













EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 21/22                              | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | 45°-26° | 21/22 | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | 45°-26° |    |
|------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|---------|-------|-----------------|-----------------|----------|-------|---------|------|--------|---------|----|
| <b>136770 1996 PC<sub>1</sub></b>  |                 |                 |          |       |         |      |        |         |       |                 |                 |          |       |         |      |        |         |    |
| 7 15                               | 0 58.20         | -12 33.7        | 0.444    | 1.200 | 55.5    | 21.2 | 103 W  | 28* 77  | 10 25 | 1 9.33          | +59 7.6         | 0.849    | 1.685 | 26.0    | 19.5 | 132 E  | 76      | 5  |
| <b>518507 2006 EE<sub>1</sub></b>  |                 |                 |          |       |         |      |        |         |       |                 |                 |          |       |         |      |        |         |    |
| 7 15                               | 1 13.16         | +18 33.2        | 0.686    | 1.212 | 57.0    | 21.5 | 89 W   | 55* 45  | 10 25 | 1 9.33          | +59 7.6         | 0.849    | 1.685 | 26.0    | 19.5 | 132 E  | 76      | 5  |
| <b>497586 2006 HS<sub>61</sub></b> |                 |                 |          |       |         |      |        |         |       |                 |                 |          |       |         |      |        |         |    |
| 7 15                               | 1 13.23         | -18 49.3        | 2.072    | 2.492 | 23.5    | 21.4 | 102 W  | 21* 83  | 7 25  | 1 45.92         | +4 6.0          | 1.172    | 1.628 | 38.4    | 21.3 | 96 W   | 44*     | 60 |
| <b>530980 2012 BW<sub>23</sub></b> |                 |                 |          |       |         |      |        |         |       |                 |                 |          |       |         |      |        |         |    |
| 7 15                               | 1 19.53         | +15 42.8        | 1.698    | 1.952 | 31.4    | 21.4 | 88 W   | 52* 48  | 7 15  | 1 27.07         | +36 7.8         | 0.538    | 1.059 | 70.7    | 21.4 | 79 W   | 65*     | 28 |

















EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 2021   | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | $45^\circ$ | $-26^\circ$ | 2021                                 | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | $45^\circ$ | $-26^\circ$ |
|--|-----------------|-----------------|----------|-------|---------|------|--------|------------|-------------|--------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|------------|-------------|
| <b>184266</b> 2004 VW <sub>14</sub> (continuation) |                 |                 |          |       |         |      |        |            |             | <b>464831</b> 2005 AR <sub>20</sub>  |                 |                 |          |       |         |      |        |            |             |
| 8 4  | 20 27.13        | -21 37.2        | 2.172    | 3.179 | 2.6     | 23.9 | 172 E  | 23         | 86          | 7 15                                 | 21 20.19        | -17 7.8         | 1.562    | 2.521 | 9.7     | 21.8 | 155 W  | 28         | 81          |
| 8 9  | 20 21.55        | -21 57.8        | 2.199    | 3.192 | 4.4     | 24.0 | 166 E  | 23         | 86          | 7 25                                 | 21 12.09        | -18 13.4        | 1.493    | 2.493 | 5.3     | 21.5 | 167 W  | 27         | 82          |
| 8 14   | 20 16.27        | -22 16.1        | 2.234    | 3.205 | 6.2     | 24.2 | 160 E  | 23         | 86          | 8 4                                  | 21 2.25         | -19 24.6        | 1.449    | 2.463 | 1.1     | 21.1 | 177 W  | 26         | 83          |
| <b>505178</b> 2012 TV <sub>78</sub>                |                 |                 |          |       |         |      |        |            |             | <b>385538</b> 2004 RJ <sub>63</sub>  |                 |                 |          |       |         |      |        |            |             |
| 7 15   | 20 52.00        | -7 54.9         | 1.789    | 2.755 | 8.2     | 23.4 | 157 W  | 37         | 72          | 7 15                                 | 21 23.57        | -6 26.1         | 1.527    | 2.461 | 11.9    | 21.3 | 150 W  | 39         | 70          |
| 7 25   | 20 39.66        | -8 25.3         | 1.770    | 2.770 | 4.6     | 23.2 | 167 W  | 37         | 72          | 7 25                                 | 21 16.89        | -7 1.6          | 1.434    | 2.416 | 8.0     | 21.0 | 161 W  | 38         | 71          |
| 8 4  | 20 26.89        | -9 4.5          | 1.779    | 2.782 | 3.9     | 23.2 | 169 E  | 36         | 73          | 8 4                                  | 21 8.30         | -7 55.7         | 1.364    | 2.370 | 4.2     | 20.6 | 170 W  | 37         | 72          |
| 8 14   | 20 14.83        | -9 48.7         | 1.819    | 2.793 | 7.1     | 23.5 | 160 E  | 35         | 74          | 8 14                                 | 20 58.67        | -9 5.0          | 1.320    | 2.324 | 4.4     | 20.5 | 170 E  | 36         | 73          |
| 8 24   | 20 4.53         | -10 33.5        | 1.886    | 2.801 | 10.7    | 23.7 | 149 E  | 34         | 75          | 8 24                                 | 20 49.23        | -10 23.2        | 1.302    | 2.278 | 8.8     | 20.7 | 160 E  | 35         | 74          |
| <b>239849</b> 1999 VO <sub>11</sub>                |                 |                 |          |       |         |      |        |            |             | <b>451043</b> 2008 YB <sub>2</sub>   |                 |                 |          |       |         |      |        |            |             |
| 7 15   | 20 52.81        | -36 15.3        | 2.454    | 3.418 | 6.4     | 23.7 | 158 W  | 9          | 80          | 7 15                                 | 21 27.54        | -50 34.6        | 2.205    | 3.084 | 11.2    | 22.2 | 144 W  | -          | 65          |
| 7 20   | 20 46.88        | -36 47.0        | 2.456    | 3.432 | 5.6     | 23.7 | 161 W  | 8          | 79          | 7 20                                 | 21 21.57        | -51 13.0        | 2.195    | 3.085 | 10.8    | 22.1 | 145 W  | -          | 65          |
| 7 25   | 20 40.75        | -37 15.0        | 2.466    | 3.445 | 5.3     | 23.7 | 162 W  | 8          | 79          | 7 25                                 | 21 15.01        | -51 45.4        | 2.191    | 3.086 | 10.6    | 22.1 | 146 W  | -          | 64          |
| 7 30   | 20 35.34        | -37 20.0        | 1.373    | 2.204 | 19.3    | 22.2 | 134 E  | 72         | 37          | 7 30                                 | 21 8.03         | -52 10.8        | 2.193    | 3.086 | 10.6    | 22.1 | 146 W  | -          | 64          |
| 8 4  | 20 28.61        | -37 38.5        | 2.483    | 3.458 | 5.5     | 23.7 | 161 E  | 7          | 78          | 8 4                                  | 21 0.82         | -52 28.7        | 2.201    | 3.086 | 10.9    | 22.1 | 145 W  | -          | 64          |
| 8 9  | 20 21.85        | -37 57.4        | 2.507    | 3.471 | 6.2     | 23.8 | 158 E  | 7          | 78          | 8 9                                  | 20 53.57        | -52 38.5        | 2.215    | 3.086 | 11.4    | 22.2 | 143 E  | -          | 63          |
| 8 14   | 20 15.26        | -38 11.3        | 2.538    | 3.483 | 7.1     | 23.9 | 155 E  | 7          | 78          | 8 14                                 | 20 46.50        | -52 40.3        | 2.235    | 3.086 | 12.0    | 22.2 | 141 E  | -          | 63          |
| 8 19   | 20 9.05         | -38 20.4        | 2.577    | 3.495 | 8.2     | 23.9 | 151 E  | 7          | 78          | 8 19                                 | 20 39.83        | -52 34.1        | 2.261    | 3.085 | 12.8    | 22.3 | 138 E  | -          | 63          |
| 8 24   | 20 3.40         | -38 20.4        | 2.108    | 2.108 | 19.5    | 21.9 | 136 E  | 65         | 44          | 8 24                                 | 20 33.73        | -52 20.5        | 2.291    | 3.084 | 13.5    | 22.3 | 134 E  | -          | 64          |
| <b>363626</b> 2004 RA <sub>11</sub>                |                 |                 |          |       |         |      |        |            |             | <b>363221</b> 2001 VX <sub>61</sub>  |                 |                 |          |       |         |      |        |            |             |
| 7 15   | 20 53.44        | +28 51.7        | 1.500    | 2.256 | 21.3    | 22.5 | 126 W  | 74         | 35          | 7 15                                 | 21 29.48        | +14 21.1        | 2.286    | 3.087 | 13.5    | 22.0 | 135 W  | 59         | 50          |
| 7 20   | 20 47.90        | +28 35.2        | 1.453    | 2.239 | 20.6    | 22.4 | 129 W  | 74         | 35          | 7 25                                 | 21 12.17        | +14 38.9        | 2.233    | 3.098 | 11.6    | 21.9 | 142 W  | 60         | 49          |
| 7 25   | 20 41.82        | +28 5.0         | 1.411    | 2.222 | 19.9    | 22.3 | 132 W  | 73         | 36          | 8 4                                  | 21 21.37        | +14 32.5        | 2.203    | 3.109 | 10.0    | 21.8 | 148 W  | 60         | 49          |
| 7 30   | 20 35.34        | +27 20.0        | 1.373    | 2.204 | 19.3    | 22.2 | 134 E  | 72         | 37          | 8 14                                 | 21 2.64         | +14 1.5         | 2.197    | 3.119 | 9.2     | 21.8 | 150 E  | 59         | 50          |
| 8 4  | 20 28.61        | +26 19.6        | 1.340    | 2.186 | 18.9    | 22.1 | 136 E  | 71         | 38          | 8 24                                 | 20 53.64        | +13 9.1         | 2.217    | 3.127 | 9.6     | 21.8 | 149 E  | 58         | 51          |
| 8 9  | 20 21.85        | +25 3.4         | 1.312    | 2.167 | 18.6    | 22.0 | 137 E  | 70         | 39          | 9 3                                  | 20 45.91        | +12 0.3         | 2.263    | 3.135 | 10.9    | 21.9 | 144 E  | 57         | 52          |
| 8 14   | 20 15.26        | +23 31.9        | 1.290    | 2.148 | 18.6    | 22.0 | 137 E  | 69         | 40          | <b>461625</b> 2005 EM <sub>36</sub>  |                 |                 |          |       |         |      |        |            |             |
| 8 19   | 20 9.05         | +21 46.2        | 1.273    | 2.128 | 18.9    | 21.9 | 137 E  | 67         | 42          | 7 15                                 | 21 30.27        | +8 16.1         | 2.017    | 2.864 | 13.4    | 22.3 | 139 W  | 53         | 56          |
| 8 24   | 20 3.40         | +19 48.2        | 1.262    | 2.108 | 19.5    | 21.9 | 136 E  | 65         | 44          | 7 25                                 | 21 23.32        | +7 46.3         | 1.933    | 2.846 | 10.9    | 22.1 | 148 W  | 53         | 56          |
| <b>447755</b> 2007 JX <sub>2</sub>                 |                 |                 |          |       |         |      |        |            |             | <b>523941</b> 1998 HK <sub>49</sub>  |                 |                 |          |       |         |      |        |            |             |
| 7 15   | 20 57.02        | -24 14.4        | 1.588    | 2.572 | 7.2     | 23.3 | 161 W  | 21         | 88          | 7 15                                 | 21 30.56        | -30 36.5        | 0.839    | 1.805 | 14.8    | 24.0 | 153 W  | 14         | 85          |
| 7 20   | 20 50.11        | -24 46.4        | 1.577    | 2.578 | 5.0     | 23.2 | 167 W  | 20         | 89          | 7 20                                 | 21 22.29        | -31 41.1        | 0.829    | 1.812 | 12.1    | 23.9 | 158 W  | 13         | 84          |
| 7 25   | 20 42.86        | -25 16.4        | 1.574    | 2.583 | 3.2     | 23.1 | 172 W  | 20         | 89          | 7 25                                 | 21 13.04        | -32 40.8        | 0.824    | 1.818 | 10.0    | 23.8 | 162 W  | 12         | 83          |
| 7 30   | 20 35.45        | -25 43.8        | 1.578    | 2.588 | 2.8     | 23.0 | 173 E  | 19         | 90          | 7 30                                 | 21 3.11         | -33 32.8        | 0.826    | 1.823 | 8.9     | 23.8 | 164 W  | 11         | 82          |
| 8 4  | 20 28.05        | -26 7.7         | 1.590    | 2.593 | 4.3     | 23.2 | 169 E  | 19         | 90          | 8 4                                  | 20 52.88        | -34 15.0        | 0.833    | 1.828 | 9.3     | 23.8 | 163 E  | 11         | 82          |
| 8 9  | 20 20.87        | -26 27.6        | 1.608    | 2.597 | 6.3     | 23.3 | 164 E  | 19         | 90          | 8 9                                  | 20 42.76        | -34 46.1        | 0.846    | 1.832 | 11.0    | 23.9 | 160 E  | 10         | 81          |
| 8 14   | 20 14.09        | -26 43.2        | 1.634    | 2.600 | 8.5     | 23.4 | 158 E  | 18         | 89          | 8 14                                 | 20 33.19        | -35 5.5         | 0.865    | 1.835 | 13.4    | 24.1 | 155 E  | 10         | 81          |
| <b>477327</b> 2009 TB <sub>8</sub>                 |                 |                 |          |       |         |      |        |            |             | <b>363071</b> 2000 GD <sub>147</sub> |                 |                 |          |       |         |      |        |            |             |
| 7 15   | 20 58.24        | -9 35.4         | 2.572    | 3.530 | 6.4     | 23.6 | 157 W  | 35         | 74          | 7 15                                 | 21 38.30        | -25 57.4        | 0.977    | 1.934 | 14.3    | 22.5 | 152 W  | 19         | 90          |
| 7 25   | 20 47.97        | -10 2.0         | 2.563    | 3.562 | 3.5     | 23.4 | 168 W  | 35         | 74          | 7 20                                 | 21 29.35        | -26 28.7        | 0.988    | 1.967 | 11.1    | 22.4 | 158 W  | 19         | 90          |
| 8 4  | 20 37.40        | -10 33.6        | 2.585    | 3.592 | 2.3     | 23.4 | 172 E  | 34         | 75          | 7 25                                 | 21 20.00        | -26 55.7        | 1.004    | 2.000 | 8.1     | 22.4 | 164 W  | 18         | 89          |
| 8 14   | 20 27.28        | -11 7.3         | 2.638    | 3.620 | 4.6     | 23.6 | 163 E  | 34         | 75          | 7 30                                 | 21 10.55        | -27 17.0        | 1.027    | 2.032 | 5.8     | 22.4 | 168 W  | 18         | 89          |
| 8 24   | 20 18.32        | -11 40.6        | 2.722    | 3.647 | 7.4     | 23.8 | 152 E  | 33         | 76          | 8 4                                  | 21 1.30         | -27 32.0        | 1.057    | 2.063 | 5.0     | 22.4 | 170 W  | 17         | 88          |
| <b>494658</b> 2000 UG <sub>11</sub>                |                 |                 |          |       |         |      |        |            |             | <b>461590</b> 2004 RS <sub>251</sub> |                 |                 |          |       |         |      |        |            |             |
| 7 15   | 20 59.49        | -2 56.2         | 1.800    | 2.743 | 9.8     | 24.5 | 153 W  | 42         | 67          | 7 15                                 | 21 38.43        | -40 50.4        | 1.857    | 2.772 | 11.2    | 22.5 | 148 W  | 4          | 75          |
| 7 25   | 20 48.24        | -3 16.8         | 1.724    | 2.708 | 6.7     | 24.3 | 162 W  | 42         | 67          | 7 20                                 | 21 32.62        | -41 11.7        | 1.827    | 2.761 | 10.2    | 22.4 | 151 W  | 4          | 75          |
| 8 4  | 20 35.68        | -3 54.0         | 1.676    | 2.671 | 5.4     | 24.1 | 166 E  | 41         | 68          | 7 25                                 | 21 26.13        | -41 28.6        | 1.802    | 2.750 | 9.4     | 22.3 | 154 W  | 4          | 75          |
| 8 14   | 20 22.91        | -4 45.2         | 1.658    | 2.632 | 7.6     | 24.1 | 160 E  | 40         | 69          | 7 30                                 | 21 19.11        | -41 39.9        | 1.784    | 2.739 | 8.9     | 22.2 | 155 W  | 3          | 74          |
| 8 24   | 20 11.15        | -5 45.4         | 1.667    | 2.591 | 11.3    | 24.3 | 150 E  | 39         | 70          | 8 4                                  | 21 11.74        | -41 44.7        | 1.773    | 2.728 | 8.9     | 22.2 | 155 W  | 3          | 74          |
| <b>524801</b> 2003 WN <sub>156</sub>               |                 |                 |          |       |         |      |        |            |             | <b>6322</b> 1991 CQ                  |                 |                 |          |       |         |      |        |            |             |
| 7 15   | 21 3.98         | -10 53.1        | 3.377    | 4.328 | 5.4     | 24.1 | 157 W  | 34         | 75          | 7 15                                 | 21 14.16        | +10 4.8         | 2.669    | 3.512 | 10.6    | 21.8 | 140 W  | 55         | 54          |
| 7 25   | 20 57.20        | -11 27.8        | 3.331    | 4.327 | 3.0     | 23.9 | 167 W  | 34         | 75          | 7 25                                 | 21 6.73         | +9 32.9         | 2.587    | 3.492 | 8.8     | 21.7 | 148 W  | 55         | 54          |
| 8 4  | 20 49.94        | -12 6.8         | 3.314    | 4.325 | 1.3     | 23.8 | 175 E  | 33         | 76          | 8 4                                  | 20 58.42        | +8 40.2         | 2.530    | 3.470 | 7.4     | 21.6 | 154 W  | 54         | 55          |
| 8 14   | 20 42.68        | -12 47.7        | 3.329    | 4.323 | 2.9     | 23.9 | 167 E  | 32         | 77          | 8 14                                 | 20 49.83        | +7 28.0         | 2.501    | 3.448 | 7.0     | 21.5 | 155 E  | 52         | 57          |
| 8 24   | 20 35.95        | -13 28.3        | 3.373    | 4.320 | 5.3     | 24.1 | 157 E  | 32         | 77          | 8 24                                 | 20 41.68        | +6 0.1          | 2.500    | 3.425 | 8.0     | 21.5 | 152 E  | 51         | 58          |
| <b>338567</b> 2003 SJ <sub>84</sub>                |                 |                 |          |       |         |      |        |            |             | <b>6322</b> 1991 CQ (continued)      |                 |                 |          |       |         |      |        |            |             |
| 7 15   | 21 5.25         | +32 51.4        | 1.522    | 2.230 | 22.8    | 23.1 | 122 W  | 78         | 31          | 9 3                                  | 20 34.61        | +4 21.7         | 2.526    | 3.400 | 9.9     | 21.6 | 145 E  | 49         | 60          |
| 7 20   | 20 59.93        | +32 42.4        | 1.492    | 2.231 | 22.0    | 23.1 | 125 W  | 78         | 31          |                                      |                 |                 |          |       |         |      |        |            |             |
| 7 25   | 20 54.14        | +32 20.2        | 1.465    | 2.231 | 21.3    | 23.0 | 127 W  | 77         | 32          |                                      |                 |                 |          |       |         |      |        |            |             |
| 7 30   | 20 48.03        | +31 44.2        | 1.442    | 2.231 | 20.5    | 23.0 | 130 W  | 77         | 32          |                                      |                 |                 |          |       |         |      |        |            |             |
