	68.0	289.5	-0.488E-07
37060.	556.	8.0	69.0	289.6	-0.325E-07
37062.	556.	2.7	70.6	289.5	-0.146E-06
37064.	558.	-2.7	72.6	289.2	-0.179E-06
37066.	559.	-8.0	74.6	289.1	-0.976E-07
37068.	560.	-13.2	76.7	289.2	-0.651E-07
37070.	561.	-18.0	78.4	289.6	-0.130E-06
37072.	563.	-22.4	79.8	290.4	-0.976E-07
37074.	564.	-26.2	80.6	291.9	-0.651E-07
37076.	566.	-29.3	80.7	293.9	-0.651E-07
37078.	568.	-31.6	80.2	296.6	-0.325E-07
37080.	568.	-32.7	78.9	299.6	-0.325E-08
37082.	568.	-32.9	77.0	302.7	-0.163E-06
37084.	568.	-31.9	74.6	305.8	-0.114E-06

Table 4 (cont.)

DATA RELATED TO SOLAR EFFECTS ON ACCELERATION OF SATELLITE 1959 α2

T (MJD)	Z	φ	ψ	D.R.A.	$\dot{P}$
37086.	567.	-29.8	71.7	308.5	-0.138E-06
37088.	565.	-26.9	68.6	310.6	-0.130E-06
37090.	564.	-23.2	65.3	312.1	-0.813E-07
37092.	560.	-18.9	62.0	313.0	-0.130E-06
37094.	559.	-14.1	58.8	313.3	-0.781E-06
37096.	558.	-9.0	55.7	313.4	-0.813E-07
37098.	558.	-3.7	53.0	313.2	-0.179E-06
37100.	557.	1.7	50.5	312.8	-0.146E-06
37102.	556.	7.0	48.3	312.6	-0.179E-06
37104.	558.	12.2	46.8	312.1	-0.211E-06
37106.	558.	17.1	44.7	312.6	-0.130E-06
37108.	561.	21.6	43.0	313.3	-0.146E-06
37110.	562.	25.6	41.2	314.6	-0.114E-06
37112.	564.	28.8	39.3	316.5	-0.163E-06
37114.	563.	31.1	37.3	318.8	-0.325E-07
37116.	561.	32.5	35.1	321.5	-0.472E-06
37118.	561.	32.9	32.6	324.6	-0.358E-06
37120.	560.	32.1	30.1	327.6	-0.309E-06
37122.	560.	30.3	27.6	330.3	-0.276E-06
37124.	560.	27.6	25.4	332.5	-0.195E-06
37126.	560.	24.0	23.8	334.2	-0.276E-06
37128.	560.	19.8	23.2	335.2	-0.228E-06
37130.	559.	15.2	23.8	335.8	-0.260E-06
37132.	559.	10.2	25.7	335.8	-0.130E-06
37134.	559.	4.9	28.5	335.7	-0.163E-06
37136.	559.	-0.4	31.9	335.4	-0.114E-06
37138.	560.	-5.8	35.6	335.2	-0.130E-06
37140.	561.	-11.0	39.3	335.1	-0.130E-06
37142.	563.	-16.0	42.8	335.4	-0.650E-07
37144.	565.	-20.6	45.9	336.1	-0.130E-06
37146.	566.	-24.7	48.4	337.4	-0.146E-06
37148.	567.	-28.1	50.2	339.2	-0.146E-06

Table 4 (cont.)