| 8 4  | 20 41.78        | +30 53.9        | 1.424    | 2.231 | 19.9    | 22.9 | 132 E  | 76         | 33          |                                      |                 |                 |          |       |         |      |        |            |             |
| 8 9  | 20 35.57        | +29 49.5        | 1.410    | 2.230 | 19.3    | 22.9 | 133 E  | 75         | 34          |                                      |                 |                 |          |       |         |      |        |            |             |
| 8 14   | 20 29.62        | +28 31.5        | 1.400    | 2.229 | 19.0    | 22.8 | 134 E  | 74         | 35          |                                      |                 |                 |          |       |         |      |        |            |             |
| 8 19   | 20 24.09        | +27 1.3         | 1.396    | 2.227 | 18.9    | 22.8 | 135 E  | 72         | 37          |                                      |                 |                 |          |       |         |      |        |            |             |

EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 2021                                | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$      | $\beta$ | $V$   | $\psi$ | $45^\circ$ | $-26^\circ$ | 2021                                | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$ | $\beta$ | $V$      | $\psi$ | $45^\circ$ | $-26^\circ$ |      |       |    |    |
|-------------------------------------|-----------------|-----------------|----------|----------|---------|-------|--------|------------|-------------|-------------------------------------|-----------------|-----------------|----------|-----|---------|----------|--------|------------|-------------|------|-------|----|----|
| <b>410318 2007 TY<sub>434</sub></b> |                 |                 |          |          |         |       |        |            |             | <b>275847 2001 SM<sub>61</sub></b>  |                 |                 |          |     |         |          |        |            |             |      |       |    |    |
| 7                                   | 15              | 21              | 40.30    | -27 34.7 | 1.504   | 2.445 | 11.5   | 21.8       | 151 W       | 17                                  | 88              | 7               | 15       | 21  | 54.71   | +12 48.1 | 2.800  | 3.559      | 12.3        | 21.5 | 132 W | 58 | 51 |
| 7                                   | 20              | 21              | 36.56    | -28 12.7 | 1.460   | 2.425 | 9.7    | 21.7       | 156 W       | 17                                  | 88              | 7               | 25       | 21  | 48.89   | +12 41.2 | 2.703  | 3.546      | 10.5        | 21.4 | 140 W | 58 | 51 |
| 7                                   | 25              | 21              | 32.09    | -28 50.8 | 1.422   | 2.404 | 8.1    | 21.5       | 161 W       | 16                                  | 87              | 8               | 4        | 21  | 41.79   | +12 14.4 | 2.628  | 3.532      | 8.7         | 21.2 | 148 W | 57 | 52 |
| 7                                   | 30              | 21              | 26.95    | -29 28.1 | 1.390   | 2.383 | 6.7    | 21.4       | 164 W       | 16                                  | 87              | 8               | 14       | 21  | 33.88   | +11 27.2 | 2.578  | 3.517      | 7.2         | 21.1 | 154 E | 56 | 53 |
| 8                                   | 4               | 21              | 21.26    | -30 3.1  | 1.364   | 2.361 | 6.0    | 21.3       | 166 W       | 15                                  | 86              | 8               | 24       | 21  | 25.82   | +10 21.3 | 2.555  | 3.501      | 6.8         | 21.1 | 156 E | 55 | 54 |
| 8                                   | 9               | 21              | 15.17    | -30 34.7 | 1.345   | 2.340 | 6.3    | 21.3       | 165 E       | 14                                  | 85              | 9               | 3        | 21  | 18.25   | +9 0.5   | 2.560  | 3.484      | 7.8         | 21.1 | 152 E | 54 | 55 |
| 8                                   | 14              | 21              | 8.87     | -31 1.6  | 1.332   | 2.318 | 7.6    | 21.3       | 162 E       | 14                                  | 85              | 9               | 13       | 21  | 11.80   | +7 29.9  | 2.592  | 3.466      | 9.5         | 21.2 | 145 E | 52 | 57 |
| 8                                   | 19              | 21              | 2.58     | -31 22.9 | 1.325   | 2.296 | 9.4    | 21.3       | 158 E       | 14                                  | 85              | 9               | 23       | 21  | 6.96    | +5 55.7  | 2.650  | 3.447      | 11.6        | 21.3 | 137 E | 51 | 58 |
| 8                                   | 24              | 20              | 56.49    | -31 37.9 | 1.325   | 2.274 | 11.5   | 21.4       | 153 E       | 13                                  | 84              | 10              | 3        | 21  | 4.04    | +4 23.4  | 2.728  | 3.428      | 13.4        | 21.4 | 127 E | 49 | 60 |
| 8                                   | 29              | 20              | 50.83    | -31 46.4 | 1.330   | 2.251 | 13.7   | 21.5       | 148 E       | 13                                  | 84              |                 |          |     |         |          |        |            |             |      |       |    |    |
| 9                                   | 3               | 20              | 45.75    | -31 48.3 | 1.340   | 2.229 | 15.9   | 21.5       | 143 E       | 13                                  | 84              |                 |          |     |         |          |        |            |             |      |       |    |    |
| <b>532359 2013 RX<sub>51</sub></b>  |                 |                 |          |          |         |       |        |            |             | <b>249595 1997 GH<sub>28</sub></b>  |                 |                 |          |     |         |          |        |            |             |      |       |    |    |
| 7                                   | 15              | 21              | 40.91    | -51 18.1 | 2.446   | 3.304 | 11.0   | 22.2       | 142 W       | -                                   | 65              | 7               | 15       | 21  | 56.16   | -20 32.6 | 1.606  | 2.523      | 12.5        | 21.4 | 148 W | 24 | 85 |
| 7                                   | 20              | 21              | 35.13    | -51 48.2 | 2.417   | 3.290 | 10.6   | 22.2       | 144 W       | -                                   | 64              | 7               | 25       | 21  | 47.37   | -21 18.1 | 1.523  | 2.497      | 8.5         | 21.1 | 159 W | 24 | 85 |
| 7                                   | 25              | 21              | 28.68    | -52 13.3 | 2.394   | 3.276 | 10.3   | 22.1       | 145 W       | -                                   | 64              | 8               | 4        | 21  | 36.01   | -22 5.6  | 1.464  | 2.469      | 4.3         | 20.8 | 169 W | 23 | 86 |
| 7                                   | 30              | 21              | 21.71    | -52 32.3 | 2.378   | 3.261 | 10.3   | 22.1       | 145 W       | -                                   | 63              | 8               | 14       | 21  | 23.03   | -22 47.7 | 1.434  | 2.440      | 3.6         | 20.7 | 171 E | 22 | 87 |
| 8                                   | 4               | 21              | 14.36    | -52 44.4 | 2.367   | 3.246 | 10.5   | 22.1       | 144 W       | -                                   | 63              | 8               | 24       | 21  | 9.86    | -23 17.3 | 1.430  | 2.409      | 7.8         | 20.8 | 161 E | 22 | 87 |
| 8                                   | 9               | 21              | 6.82     | -52 49.0 | 2.363   | 3.231 | 10.9   | 22.1       | 143 E       | -                                   | 63              | 9               | 3        | 20  | 57.99   | -23 30.5 | 1.453  | 2.377      | 12.5        | 21.0 | 149 E | 21 | 88 |
| 8                                   | 14              | 20              | 59.32    | -52 45.7 | 2.365   | 3.216 | 11.4   | 22.1       | 141 E       | -                                   | 63              | 9               | 13       | 20  | 48.68   | -23 26.5 | 1.498  | 2.343      | 16.8        | 21.2 | 138 E | 22 | 87 |
| 8                                   | 19              | 20              | 52.05    | -52 34.5 | 2.372   | 3.201 | 12.1   | 22.1       | 138 E       | -                                   | 63              | 9               | 23       | 20  | 42.73   | -23 6.6  | 1.561  | 2.308      | 20.3        | 21.4 | 127 E | 22 | 87 |
| 8                                   | 24              | 20              | 45.21    | -52 15.6 | 2.385   | 3.185 | 12.9   | 22.2       | 135 E       | -                                   | 64              |                 |          |     |         |          |        |            |             |      |       |    |    |
| 8                                   | 29              | 20              | 38.96    | -51 49.7 | 2.403   | 3.169 | 13.7   | 22.2       | 132 E       | -                                   | 64              |                 |          |     |         |          |        |            |             |      |       |    |    |
| 9                                   | 3               | 20              | 33.42    | -51 17.3 | 2.426   | 3.153 | 14.5   | 22.2       | 128 E       | -                                   | 65              |                 |          |     |         |          |        |            |             |      |       |    |    |
| <b>484757 2009 BL<sub>2</sub></b>   |                 |                 |          |          |         |       |        |            |             | <b>496872 2000 SH<sub>5</sub></b>   |                 |                 |          |     |         |          |        |            |             |      |       |    |    |
| 7                                   | 15              | 21              | 45.77    | -8 16.3  | 0.945   | 1.878 | 17.5   | 21.5       | 146 W       | 37                                  | 72              | 7               | 15       | 21  | 58.82   | -41 10.0 | 1.718  | 2.612      | 13.1        | 21.4 | 144 W | 4  | 75 |
| 7                                   | 20              | 21              | 39.63    | -9 11.2  | 0.956   | 1.916 | 14.1   | 21.4       | 153 W       | 36                                  | 73              | 7               | 20       | 21  | 53.31   | -41 26.9 | 1.673  | 2.591      | 12.0        | 21.3 | 148 W | 4  | 75 |
| 7                                   | 25              | 21              | 33.04    | -10 8.8  | 0.971   | 1.955 | 10.6   | 21.4       | 159 W       | 35                                  | 74              | 7               | 25       | 21  | 46.90   | -41 39.5 | 1.634  | 2.569      | 11.1        | 21.2 | 151 W | 3  | 74 |
| 7                                   | 30              | 21              | 26.22    | -11 7.5  | 0.993   | 1.993 | 7.1    | 21.3       | 166 W       | 34                                  | 75              | 7               | 30       | 21  | 39.71   | -41 46.4 | 1.600  | 2.548      | 10.3        | 21.1 | 153 W | 3  | 74 |
| 8                                   | 4               | 21              | 19.39    | -12 5.6  | 1.021   | 2.031 | 3.8    | 21.2       | 172 E       | 33                                  | 76              | 8               | 4        | 21  | 31.88   | -41 46.4 | 1.573  | 2.526      | 10.0        | 21.0 | 154 W | 3  | 74 |
| 8                                   | 9               | 21              | 12.77    | -13 1.6  | 1.055   | 2.069 | 1.5    | 21.2       | 177 E       | 32                                  | 77              | 8               | 9        | 21  | 23.63   | -41 38.2 | 1.553  | 2.505      | 10.1        | 21.0 | 154 W | 3  | 74 |
| 8                                   | 14              | 21              | 6.58     | -13 54.1 | 1.096   | 2.106 | 3.2    | 21.4       | 173 E       | 31                                  | 78              | 8               | 14       | 21  | 15.20   | -41 20.9 | 1.538  | 2.483      | 10.8        | 21.0 | 153 E | 4  | 75 |
| 8                                   | 19              | 21              | 0.98     | -14 42.4 | 1.144   | 2.142 | 6.0    | 21.7       | 167 E       | 30                                  | 79              | 8               | 19       | 21  | 6.86    | -40 54.3 | 1.531  | 2.461      | 11.8        | 21.0 | 150 E | 4  | 75 |
| 8                                   | 24              | 20              | 56.11    | -15 25.6 | 1.197   | 2.179 | 8.6    | 22.0       | 161 E       | 30                                  | 79              | 8               | 24       | 20  | 58.86   | -40 18.5 | 1.529  | 2.439      | 13.1        | 21.0 | 147 E | 5  | 76 |
| 8                                   | 29              | 20              | 52.03    | -16 3.6  | 1.256   | 2.215 | 11.0   | 22.2       | 155 E       | 29                                  | 80              | 8               | 29       | 20  | 51.43   | -39 34.0 | 1.534  | 2.417      | 14.6        | 21.1 | 143 E | 5  | 76 |
| 9                                   | 3               | 20              | 48.79    | -16 36.2 | 1.321   | 2.250 | 13.1   | 22.4       | 150 E       | 28                                  | 81              | 9               | 3        | 20  | 44.75   | -38 41.8 | 1.544  | 2.395      | 16.2        | 21.1 | 138 E | 6  | 77 |
| <b>543244 2013 VC<sub>2</sub></b>   |                 |                 |          |          |         |       |        |            |             | <b>363163 2001 SE<sub>286</sub></b> |                 |                 |          |     |         |          |        |            |             |      |       |    |    |
| 7                                   | 15              | 21              | 49.46    | +9 5.1   | 1.618   | 2.448 | 17.0   | 22.3       | 135 W       | 54                                  | 55              | 7               | 15       | 21  | 59.39   | +21 36.6 | 1.817  | 2.536      | 19.3        | 22.1 | 125 W | 67 | 42 |
| 7                                   | 25              | 21              | 41.50    | +9 40.4  | 1.553   | 2.448 | 14.1   | 22.1       | 144 W       | 55                                  | 54              | 7               | 20       | 21  | 55.55   | +22 35.3 | 1.761  | 2.517      | 18.6        | 22.0 | 128 W | 68 | 41 |
| 8                                   | 4               | 21              | 31.56    | +9 48.4  | 1.508   | 2.448 | 11.4   | 21.9       | 151 W       | 55                                  | 54              | 7               | 25       | 21  | 50.97   | +23 28.8 | 1.710  | 2.498      | 17.8        | 21.9 | 131 W | 68 | 41 |
| 8                                   | 14              | 21              | 20.55    | +9 27.5  | 1.487   | 2.446 | 9.8    | 21.8       | 156 E       | 54                                  | 55              | 7               | 30       | 21  | 45.67   | +24 15.8 | 1.663  | 2.478      | 17.1        | 21.8 | 134 W | 69 | 40 |
| 8                                   | 24              | 21              | 9.71     | +8 40.1  | 1.490   | 2.444 | 10.1   | 21.9       | 155 E       | 54                                  | 55              | 8               | 4        | 21  | 39.73   | +24 55.2 | 1.621  | 2.458      | 16.5        | 21.7 | 136 W | 70 | 39 |
| 9                                   | 3               | 21              | 0.20     | +7 32.4  | 1.518   | 2.440 | 12.2   | 22.0       | 149 E       | 53                                  | 56              | 8               | 9        | 21  | 33.23   | +25 25.9 | 1.585  | 2.438      | 16.0        | 21.6 | 138 W | 70 | 39 |
| <b>5731 Zeus</b>                    |                 |                 |          |          |         |       |        |            |             | <b>251346 2007 SJ</b>               |                 |                 |          |     |         |          |        |            |             |      |       |    |    |
| 7                                   | 15              | 21              | 49.96    | -3 26.6  | 2.887   | 3.749 | 9.4    | 21.4       | 143 W       | 42                                  | 67              | 7               | 15       | 22  | 0.71    | -9 56.6  | 2.092  | 2.972      | 11.7        | 21.5 | 144 W | 35 | 74 |
| 7                                   | 25              | 21              | 42.22    | -3 41.6  | 2.809   | 3.747 | 6.9    | 21.2       | 154 W       | 41                                  | 68              | 7               | 25       | 21  | 52.26   | -10 18.9 | 1.999  | 2.952      | 8.3         | 21.2 | 155 W | 35 | 74 |
| 8                                   | 4               | 21              | 33.30    | -4 6.6   | 2.758   | 3.743 | 4.3    | 21.1       | 164 W       | 41                                  | 68              | 8               | 4        | 21  | 41.81   | -10 50.7 | 1.931  | 2.929      | 4.4         | 21.0 | 167 W | 34 | 75 |
| 8                                   | 14              | 21              | 23.77    | -4 40.1  | 2.737   | 3.738 | 2.7    | 20.9       | 170 E       | 40                                  | 69              | 8               | 14       | 21  | 30.09   | -11 28.5 | 1.892  | 2.904      | 1.1         | 20.7 | 177 E | 34 | 75 |
| 8                                   | 24              | 21              | 14.29    | -5 19.2  | 2.747   | 3.732 | 4.1    | 21.0       | 165 E       | 40                                  | 69              | 8               | 24       | 21  | 18.09   | -12 8.1  | 1.884  | 2.878      | 4.6         | 20.9 | 167 E | 33 | 76 |
| 9                                   | 3               | 21              | 5.53     | -6 0.7   | 2.788   | 3.724 | 6.7    | 21.2       | 155 E       | 39                                  | 70              | 9               | 3        | 21  | 6.88    | -12 45.0 | 1.906  | 2.850      | 8.7         | 21.1 | 155 E | 32 | 77 |
| 9                                   | 13              | 20              | 58.07    | -6 41.6  | 2.857   | 3.715 | 9.2    | 21.3       | 144 E       | 38                                  | 71              | 9               | 13       | 20  | 57.43   | -13 15.8 | 1.954  | 2.821      | 12.5        | 21.2 | 143 E | 32 | 77 |
| 9                                   | 23              | 20              | 52.33    | -7 19.1  | 2.950   | 3.705 | 11.5   | 21.5       | 133 E       | 38                                  | 71              | 9               | 23       | 20  | 50.44   | -13 38.3 | 2.024  | 2.789      | 15.7        | 21.4 | 131 E | 31 | 78 |
| <b>381960 2010 EV<sub>87</sub></b>  |                 |                 |          |          |         |       |        |            |             | <b>10636 1998 QK<sub>56</sub></b>   |                 |                 |          |     |         |          |        |            |             |      |       |    |    |
| 7                                   | 15              | 21              | 53.93    | +13 29.5 | 2.352   | 3.119 | 14.1   | 21.8       | 131 W       | 58                                  | 51              | 7               | 15       | 22  | 1.25    | +1 33.9  | 1.509  | 2.363      | 16.8        | 21.4 | 138 W | 47 | 62 |
| 7                                   | 25              | 21              | 48.39    | +13 13.9 | 2.239   | 3.088 | 12.2   | 21.6       | 140 W       | 58                                  | 51              | 7               | 25       | 21  | 54.20   | +1 3.8   | 1.390  | 2.317      | 13.3        | 21.0 | 148 W | 46 | 63 |
| 8                                   | 4               | 21              | 41.24    | +12 33.0 | 2.146   | 3.055 | 10.1   | 21.4       | 148 W       | 58                                  | 51              | 8               | 4        | 21  | 44.18   | +0 4.1   | 1.293  | 2.270      | 9.2         | 20.7 | 159 W | 45 | 64 |
| 8                                   | 14              | 21              | 33.00    | +11 25.4 | 2.078   | 3.022 | 8.4    | 21.3       | 154 E       | 56                                  | 53              | 8               | 14       | 21  | 31.77   | -1 26.0  | 1.221  | 2.220      | 5.9         | 20.3 | 167 E | 44 | 65 |
| 8                                   | 24              | 21              | 24.42    | +9 52.8  | 2.036   | 2.988 | 7.9    | 21.2       | 156 E       | 55                                  | 54              | 8               | 19       | 21  | 25.03   | -2 21.3  | 1.195  | 2.194      | 5.8         | 20.3 | 167 E | 43 | 66 |
| 9                                   | 3               | 21              | 16.32    | +8 0.1   | 2.022   | 2.953 | 9.1    | 21.2       | 152 E       | 53                                  | 56              | 8               | 24       | 21  | 18.17   | -3 21.9  | 1.176  | 2.167      | 7.1         | 20.3 | 165 E | 42 | 67 |
| 9                                   | 13              | 21              | 9.50     | +5 54.5  | 2.034   | 2.917 | 11.4   | 21.3       | 145 E       | 51                                  | 58              | 8               | 29       | 21  | 11.40   | -4 26.7  | 1.163  | 2.140      | 9.3         | 20.3 | 160 E | 41 | 68 |
| 9                                   | 23              | 21              | 4.62     | +3 44.7  | 2.072   | 2.880 | 14.0   | 21.4       | 136 E       | 49                                  | 60              | 9               | 3        | 21  | 4.91    | -5 34.0  | 1.158  | 2.113      | 11.9        | 20.4 | 154 E | 39 | 70 |
| 10                                  | 3               | 21              | 2.06     | +1 38.5  | 2.130   | 2.843 | 16.4   | 21.5       | 127 E       | 47                                  | 62              | 9               | 8        | 20  | 58.93   | -6 42.4  | 1.158  | 2.085      | 14.6        | 20.4 | 148 E | 38 | 71 |
| <b>525399 2005 ET<sub>87</sub></b>  |                 |                 |          |          |         |       |        |            |             | <b>9</b>                            |                 |                 |          |     |         |          |        |            |             |      |       |    |    |



EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 21/22  | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | $45^\circ$ - $26^\circ$ | 21/22                               | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | $45^\circ$ - $26^\circ$ |
|--|-----------------|-----------------|----------|-------|---------|------|--------|-------------------------|-------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|-------------------------|
| <b>10636 1998 QK<sub>56</sub></b> (continuation) |                 |                 |          |       |         |      |        |                         | <b>456536 2007 BA</b>               |                 |                 |          |       |         |      |        |                         |
| 10 3   | 20 41.60        | -11 50.9        | 1.233    | 1.935 | 26.7    | 20.8 | 120 E  | 33 76                   | 7 15                                | 22 9.79         | -2 32.0         | 1.360    | 2.224 | 17.7    | 22.2 | 138 W  | 42 67                   |
| 10 8   | 20 41.17        | -12 39.9        | 1.258    | 1.904 | 28.5    | 20.9 | 115 E  | 32 77                   | 7 25                                | 22 0.23         | -2 1.5          | 1.290    | 2.224 | 13.5    | 22.0 | 149 W  | 43 66                   |
| 10 13  | 20 41.79        | -13 23.6        | 1.284    | 1.872 | 30.1    | 20.9 | 110 E  | 32 77                   | 8 4                                 | 21 47.81        | -1 49.6         | 1.242    | 2.223 | 9.0     | 21.7 | 160 W  | 43 66                   |
| 10 18  | 20 43.43        | -14 1.9         | 1.310    | 1.839 | 31.6    | 21.0 | 105 E  | 31 78                   | 8 14                                | 21 33.60        | -1 56.5         | 1.219    | 2.219 | 5.7     | 21.5 | 167 E  | 43 66                   |
| 10 23  | 20 46.05        | -14 34.8        | 1.338    | 1.806 | 32.8    | 21.0 | 100 E  | 30 79                   | 8 24                                | 21 19.20        | -2 18.7         | 1.224    | 2.214 | 7.1     | 21.6 | 164 E  | 43 66                   |
| 10 28  | 20 49.60        | -15 2.3         | 1.365    | 1.773 | 33.9    | 21.0 | 96 E   | 30 79*                  | 9 3                                 | 21 6.24         | -2 50.9         | 1.254    | 2.207 | 11.4    | 21.8 | 154 E  | 42 67                   |
| 11 2   | 20 54.03        | -15 24.6        | 1.391    | 1.738 | 34.8    | 21.1 | 92 E   | 30 77*                  | <b>376720 1997 CO<sub>5</sub></b>   |                 |                 |          |       |         |      |        |                         |
| 11 7   | 20 59.31        | -15 41.6        | 1.416    | 1.704 | 35.6    | 21.1 | 88 E   | 29 74*                  | 7 15                                | 22 11.93        | -10 56.9        | 1.895    | 2.764 | 13.3    | 21.4 | 141 W  | 34 75                   |
| 11 12  | 21 5.39         | -15 53.4        | 1.440    | 1.669 | 36.2    | 21.1 | 85 E   | 29 71*                  | 7 25                                | 22 4.66         | -10 36.5        | 1.773    | 2.715 | 9.9     | 21.1 | 153 W  | 34 75                   |
| 11 17  | 21 12.22        | -16 0.1         | 1.462    | 1.633 | 36.7    | 21.1 | 81 E   | 29 68*                  | 8 4                                 | 21 54.85        | -10 22.3        | 1.675    | 2.665 | 6.0     | 20.7 | 164 W  | 35 74                   |
| 11 22  | 21 19.74        | -16 1.7         | 1.482    | 1.597 | 37.2    | 21.1 | 78 E   | 29 65*                  | 8 14                                | 21 43.04        | -10 12.6        | 1.604    | 2.615 | 1.8     | 20.3 | 175 W  | 35 74                   |
| 11 27  | 21 27.93        | -15 58.3        | 1.499    | 1.561 | 37.6    | 21.1 | 75 E   | 29 61*                  | 8 24                                | 21 30.26        | -10 4.8         | 1.562    | 2.563 | 4.0     | 20.4 | 170 E  | 35 74                   |
| 12 2   | 21 36.75        | -15 49.9        | 1.514    | 1.524 | 37.9    | 21.0 | 72 E   | 29 58*                  | 9 3                                 | 21 17.73        | -9 56.1         | 1.548    | 2.511 | 8.8     | 20.5 | 158 E  | 35 74                   |
| 12 7   | 21 46.18        | -15 36.6        | 1.527    | 1.487 | 38.1    | 21.0 | 69 E   | 29 55*                  | 9 13                                | 21 6.74         | -9 44.4         | 1.561    | 2.457 | 13.4    | 20.7 | 146 E  | 35 74                   |
| 12 12  | 21 56.20        | -15 18.1        | 1.537    | 1.450 | 38.4    | 21.0 | 66 E   | 30 52*                  | 9 23                                | 20 58.32        | -9 27.8         | 1.596    | 2.403 | 17.5    | 20.8 | 134 E  | 36 73                   |
| 12 17  | 22 6.77         | -14 54.7        | 1.543    | 1.413 | 38.6    | 20.9 | 64 E   | 30 49*                  | 10 3                                | 20 53.08        | -9 5.0          | 1.647    | 2.348 | 20.9    | 21.0 | 123 E  | 36 73                   |
| 12 22  | 22 17.87        | -14 26.3        | 1.547    | 1.375 | 38.8    | 20.9 | 61 E   | 30 46*                  | 10 13                               | 20 51.23        | -8 35.1         | 1.711    | 2.292 | 23.6    | 21.1 | 113 E  | 36 73                   |
| 12 27  | 22 29.50        | -13 52.9        | 1.548    | 1.338 | 39.0    | 20.8 | 59 E   | 30 44*                  | 10 23                               | 20 52.72        | -7 57.2         | 1.781    | 2.236 | 25.6    | 21.2 | 104 E  | 37 72                   |
| 1 1  | 22 41.66        | -13 14.4        | 1.545    | 1.301 | 39.3    | 20.8 | 57 E   | 30 41*                  | 11 2                                | 20 57.28        | -7 10.6         | 1.853    | 2.179 | 27.0    | 21.2 | 95 E   | 38 70*                  |
| 1 6  | 22 54.34        | -12 30.8        | 1.540    | 1.264 | 39.6    | 20.7 | 55 E   | 30 39*                  | 11 12                               | 21 4.61         | -6 14.2         | 1.924    | 2.121 | 27.8    | 21.3 | 87 E   | 39 64*                  |
| 1 11   | 23 7.54         | -11 42.0        | 1.531    | 1.227 | 39.9    | 20.6 | 53 E   | 30 37*                  | 11 22                               | 21 14.38        | -5 7.2          | 1.992    | 2.064 | 28.1    | 21.3 | 80 E   | 40 57*                  |
| 1 16   | 23 21.26        | -10 48.1        | 1.520    | 1.192 | 40.3    | 20.6 | 52 E   | 30 36*                  | 12 2                                | 21 26.30        | -3 49.0         | 2.053    | 2.006 | 28.1    | 21.3 | 73 E   | 41 50*                  |
| 1 21   | 23 35.50        | -9 49.0         | 1.506    | 1.157 | 40.8    | 20.5 | 50 E   | 30 34*                  | 12 12                               | 21 40.13        | -2 18.9         | 2.107    | 1.948 | 27.8    | 21.3 | 67 E   | 42 42*                  |
| <b>530863 2011 VT<sub>10</sub></b>               |                 |                 |          |       |         |      |        |                         | 12 22                               | 21 55.67        | -0 36.4         | 2.152    | 1.890 | 27.2    | 21.3 | 61 E   | 42 35*                  |
| 7 15   | 22 2.37         | -46 39.7        | 2.131    | 2.993 | 12.2    | 22.3 | 141 W  | - 69                    | 1 1                                 | 22 12.77        | + 1 18.6        | 2.189    | 1.833 | 26.5    | 21.2 | 56 E   | 42 28*                  |
| 7 20   | 21 58.28        | -47 36.1        | 2.106    | 2.987 | 11.6    | 22.2 | 144 W  | - 68                    | 1 11                                | 22 31.36        | + 3 25.9        | 2.216    | 1.777 | 25.6    | 21.1 | 51 E   | 41 22*                  |
| 7 25   | 21 53.42        | -48 28.8        | 2.088    | 2.980 | 11.2    | 22.2 | 145 W  | - 68                    | 1 21                                | 22 51.38        | + 5 45.2        | 2.235    | 1.723 | 24.7    | 21.1 | 47 E   | 39 17*                  |
| 7 30   | 21 47.87        | -49 16.7        | 2.076    | 2.973 | 11.0    | 22.1 | 146 W  | - 67                    | <b>503928 2003 EL<sub>35</sub></b>  |                 |                 |          |       |         |      |        |                         |
| 8 4  | 21 41.76        | -49 58.5        | 2.069    | 2.966 | 11.0    | 22.1 | 146 W  | - 66                    | 7 15                                | 22 13.72        | -20 49.2        | 1.064    | 1.977 | 17.8    | 22.0 | 144 W  | 24 85                   |
| 8 9  | 21 35.23        | -50 33.2        | 2.069    | 2.958 | 11.3    | 22.1 | 145 W  | - 65                    | 7 20                                | 22 8.99         | -21 4.7         | 1.040    | 1.983 | 15.2    | 21.9 | 149 W  | 24 85                   |
| 8 14   | 21 28.47        | -50 59.8        | 2.074    | 2.951 | 11.8    | 22.2 | 143 E  | - 65                    | 7 25                                | 22 3.28         | -21 21.1        | 1.020    | 1.988 | 12.4    | 21.8 | 155 W  | 24 85                   |
| 8 19   | 21 21.69        | -51 17.9        | 2.086    | 2.943 | 12.5    | 22.2 | 141 E  | - 65                    | 7 30                                | 21 56.73        | -21 37.4        | 1.006    | 1.993 | 9.6     | 21.6 | 161 W  | 23 86                   |
| 8 24   | 21 15.10        | -51 27.4        | 2.103    | 2.934 | 13.3    | 22.2 | 138 E  | - 65                    | 8 4                                 | 21 49.48        | -21 52.4        | 0.997    | 1.998 | 6.7     | 21.5 | 167 W  | 23 86                   |
| 8 29   | 21 8.89         | -51 28.5        | 2.125    | 2.926 | 14.2    | 22.3 | 135 E  | - 65                    | 8 9                                 | 21 41.79        | -22 4.8         | 0.995    | 2.003 | 4.4     | 21.4 | 171 W  | 23 86                   |
| 9 3  | 21 3.23         | -51 21.6        | 2.152    | 2.917 | 15.1    | 22.3 | 131 E  | - 65                    | 8 14                                | 21 33.91        | -22 13.5        | 0.998    | 2.007 | 3.9     | 21.4 | 172 E  | 23 86                   |
| 9 8  | 20 58.27        | -51 7.2         | 2.183    | 2.909 | 15.9    | 22.4 | 128 E  | - 65                    | 8 19                                | 21 26.13        | -22 17.8        | 1.008    | 2.010 | 5.7     | 21.5 | 169 E  | 23 86                   |
| <b>483531 2003 UF<sub>22</sub></b>               |                 |                 |          |       |         |      |        |                         | 8 24                                | 21 18.73        | -22 17.2        | 1.024    | 2.014 | 8.3     | 21.6 | 163 E  | 23 86                   |
| 7 15   | 22 3.73         | -40 6.6         | 0.778    | 1.708 | 20.6    | 21.6 | 144 W  | 5 76                    | 8 29                                | 21 11.94        | -22 11.8        | 1.047    | 2.017 | 11.1    | 21.8 | 157 E  | 23 86                   |
| 7 20   | 22 2.21         | -41 17.0        | 0.739    | 1.682 | 19.5    | 21.5 | 147 W  | 4 75                    | 9 3                                 | 21 5.94         | -22 1.7         | 1.074    | 2.020 | 13.7    | 22.0 | 152 E  | 23 86                   |
| 7 25   | 21 59.28        | -42 27.7        | 0.703    | 1.657 | 18.6    | 21.3 | 149 W  | 3 74                    | 9 8                                 | 21 0.89         | -21 47.2        | 1.107    | 2.022 | 16.2    | 22.1 | 146 E  | 23 86                   |
| 7 30   | 21 54.89        | -43 35.9        | 0.671    | 1.631 | 18.1    | 21.1 | 150 W  | 1 72                    | <b>119866 2002 CL<sub>142</sub></b> |                 |                 |          |       |         |      |        |                         |
| 8 4  | 21 49.02        | -44 38.5        | 0.642    | 1.605 | 18.1    | 21.0 | 150 W  | - 71                    | 7 15                                | 22 34.74        | -1 14.8         | 2.819    | 3.582 | 12.1    | 21.5 | 132 W  | 44 65                   |
| 8 9  | 21 41.81        | -45 31.8        | 0.618    | 1.580 | 18.8    | 20.9 | 150 W  | - 70                    | 7 25                                | 22 30.33        | -1 27.0         | 2.711    | 3.572 | 9.9     | 21.3 | 143 W  | 44 65                   |
| 8 14   | 21 33.52        | -46 12.0        | 0.598    | 1.554 | 20.1    | 20.8 | 148 E  | - 70                    | 8 4                                 | 22 24.34        | -1 51.6         | 2.625    | 3.561 | 7.3     | 21.1 | 153 W  | 43 66                   |
| 8 19   | 21 24.56        | -46 35.9        | 0.582    | 1.528 | 21.9    | 20.8 | 146 E  | - 69                    | 8 14                                | 22 17.09        | -2 27.7         | 2.565    | 3.549 | 4.5     | 20.9 | 164 W  | 43 66                   |
| 8 24   | 21 15.42        | -46 41.4        | 0.569    | 1.503 | 24.1    | 20.8 | 143 E  | - 69                    | 8 24                                | 22 9.12         | -3 12.8         | 2.533    | 3.537 | 2.3     | 20.7 | 172 E  | 42 67                   |
| 8 29   | 21 6.64         | -46 27.1        | 0.559    | 1.478 | 26.6    | 20.8 | 139 E  | - 70                    | 9 3                                 | 22 1.04         | -4 3.6          | 2.530    | 3.523 | 3.5     | 20.8 | 168 E  | 41 68                   |
| 9 3  | 20 58.72        | -45 53.1        | 0.552    | 1.453 | 29.3    | 20.8 | 135 E  | - 70                    | 9 13                                | 21 53.54        | -4 56.2         | 2.558    | 3.509 | 6.3     | 21.0 | 157 E  | 40 69                   |
| 9 8  | 20 52.14        | -45 0.2         | 0.547    | 1.429 | 32.0    | 20.8 | 131 E  | - 71                    | 9 23                                | 21 47.23        | -5 46.3         | 2.613    | 3.493 | 9.1     | 21.1 | 146 E  | 39 70                   |
| 9 13   | 20 47.23        | -43 50.0        | 0.545    | 1.405 | 34.8    | 20.9 | 127 E  | 1 72                    | 10 3                                | 21 42.54        | -6 30.8         | 2.692    | 3.477 | 11.6    | 21.3 | 136 E  | 38 71                   |
| 9 18   | 20 44.18        | -42 24.6        | 0.544    | 1.381 | 37.4    | 20.9 | 123 E  | 3 74                    | 10 13                               | 21 39.77        | -7 7.0          | 2.790    | 3.461 | 13.7    | 21.4 | 125 E  | 38 71                   |
| 9 23   | 20 43.02        | -40 46.2        | 0.545    | 1.359 | 39.9    | 20.9 | 120 E  | 4 75                    | <b>357956 2006 AN<sub>11</sub></b>  |                 |                 |          |       |         |      |        |                         |
| 9 28   | 20 43.69        | -38 56.4        | 0.546    | 1.337 | 42.3    | 21.0 | 116 E  | 6 77                    | 7 15                                | 22 48.34        | -35 55.1        | 2.079    | 2.899 | 14.1    | 21.4 | 136 W  | 9 80                    |
| 10 3   | 20 46.10        | -36 56.7        | 0.549    | 1.315 | 44.5    | 21.0 | 113 E  | 8 79                    | 7 20                                | 22 44.70        | -36 22.7        | 2.039    | 2.896 | 12.9    | 21.3 | 140 W  | 9 80                    |
| 10 8   | 20 50.12        | -34 48.1        | 0.552    | 1.295 | 46.5    | 21.0 | 110 E  | 10 81                   | 7 25                                | 22 40.28        | -36 49.3        | 2.005    | 2.892 | 11.8    | 21.2 | 144 W  | 8 79                    |
| 10 13  | 20 55.60        | -32 31.4        | 0.556    | 1.276 | 48.4    | 21.1 | 107 E  | 12 83                   | 7 30                                | 22 35.12        | -37 13.8        | 1.976    | 2.888 | 10.7    | 21.2 | 148 W  | 8 79                    |
| 10 18  | 21 2.38         | -30 7.3         | 0.560    | 1.258 | 50.1    | 21.1 | 104 E  | 15 86                   | 8 4                                 | 22 29.28        | -37 35.1        | 1.953    | 2.884 | 9.8     | 21.1 | 151 W  | 7 78                    |
| 10 23  | 21 10.28        | -27 36.1        | 0.564    | 1.242 | 51.6    | 21.1 | 102 E  | 17 88                   | 8 9                                 | 22 22.88        | -37 51.9        | 1.936    | 2.879 | 9.0     | 21.0 | 153 W  | 7 78                    |
| 10 28  | 21 19.18        | -24 58.2        | 0.568    | 1.227 | 53.0    | 21.2 | 100 W  | 20 89                   | 8 14                                | 22 16.06        | -38 3.3         | 1.926    | 2.875 | 8.7     | 21.0 | 155 W  | 7 78                    |