DATA RELATED TO SOLAR EFFECTS ON ACCELERATION OF SATELLITE 1959 α2

T (MJD)	Z	φ	ψ	D.R.A.	$\dot{P}$
37150.	569.	-31.5	50.6	346.3	-0.976E-07
37152.	569.	-32.3	51.3	344.6	-0.179E-06
37154.	570.	-32.9	50.7	346.9	-0.813E-07
37156.	570.	-32.3	48.7	351.3	-0.244E-06
37158.	569.	-30.7	46.0	354.4	-0.211E-06
37160.	568.	-28.1	42.7	356.8	-0.325E-06
37162.	566.	-24.6	38.5	359.0	-0.325E-06
37164.	565.	-20.6	33.8	0.1	-0.650E-06
37166.	564.	-16.0	28.5	0.9	-0.634E-06
37168.	562.	-11.0	22.9	1.2	-0.574E-06
37170.	561.	-5.8	17.0	1.3	-0.309E-06
37172.	561.	-0.4	11.0	1.2	-0.471E-06
37174.	560.	4.9	5.0	1.1	-0.293E-06
37176.	560.	10.2	1.6	1.2	-0.276E-06
37178.	560.	15.2	7.0	1.5	-0.260E-06
37180.	560.	19.9	12.4	2.2	-0.276E-06
37182.	560.	24.1	17.5	3.5	-0.260E-06
37184.	561.	27.6	22.0	5.3	-0.163E-06
37186.	562.	30.3	26.0	7.8	-0.341E-06
37188.	563.	32.1	29.3	10.7	-0.585E-06
37190.	562.	32.9	31.9	14.1	-0.650E-06
37192.	562.	32.6	33.7	17.4	-0.731E-06
37194.	562.	31.2	34.7	20.5	-0.715E-06
37196.	561.	28.8	35.0	23.2	-0.910E-06
37198.	561.	25.5	34.7	25.3	-0.585E-06
37200.	560.	21.5	33.9	26.9	-0.780E-06
37202.	560.	17.1	32.7	27.8	-0.764E-06
37204.	560.	12.2	31.2	28.2	-0.504E-06
37206.	560.	7.0	29.8	28.4	-0.439E-06
37208.	560.	1.7	28.7	28.3	-0.422E-06
37210.	560.	-3.7	28.2	28.3	-0.195E-06
37212.	561.	-9.0	28.4	28.3	-0.487E-06

Table 4 (cont.)

DATA RELATED TO SOLAR EFFECTS ON ACCELERATION OF SATELLITE 1959 α2

T (MJD)	Z	φ	ψ	D.R.A.	$\dot{P}$
37214.	562.	-14.1	29.4	28.5	-0.552E-06
37216.	565.	-18.9	31.1	29.1	-0.374E-06
37218.	565.	-23.2	33.4	30.3	-0.520E-06
37220.	567.	-26.9	36.0	32.1	-0.195E-06
37222.	569.	-29.9	38.7	34.5	-0.341E-06
37224.	572.	-31.9	41.5	37.6	-0.601E-06
37226.	570.	-32.8	43.8	40.5	-0.585E-06
37228.	570.	-32.7	45.8	43.7	-0.650E-06
37230.	569.	-31.5	47.6	46.9	-0.601E-06
37232.	569.	-29.3	49.1	49.6	-0.146E-06
37234.	567.	-26.1	50.4	51.8	-0.536E-06
37236.	565.	-22.3	51.3	53.3	-0.374E-06
37238.	563.	-17.8	52.1	54.3	-0.390E-06
37240.	561.	-13.0	53.0	54.7	-0.471E-06
37242.	560.	-7.8	54.0	54.7	-0.487E-06
37244.	559.	-2.5	55.3	54.6	-0.520E-06
37246.	558.	2.9	57.0	54.3	-0.568E-06
37248.	557.	8.2	59.1	54.1	-0.640E-06
37250.	557.	13.3	61.7	54.1	-0.713E-06
37252.	557.	18.2	63.0	52.4	-0.703E-06
37254.	558.	22.6	67.9	55.2	-0.617E-06
37256.	564.	27.2	73.7	59.2	-0.568E-06
37258.	559.	29.4	74.7	58.5	-0.333E-06
37260.	559.	31.6	78.0	61.0	-0.328E-06
37262.	559.	32.7	81.0	63.9	-0.248E-06
37264.	559.	32.8	83.4	67.0	-0.185E-06
37266.	559.	31.8	85.3	69.8	-0.229E-06
37268.	559.	29.7	86.5	72.4	-0.244E-06
37270.	559.	26.8	86.8	74.3	-0.292E-06
37272.	558.	23.1	86.4	75.7	-0.336E-06
37274.	558.	18.8	85.3	76.4	-0.354E-06
37276.	557.	14.0	83.5	76.7	-0.414E-06

Table 4 (cont.)

DATA RELATED TO SOLAR EFFECTS ON ACCELERATION OF SATELLITE 1959 α2

T (MJD)	Z	φ	ψ	D.R.A.	$\dot{P}$
37278.	558.	8.9	81.3	76.5	-0.409E-06
37280.	558.	3.6	78.8	76.2	-0.391E-06
37282.	558.	-1.8	76.2	75.7	-0.365E-06
37284.	559.	-7.1	73.7	75.3	-0.339E-06
37286.	560.	-12.3	71.6	75.0	-0.273E-06
37288.	562.	-17.2	70.0	75.1	-0.276E-06
37290.	564.	-21.7	69.0	75.7	-0.227E-06
37292.	565.	-25.7	68.9	76.8	-0.195E-06
37294.	565.	-28.9	69.5	78.6	-0.195E-06
37296.	566.	-31.3	70.8	80.9	-0.195E-06
37298.	566.	-32.6	72.7	83.7	-0.247E-06
37300.	567.	-32.9	75.1	86.7	-0.295E-06
37302.	566.	-32.1	77.8	89.6	-0.305E-06
37304.	566.	-30.2	81.5	93.3	-0.260E-06
37306.	564.	-27.3	83.8	94.7	-0.308E-06
37308.	566.	-23.8	89.3	99.5	-0.162E-06
37310.	564.	-19.5	89.4	97.5	-0.211E-06
37312.	561.	-14.8	90.9	97.0	-0.211E-06
37314.	559.	-9.7	96.5	100.9	-0.114E-06
37316.	558.	-4.4	94.6	96.7	-0.974E-07
37318.	556.	1.0	96.2	96.3	-0.109E-06
37320.	558.	6.3	97.7	95.9	-0.130E-06
37322.	557.	11.5	99.2	95.8	-0.812E-07
37324.	557.	16.5	100.7	95.9	-0.877E-07
37326.	557.	21.1	102.4	96.5	-0.162E-07
37328.	557.	25.1	104.2	97.7	-0.140E-06
37330.	557.	28.4	106.3	99.4	-0.119E-06
37332.	558.	30.9	108.5	101.8	-0.144E-06
37334.	558.	32.4	110.8	104.6	-0.133E-06
		PERIGEE	IN EARTH	SHADOW	
37336.	558.	32.9	113.2	107.8	-0.135E-06
37338.	558.	32.3	115.5	110.9	-0.119E-06

Table 4 (cont.)