| 11 2   | 21 28.96        | -22 13.8        | 0.573    | 1.213 | 54.1    | 21.2 | 98 E   | 23 86                   | 8 19                                | 22 8.99         | -38 8.4         | 1.923    | 2.870 | 8.7     | 21.0 | 154 W  | 7 78                    |
| 11 7   | 21 39.53        | -19 23.4        | 0.579    | 1.201 | 55.1    | 21.2 | 96 E   | 26 83*                  | 8 24                                | 22 1.84         | -38 6.7         | 1.927    | 2.865 | 9.2     | 21.0 | 153 E  | 7 78                    |
| 11 12  | 21 50.80        | -16 27.3        | 0.585    | 1.191 | 55.9    | 21.2 | 95 E   | 29 79*                  | 8 29                                | 21 54.80        | -37 57.8        | 1.937    | 2.859 | 10.0    | 21.1 | 150 E  | 7 78                    |
| 11 17  | 22 2.71         | -13 26.2        | 0.591    | 1.182 | 56.6    | 21.3 | 93 E   | 32 75*                  | 9 3                                 | 21 48.05        | -37 41.9        | 1.954    | 2.854 | 11.1    | 21.1 | 147 E  | 7 78                    |
| 11 22  | 22 15.18        | -10 20.9        | 0.599    | 1.176 | 57.1    | 21.3 | 92 E   | 35 71*                  | 9 8                                 | 21 41.75        | -37 19.1        | 1.977    | 2.848 | 12.3    | 21.2 | 143 E  | 8 79                    |
| 11 27  | 22 28.17        | -7 12.5         | 0.607    | 1.172 | 57.4    | 21.3 | 91 E   | 38 67*                  | 9 13                                | 21 36.04        | -36 50.1        | 2.006    | 2.842 | 13.5    | 21.3 | 139 E  | 8 79                    |
| 12 2   | 22 41.68        | -4 1.8          | 0.617    | 1.169 | 57.5    | 21.4 | 91 E   | 41 63*                  | 9 18                                | 21 3            |                 |          |       |         |      |        |                         |

EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 21/22  | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | $45^\circ$ - $26^\circ$ | 21/22   | $\alpha_{2000}$                    | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | $45^\circ$ - $26^\circ$ |     |     |
|--|-----------------|-----------------|----------|-------|---------|------|--------|-------------------------|---|------------------------------------|-----------------|----------|-------|---------|------|--------|-------------------------|-----|-----|
| <b>524536 2003 AO<sub>4</sub></b> (continuation) |                 |                 |          |       |         |      |        |                         | <b>528507 2008 UC<sub>95</sub></b> (continuation) |                                    |                 |          |       |         |      |        |                         |     |     |
| 8 29   | 22 4.57         | +19 49.2        | 0.632    | 1.589 | 18.5    | 19.8 | 150 E  | 65                      | 11 2  | 22 31.76                           | -28 56.5        | 0.547    | 1.274 | 47.7    | 19.6 | 108 E  | 16                      | 87  |     |
| 9 3  | 21 53.98        | +21 47.3        | 0.611    | 1.560 | 20.2    | 19.7 | 148 E  | 67                      | 11 7  | 22 37.25                           | -27 26.4        | 0.547    | 1.251 | 49.9    | 19.6 | 105 E  | 18                      | 89  |     |
| 9 8  | 21 42.97        | +23 35.1        | 0.596    | 1.532 | 22.6    | 19.7 | 144 E  | 69                      | 11 12   | 22 44.13                           | -25 44.2        | 0.545    | 1.230 | 51.8    | 19.6 | 103 E  | 19                      | 90  |     |
| 9 13   | 21 31.97        | +25 10.3        | 0.585    | 1.503 | 25.3    | 19.7 | 140 E  | 70                      | 11 17   | 22 52.30                           | -23 49.9        | 0.544    | 1.210 | 53.5    | 19.7 | 100 E  | 21                      | 88  |     |
| 9 18   | 21 21.43        | +26 32.2        | 0.579    | 1.476 | 28.4    | 19.7 | 136 E  | 72                      | 11 22   | 23 1.64                            | -21 43.7        | 0.542    | 1.192 | 55.1    | 19.7 | 98 E   | 23                      | 86  |     |
| 9 23   | 21 11.78        | +27 41.1        | 0.575    | 1.449 | 31.4    | 19.7 | 131 E  | 73                      | 11 27   | 23 12.07                           | -19 25.4        | 0.540    | 1.177 | 56.4    | 19.7 | 96 E   | 26                      | 83* |     |
| 9 28   | 21 3.35         | +28 38.1        | 0.575    | 1.422 | 34.4    | 19.8 | 127 E  | 74                      | 12 2  | 23 23.53                           | -16 55.2        | 0.537    | 1.164 | 57.5    | 19.7 | 95 E   | 28                      | 79* |     |
| 10 3   | 20 56.42        | +29 25.0        | 0.577    | 1.396 | 37.3    | 19.8 | 122 E  | 74                      | 12 7  | 23 35.97                           | -14 13.1        | 0.535    | 1.153 | 58.5    | 19.7 | 94 E   | 31                      | 76* |     |
| 10 8   | 20 51.19        | +30 4.1         | 0.579    | 1.371 | 40.0    | 19.9 | 118 E  | 75                      | 12 12   | 23 49.34                           | -11 19.6        | 0.534    | 1.145 | 59.1    | 19.7 | 93 E   | 34                      | 72* |     |
| 10 13  | 20 47.78        | +30 38.0        | 0.583    | 1.348 | 42.4    | 19.9 | 114 E  | 76                      | 12 17   | 0 3.59                             | -8 15.6         | 0.533    | 1.140 | 59.6    | 19.7 | 93 E   | 37                      | 68* |     |
| 10 18  | 20 46.20        | +31 9.2         | 0.587    | 1.325 | 44.6    | 20.0 | 111 E  | 76                      | 12 22   | 0 18.68                            | -5 2.6          | 0.534    | 1.137 | 59.8    | 19.7 | 92 E   | 40                      | 65* |     |
| 10 23  | 20 46.43        | +31 39.4        | 0.590    | 1.304 | 46.6    | 20.0 | 108 E  | 77                      | 12 27   | 0 34.59                            | -1 42.2         | 0.536    | 1.137 | 59.8    | 19.7 | 92 E   | 43                      | 61* |     |
| 10 28  | 20 48.44        | +32 10.2        | 0.593    | 1.284 | 48.3    | 20.0 | 105 E  | 77                      | 1 1   | 0 31.32                            | +1 43.2         | 0.540    | 1.140 | 59.9    | 19.7 | 92 E   | 47                      | 57* |     |
| 11 2   | 20 52.22        | +32 42.6        | 0.595    | 1.265 | 49.9    | 20.0 | 103 E  | 78                      | 1 6   | 1 8.86                             | +5 10.9         | 0.547    | 1.146 | 59.0    | 19.7 | 93 E   | 50                      | 54* |     |
| 11 7   | 20 57.77        | +33 17.6        | 0.596    | 1.248 | 51.3    | 20.1 | 101 E  | 78                      | 29*   | 1 11 1 27.19                       | +8 37.5         | 0.556    | 1.154 | 58.3    | 19.7 | 93 E   | 54                      | 51* |     |
| 11 12  | 21 5.07         | +33 56.1        | 0.596    | 1.233 | 52.4    | 20.1 | 99 E   | 79                      | 28*   | 1 16 1 46.25                       | +11 59.4        | 0.568    | 1.165 | 57.4    | 19.8 | 93 E   | 57                      | 48* |     |
| 11 17  | 21 14.14        | +34 38.2        | 0.594    | 1.220 | 53.4    | 20.1 | 98 E   | 80                      | 26*   | 1 21 2 6.00                        | +15 13.1        | 0.584    | 1.178 | 56.4    | 19.8 | 94 E   | 60                      | 45* |     |
| 11 22  | 21 25.00        | +35 23.7        | 0.592    | 1.209 | 54.2    | 20.1 | 97 E   | 80                      | <b>334384 2002 BL<sub>26</sub></b>                |                                    |                 |          |       |         |      |        |                         |     |     |
| 11 27  | 21 37.74        | +36 12.0        | 0.588    | 1.200 | 54.8    | 20.0 | 96 E   | 81                      | 7 15  | 23 24.28                           | +3 48.2         | 2.995    | 3.598 | 14.3    | 21.5 | 119 W  | 49*                     | 60  |     |
| 12 2   | 21 52.45        | +37 2.2         | 0.584    | 1.194 | 55.3    | 20.0 | 96 E   | 82                      | 7 25  | 23 19.30                           | +4 33.3         | 2.884    | 3.611 | 12.6    | 21.3 | 129 W  | 50                      | 59  |     |
| 12 7   | 22 9.25         | +37 53.0        | 0.580    | 1.189 | 55.5    | 20.0 | 95 E   | 83                      | 8 4   | 23 12.40                           | +5 8.0          | 2.791    | 3.623 | 10.5    | 21.2 | 140 W  | 50                      | 59  |     |
| 12 12  | 22 28.23        | +38 42.6        | 0.576    | 1.188 | 55.6    | 20.0 | 96 E   | 84                      | 8 14  | 23 3.80                            | +5 31.4         | 2.721    | 3.634 | 8.0     | 21.0 | 150 W  | 51                      | 58  |     |
| 12 17  | 22 49.45        | +39 28.4        | 0.572    | 1.188 | 55.5    | 20.0 | 96 E   | 84                      | 8 24  | 22 53.94                           | +5 43.2         | 2.678    | 3.645 | 5.4     | 20.9 | 160 W  | 51                      | 58  |     |
| 12 22  | 23 12.90        | +40 7.1         | 0.569    | 1.191 | 55.2    | 20.0 | 96 E   | 85                      | 18*   | 9 3 22 43.43                       | +5 44.0         | 2.666    | 3.654 | 3.7     | 20.8 | 167 E  | 51                      | 58  |     |
| 12 27  | 23 38.46        | +40 35.0        | 0.568    | 1.196 | 54.7    | 20.0 | 97 E   | 86                      | 18*   | 9 13 22 32.98                      | +5 35.6         | 2.685    | 3.663 | 4.3     | 20.8 | 164 E  | 51                      | 58  |     |
| 1 1  | 0 5.90          | +40 48.4        | 0.570    | 1.203 | 54.0    | 20.0 | 98 E   | 86                      | 19*   | 9 23 22 23.34                      | +5 21.0         | 2.735    | 3.671 | 6.5     | 21.0 | 155 E  | 50                      | 59  |     |
| 1 6  | 0 34.80         | +40 44.4        | 0.575    | 1.213 | 53.2    | 20.0 | 99 E   | 86                      | 20*   | 10 3 22 15.11                      | +5 3.5          | 2.814    | 3.678 | 9.0     | 21.2 | 145 E  | 50                      | 59  |     |
| 1 11   | 1 4.57          | +40 21.0        | 0.583    | 1.224 | 52.3    | 20.0 | 100 E  | 85                      | 21*   | 10 13 22 8.71                      | +4 46.7         | 2.917    | 3.684 | 11.2    | 21.4 | 134 E  | 50                      | 59  |     |
| 1 16   | 1 34.56         | +39 37.4        | 0.595    | 1.238 | 51.4    | 20.0 | 100 E  | 85                      | <b>307457 2002 VE<sub>66</sub></b>                |                                    |                 |          |       |         |      |        |                         |     |     |
| 1 21   | 2 4.09          | +38 34.9        | 0.612    | 1.254 | 50.4    | 20.1 | 101 E  | 84                      | 7 15  | 23 25.68                           | -41 46.3        | 2.790    | 3.513 | 13.1    | 21.4 | 128 W  | 3*                      | 74  |     |
| <b>478385 2012 BP<sub>13</sub></b>               |                 |                 |          |       |         |      |        |                         | 7 20  | 23 24.02                           | -42 34.1        | 2.755    | 3.514 | 12.5    | 21.4 | 132 W  | 2                       | 73  |     |
| 7 15   | 23 3.64         | +3 58.7         | 0.862    | 1.682 | 28.9    | 21.4 | 127 W  | 41                      | 68  | 7 25                               | 23 21.69        | -43 21.8 | 2.724 | 3.515   | 11.8 | 21.3   | 135 W                   | 2   | 73  |
| 7 25   | 23 7.27         | +1 47.9         | 0.771    | 1.651 | 25.9    | 21.0 | 135 W  | 43                      | 66  | 7 30                               | 23 18.70        | -44 8.4  | 2.699 | 3.516   | 11.2 | 21.3   | 138 W                   | 1   | 72  |
| 8 4  | 23 7.16         | +0 21.2         | 0.691    | 1.621 | 22.0    | 20.6 | 143 W  | 45                      | 64  | 8 4                                | 23 15.05        | -44 53.1 | 2.679 | 3.517   | 10.7 | 21.2   | 140 W                   | —   | 71  |
| 8 14   | 23 2.87         | +2 24.4         | 0.624    | 1.592 | 17.2    | 20.2 | 152 W  | 47                      | 62  | 8 9                                | 23 10.78        | -45 34.6 | 2.665 | 3.518   | 10.3 | 21.2   | 142 W                   | —   | 70  |
| 8 19   | 22 59.19        | +3 22.0         | 0.596    | 1.578 | 14.6    | 20.0 | 157 W  | 48                      | 61  | 8 14                               | 23 5.97         | -46 12.1 | 2.657 | 3.518   | 10.0 | 21.2   | 143 W                   | —   | 70  |
| 8 24   | 22 54.59        | +4 16.0         | 0.573    | 1.564 | 12.1    | 19.8 | 161 W  | 49                      | 60  | 8 19                               | 23 0.71         | -46 44.6 | 2.655 | 3.518   | 9.9  | 21.2   | 143 W                   | —   | 69  |
| 8 29   | 22 49.23        | +5 5.3          | 0.554    | 1.551 | 9.9     | 19.6 | 165 W  | 50                      | 59  | 8 24                               | 22 55.10        | -47 11.4 | 2.659 | 3.518   | 10.0 | 21.2   | 143 W                   | —   | 69  |
| 9 3  | 22 43.30        | +5 49.1         | 0.539    | 1.538 | 8.8     | 19.5 | 166 E  | 51                      | 58  | 8 29                               | 22 49.28        | -47 31.7 | 2.669 | 3.518   | 10.2 | 21.2   | 142 W                   | —   | 68  |
| 9 13   | 22 31.02        | +6 58.0         | 0.523    | 1.514 | 11.3    | 19.5 | 163 E  | 52                      | 57  | 9 3                                | 22 43.36        | -47 45.1 | 2.685 | 3.517   | 10.6 | 21.2   | 140 E                   | —   | 68  |
| 9 23   | 22 20.42        | +7 43.0         | 0.523    | 1.492 | 17.1    | 19.7 | 154 E  | 53                      | 56  | 9 8                                | 22 37.51        | -47 51.5 | 2.707 | 3.516   | 11.2 | 21.3   | 138 E                   | —   | 68  |
| 10 3   | 22 13.75        | +8 10.1         | 0.538    | 1.472 | 23.3    | 19.9 | 144 E  | 53                      | 56  | 9 13                               | 22 31.86        | -47 50.6 | 2.734 | 3.515   | 11.7 | 21.3   | 135 E                   | —   | 68  |
| 10 8   | 22 12.34        | +8 19.8         | 0.550    | 1.463 | 26.1    | 20.0 | 140 E  | 53                      | 56  | 9 18                               | 22 26.55        | -47 42.9 | 2.767 | 3.514   | 12.4 | 21.4   | 131 E                   | —   | 68  |
| 10 13  | 22 12.35        | +8 28.7         | 0.565    | 1.455 | 28.7    | 20.1 | 135 E  | 53                      | 56  | 9 23                               | 22 21.69        | -47 28.6 | 2.804 | 3.512   | 13.0 | 21.4   | 128 E                   | —   | 69  |
| 10 18  | 22 13.78        | +8 38.2         | 0.582    | 1.448 | 31.1    | 20.3 | 131 E  | 54                      | 55  | 9 28                               | 22 17.37        | -47 8.2  | 2.846 | 3.511   | 13.6 | 21.5   | 124 E                   | —   | 69  |
| 10 23  | 22 16.56        | +8 48.9         | 0.600    | 1.442 | 33.2    | 20.4 | 128 E  | 54                      | 55  | <b>370181 2002 CX<sub>46</sub></b> |                 |          |       |         |      |        |                         |     |     |
| 10 28  | 22 20.63        | +9 1.7          | 0.621    | 1.436 | 35.0    | 20.5 | 124 E  | 54                      | 55  | 7 15                               | 23 27.10        | -10 15.6 | 1.985 | 2.687   | 18.3 | 21.3   | 124 W                   | 35* | 74  |
| 11 2   | 22 25.91        | +9 17.1         | 0.643    | 1.431 | 36.6    | 20.6 | 121 E  | 54                      | 55  | 7 25                               | 23 23.78        | -9 32.9  | 1.838 | 2.645   | 16.1 | 21.0   | 134 W                   | 35  | 74  |
| 11 7   | 22 32.32        | +9 35.5         | 0.666    | 1.427 | 38.0    | 20.7 | 118 E  | 55                      | 54  | 8 4                                | 23 17.43        | -8 55.2  | 1.708 | 2.602   | 13.0 | 20.7   | 145 W                   | 36  | 73  |
| 11 12  | 22 39.76        | +9 57.2         | 0.691    | 1.424 | 39.2    | 20.8 | 115 E  | 55                      | 54  | 8 14                               | 23 7.98         | -8 21.3  | 1.599 | 2.559   | 9.2  | 20.4   | 156 W                   | 37  | 72  |
| 11 17  | 22 48.12        | +10 22.5        | 0.717    | 1.422 | 40.2    | 20.9 | 112 E  | 55                      | 54  | 8 24                               | 22 55.79        | -7 49.1  | 1.516 | 2.515   | 4.6  | 20.0   | 169 W                   | 37  | 72  |
| 11 22  | 22 57.31        | +10 51.2        | 0.744    | 1.421 | 41.0    | 21.0 | 109 E  | 56                      | 53*   | 9 3                                | 22 41.68        | -7 16.2  | 1.462 | 2.470   | 0.6  | 19.6   | 178 E                   | 38  | 71  |
| 11 27  | 23 7.24         | +11 23.1        | 0.772    | 1.420 | 41.6    | 21.1 | 107 E  | 56                      | 52*   | 9 13                               | 22 26.93        | -6 40.2  | 1.437 | 2.425   | 5.9  | 19.9   | 166 E                   | 38  | 71  |
| 12 2   | 23 17.83        | +11 58.0        | 0.801    | 1.421 | 42.1    | 21.2 | 105 E  | 57                      | 51*   | 9 23                               | 22 13.10        | -5 59.3  | 1.442 | 2.379   | 11.1 | 20.1   | 153 E                   | 39  | 70  |
| 12 7   | 23 29.03        | +12 35.8        | 0.831    | 1.422 | 42.5    | 21.3 | 103 E  | 58                      | 50*   | 10 3                               | 22 1.52         | -5 12.4  | 1.472 | 2.332   | 15.9 | 20.2   | 140 W                   | 40  | 69  |
| 12 12  | 23 40.75        | +13 16.1        | 0.862    | 1.425 | 42.8    | 21.4 | 101 E  | 58                      | 49*   | 10 13                              | 21 53.14        | -4 19.0  | 1.523 | 2.286   | 19.9 | 20.4   | 129 E                   | 41  | 68  |
| 12 17  | 23 52.94        | +13 58.7        | 0.894    | 1.428 | 42.9    | 21.5 | 99 E   | 59                      | 47*   | 10 23                              | 21 48.38        | -3 18.6  | 1.589 | 2.238   | 23.1 | 20.5   | 118 E                   | 42  | 67  |
| <b>528507 2008 UC<sub>95</sub></b>               |                 |                 |          |       |         |      |        |                         | 11 2  | 21 47.21                           | -2 10.8         | 1.664    | 2.191 | 25.4    | 20.7 | 108 E  | 43                      | 66  |     |
| 7 15   | 23 12.24        | -18 5.8         | 1.132    | 1.944 | 23.8    | 21.4 | 129 W  | 27                      | 82  | 11 12                              | 21 49.40        | -0 54.9  | 1.745 | 2.143   | 27.1 | 20.8   | 100 E                   | 44  | 64* |
| 7 25   | 23 17.48        | -19 22.6        | 1.002    | 1.881 | 21.3    | 21.0 | 138 W  | 26                      | 83  | 11 22                              | 21 54.60        | +0 30.1  | 1.826 | 2.096   | 28.1 | 20.9   | 91 E                    | 46  | 59* |
| 8 4  | 23 19.85        | -21 9.3         | 0.887    | 1.818 | 18.2    | 20.6 | 146 W  | 24                      | 85  | 12 2                               | 22 2.42         | +2 4.5   | 1.904 | 2.049   | 28.6 | 20.9   | 84 E                    | 47  | 52* |
| 8 14   | 23 18.72        | -23 25.1        | 0.787    | 1.754 | 14.8    | 20.1 | 154 W  | 22                      | 87  | 12 12                              | 22 12.55        | +3 49.2  | 1.978 | 2.002   | 28.6 | 20.9   | 77 E                    | 49* | 45* |
| 8 19   | 23 16.70        | -24 41.7        | 0.745    | 1.722 | 13.3    | 19.9 | 157 W  | 20                      | 89  | 12 22                              | 22 24.69        | +5 44.6  | 2.045 | 1.955   | 28.4 | 21.0   | 71 E                    | 50* | 37* |
| 8 24   | 23 13.68        | -26 1.8         | 0.707    | 1.690 | 12.3    | 19   |        |                         |   |                                    |                 |          |       |         |      |        |                         |     |     |

EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 2021                                | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | 45°   | -26° | 21/22   | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$      | $\beta$ | $V$   | $\psi$ | 45°  | -26°  |     |       |
|-------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|-------|------|---|-----------------|-----------------|----------|----------|---------|-------|--------|------|-------|-----|-------|
| <b>418896</b> 2009 AK <sub>15</sub> |                 |                 |          |       |         |      |        |       |      | <b>471108</b> 2010 CL <sub>1</sub> (continuation) |                 |                 |          |          |         |       |        |      |       |     |       |
| 7                                   | 15              | 23 53.69        | +18 5.1  | 0.826 | 1.473   | 41.6 | 21.5   | 106 W | 62*  | 46  | 10              | 8               | 4 57.44  | -33 12.6 | 0.417   | 1.210 | 50.7   | 19.8 | 110 W | 12  | 83    |
| 7                                   | 20              | 23 53.19        | +18 1.9  | 0.805 | 1.500   | 39.4 | 21.4   | 110 W | 63*  | 46  | 10              | 13              | 5 14.11  | -35 47.1 | 0.417   | 1.198 | 52.2   | 19.8 | 109 W | 9   | 80    |
| 7                                   | 25              | 23 51.47        | +17 48.1 | 0.784 | 1.526   | 37.0 | 21.3   | 115 W | 63   | 46  | 10              | 18              | 5 29.87  | -38 2.2  | 0.419   | 1.187 | 53.4   | 19.8 | 107 W | 7   | 78    |
| 7                                   | 30              | 23 48.46        | +17 22.3 | 0.764 | 1.551   | 34.2 | 21.2   | 121 W | 62   | 47  | 10              | 23              | 5 44.57  | -39 57.9 | 0.421   | 1.179 | 54.5   | 19.9 | 105 W | 5   | 76    |
| 8                                   | 4               | 23 44.15        | +16 43.2 | 0.745 | 1.575   | 31.2 | 21.1   | 126 W | 62   | 47  | 10              | 28              | 5 58.06  | -41 34.4 | 0.424   | 1.172 | 55.3   | 19.9 | 104 W | 3   | 74    |
| 8                                   | 9               | 23 38.55        | +15 49.4 | 0.728 | 1.598   | 27.9 | 21.0   | 132 W | 61   | 48  | 11              | 2               | 6 10.25  | -42 52.5 | 0.426   | 1.167 | 55.9   | 19.9 | 103 W | 2   | 73    |
| 8                                   | 14              | 23 31.76        | +14 40.4 | 0.714 | 1.621   | 24.3 | 20.9   | 139 W | 60   | 49  | 11              | 7               | 6 21.02  | -43 52.6 | 0.428   | 1.163 | 56.2   | 19.9 | 103 W | 1   | 72    |
| 8                                   | 19              | 23 23.97        | +13 16.1 | 0.705 | 1.642   | 20.5 | 20.7   | 145 W | 58   | 51  | 11              | 12              | 6 30.37  | -44 34.9 | 0.429   | 1.162 | 56.2   | 19.9 | 103 W | —   | 71    |
| 8                                   | 24              | 23 15.43        | +11 37.6 | 0.700 | 1.662   | 16.5 | 20.6   | 152 W | 57   | 52  | 11              | 17              | 6 38.30  | -44 59.6 | 0.429   | 1.163 | 56.0   | 19.9 | 103 W | —   | 71    |
| 8                                   | 29              | 23 6.43         | +9 47.0  | 0.700 | 1.681   | 12.6 | 20.5   | 159 W | 55   | 54  | 11              | 22              | 6 44.80  | -45 6.8  | 0.428   | 1.165 | 55.5   | 19.9 | 104 W | —   | 71    |
| 9                                   | 3               | 22 57.32        | +7 47.5  | 0.706 | 1.700   | 9.2  | 20.4   | 164 W | 53   | 56  | 11              | 27              | 6 49.90  | -44 55.9 | 0.425   | 1.170 | 54.7   | 19.9 | 105 W | —   | 71    |
| 9                                   | 8               | 22 48.45        | +5 43.2  | 0.719 | 1.717   | 7.2  | 20.4   | 168 E | 51   | 58  | 12              | 2               | 6 53.61  | -44 25.6 | 0.422   | 1.176 | 53.6   | 19.8 | 106 W | 1   | 72    |
| 9                                   | 13              | 22 40.17        | +3 38.4  | 0.739 | 1.734   | 7.6  | 20.5   | 167 E | 49   | 60  | 12              | 7               | 6 56.00  | -43 33.8 | 0.418   | 1.184 | 52.2   | 19.8 | 108 W | 1   | 72    |
| 9                                   | 18              | 22 32.77        | +1 37.4  | 0.765 | 1.749   | 10.0 | 20.7   | 162 E | 47   | 62  | 12              | 12              | 6 57.24  | -42 18.1 | 0.412   | 1.194 | 50.5   | 19.7 | 111 W | 3   | 74    |
| 9                                   | 23              | 22 26.42        | +0 16.3  | 0.797 | 1.764   | 13.0 | 20.9   | 157 E | 45   | 64  | 12              | 17              | 6 57.50  | -40 36.3 | 0.407   | 1.205 | 48.5   | 19.7 | 113 W | 4   | 75    |
| 9                                   | 28              | 22 21.26        | -2 0 5   | 0.835 | 1.778   | 16.0 | 21.1   | 151 E | 43   | 66  | 12              | 22              | 6 56.98  | -38 26.4 | 0.402   | 1.218 | 46.2   | 19.6 | 117 W | 7   | 78    |
| 10                                  | 3               | 22 17.32        | -3 33.5  | 0.878 | 1.790   | 18.9 | 21.3   | 145 E | 41   | 68  | 12              | 27              | 6 55.89  | -35 46.3 | 0.397   | 1.233 | 43.5   | 19.5 | 120 W | 9   | 80    |
| <b>419472</b> 2010 DW <sub>1</sub>  |                 |                 |          |       |         |      |        |       |      | <b>3361</b> Orpheus                               |                 |                 |          |          |         |       |        |      |       |     |       |
| 7                                   | 25              | 0 2.70          | +11 30.9 | 0.672 | 1.445   | 39.1 | 21.4   | 116 W | 57   | 52  | 7               | 25              | 1 14.80  | +10 10.6 | 0.945   | 1.513 | 41.3   | 21.4 | 101 W | 53* | 54    |
| 7                                   | 30              | 0 5.68          | +9 57.8  | 0.637 | 1.451   | 36.8 | 21.2   | 121 W | 55   | 54  | 8               | 4               | 1 31.30  | +11 40.8 | 0.839   | 1.485 | 41.0   | 21.1 | 106 W | 56* | 52    |
| 8                                   | 4               | 0 7.61          | +8 2 9   | 0.603 | 1.455   | 34.2 | 21.0   | 126 W | 53   | 56  | 8               | 14              | 1 47.16  | +12 59.8 | 0.735   | 1.454 | 40.4   | 20.7 | 112 W | 58  | 51    |
| 8                                   | 9               | 0 8.36          | +5 43.7  | 0.572 | 1.460   | 31.1 | 20.8   | 132 W | 51   | 58  | 8               | 24              | 2 2.22   | +14 5.0  | 0.634   | 1.419 | 39.2   | 20.3 | 117 W | 59  | 50    |
| 8                                   | 14              | 0 7.86          | +2 58.7  | 0.543 | 1.463   | 27.5 | 20.6   | 138 W | 48   | 61  | 8               | 29              | 2 9.37   | +14 31.6 | 0.585   | 1.401 | 38.4   | 20.1 | 120 W | 60  | 49    |
| 8                                   | 19              | 0 6.03          | +0 12.6  | 0.518 | 1.466   | 23.5 | 20.4   | 145 W | 45   | 64  | 9               | 3               | 2 16.22  | +14 53.3 | 0.538   | 1.381 | 37.5   | 19.9 | 124 W | 60  | 49    |
| 8                                   | 24              | 0 2.85          | +3 48.3  | 0.498 | 1.468   | 19.3 | 20.2   | 151 W | 41   | 68  | 9               | 8               | 2 22.71  | +15 9.4  | 0.492   | 1.361 | 36.3   | 19.6 | 127 W | 60  | 49    |
| 8                                   | 29              | 23 58.36        | -7 44.2  | 0.484 | 1.469   | 14.9 | 20.0   | 158 W | 37   | 72  | 9               | 13              | 2 28.78  | +15 19.0 | 0.447   | 1.340 | 34.9   | 19.3 | 130 W | 60  | 49    |
| 9                                   | 3               | 23 52.63        | -11 53.0 | 0.475 | 1.470   | 11.3 | 19.8   | 163 W | 33   | 76  | 9               | 18              | 2 34.40  | +15 21.3 | 0.404   | 1.318 | 33.3   | 19.0 | 134 W | 60  | 49    |
| 9                                   | 5               | 23 50.04        | -13 34.0 | 0.473 | 1.470   | 10.3 | 19.8   | 165 W | 31   | 78  | 9               | 23              | 2 39.52  | +15 15.0 | 0.363   | 1.295 | 31.5   | 18.7 | 138 W | 60  | 49    |
| 9                                   | 7               | 23 47.30        | -15 14.8 | 0.473 | 1.470   | 9.8  | 19.7   | 166 W | 30   | 79  | 9               | 28              | 2 44.06  | +14 58.3 | 0.324   | 1.272 | 29.3   | 18.4 | 142 W | 60  | 49    |
| 9                                   | 9               | 23 44.44        | -16 54.6 | 0.473 | 1.470   | 9.8  | 19.7   | 166 W | 28   | 81  | 10              | 3               | 2 47.92  | +14 28.7 | 0.286   | 1.248 | 26.8   | 18.0 | 146 W | 59  | 50    |
| 9                                   | 11              | 23 41.48        | -18 32.7 | 0.475 | 1.470   | 10.3 | 19.8   | 165 W | 26   | 83  | 10              | 8               | 2 51.02  | +13 43.1 | 0.251   | 1.223 | 24.0   | 17.6 | 150 W | 59  | 50    |
| 9                                   | 13              | 23 38.45        | -20 8.4  | 0.477 | 1.470   | 11.3 | 19.8   | 163 W | 25   | 84  | 10              | 13              | 2 53.29  | +12 37.0 | 0.217   | 1.198 | 20.9   | 17.1 | 155 W | 58  | 51    |
| 9                                   | 18              | 23 30.74        | -23 53.2 | 0.488 | 1.468   | 14.9 | 20.0   | 158 E | 21   | 88  | 10              | 18              | 2 54.70  | +11 4.3  | 0.186   | 1.172 | 17.5   | 16.6 | 159 W | 56  | 53    |
| 9                                   | 23              | 23 23.16        | -27 11.9 | 0.504 | 1.466   | 19.1 | 20.2   | 151 E | 18   | 89  | 10              | 23              | 2 55.17  | +8 54.6  | 0.156   | 1.146 | 14.1   | 16.1 | 164 W | 54  | 55    |
| 9                                   | 28              | 23 16.14        | -30 0 2  | 0.526 | 1.464   | 23.2 | 20.4   | 145 E | 15   | 86  | 10              | 25              | 2 55.06  | +7 48.9  | 0.145   | 1.135 | 12.9   | 15.8 | 165 W | 53  | 56    |
| 10                                  | 3               | 23 10.01        | -32 17.0 | 0.552 | 1.460   | 27.0 | 20.6   | 139 E | 13   | 84  | 10              | 27              | 2 54.77  | +6 33.0  | 0.134   | 1.125 | 12.1   | 15.6 | 166 W | 52  | 57    |
| 10                                  | 8               | 23 5 08         | -34 3 6  | 0.581 | 1.456   | 30.3 | 20.8   | 133 E | 11   | 82  | 10              | 29              | 2 54.27  | +5 5 1   | 0.124   | 1.114 | 11.7   | 15.4 | 167 W | 50  | 59    |
| 10                                  | 13              | 23 1 53         | -35 22.6 | 0.612 | 1.452   | 33.3 | 21.0   | 127 E | 10   | 81  | 10              | 31              | 2 53.55  | +3 22.5  | 0.113   | 1.104 | 12.0   | 15.2 | 167 W | 48  | 61    |
| 10                                  | 18              | 22 59.45        | -36 17.6 | 0.646 | 1.446   | 35.7 | 21.2   | 122 E | 9    | 80  | 11              | 2               | 2 52.57  | +1 21.8  | 0.104   | 1.093 | 13.2   | 15.0 | 165 W | 46  | 63    |
| 10                                  | 23              | 22 58.81        | -36 52.1 | 0.681 | 1.440   | 37.9 | 21.4   | 117 E | 8    | 79  | 11              | 4               | 2 51.32  | -1 1 4   | 0.094   | 1.082 | 15.3   | 14.9 | 163 W | 44  | 65    |
| <b>363344</b> 2002 GC <sub>7</sub>  |                 |                 |          |       |         |      |        |       |      | <b>3361</b> Orpheus                               |                 |                 |          |          |         |       |        |      |       |     |       |
| 7                                   | 25              | 0 43.20         | -10 8.5  | 0.599 | 1.383   | 41.6 | 21.2   | 115 W | 34*  | 74  | 11              | 6               | 2 49.72  | -3 53.1  | 0.085   | 1.072 | 18.3   | 14.7 | 160 W | 41  | 68    |
| 7                                   | 30              | 0 39.62         | -8 13.8  | 0.563 | 1.387   | 39.2 | 21.0   | 120 W | 37*  | 72  | 11              | 8               | 2 47.72  | -7 21.2  | 0.076   | 1.061 | 22.2   | 14.6 | 156 E | 38  | 71    |
| 8                                   | 4               | 0 34.03         | -6 10.7  | 0.529 | 1.391   | 36.3 | 20.8   | 126 W | 39   | 70  | 11              | 10              | 2 45.21  | -11 37.0 | 0.068   | 1.050 | 27.1   | 14.5 | 151 E | 33  | 76    |
| 8                                   | 9               | 0 26.14         | -3 57.9  | 0.496 | 1.394   | 32.9 | 20.6   | 132 W | 41   | 68  | 11              | 12              | 2 41.98  | -16 55.1 | 0.060   | 1.040 | 33.2   | 14.4 | 145 E | 28  | 81    |
| 8                                   | 14              | 0 15.71         | -1 34.8  | 0.467 | 1.396   | 29.0 | 20.3   | 138 W | 43   | 66  | 11              | 13              | 2 40.00  | -20 3 5  | 0.056   | 1.034 | 36.8   | 14.3 | 141 E | 25  | 84    |
| 8                                   | 19              | 0 2 59          | +0 58.1  | 0.442 | 1.398   | 24.6 | 20.1   | 145 W | 46   | 63  | 11              | 14              | 2 37.69  | -23 35.0 | 0.053   | 1.029 | 40.8   | 14.3 | 137 E | 21  | 88    |
| 8                                   | 24              | 23 46.81        | +3 38.4  | 0.423 | 1.398   | 19.9 | 19.9   | 152 W | 49   | 60  | 11              | 15              | 2 34.96  | -27 32.4 | 0.050   | 1.024 | 45.2   | 14.3 | 133 E | 17  | 88    |
| 8                                   | 29              | 23 28.62        | +6 21.2  | 0.409 | 1.398   | 15.4 | 19.6   | 158 W | 51   | 58  | 11              | 16              | 2 31.67  | -31 58.2 | 0.047   | 1.019 | 50.1   | 14.3 | 128 E | 13  | 84    |
| 9                                   | 3               | 23 8.62         | +8 59.2  | 0.402 | 1.398   | 12.5 | 19.5   | 163 W | 54   | 55  | 11              | 17              | 2 27.61  | -36 54.5 | 0.045   | 1.013 | 55.5   | 14.3 | 122 E | 8   | 79    |
| 9                                   | 8               | 22 47.75        | +11 24.4 | 0.402 | 1.396   | 12.7 | 19.5   | 162 E | 56   | 53  | 11              | 18              | 2 22.49  | -42 21.5 | 0.042   | 1.008 | 61.5   | 14.3 | 116 E | 3   | 74    |
| 9                                   | 13              | 22 27.17        | +13 30.0 | 0.410 | 1.394   | 15.9 | 19.7   | 158 E | 59   | 50  | 11              | 19              | 2 15.79  | -48 17.5 | 0.041   | 1.003 | 67.9   | 14.4 | 110 E | —   | 68    |
| 9                                   | 18              | 22 7 95         | +15 13.0 | 0.424 | 1.391   | 20.4 | 19.9   | 151 E | 60   | 49  | 11              | 20              | 2 6 62   | -54 37.5 | 0.039   | 0.998 | 74.7   | 14.6 | 103 E | —   | 61    |
| 9                                   | 23              | 21 50.91        | +16 33.4 | 0.443 | 1.387   | 25.0 | 20.1   | 144 E | 62   | 47  | 11              | 21              | 1 53.34  | -61 12.5 | 0.039   | 0.993 | 81.9   | 14.8 | 96 E  | —   | 55    |
| 9                                   | 28              | 21 36.51        | +17 34.0 | 0.467 | 1.383   | 29.3 | 20.3   | 137 E | 63   | 46  | 11              | 22              | 1 32.51  | -67 48.7 | 0.039   | 0.988 | 89.2   | 15.0 | 89 E  | —   | 48    |
| 10                                  | 3               | 21 24.91        | +18 18.9 | 0.495 | 1.378   | 33.1 | 20.6   | 131 E | 63   | 46  | 11              | 23              | 0 55.99  | -74 5 2  | 0.039   | 0.982 | 96.4   | 15.4 | 81 E  | —   | 42    |
| 10                                  | 8               | 21 16.06        | +18 52.4 | 0.525 | 1.372   | 36.4 | 20.8   | 125 E | 64   | 45  | 11              | 24              | 23 42.50 | -79 23.1 | 0.040   | 0.977 | 103.3  | 15.7 | 74 E  | —   | 37    |
| 10                                  | 13              | 21 9 78         | +19 18.4 | 0.557 | 1.365   | 39.2 | 21.0   | 120 E | 64   | 45  | 11              | 25              | 21 16.31 | -82 7 0  | 0.041   | 0.972 | 109.8  | 16.2 | 68 E  | —   | 33*   |
| 10                                  | 18              | 21 5 77         | +19 40.4 | 0.589 | 1.358   | 41.5 | 21.1   | 115 E | 65   | 44  | 11              | 26              | 18 40.65 | -80 42.0 | 0.043   | 0.967 | 115.8  | 16.6 | 62 E  | —   | 29*   |
| 10                                  | 23              | 21 3 76         | +20 0 4  | 0.622 | 1.350   | 43.4 | 21.3   | 111 E | 65   | 44  | 11              | 27              | 17 18.84 | -77 1 9  | 0.046   | 0.962 | 121.1  | 17.1 | 57 E  | —   | 25*</ |

EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 21/22              | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$   | $\psi$ | 45°-26° | 21/22                               | $\alpha_{2000}$                     | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$   | $\psi$ | 45°-26° |     |     |
|--------------------|-----------------|-----------------|----------|-------|---------|-------|--------|---------|-------------------------------------|-------------------------------------|-----------------|----------|-------|---------|-------|--------|---------|-----|-----|
| <b>4660 Nereus</b> |                 |                 |          |       |         |       |        |         | <b>390774 2003 UJ<sub>188</sub></b> |                                     |                 |          |       |         |       |        |         |     |     |
|                    | h m             | ° ' "           |          | ° ' " | ° ' "   | ° ' " | ° ' "  | ° ' "   | h m                                 | ° ' "                               | ° ' "           |          | ° ' " | ° ' "   | ° ' " | ° ' "  | ° ' "   |     |     |
| 7 25               | 1 14.93         | +9 2.7          | 1.141    | 1.670 | 36.6    | 21.3  | 101 W  | 52*     | 55                                  | 9 18                                | 1 0.00          | -23 2.8  | 2.083 | 3.005   | 9.1   | 20.4   | 152 W   | 22  | 87  |
| 8 4                | 1 30.52         | +10 50.6        | 1.013    | 1.626 | 36.7    | 21.0  | 107 W  | 55*     | 53                                  | 9 23                                | 0 54.52         | -23 17.7 | 2.056 | 2.986   | 8.7   | 20.3   | 153 W   | 22  | 87  |
| 8 14               | 1 45.64         | +12 35.7        | 0.889    | 1.580 | 36.4    | 20.6  | 112 W  | 58      | 51                                  | 9 28                                | 0 48.70         | -23 27.6 | 2.036 | 2.967   | 8.7   | 20.3   | 154 W   | 22  | 87  |
| 8 24               | 2 0.17          | +14 18.1        | 0.772    | 1.532 | 35.7    | 20.2  | 118 W  | 59      | 50                                  | 10 3                                | 0 42.65         | -23 31.8 | 2.023 | 2.947   | 9.0   | 20.3   | 153 W   | 21  | 88  |
| 9 3                | 2 13.92         | +15 58.2        | 0.661    | 1.482 | 34.5    | 19.8  | 124 W  | 61      | 48                                  | 10 8                                | 0 36.51         | -23 29.5 | 2.016 | 2.927   | 9.7   | 20.3   | 150 E   | 22  | 87  |