DATA RELATED TO SOLAR EFFECTS ON ACCELERATION OF SATELLITE 1959 α2

T (MJD)	Z	φ	ψ	D.R.A.	$\dot{P}$
37340.	557.	30.6	117.5	113.7	-0.649E-07
37342.	557.	27.9	119.2	116.0	-0.714E-07
37344.	556.	24.5	120.5	117.8	-0.110E-06
37346.	556.	20.4	121.3	119.0	-0.130E-06
37348.	558.	15.7	121.5	119.7	-0.487E-07
37350.	557.	10.7	121.2	120.0	-0.114E-06
37352.	557.	5.5	120.4	119.9	-0.860E-07
37354.	557.	0.1	119.3	119.8	-0.130E-06
37356.	559.	-5.3	118.2	119.7	-0.974E-07
37358.	557.	-10.5	117.0	119.5	-0.649E-07
37360.	562.	-15.6	116.3	120.0	-0.714E-07
37362.	553.	-20.2	115.7	120.6	-0.763E-07
37364.	561.	-24.4	115.9	121.9	-0.812E-07
37366.	565.	-27.9	116.7	123.8	-0.763E-07
37368.	565.	-30.5	118.1	126.4	-0.601E-07
37370.	565.	-32.3	120.2	129.4	-0.601E-07
37372.	566.	-32.9	122.9	132.7	-0.601E-07
37374.	566.	-32.5	126.1	136.1	-0.487E-07
37376.	565.	-30.9	129.7	139.2	-0.438E-07
37378.	564.	-28.4	133.5	141.8	-0.795E-07
37380.	563.	-25.1	137.3	143.9	-0.107E-06
37382.	561.	-21.0	140.8	145.3	-0.552E-07
37384.	560.	-16.4	143.8	146.2	-0.633E-07
37386.	559.	-11.5	145.8	146.6	-0.990E-07
37388.	557.	-6.3	146.8	146.7	-0.714E-07
37390.	557.	-0.9	146.6	146.7	-0.812E-07
37392.	557.	4.5	145.3	146.6	-0.958E-07
37394.	556.	9.8	143.3	146.7	-0.487E-07
37396.	557.	14.8	140.8	146.9	-0.682E-07
37398.	557.	19.5	143.3	154.6	-0.649E-07
37400.	557.	23.8	135.9	148.8	-0.519E-07
37402.	558.	27.4	133.9	150.6	-0.666E-07

Table 4 (cont.)

DATA RELATED TO SOLAR EFFECTS ON ACCELERATION OF SATELLITE 1959 α2

T (MJD)	Z	φ	ψ	D.R.A.	$\dot{P}$
37404.	558.	30.2	132.5	152.9	-0.893E-07
37406.	559.	32.0	133.1	158.8	-0.909E-07
37408.	559.	32.9	131.8	159.1	-0.373E-07
37410.	559.	32.6	132.6	162.4	-0.308E-07
37412.	558.	31.3	134.2	165.4	-0.698E-07
37414.	558.	29.0	136.4	168.0	-0.795E-07
37416.	557.	25.8	139.4	170.1	-0.536E-07
37418.	557.	21.8	142.9	171.5	-0.519E-07
37420.	556.	17.4	146.8	172.4	-0.373E-07
37422.	556.	12.5	151.1	172.8	-0.195E-07
37424.	557.	7.3	155.6	172.9	-0.227E-07
37426.	557.	2.0	160.0	172.7	-0.211E-07
37428.	558.	-3.4	164.4	172.5	0.195E-07
37430.	559.	-8.7	168.4	172.4	0.325E-07
37432.	560.	-13.9	171.6	172.6	0.146E-07
37434.	561.	-18.7	173.4	173.0	0.179E-07
37436.	563.	-23.0	173.3	174.0	0.179E-07
37438.	564.	-26.8	171.8	175.6	0.649E-08
37440.	566.	29.7	170.1	177.7	0.162E 08
37442.	567.	-31.8	168.7	180.5	-0.162E-07
37444.	567.	-32.8	167.6	183.6	-0.649E-07
37446.	567.	-32.8	167.0	186.8	-0.649E-07
37448.	566.	-31.6	166.7	189.8	0.649E-07
37450.	564.	-29.4	166.5	192.4	0.487E-07
37452.	553.	-26.2	166.1	194.6	-0.633E-07
37454.	563.	-22.5	165.4	195.8	-0.292E-07
37456.	561.	-18.0	163.8	196.6	-0.649E-07
37458.	560.	-13.2	161.3	196.9	-0.649E-08
37460.	558.	-8.0	157.9	196.9	-0.292E-07
37462.	557.	-2.7	154.0	196.7	-0.243E-07
37464.	557.	2.7	149.6	196.3	0.195E 07
37466.	556.	8.0	145.0	196.0	-0.357E-07

Table 4 (cont.)

DATA RELATED TO SOLAR EFFECTS ON ACCELERATION OF SATELLITE 1959 α2

T (MJD)	Z	φ	ψ	D.R.A.	$\dot{P}$
37468.	556.	13.1	140.3	195.9	-0.584E-07
37470.	557.	18.0	135.7	196.2	-0.536E-07
37472.	557.	22.4	131.3	197.0	-0.487E-07
37474.	558.	26.2	127.3	198.3	-0.519E-07
37476.	558.	29.3	123.8	200.3	-0.162E-07
37478.	557.	31.5	121.0	202.9	-0.487E-08
37480.	558.	32.7	118.9	205.8	-0.308E-07
37482.	558.	32.8	117.7	208.9	0.162E-07
37484.	558.	31.8	117.4	211.8	0.325E-07
37486.	558.	29.8	117.9	214.4	0.162E-08
37488.	558.	26.9	119.3	216.5	0.211E-07
37490.	557.	23.2	121.4	218.0	0.276E-07
37492.	557.	18.9	124.1	218.9	0.308E-07
37494.	556.	14.2	127.3	219.3	0.325E-07
37496.	556.	9.1	130.8	219.4	0.438E-07
37498.	556.	3.8	134.3	219.2	0.390E-07
37500.	557.	-1.6	137.5	218.9	0.438E-07
37502.	558.	-7.0	140.2	218.7	0.146E-07
37504.	559.	-12.2	142.1	218.7	0.227E-07

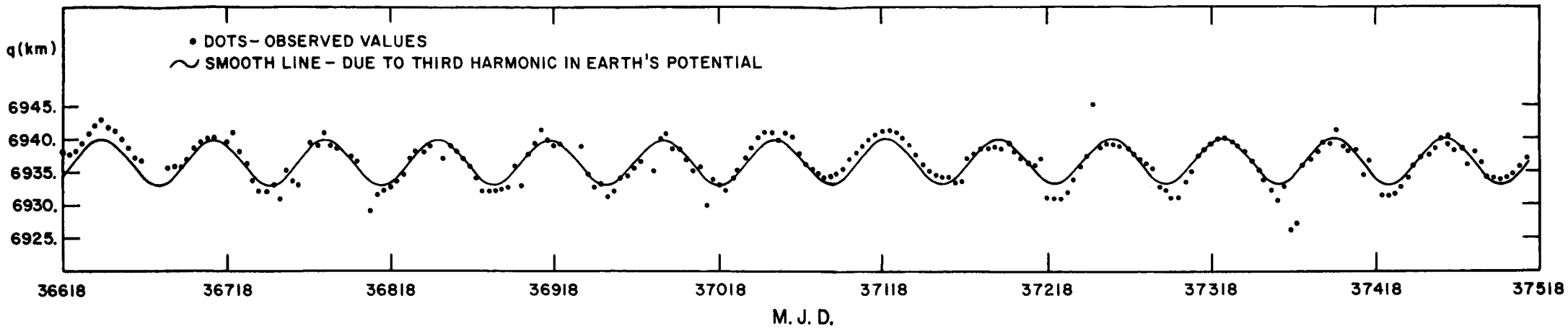

Figure 1. --The geocentric perigee distance of Satellite 1959 *a*1 (Vanguard II).