| 9 13               | 2 26.59         | +17 36.5        | 0.557    | 1.430 | 32.6    | 19.3  | 130 W  | 63      | 46                                  | 10 13                               | 0 30.43         | -23 20.4 | 2.017 | 2.907   | 10.7  | 20.3   | 147 E   | 22  | 87  |
| 9 23               | 2 37.94         | +19 14.8        | 0.462    | 1.377 | 30.0    | 18.7  | 137 W  | 64      | 45                                  | 10 18                               | 0 24.56         | -23 4.4  | 2.024 | 2.887   | 11.8  | 20.4   | 144 E   | 22  | 87  |
| 10 3               | 2 47.64         | +20 56.0        | 0.376    | 1.323 | 26.6    | 18.1  | 144 W  | 66      | 43                                  | 10 23                               | 0 19.01         | -22 41.4 | 2.037 | 2.867   | 13.1  | 20.4   | 139 E   | 22  | 87  |
| 10 13              | 2 55.34         | +22 43.9        | 0.299    | 1.268 | 22.4    | 17.4  | 151 W  | 68      | 41                                  | 10 28                               | 0 13.92         | -22 11.8 | 2.057 | 2.846   | 14.3  | 20.4   | 135 E   | 23  | 86  |
| 10 18              | 2 58.45         | +23 43.0        | 0.265    | 1.241 | 20.0    | 17.0  | 155 W  | 69      | 40                                  | 11 2                                | 0 9.36          | -21 36.1 | 2.081 | 2.826   | 15.5  | 20.5   | 130 E   | 23  | 86  |
| 10 23              | 3 1.10          | +24 47.4        | 0.233    | 1.214 | 17.6    | 16.6  | 158 W  | 70      | 39                                  | 11 12                               | 0 2.15          | -20 8.1  | 2.144 | 2.784   | 17.8  | 20.6   | 121 E   | 25  | 84  |
| 10 28              | 3 3.37          | +25 59.5        | 0.202    | 1.188 | 15.2    | 16.1  | 162 W  | 71      | 38                                  | 11 22                               | 23 57.70        | -18 22.3 | 2.222 | 2.741   | 19.6  | 20.7   | 111 E   | 27  | 82  |
| 11 2               | 3 5.34          | +27 22.1        | 0.175    | 1.162 | 13.1    | 15.7  | 165 W  | 72      | 37                                  | 12 2                                | 23 56.03        | -16 23.3 | 2.310 | 2.698   | 20.9  | 20.8   | 102 E   | 29  | 80  |
| 11 7               | 3 7.29          | +29 0.2         | 0.149    | 1.136 | 11.8    | 15.3  | 166 W  | 74      | 35                                  | 12 12                               | 23 56.98        | -14 14.5 | 2.404 | 2.654   | 21.7  | 20.9   | 94 E    | 31  | 75* |
| 11 12              | 3 9.69          | +31 1.9         | 0.125    | 1.112 | 11.9    | 14.8  | 167 W  | 76      | 33                                  | 12 22                               | 0 0.29          | -11 58.7 | 2.500 | 2.610   | 22.1  | 20.9   | 85      | 33  | 67* |
| 11 14              | 3 10.96         | +32 0.1         | 0.116    | 1.102 | 12.5    | 14.7  | 166 E  | 77      | 32                                  | 1 1                                 | 0 5.68          | -9 37.8  | 2.594 | 2.565   | 22.0  | 21.0   | 77 E    | 35  | 58* |
| 11 16              | 3 12.51         | +33 5.5         | 0.107    | 1.093 | 13.3    | 14.5  | 165 E  | 78      | 31                                  | 1 11                                | 0 12.88         | -7 12.7  | 2.684 | 2.520   | 21.5  | 21.0   | 70 E    | 38* | 50* |
| 11 18              | 3 14.43         | +34 19.9        | 0.098    | 1.083 | 14.3    | 14.3  | 164 E  | 79      | 30                                  | 1 21                                | 0 21.66         | -4 44.4  | 2.767 | 2.475   | 20.7  | 21.0   | 63 E    | 38* | 42* |
| 11 20              | 3 16.86         | +35 45.3        | 0.090    | 1.074 | 15.6    | 14.2  | 163 E  | 81      | 28                                  | <b>474370 2002 RT<sub>157</sub></b> |                 |          |       |         |       |        |         |     |     |
| 11 22              | 3 19.99         | +37 24.6        | 0.082    | 1.065 | 17.1    | 14.0  | 161 E  | 82      | 27                                  | 7 25                                | 1 23.74         | +10 13.3 | 1.571 | 1.998   | 30.2  | 21.4   | 99 W    | 52* | 54  |
| 11 23              | 3 21.90         | +38 20.6        | 0.078    | 1.061 | 18.0    | 13.9  | 161 E  | 83      | 26                                  | 8 4                                 | 1 37.30         | +12 17.8 | 1.432 | 1.952   | 30.2  | 21.1   | 105 W   | 57* | 52  |
| 11 24              | 3 24.09         | +39 21.6        | 0.074    | 1.057 | 18.9    | 13.8  | 160 E  | 84      | 25                                  | 8 14                                | 1 49.90         | +14 22.2 | 1.300 | 1.908   | 29.8  | 20.9   | 110 W   | 59  | 50  |
| 11 25              | 3 26.63         | +40 28.3        | 0.070    | 1.053 | 19.8    | 13.7  | 159 E  | 85      | 24                                  | 8 24                                | 2 1.20          | +16 26.3 | 1.176 | 1.865   | 28.9  | 20.6   | 117 W   | 61  | 48  |
| 11 26              | 3 29.60         | +41 41.5        | 0.066    | 1.049 | 20.9    | 13.6  | 158 E  | 87      | 22                                  | 9 3                                 | 2 10.79         | +18 29.8 | 1.061 | 1.824   | 27.5  | 20.3   | 124 W   | 63  | 46  |
| 11 27              | 3 33.08         | +43 2.2         | 0.062    | 1.044 | 22.0    | 13.5  | 157 E  | 88      | 21                                  | 9 13                                | 2 18.09         | +20 31.6 | 0.958 | 1.786   | 25.3  | 19.9   | 131 W   | 66  | 43  |
| 11 28              | 3 37.22         | +44 31.4        | 0.059    | 1.040 | 23.2    | 13.4  | 155 E  | 90      | 19                                  | 9 23                                | 2 22.58         | +22 29.7 | 0.866 | 1.750   | 22.3  | 19.6   | 139 W   | 67  | 42  |
| 11 29              | 3 42.19         | +46 10.3        | 0.055    | 1.036 | 24.5    | 13.3  | 154 E  | 91      | 18                                  | 9 28                                | 2 23.60         | +23 26.4 | 0.826 | 1.733   | 20.5  | 19.4   | 143 W   | 68  | 41  |
| 11 30              | 3 48.23         | +48 0.4         | 0.052    | 1.033 | 26.0    | 13.2  | 153 E  | 87      | 16                                  | 10 3                                | 2 23.75         | +24 20.6 | 0.789 | 1.717   | 18.6  | 19.2   | 147 W   | 69  | 40  |
| 12 1               | 3 55.70         | +50 3.2         | 0.048    | 1.029 | 27.7    | 13.1  | 151 E  | 85      | 14                                  | 10 8                                | 2 23.01         | +25 11.6 | 0.757 | 1.702   | 16.5  | 19.0   | 151 W   | 70  | 39  |
| 12 2               | 4 5.10          | +52 20.2        | 0.045    | 1.025 | 29.6    | 13.0  | 149 E  | 83      | 12                                  | 10 13                               | 2 21.41         | +25 58.3 | 0.728 | 1.687   | 14.3  | 18.9   | 155 W   | 71  | 38  |
| 12 3               | 4 17.21         | +54 52.6        | 0.042    | 1.021 | 31.7    | 12.9  | 147 E  | 80      | 9                                   | 10 18                               | 2 19.05         | +26 39.9 | 0.704 | 1.674   | 12.1  | 18.7   | 159 W   | 72  | 37  |
| 12 4               | 4 33.23         | +57 40.6        | 0.039    | 1.018 | 34.2    | 12.8  | 144 E  | 77      | 6                                   | 10 23                               | 2 16.06         | +27 15.7 | 0.685 | 1.661   | 10.2  | 18.5   | 163 W   | 72  | 37  |
| 12 5               | 4 55.06         | +60 42.3        | 0.036    | 1.014 | 37.1    | 12.7  | 142 W  | 74      | 3                                   | 10 28                               | 2 12.64         | +27 44.9 | 0.670 | 1.650   | 8.8   | 18.4   | 165 W   | 73  | 36  |
| 12 6               | 5 25.73         | +63 50.7        | 0.034    | 1.011 | 40.6    | 12.7  | 138 W  | 71      | —                                   | 11 2                                | 2 9.00          | +28 7.0  | 0.660 | 1.640   | 8.5   | 18.4   | 166 E   | 73  | 36  |
| 12 7               | 6 9.72          | +66 48.1        | 0.032    | 1.007 | 44.5    | 12.6  | 134 W  | 68      | —                                   | 11 7                                | 2 5.44          | +28 22.1 | 0.654 | 1.631   | 9.4   | 18.4   | 164 E   | 73  | 36  |
| 12 8               | 7 11.72         | +68 58.7        | 0.030    | 1.004 | 49.2    | 12.6  | 130 W  | 66      | —                                   | 11 12                               | 2 2.26          | +28 30.8 | 0.653 | 1.622   | 11.3  | 18.4   | 161 E   | 74  | 35  |
| 12 9               | 8 30.29         | +69 26.8        | 0.028    | 1.001 | 54.5    | 12.6  | 124 W  | 66      | —                                   | 11 17                               | 1 59.72         | +28 34.1 | 0.657 | 1.615   | 13.5  | 18.5   | 158 E   | 74  | 35  |
| 12 10              | 9 50.84         | +67 27.5        | 0.027    | 0.998 | 60.3    | 12.7  | 118 W  | 68      | —                                   | 11 22                               | 1 58.05         | +28 33.2 | 0.665 | 1.610   | 16.0  | 18.6   | 153 E   | 74  | 35  |
| 12 11              | 10 56.74        | +63 8.9         | 0.026    | 0.995 | 66.6    | 12.8  | 112 W  | 72      | —                                   | 11 27                               | 1 57.40         | +28 29.5 | 0.677 | 1.605   | 18.5  | 18.7   | 149 E   | 73  | 36  |
| 12 12              | 11 44.18        | +57 18.9        | 0.026    | 0.992 | 73.0    | 13.0  | 106 W  | 78      | 4*                                  | 12 2                                | 1 57.90         | +28 24.2 | 0.693 | 1.602   | 20.9  | 18.9   | 145 E   | 73  | 36  |
| 12 13              | 12 17.31        | +50 48.3        | 0.027    | 0.989 | 79.2    | 13.3  | 99 W   | 84      | 8*                                  | 12 7                                | 1 59.60         | +28 18.6 | 0.712 | 1.600   | 23.1  | 19.0   | 140 E   | 73  | 36  |
| 12 14              | 12 40.86        | +44 14.3        | 0.028    | 0.986 | 84.9    | 13.6  | 93 W   | 87*     | 11*                                 | 12 12                               | 2 2.53          | +28 13.8 | 0.735 | 1.599   | 25.1  | 19.1   | 136 E   | 73  | 36  |
| 12 15              | 12 58.14        | +38 0.6         | 0.029    | 0.984 | 90.1    | 13.9  | 88 W   | 81*     | 15*                                 | 12 17                               | 2 6.66          | +28 10.5 | 0.760 | 1.599   | 27.0  | 19.2   | 133 E   | 73  | 36  |
| 12 16              | 13 11.25        | +32 19.6        | 0.031    | 0.981 | 94.5    | 14.2  | 84 W   | 76*     | 18*                                 | 12 22                               | 2 11.90         | +28 9.1  | 0.789 | 1.601   | 28.6  | 19.4   | 129 E   | 73  | 36  |
| 12 17              | 13 21.50        | +27 15.6        | 0.033    | 0.979 | 98.1    | 14.5  | 80 W   | 70*     | 21*                                 | 12 27                               | 2 18.19         | +28 9.7  | 0.820 | 1.604   | 30.0  | 19.5   | 125 E   | 73  | 36  |
| 12 18              | 13 29.72        | +22 48.2        | 0.036    | 0.976 | 101.1   | 14.8  | 77 W   | 66*     | 24*                                 | 1 1                                 | 2 25.44         | +28 12.2 | 0.853 | 1.608   | 31.2  | 19.6   | 122 E   | 73  | 36  |
| 12 19              | 13 36.47        | +18 54.5        | 0.038    | 0.974 | 103.5   | 15.1  | 74 W   | 62*     | 26*                                 | 1 6                                 | 2 33.57         | +28 16.7 | 0.889 | 1.613   | 32.2  | 19.7   | 119 E   | 73  | 36  |
| 12 20              | 13 42.12        | +15 30.5        | 0.041    | 0.972 | 105.4   | 15.3  | 72 W   | 59*     | 28*                                 | 1 11                                | 2 42.50         | +28 22.8 | 0.928 | 1.620   | 33.1  | 19.9   | 116 E   | 73  | 36* |
| 12 21              | 13 46.94        | +12 32.2        | 0.044    | 0.970 | 106.9   | 15.5  | 71 W   | 56*     | 30*                                 | 1 16                                | 2 52.13         | +28 30.1 | 0.968 | 1.628   | 33.8  | 20.0   | 113 E   | 74  | 35* |
| 12 22              | 13 51.12        | +9 55.8         | 0.047    | 0.968 | 108.0   | 15.7  | 69 W   | 53*     | 32*                                 | 1 21                                | 3 2.37          | +28 38.1 | 1.010 | 1.637   | 34.3  | 20.1   | 110 E   | 74  | 35* |
| 12 23              | 13 54.79        | +7 37.9         | 0.050    | 0.966 | 108.8   | 15.9  | 68 W   | 51*     | 33*                                 | <b>403049 2008 AY<sub>36</sub></b>  |                 |          |       |         |       |        |         |     |     |
| 12 24              | 13 58.05        | +5 35.8         | 0.053    | 0.965 | 109.4   | 16.1  | 68 W   | 49*     | 35*                                 | 7 25                                | 1 29.84         | +14 55.9 | 1.588 | 1.968   | 30.9  | 21.4   | 96 W    | 56* | 49  |
| 12 25              | 14 0.99         | +3 47.1         | 0.057    | 0.963 | 109.7   | 16.2  | 67 W   | 48*     | 36*                                 | 8 4                                 | 1 44.48         | +16 27.5 | 1.454 | 1.930   | 31.0  | 21.2   | 101 W   | 60* | 48  |
| 12 26              | 14 3.67         | +2 9.8          | 0.060    | 0.961 | 109.9   | 16.4  | 67 W   | 46*     | 37*                                 | 8 14                                | 1 58.21         | +17 49.9 | 1.326 | 1.893   | 30.7  | 20.9   | 107 W   | 63* | 46  |
| 12 27              | 14 6.12         | +0 42.1         | 0.063    | 0.960 | 109.9   | 16.5  | 67 W   | 45*     | 39*                                 | 8 24                                | 2 10.70         | +19 0.7  | 1.203 | 1.857   | 29.9  | 20.6   | 114 W   | 64  | 45  |
| 12 28              | 14 8.40         | -0 37.1         | 0.067    | 0.959 | 109.8   | 16.6  | 67 W   | 44*     | 40*                                 | 9 3                                 | 2 21.51         | +19 57.7 | 1.089 | 1.823   | 28.4  | 20.3   | 121 W   |     |     |

EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 21/22   | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | 45° | -26° | 21/22   | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | 45° | -26° |       |          |          |       |       |      |      |       |     |    |
|---|-----------------|-----------------|----------|-------|---------|------|--------|-----|------|---|-----------------|-----------------|----------|-------|---------|------|--------|-----|------|-------|----------|----------|-------|-------|------|------|-------|-----|----|
| <b>403049 2008 AY<sub>36</sub></b> (continuation) |                 |                 |          |       |         |      |        |     |      | <b>438116 2005 NX<sub>44</sub></b> (continuation) |                 |                 |          |       |         |      |        |     |      |       |          |          |       |       |      |      |       |     |    |
| 1 11  | 2 49.05         | +12 40.0        | 0.906    | 1.578 | 35.0    | 19.8 | 113 E  | 58  | 51   | 9 29  | 11 19.63        | +55 7.5         | 0.740    | 0.885 | 75.5    | 19.1 | 59 W   | 40* | —    | 9 30  | 11 26.73 | +53 19.7 | 0.736 | 0.865 | 77.0 | 19.1 | 57 W  | 39* | —  |
| 1 21  | 3 5.98          | +13 26.5        | 0.982    | 1.582 | 36.4    | 20.0 | 107 E  | 58  | 50*  | 10 1  | 11 33.33        | +51 28.6        | 0.732    | 0.845 | 78.5    | 19.1 | 56 W   | 38* | —    | 10 2  | 11 39.49 | +49 34.5 | 0.729 | 0.825 | 80.0 | 19.1 | 54 W  | 37* | —  |
| <b>508805 2000 TT<sub>28</sub></b>                |                 |                 |          |       |         |      |        |     |      |   |                 |                 |          |       |         |      |        |     |      |       |          |          |       |       |      |      |       |     |    |
| 7 25  | 1 52.51         | +18 50.3        | 1.556    | 1.846 | 33.4    | 21.5 | 89 W   | 57* | 45   | 10 3  | 11 45.25        | +47 37.6        | 0.727    | 0.804 | 81.4    | 19.1 | 53 W   | 36* | —    | 10 5  | 11 55.71 | +43 36.3 | 0.725 | 0.763 | 84.4 | 19.1 | 49 W  | 34* | —  |
| 8 4   | 2 12.47         | +21 23.4        | 1.418    | 1.792 | 34.4    | 21.3 | 93 W   | 63* | 43   | 10 7  | 12 4.96         | +39 26.7        | 0.727    | 0.720 | 87.4    | 19.1 | 46 W   | 32* | —    | 10 9  | 12 13.23 | +35 10.5 | 0.732 | 0.676 | 90.3 | 19.1 | 43 W  | 30* | —  |
| 8 14  | 2 33.17         | +23 56.8        | 1.287    | 1.739 | 35.3    | 21.0 | 98 W   | 68* | 40   | 10 11   | 12 20.70        | +30 49.4        | 0.741    | 0.632 | 93.0    | 19.1 | 39 W   | 28* | —    | 10 13 | 12 27.55 | +26 24.9 | 0.754 | 0.586 | 95.4 | 19.0 | 36 W  | 25* | —  |
| 8 24  | 2 54.66         | +26 29.2        | 1.163    | 1.688 | 35.9    | 20.7 | 102 W  | 71* | 38   | 10 15   | 12 33.92        | +21 58.3        | 0.772    | 0.539 | 97.5    | 19.0 | 32 W   | 23* | —    | 10 17 | 12 39.99 | +17 30.4 | 0.794 | 0.491 | 99.0 | 18.9 | 29 W  | 21* | —  |
| 9 3   | 3 17.00         | +28 59.0        | 1.048    | 1.639 | 36.4    | 20.5 | 106 W  | 74  | 35   | 10 19   | 12 45.93        | +13 1.7         | 0.821    | 0.441 | 99.8    | 18.8 | 26 W   | 19* | —    | 10 21 | 12 51.98 | +8 32.0  | 0.854 | 0.392 | 99.3 | 18.6 | 23 W  | 16* | —  |
| 9 8   | 3 28.48         | +30 12.2        | 0.993    | 1.615 | 36.5    | 20.3 | 108 W  | 75  | 34   | 10 23   | 12 58.44        | +4 0.4          | 0.893    | 0.342 | 97.1    | 18.3 | 20 W   | 14* | —    | 10 25 | 13 5.79  | +0 34.1  | 0.938 | 0.294 | 92.3 | 17.9 | 17 W  | 11* | —  |
| 9 13  | 3 40.13         | +31 23.6        | 0.941    | 1.592 | 36.5    | 20.2 | 110 W  | 76  | 33   | 10 27   | 13 14.77        | +5 12.6         | 0.990    | 0.250 | 83.5    | 17.3 | 14 W   | 8*  | 2*   | 10 29 | 13 26.44 | +9 52.6  | 1.047 | 0.217 | 69.8 | 16.6 | 12 W  | 4*  | 2* |
| 9 18  | 3 51.96         | +32 33.0        | 0.891    | 1.570 | 36.5    | 20.0 | 112 W  | 78  | 31   | 10 31   | 13 41.80        | +14 22.5        | 1.104    | 0.205 | 52.3    | 16.1 | 9 W    | —   | 2*   | 10 3  | 14 0.71  | +18 21.3 | 1.156 | 0.216 | 37.3 | 15.9 | 8 W   | —   | 2* |
| 9 23  | 4 3.94          | +33 39.9        | 0.844    | 1.549 | 36.4    | 19.9 | 114 W  | 79  | 30   | 11 3  | 14 11.04        | +20 3.9         | 1.178    | 0.230 | 32.6    | 15.9 | 7 W    | —   | 1*   | 9 28  | 4 16.02  | +34 43.8 | 0.798 | 1.529 | 36.2 | 19.7 | 116 W | 80  | 29 |
| 9 28  | 4 16.02         | +34 43.8        | 0.798    | 1.529 | 36.2    | 19.7 | 116 W  | 80  | 29   | 11 4  | 14 21.64        | +21 34.6        | 1.199    | 0.248 | 30.0    | 16.1 | 7 W    | —   | —    | 10 7  | 4 28.14  | +35 44.1 | 0.756 | 1.510 | 35.9 | 19.6 | 118 W | 81  | 28 |
| 10 3  | 4 28.14         | +35 44.1        | 0.756    | 1.510 | 35.9    | 19.6 | 118 W  | 81  | 28   | 11 5  | 14 32.34        | +22 54.1        | 1.218    | 0.269 | 29.0    | 16.2 | 8 W    | —   | —    | 10 8  | 4 40.22  | +36 40.2 | 0.715 | 1.491 | 35.5 | 19.4 | 120 W | 82  | 27 |
| 10 8  | 4 40.22         | +36 40.2        | 0.715    | 1.491 | 35.5    | 19.4 | 120 W  | 82  | 27   | 11 6  | 14 43.02        | +24 3.4         | 1.236    | 0.291 | 29.0    | 16.5 | 8 W    | —   | —    | 10 13 | 4 52.18  | +37 31.4 | 0.677 | 1.475 | 35.0 | 19.2 | 122 W | 83  | 26 |