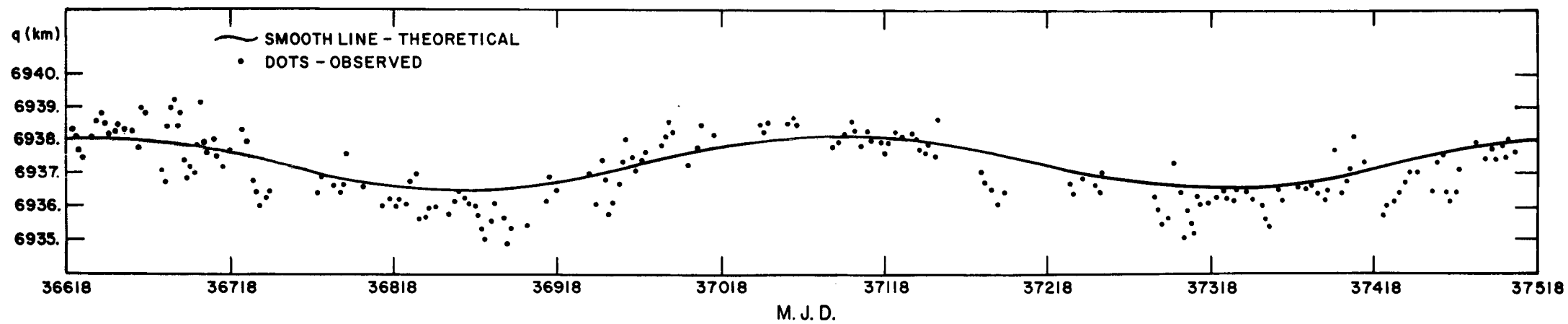

Figure 2. --The effect of solar radiation pressure on the geocentric perigee distance of Satellite 1959 *a*1 (Vanguard II).

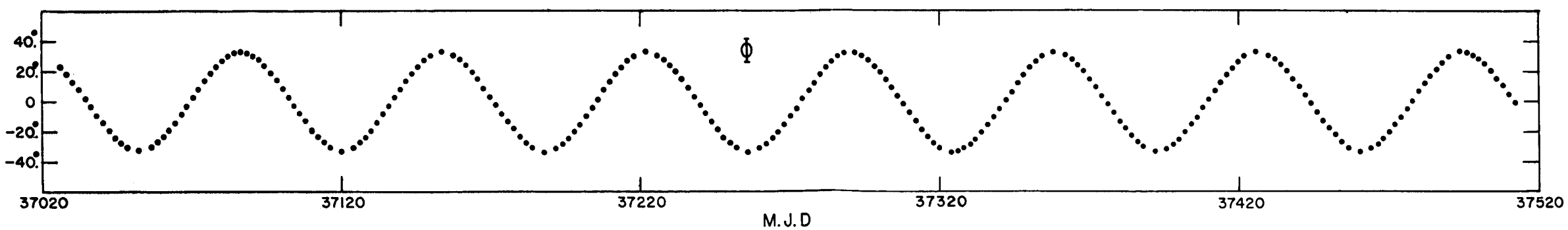

Figure 3. --The latitude of the perigee of Satellite 1959 *a*1.

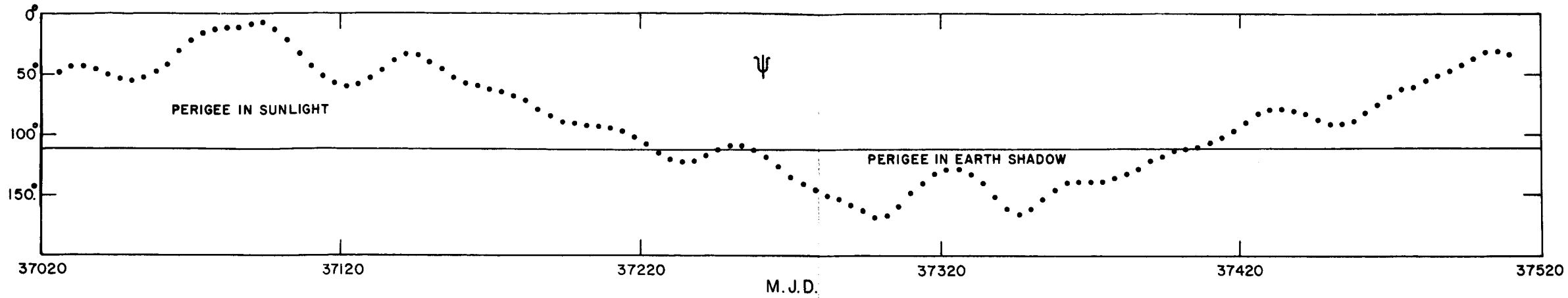

Figure 4. --The geocentric angle between the sun and the perigee of Satellite 1959 $\alpha 1$.