| 10 13   | 4 52.18         | +37 31.4        | 0.677    | 1.475 | 35.0    | 19.2 | 122 W  | 83  | 26   | 11 7  | 14 53.58        | +25 3.4         | 1.253    | 0.315 | 29.4    | 16.7 | 9 E    | —   | —    | 10 18 | 5 3.90   | +38 17.2 | 0.642 | 1.459 | 34.3 | 19.1 | 124 W | 83  | 26 |
| 10 18   | 5 3.90          | +38 17.2        | 0.642    | 1.459 | 34.3    | 19.1 | 124 W  | 83  | 26   | 11 8  | 15 3.98         | +25 55.3        | 1.270    | 0.339 | 30.0    | 16.9 | 10 E   | —   | —    | 10 23 | 5 15.27  | +38 57.0 | 0.609 | 1.445 | 33.5 | 18.9 | 127 W | 84  | 25 |
| 10 23   | 5 15.27         | +38 57.0        | 0.609    | 1.445 | 33.5    | 18.9 | 127 W  | 84  | 25   | 11 9  | 15 14.17        | +26 40.0        | 1.287    | 0.364 | 30.5    | 17.1 | 11 E   | —   | —    | 10 28 | 5 26.14  | +39 30.0 | 0.578 | 1.432 | 32.5 | 18.8 | 129 W | 84  | 25 |
| 10 28   | 5 26.14         | +39 30.0        | 0.578    | 1.432 | 32.5    | 18.8 | 129 W  | 84  | 25   | 11 10   | 15 24.14        | +27 18.3        | 1.303    | 0.389 | 31.0    | 17.3 | 12 E   | —   | —    | 11 2  | 5 36.33  | +39 55.6 | 0.550 | 1.420 | 31.3 | 18.6 | 132 W | 85  | 24 |
| 11 2  | 5 36.33         | +39 55.6        | 0.550    | 1.420 | 31.3    | 18.6 | 132 W  | 85  | 24   | 11 11   | 15 33.87        | +27 50.9        | 1.320    | 0.414 | 31.3    | 17.4 | 13 E   | —   | —    | 11 7  | 5 45.65  | +40 13.1 | 0.525 | 1.411 | 29.9 | 18.4 | 135 W | 85  | 24 |
| 11 7  | 5 45.65         | +40 13.1        | 0.525    | 1.411 | 29.9    | 18.4 | 135 W  | 85  | 24   | 11 12   | 15 43.35        | +28 18.5        | 1.337    | 0.439 | 31.5    | 17.6 | 13 E   | —   | —    | 11 12 | 5 53.95  | +40 21.8 | 0.502 | 1.403 | 28.3 | 18.3 | 138 W | 85  | 24 |
| 11 12   | 5 53.95         | +40 21.8        | 0.502    | 1.403 | 28.3    | 18.3 | 138 W  | 85  | 24   | 11 13   | 16 18.74        | +29 28.2        | 1.407    | 0.536 | 31.4    | 18.1 | 16 E   | —   | —    | 11 17 | 6 1.12   | +40 21.2 | 0.481 | 1.396 | 26.5 | 18.1 | 141 W | 85  | 24 |
| 11 17   | 6 1.12          | +40 21.2        | 0.481    | 1.396 | 26.5    | 18.1 | 141 W  | 85  | 24   | 11 14   | 16 34.93        | +29 44.2        | 1.443    | 0.583 | 30.9    | 18.4 | 18 E   | —   | —    | 11 22 | 6 7.02   | +40 10.5 | 0.464 | 1.391 | 24.4 | 18.0 | 144 W | 85  | 24 |
| 11 22   | 6 7.02          | +40 10.5        | 0.464    | 1.391 | 24.4    | 18.0 | 144 W  | 85  | 24   | 11 15   | 16 50.16        | +29 50.7        | 1.480    | 0.629 | 30.2    | 18.6 | 19 E   | —   | —    | 11 27 | 6 11.59  | +39 49.3 | 0.449 | 1.388 | 22.0 | 17.8 | 148 W | 85  | 24 |
| 11 27   | 6 11.59         | +39 49.3        | 0.449    | 1.388 | 22.0    | 17.8 | 148 W  | 85  | 24   | 11 16   | 16 18.74        | +29 28.2        | 1.407    | 0.536 | 31.4    | 18.1 | 16 E   | —   | —    | 12 2  | 6 14.82  | +39 17.2 | 0.437 | 1.387 | 19.4 | 17.7 | 152 W | 84  | 25 |
| 12 2  | 6 14.82         | +39 17.2        | 0.437    | 1.387 | 19.4    | 17.7 | 152 W  | 84  | 25   | 11 17   | 16 34.93        | +29 44.2        | 1.443    | 0.583 | 30.9    | 18.4 | 18 E   | —   | —    | 12 7  | 6 16.77  | +38 33.7 | 0.428 | 1.388 | 16.7 | 17.6 | 156 W | 84  | 25 |
| 12 7  | 6 16.77         | +38 33.7        | 0.428    | 1.388 | 16.7    | 17.6 | 156 W  | 84  | 25   | 11 18   | 16 50.16        | +29 50.7        | 1.480    | 0.629 | 30.2    | 18.6 | 19 E   | —   | —    | 12 12 | 6 17.66  | +37 39.3 | 0.423 | 1.390 | 13.8 | 17.4 | 160 W | 83  | 26 |
| 12 12   | 6 17.66         | +37 39.3        | 0.423    | 1.390 | 13.8    | 17.4 | 160 W  | 83  | 26   | 11 19   | 16 34.93        | +29 44.2        | 1.443    | 0.583 | 30.9    | 18.4 | 18 E   | —   | —    | 12 17 | 6 17.74  | +36 34.6 | 0.421 | 1.394 | 11.1 | 17.3 | 164 W | 82  | 27 |
| 12 17   | 6 17.74         | +36 34.6        | 0.421    | 1.394 | 11.1    | 17.3 | 164 W  | 82  | 27   | 11 20   | 16 50.16        | +29 50.7        | 1.480    | 0.629 | 30.2    | 18.6 | 19 E   | —   | —    | 12 22 | 6 17.32  | +35 21.1 | 0.423 | 1.400 | 8.7  | 17.3 | 168 W | 80  | 29 |
| 12 22   | 6 17.32         | +35 21.1        | 0.423    | 1.400 | 8.7     | 17.3 | 168 W  | 80  | 29   | 11 21   | 17 3.98         | +25 55.3        | 1.270    | 0.339 | 30.0    | 16.9 | 10 E   | —   | —    | 12 27 | 6 16.69  | +34 0.9  | 0.429 | 1.408 | 7.5  | 17.2 | 169 E | 79  | 30 |
| 12 27   | 6 16.69         | +34 0.9         | 0.429    | 1.408 | 7.5     | 17.2 | 169 E  | 79  | 30   | 11 22   | 17 17.93        | +29 42.6        | 1.557    | 0.718 | 28.5    | 18.9 | 20 E   | —   | —    | 1 1   | 6 16.15  | +32 36.3 | 0.439 | 1.417 | 7.9  | 17.3 | 169 E | 78  | 31 |
| 1 1   | 6 16.15         | +32 36.3        | 0.439    | 1.417 | 7.9     | 17.3 | 169 E  | 78  | 31   | 11 23   | 17 30.58        | +29 30.6        | 1.597    | 0.760 | 27.5    | 19.1 | 21 E   | —   | —    | 1 6   | 6 15.99  | +31 9.9  | 0.454 | 1.428 | 9.7  | 17.5 | 166 E | 76  | 33 |
| 1 6   | 6 15.99         | +31 9.9         | 0.454    | 1.428 | 9.7     | 17.5 | 166 E  | 76  | 33   | 11 24   | 17 42.48        | +29 14.7        | 1.637    | 0.802 | 26.5    | 19.2 | 21 E   | —   | —    | 1 11  | 6 16.44  | +29 44.3 | 0.472 | 1.440 | 12.2 | 17.7 | 162 E | 75  | 34 |
| 1 11  | 6 16.44         | +29 44.3        | 0.472    | 1.440 | 12.2    | 17.7 | 162 E  | 75  | 34   | 11 25   | 17 53.69        | +28 55.7        | 1.678    | 0.843 | 25.5    | 19.3 | 22 E   | —   | —    | 1 16  | 6 17.65  | +28 21.6 | 0.494 | 1.454 | 14.8 | 17.9 | 158 E | 73  | 36 |
| 1 16  | 6 17.65         | +28 21.6        | 0.494    | 1.454 | 14.8    | 17.9 | 158 E  | 73  | 36   | 11 26   | 18 4.25         | +28 34.2        | 1.719    | 0.883 | 24.5    | 19.4 | 22 E   | —   | —    | 1 21  | 6 19.66  | +27 3.4  | 0.521 | 1.469 | 17.4 | 18.1 | 154 E | 72  | 37 |
| 1 21  | 6 19.66         | +27 3.4         | 0.521    | 1.469 | 17.4    | 18.1 | 154 E  | 72  | 37   | 11 27   | 18 28.19        | +27 33.2        | 1.822    | 0.979 | 22.0    | 19.7 | 22 E   | —   | —    | 7 25  | 1 57.63  | +48 43.2 | 1.808 | 1.888 | 31.8 | 21.4 | 78 W  | 72* | 15 |
|   |                 |                 |          |       |         |      |        |     |      | <b>438116 2005 NX<sub>44</sub></b>                |                 |                 |          |       |         |      |        |     |      |       |          |          |       |       |      |      |       |     |    |
| 7 30  | 2 8.16          | +50 58.0        | 1.704    | 1.826 | 33.2    | 21.3 | 80 W   | 74* | 13   | 11 28   | 17 42.48        | +29 14.7        | 1.637    | 0.802 | 26.5    | 19.2 | 21 E   | —   | —    | 8 4   | 2 19.97  | +53 22.3 | 1.601 | 1.763 | 34.7 | 21.1 | 81 W  | 75* | 11 |
| 8 4   | 2 19.97         | +53 22.3        | 1.601    | 1.763 | 34.7    | 21.1 | 81 W   | 75* | 11   | 11 30   | 17 53.69        | +28 55.7        | 1.678    | 0.843 | 25.5    | 19.3 | 22 E   | —   | —    | 8 9   | 2 33.56  | +55 57.1 | 1.500 | 1.698 | 36.3 | 20.9 | 83 W  | 75* | 8  |
| 8 9   | 2 33.56         | +55 57.1        | 1.500    | 1.698 | 36.3    | 20.9 | 83 W   | 75* | 8    | 12 12   | 18 49.14        | +26 25.9        | 1.925    | 1.    |         |      |        |     |      |       |          |          |       |       |      |      |       |     |    |

EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 21/22                               | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | $45^\circ$ - $26^\circ$ | 21/22                               | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | $45^\circ$ - $26^\circ$ |     |    |
|-------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|-------------------------|-------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|-------------------------|-----|----|
| <b>162679 2000 TK<sub>1</sub></b>   |                 |                 |          |       |         |      |        |                         | <b>405776 2006 AP</b>               |                 |                 |          |       |         |      |        |                         |     |    |
| (continuation)                      |                 |                 |          |       |         |      |        |                         |                                     |                 |                 |          |       |         |      |        |                         |     |    |
| 9 3                                 | 2 3.72          | +5 28.2         | 1.067    | 1.876 | 24.6    | 20.4 | 129 W  | 50 59                   | 7 25                                | 2 12.76         | -13 25.0        | 2.162    | 2.474 | 24.1    | 21.5 | 95 W   | 26*                     | 77  |    |
| 9 13                                | 1 49.79         | +6 1.2          | 0.965    | 1.865 | 19.3    | 20.1 | 142 W  | 51 58                   | 8 4                                 | 2 23.23         | -14 29.6        | 2.030    | 2.449 | 23.9    | 21.3 | 102 W  | 28*                     | 78  |    |
| 9 23                                | 1 29.13         | +6 24.5         | 0.883    | 1.848 | 12.4    | 19.6 | 157 W  | 51 58                   | 8 14                                | 2 32.09         | -15 53.6        | 1.903    | 2.423 | 23.4    | 21.1 | 109 W  | 29*                     | 80  |    |
| 10 3                                | 1 2.45          | +6 36.5         | 0.830    | 1.827 | 3.9     | 19.1 | 173 W  | 52 57                   | 8 24                                | 2 38.97         | -17 36.5        | 1.785    | 2.397 | 22.4    | 20.9 | 115 W  | 27                      | 82  |    |
| 10 8                                | 0 47.62         | +6 38.4         | 0.815    | 1.814 | 1.0     | 18.8 | 178 E  | 52 57                   | 9 3                                 | 2 43.46         | -19 36.4        | 1.677    | 2.369 | 21.2    | 20.7 | 122 W  | 25                      | 84  |    |
| 10 13                               | 0 32.47         | +6 38.3         | 0.809    | 1.800 | 5.5     | 19.1 | 170 E  | 52 57                   | 9 13                                | 2 45.10         | -21 48.9        | 1.582    | 2.341 | 19.8    | 20.5 | 128 W  | 23                      | 86  |    |
| 10 18                               | 0 17.57         | +6 37.0         | 0.812    | 1.785 | 10.1    | 19.3 | 162 E  | 52 57                   | 9 23                                | 2 43.55         | -24 5.8         | 1.503    | 2.312 | 18.3    | 20.4 | 134 W  | 21                      | 88  |    |
| 10 23                               | 0 3.45          | +6 35.7         | 0.823    | 1.769 | 14.6    | 19.4 | 153 E  | 52 57                   | 9 28                                | 2 41.52         | -25 12.6        | 1.470    | 2.297 | 17.7    | 20.3 | 136 W  | 20                      | 89  |    |
| 10 28                               | 23 50.54        | +6 35.4         | 0.840    | 1.751 | 18.8    | 19.6 | 145 E  | 52 57                   | 10 3                                | 2 38.67         | -26 16.1        | 1.441    | 2.283 | 17.2    | 20.2 | 138 W  | 19                      | 90  |    |
| 11 2                                | 23 39.15        | +6 37.2         | 0.864    | 1.732 | 22.7    | 19.8 | 138 E  | 52 57                   | 10 8                                | 2 35.02         | -27 14.6        | 1.417    | 2.268 | 16.8    | 20.1 | 139 W  | 18                      | 89  |    |
| 11 12                               | 23 21.55        | +6 50.5         | 0.927    | 1.691 | 29.1    | 20.0 | 124 E  | 52 57                   | 10 13                               | 2 30.66         | -28 5.9         | 1.398    | 2.253 | 16.7    | 20.1 | 140 W  | 17                      | 88  |    |
| 11 22                               | 23 10.76        | +7 20.4         | 1.000    | 1.643 | 34.0    | 20.3 | 112 E  | 52 57                   | 10 18                               | 2 25.71         | -28 48.5        | 1.384    | 2.237 | 16.8    | 20.1 | 139 W  | 16                      | 87  |    |
| 12 2                                | 23 5.92         | +8 7.9          | 1.077    | 1.591 | 37.5    | 20.5 | 101 E  | 53 54*                  | 10 23                               | 2 20.32         | -29 20.7        | 1.375    | 2.222 | 17.2    | 20.0 | 139 W  | 16                      | 87  |    |
| 12 12                               | 23 5.98         | +9 13.4         | 1.151    | 1.532 | 40.0    | 20.6 | 91 E   | 54 49*                  | 10 28                               | 2 14.66         | -29 41.5        | 1.371    | 2.207 | 17.8    | 20.0 | 137 W  | 15                      | 86  |    |
| 12 22                               | 23 9.97         | +10 36.0        | 1.217    | 1.468 | 41.7    | 20.7 | 83 E   | 56 42*                  | 11 2                                | 2 8.92          | -29 49.8        | 1.372    | 2.191 | 18.6    | 20.0 | 135 E  | 15                      | 86  |    |
| 1 1                                 | 23 17.12        | +12 15.0        | 1.270    | 1.397 | 42.9    | 20.7 | 75 E   | 57 34*                  | 11 7                                | 2 3.30          | -29 45.3        | 1.377    | 2.175 | 19.5    | 20.1 | 133 E  | 15                      | 86  |    |
| 1 11                                | 23 26.95        | +14 9.9         | 1.308    | 1.320 | 44.0    | 20.7 | 69 E   | 56 28*                  | 11 12                               | 1 58.01         | -29 27.9        | 1.386    | 2.160 | 20.6    | 20.1 | 130 E  | 16                      | 87  |    |
| 1 21                                | 23 39.10        | +16 20.0        | 1.326    | 1.236 | 45.0    | 20.6 | 63 E   | 54 21*                  | 11 17                               | 1 53.22         | -28 58.2        | 1.400    | 2.144 | 21.7    | 20.1 | 127 E  | 16                      | 87  |    |
|                                     |                 |                 |          |       |         |      |        |                         | 11 22                               | 1 49.06         | -28 17.0        | 1.416    | 2.128 | 22.8    | 20.2 | 124 E  | 17                      | 88  |    |
|                                     |                 |                 |          |       |         |      |        |                         | 11 27                               | 1 45.64         | -27 25.4        | 1.437    | 2.112 | 23.8    | 20.2 | 120 E  | 18                      | 89  |    |
|                                     |                 |                 |          |       |         |      |        |                         | 12 2                                | 1 43.03         | -26 24.3        | 1.460    | 2.096 | 24.9    | 20.3 | 117 E  | 19                      | 90  |    |
|                                     |                 |                 |          |       |         |      |        |                         | 12 7                                | 1 41.28         | -25 14.9        | 1.485    | 2.080 | 25.8    | 20.3 | 113 E  | 20                      | 89  |    |
|                                     |                 |                 |          |       |         |      |        |                         | 12 12                               | 1 40.41         | -23 58.5        | 1.513    | 2.064 | 26.7    | 20.4 | 110 E  | 21                      | 88  |    |
|                                     |                 |                 |          |       |         |      |        |                         | 12 17                               | 1 40.41         | -22 36.2        | 1.542    | 2.048 | 27.5    | 20.4 | 106 E  | 22                      | 87  |    |
|                                     |                 |                 |          |       |         |      |        |                         | 12 22                               | 1 41.24         | -21 9.0         | 1.573    | 2.032 | 28.2    | 20.5 | 103 E  | 24                      | 85  |    |
|                                     |                 |                 |          |       |         |      |        |                         | 12 27                               | 1 42.86         | -19 37.7        | 1.606    | 2.016 | 28.8    | 20.5 | 99 E   | 25                      | 84  |    |
|                                     |                 |                 |          |       |         |      |        |                         | 1 1                                 | 1 45.25         | -18 3.3         | 1.639    | 2.000 | 29.3    | 20.6 | 96 E   | 27                      | 81* |    |
|                                     |                 |                 |          |       |         |      |        |                         | 1 6                                 | 1 48.36         | -16 26.2        | 1.673    | 1.984 | 29.7    | 20.6 | 93 E   | 29                      | 77* |    |
|                                     |                 |                 |          |       |         |      |        |                         | 1 11                                | 1 52.15         | -14 47.2        | 1.707    | 1.969 | 30.0    | 20.6 | 90 E   | 30                      | 74* |    |
|                                     |                 |                 |          |       |         |      |        |                         | 1 16                                | 1 56.56         | -13 6.8         | 1.742    | 1.953 | 30.2    | 20.7 | 87 E   | 32                      | 70* |    |
|                                     |                 |                 |          |       |         |      |        |                         | 1 21                                | 2 1.56          | -11 25.5        | 1.777    | 1.937 | 30.3    | 20.7 | 84 E   | 34                      | 66* |    |
|                                     |                 |                 |          |       |         |      |        |                         |                                     |                 |                 |          |       |         |      |        |                         |     |    |
| <b>402946 2007 TN<sub>348</sub></b> |                 |                 |          |       |         |      |        |                         | <b>306695 2000 VL<sub>1</sub></b>   |                 |                 |          |       |         |      |        |                         |     |    |
| 7 25                                | 2 8.80          | +10 56.8        | 1.372    | 1.682 | 37.1    | 21.4 | 88 W   | 48*                     | 53                                  | 7 25            | 2 18.10         | -22 14.5 | 3.070 | 3.350   | 17.5 | 21.4   | 97 W                    | 17* | 86 |
| 8 4                                 | 2 30.04         | +12 24.4        | 1.282    | 1.668 | 37.4    | 21.3 | 92 W   | 53*                     | 52                                  | 8 4             | 2 23.82         | -23 19.8 | 2.925 | 3.319   | 17.3 | 21.2   | 104 W                   | 19* | 87 |
| 8 14                                | 2 50.49         | +13 38.4        | 1.195    | 1.656 | 37.4    | 21.1 | 97 W   | 57*                     | 50                                  | 8 14            | 2 27.84         | -24 38.8 | 2.787 | 3.286   | 16.7 | 21.1   | 111 W                   | 20* | 89 |
| 8 24                                | 3 9.77          | +14 37.6        | 1.113    | 1.648 | 36.9    | 20.9 | 102 W  | 59*                     | 49                                  | 8 24            | 2 29.88         | -26 9.4  | 2.659 | 3.253   | 16.0 | 21.0   | 118 W                   | 19  | 90 |