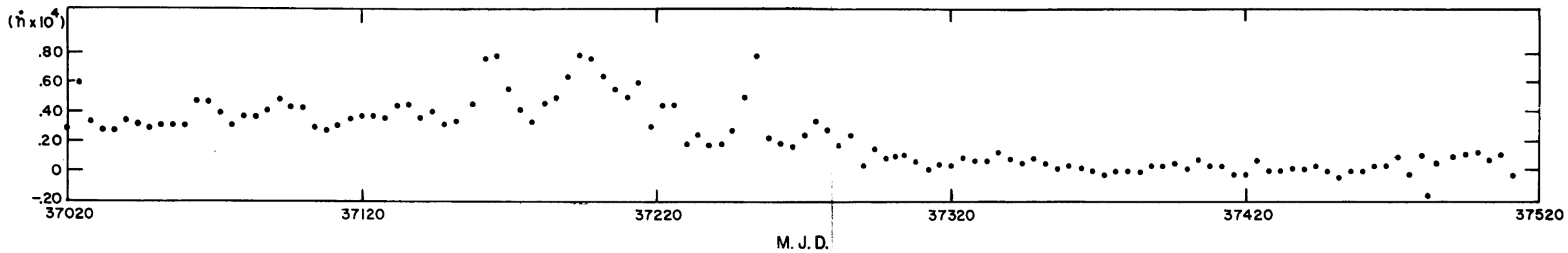

Figure 5. --Observed accelerations of Satellite 1959 $\alpha 1$.

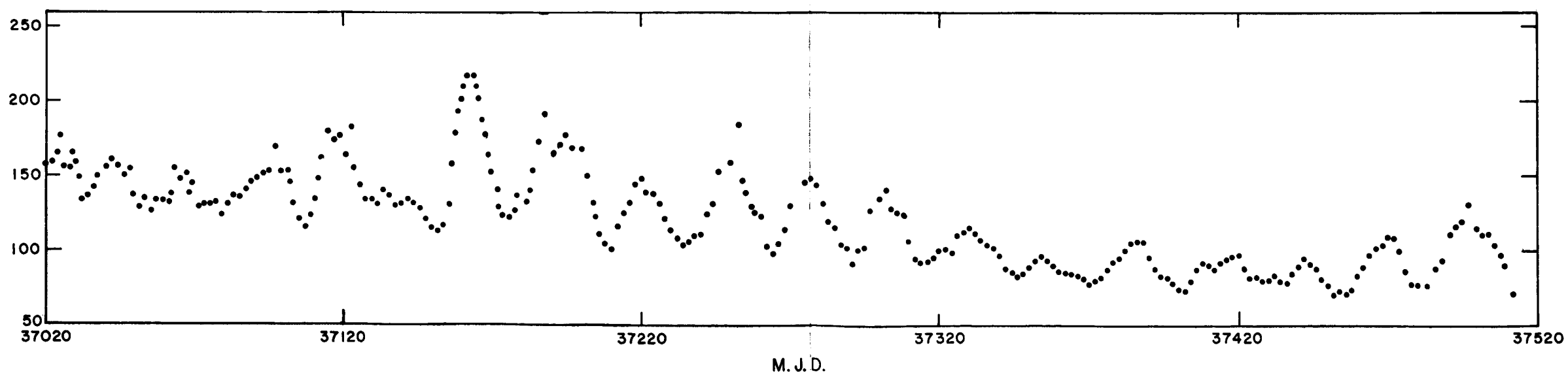

Figure 6. --The 20-cm solar flux (10^{-22} watts/m^2/cycle).

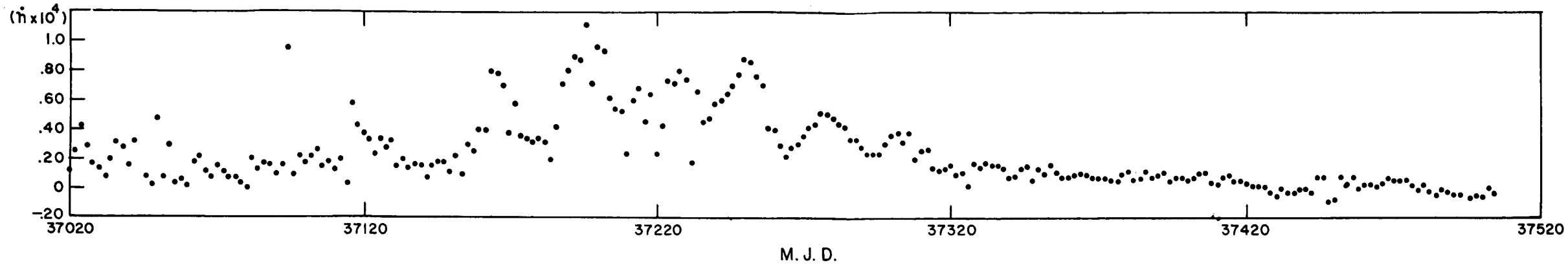

Figure 7. --Observed accelerations of Satellite 1959 $\alpha 2$.

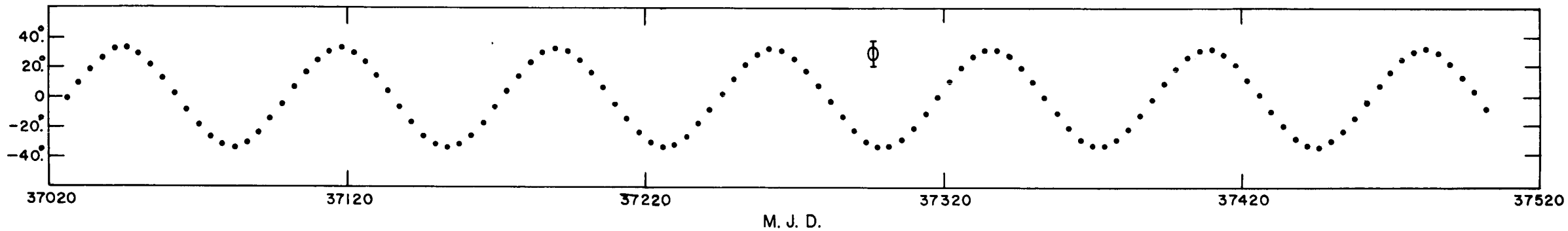

Figure 8. --The latitude of the perigee of Satellite 1959 $\alpha 2$.

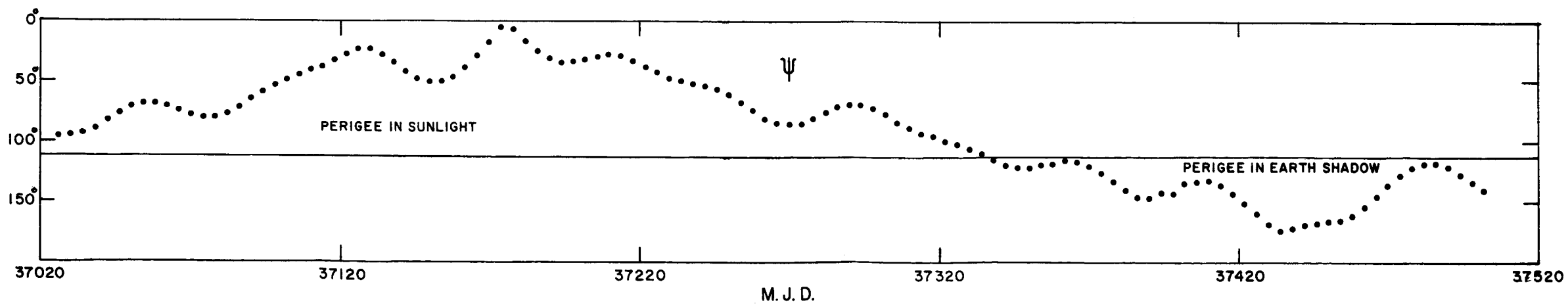

Figure 9. --The geocentric angle between the sun and the perigee of Satellite 1959 $\alpha 2$.