| 9 3                                 | 3 27.40         | +15 21.5        | 1.034    | 1.643 | 36.0    | 20.7 | 107 W  | 60                      | 49                                  | 9 3             | 2 29.66         | -27 48.2 | 2.544 | 3.218   | 15.1 | 20.8   | 124 W                   | 17  | 88 |
| 9 13                                | 3 42.77         | +15 49.9        | 0.961    | 1.641 | 34.4    | 20.5 | 113 W  | 61                      | 48                                  | 9 13            | 2 26.92         | -29 29.9 | 2.444 | 3.183   | 14.1 | 20.7   | 130 W                   | 16  | 87 |
| 9 23                                | 3 55.23         | +16 3.4         | 0.893    | 1.641 | 32.1    | 20.3 | 120 W  | 61                      | 48                                  | 9 23            | 2 21.60         | -31 7.2  | 2.363 | 3.146   | 13.2 | 20.5   | 134 W                   | 14  | 85 |
| 10 3                                | 4 0.99          | +16 3.4         | 0.832    | 1.645 | 28.9    | 20.1 | 127 W  | 61                      | 48                                  | 10 3            | 2 13.82         | -32 31.4 | 2.303 | 3.109   | 12.7 | 20.4   | 137 W                   | 12  | 83 |
| 10 13                               | 4 8.71          | +15 51.8        | 0.781    | 1.652 | 24.7    | 19.8 | 136 W  | 61                      | 48                                  | 10 8            | 2 9.14          | -33 5.7  | 2.281 | 3.090   | 12.7 | 20.4   | 137 W                   | 12  | 83 |
| 10 23                               | 4 8.78          | +15 31.5        | 0.741    | 1.662 | 19.6    | 19.5 | 146 W  | 61                      | 48                                  | 10 13           | 2 4.04          | -33 33.3 | 2.264 | 3.070   | 12.8 | 20.4   | 137 W                   | 11  | 82 |
| 11 2                                | 4 4.53          | +15 6.2         | 0.716    | 1.674 | 13.5    | 19.3 | 157 W  | 60                      | 49                                  | 10 18           | 1 58.64         | -33 53.4 | 2.254 | 3.051   | 13.1 | 20.4   | 136 W                   | 11  | 82 |
| 11 7                                | 4 1.06          | +14 53.1        | 0.710    | 1.682 | 10.3    | 19.1 | 162 W  | 60                      | 49                                  | 10 23           | 1 53.07         | -34 5.2  | 2.248 | 3.031   | 13.5 | 20.3   | 135 W                   | 11  | 82 |
| 11 12                               | 3 56.95         | +14 40.7        | 0.709    | 1.690 | 7.0     | 19.0 | 168 W  | 60                      | 49                                  | 10 28           | 1 47.45         | -34 8.2  | 2.248 | 3.011   | 14.1 | 20.4   | 133 E                   | 11  | 82 |
| 11 17                               | 3 52.48         | +14 29.7        | 0.713    | 1.698 | 4.2     | 18.9 | 173 W  | 59                      | 50                                  | 11 2            | 1 41.93         | -34 2.3  | 2.254 | 2.991   | 14.7 | 20.4   | 130 E                   | 11  | 82 |
| 11 22                               | 3 47.91         | +14 20.8        | 0.722    | 1.707 | 3.3     | 18.9 | 174 E  | 59                      | 50                                  | 11 7            | 1 36.64         | -33 47.4 | 2.264 | 2.970   | 15.4 | 20.4   | 127 E                   | 11  | 82 |
| 11 27                               | 3 43.50         | +14 14.8        | 0.736    | 1.717 | 5.4     | 19.0 | 171 E  | 59                      | 50                                  | 11 12           | 1 31.70         | -33 23.7 | 2.279 | 2.949   | 16.2 | 20.4   | 124 E                   | 12  | 83 |
| 12 2                                | 3 39.49         | +14 12.0        | 0.755    | 1.727 | 8.3     | 19.3 | 165 E  | 59                      | 50                                  | 11 17           | 1 27.23         | -32 51.8 | 2.298 | 2.928   | 16.9 | 20.4   | 121 E                   | 12  | 83 |
| 12 7                                | 3 36.10         | +14 13.1        | 0.780    | 1.738 | 11.3    | 19.5 | 160 E  | 59                      | 50                                  | 11 22           | 1 23.31         | -32 12.3 | 2.321 | 2.907   | 17.6 | 20.5   | 117 E                   | 13  | 84 |
| 12 12                               | 3 33.50         | +14 18.1        | 0.810    | 1.750 | 14.1    | 19.7 | 154 E  | 59                      | 50                                  | 11 27           | 1 19.99         | -31 25.9 | 2.347 | 2.885   | 18.3 | 20.5   | 113 E                   | 14  | 85 |
| 12 22                               | 3 31.06         | +14 40.1        | 0.882    | 1.774 | 19.1    | 20.0 | 144 E  | 60                      | 49                                  | 12 2            | 1 17.31         | -30 33.2 | 2.376 | 2.864   | 18.9 | 20.5   | 110 E                   | 14  | 85 |
| 1 1                                 | 3 32.44         | +15 16.2        | 0.970    | 1.800 | 23.1    | 20.4 | 134 E  | 60                      | 49                                  | 12 7            | 1 15.31         | -29 35.2 | 2.408 | 2.842   | 19.5 | 20.6   | 106 E                   | 15  | 86 |
| 1 11                                | 3 37.47         | +16 3.4         | 1.072    | 1.827 | 26.0    | 20.7 | 125 E  | 61                      | 48                                  | 12 12           | 1 14.00         | -28 32.4 | 2.442 | 2.819   | 20.0 | 20.6   | 102 E                   | 16  | 87 |
| 1 21                                | 3 45.72         | +16 57.9        | 1.184    | 1.856 | 28.1    | 21.1 | 117 E  | 62                      | 47                                  | 12 17           | 1 13.36         | -27 25.7 | 2.478 | 2.797   | 20.4 | 20.6   | 98 E                    | 18  | 89 |
|                                     |                 |                 |          |       |         |      |        |                         | 12 22                               | 1 13.37         | -26 15.8        | 2.514    | 2.774 | 20.7    | 20.6 | 95 E   | 19                      | 89* |    |
|                                     |                 |                 |          |       |         |      |        |                         | 12 27                               | 1 14.01         | -25 3.1         | 2.552    | 2.751 | 20.9    | 20.7 | 91 E   | 20                      | 84* |    |
|                                     |                 |                 |          |       |         |      |        |                         | 1 1                                 | 1 15.24         | -23 48.2        | 2.590    | 2.728 | 21.1    | 20.7 | 87 E   | 21                      | 79* |    |
|                                     |                 |                 |          |       |         |      |        |                         | 1 6                                 | 1 17.05         | -22 31.4        | 2.628    | 2.705 | 21.2    | 20.7 | 84 E   | 22                      | 75* |    |
|                                     |                 |                 |          |       |         |      |        |                         | 1 11                                | 1 19.40         | -21 13.3        | 2.666    | 2.681 | 21.2    | 20.7 | 80 E   | 24                      | 70* |    |
|                                     |                 |                 |          |       |         |      |        |                         | 1 16                                | 1 22.25         | -19 54.1        | 2.703    | 2.657 | 21.1    | 20.7 | 77 E   | 25                      | 66* |    |
|                                     |                 |                 |          |       |         |      |        |                         | 1 21                                | 1 25.56         | -18 34.2        | 2.739    | 2.633 | 21.0    | 20.7 | 73 E   | 26                      | 62* |    |
|                                     |                 |                 |          |       |         |      |        |                         |                                     |                 |                 |          |       |         |      |        |                         |     |    |
| <b>220095 2002 SU<sub>41</sub></b>  |                 |                 |          |       |         |      |        |                         | <b>153591 2001 SN<sub>263</sub></b> |                 |                 |          |       |         |      |        |                         |     |    |
| 7 25                                | 2 10.90         | +13 37.3        | 1.577    | 1.828 | 33.7    | 21.4 | 87 W   | 50*                     | 50                                  | 7 25            | 2 25.35         | +19 48.4 | 2.033 | 2.136   | 28.1 | 21.3   | 82 W                    | 53* | 44 |
| 8 4                                 | 2 26.47         | +15 26.4        | 1.467    | 1.816 | 33.9    | 21.2 | 92 W   | 56*                     | 49                                  | 8 4             | 2 40.13         | +21 32.2 | 1.866 | 2.081   | 29.1 | 21.1   | 87 W                    | 59* | 42 |
| 8 14                                | 2 40.89         | +17 9.7         | 1.358    | 1.804 | 33.8    | 21.1 | 98 W   | 61*                     | 47                                  | 8 14            | 2 54.68         | +23 15.6 | 1.699 | 2.024   | 30.0 | 20.9   | 93 W                    | 65* | 41 |
| 8 24                                | 2 53.78         | +18 47.3        | 1.252    | 1.792 | 33.2    | 20.8 | 104 W  | 64*                     | 45                                  | 8 24            | 3 8.88          | +24 59.3 | 1.535 | 1.966   | 30.5 | 20.6   | 99 W                    | 70* | 39 |
| 9 3                                 | 3 4.66          | +20 19.1        | 1.148    | 1.779 | 32.0    | 2    |        |                         |                                     |                 |                 |          |       |         |      |        |                         |     |    |

EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 21/22  | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | $45^\circ$ | $-26^\circ$ | 21/22                                       | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | $45^\circ$ | $-26^\circ$ |
|--|-----------------|-----------------|----------|-------|---------|------|--------|------------|-------------|---|-----------------|-----------------|----------|-------|---------|------|--------|------------|-------------|
| 153591 2001 SN <sub>263</sub> (continuation) |                 |                 |          |       |         |      |        |            |             | 531914 2013 BW <sub>76</sub> (continuation) |                 |                 |          |       |         |      |        |            |             |
| 11 12  | 4 3.56          | +41 4.3         | 0.497    | 1.452 | 17.6    | 17.1 | 154 W  | 86         | 23          | 10 27                                       | 1 50.03         | -83 48.5        | 0.500    | 1.061 | 68.6    | 19.5 | 84 E   | —          | 32          |
| 11 17  | 3 58.60         | +42 8.8         | 0.458    | 1.419 | 16.5    | 16.8 | 156 W  | 87         | 22          | 10 28                                       | 1 30.48         | -83 30.9        | 0.489    | 1.056 | 69.2    | 19.5 | 83 E   | —          | 32          |
| 11 22  | 3 52.12         | +43 7.8         | 0.422    | 1.386 | 16.2    | 16.6 | 157 W  | 88         | 21          | 10 29                                       | 1 12.01         | -83 9.3         | 0.478    | 1.051 | 69.9    | 19.5 | 83 E   | —          | 33          |
| 11 27  | 3 44.25         | +43 58.6        | 0.391    | 1.354 | 16.9    | 16.4 | 156 E  | 89         | 20          | 10 30                                       | 0 54.78         | -82 43.8        | 0.467    | 1.046 | 70.5    | 19.4 | 83 E   | —          | 33          |
| 12 2   | 3 35.24         | +44 38.1        | 0.362    | 1.322 | 18.8    | 16.3 | 154 E  | 90         | 19          | 10 31                                       | 0 38.88         | -82 14.5        | 0.456    | 1.041 | 71.2    | 19.4 | 83 E   | —          | 34          |
| 12 7   | 3 25.58         | +45 4.1         | 0.337    | 1.291 | 21.6    | 16.1 | 151 E  | 90         | 19          | 11 1  | 0 24.33         | -81 41.4        | 0.445    | 1.036 | 71.9    | 19.3 | 83 E   | —          | 34          |
| 12 12  | 3 15.89         | +45 15.2        | 0.315    | 1.261 | 25.1    | 16.1 | 147 E  | 90         | 19          | 11 2  | 0 11.07         | -81 4.4         | 0.434    | 1.032 | 72.6    | 19.3 | 83 E   | —          | 35          |
| 12 17  | 3 6.84          | +45 11.4        | 0.295    | 1.231 | 29.2    | 16.0 | 142 E  | 90         | 19          | 11 3  | 23 59.03        | -80 23.6        | 0.422    | 1.027 | 73.3    | 19.3 | 83 E   | —          | 36          |
| 12 22  | 2 59.07         | +44 53.9        | 0.277    | 1.203 | 33.5    | 15.9 | 138 E  | 90         | 19          | 11 4  | 23 48.13        | -79 38.8        | 0.411    | 1.023 | 74.0    | 19.2 | 83 E   | —          | 36          |
| 12 27  | 2 53.13         | +44 24.4        | 0.261    | 1.176 | 37.9    | 15.9 | 133 E  | 89         | 20          | 11 5  | 23 38.26        | -78 50.1        | 0.400    | 1.019 | 74.7    | 19.2 | 82 E   | —          | 37          |
| 1 1  | 2 49.50         | +43 45.0        | 0.246    | 1.151 | 42.3    | 15.8 | 128 E  | 89         | 20          | 11 6  | 23 29.31        | -77 57.2        | 0.388    | 1.015 | 75.5    | 19.1 | 82 E   | —          | 38          |
| 1 6  | 2 48.60         | +42 58.1        | 0.231    | 1.128 | 46.6    | 15.7 | 124 E  | 88         | 21          | 11 7  | 23 21.19        | -77 0.1         | 0.377    | 1.011 | 76.2    | 19.1 | 82 E   | —          | 39          |
| 1 11   | 2 50.70         | +42 5.4         | 0.217    | 1.106 | 50.7    | 15.7 | 119 E  | 87         | 22          | 11 8  | 23 13.80        | -75 58.4        | 0.366    | 1.007 | 77.0    | 19.0 | 82 E   | —          | 40          |
| 1 16   | 2 56.00         | +41 7.2         | 0.202    | 1.087 | 54.5    | 15.6 | 116 E  | 86         | 23*         | 11 9  | 23 7.07         | -74 51.9        | 0.355    | 1.003 | 77.8    | 19.0 | 82 E   | —          | 41          |
| 1 21   | 3 4.72          | +40 1.9         | 0.188    | 1.071 | 57.9    | 15.5 | 113 E  | 85         | 24*         | 11 10                                       | 23 0.91         | -73 40.4        | 0.344    | 1.000 | 78.5    | 18.9 | 82 E   | —          | 42          |
| 531914 2013 BW <sub>76</sub>                 |                 |                 |          |       |         |      |        |            |             |   |                 |                 |          |       |         |      |        |            |             |
| 7 25   | 2 38.65         | -70 6.6         | 1.135    | 1.727 | 34.3    | 21.4 | 107 W  | —          | 46*         | 11 12                                       | 22 50.05        | -71 0.4         | 0.321    | 0.993 | 80.1    | 18.8 | 81 E   | —          | 44          |
| 7 27   | 2 48.43         | -70 30.4        | 1.124    | 1.712 | 34.7    | 21.4 | 106 W  | —          | 45*         | 11 13                                       | 22 45.24        | -69 31.2        | 0.311    | 0.990 | 80.9    | 18.8 | 81 E   | —          | 46          |
| 7 29   | 2 58.26         | -70 53.2        | 1.114    | 1.698 | 35.2    | 21.3 | 106 W  | —          | 45*         | 11 14                                       | 22 40.77        | -67 55.0        | 0.300    | 0.987 | 81.8    | 18.7 | 81 E   | —          | 48          |
| 7 31   | 3 8.11          | -71 15.1        | 1.103    | 1.683 | 35.6    | 21.3 | 105 W  | —          | 45*         | 11 15                                       | 22 36.61        | -66 11.3        | 0.289    | 0.984 | 82.6    | 18.7 | 81 E   | —          | 50          |
| 8 2  | 3 17.96         | -71 36.0        | 1.093    | 1.668 | 36.1    | 21.3 | 105 W  | —          | 44*         | 11 16                                       | 22 32.72        | -64 19.5        | 0.279    | 0.981 | 83.4    | 18.6 | 80 E   | —          | 52          |
| 8 4  | 3 27.79         | -71 56.0        | 1.083    | 1.654 | 36.5    | 21.3 | 104 W  | —          | 44*         | 11 17                                       | 22 29.07        | -62 18.8        | 0.269    | 0.979 | 84.2    | 18.6 | 80 E   | —          | 54*         |
| 8 6  | 3 37.57         | -72 15.2        | 1.073    | 1.639 | 37.0    | 21.2 | 103 W  | —          | 44*         | 11 18                                       | 22 25.63        | -60 8.5         | 0.259    | 0.976 | 85.1    | 18.5 | 80 E   | —          | 56*         |
| 8 8  | 3 47.27         | -72 33.5        | 1.063    | 1.624 | 37.5    | 21.2 | 103 W  | —          | 44*         | 11 19                                       | 22 22.37        | -57 47.9        | 0.249    | 0.974 | 85.9    | 18.4 | 80 E   | —          | 58*         |
| 8 10   | 3 56.87         | -72 51.1        | 1.054    | 1.609 | 38.0    | 21.2 | 102 W  | —          | 43*         | 11 20                                       | 22 19.29        | -55 16.2        | 0.240    | 0.972 | 86.7    | 18.4 | 79 E   | —          | 60*         |
| 8 12   | 4 6.35          | -73 8.0         | 1.044    | 1.594 | 38.5    | 21.1 | 102 W  | —          | 43*         | 11 21                                       | 22 16.36        | -52 32.7        | 0.232    | 0.970 | 87.5    | 18.3 | 79 E   | —          | 62*         |
| 8 14   | 4 15.68         | -73 24.2        | 1.035    | 1.579 | 39.0    | 21.1 | 101 W  | —          | 42*         | 11 22                                       | 22 13.55        | -49 36.6        | 0.224    | 0.969 | 88.3    | 18.3 | 79 E   | —          | 65*         |
| 8 16   | 4 24.83         | -73 39.8        | 1.025    | 1.564 | 39.6    | 21.1 | 100 W  | —          | 42*         | 11 24                                       | 22 8.30         | -43 5.3         | 0.209    | 0.966 | 89.8    | 18.2 | 78 E   | —          | 69*         |
| 8 18   | 4 33.79         | -73 54.9        | 1.016    | 1.549 | 40.1    | 21.1 | 100 W  | —          | 42*         | 11 26                                       | 22 3.44         | -35 41.5        | 0.197    | 0.963 | 91.1    | 18.1 | 77 E   | —          | 71*         |
| 8 20   | 4 42.53         | -74 9.6         | 1.006    | 1.534 | 40.7    | 21.0 | 99 W   | —          | 41*         | 11 28                                       | 21 58.90        | -27 31.0        | 0.189    | 0.962 | 92.0    | 18.1 | 77 E   | —          | 70*         |
| 8 22   | 4 51.04         | -74 23.9        | 0.996    | 1.519 | 41.2    | 21.0 | 98 W   | —          | 41*         | 11 30                                       | 21 54.64        | -18 47.7        | 0.185    | 0.961 | 92.5    | 18.0 | 77 E   | —          | 26          |
| 8 24   | 4 59.30         | -74 38.0        | 0.987    | 1.504 | 41.8    | 21.0 | 98 W   | —          | 41*         | 12 2  | 21 50.60        | -9 53.2         | 0.185    | 0.961 | 92.4    | 18.0 | 77 E   | —          | 35          |
| 8 26   | 5 7.30          | -74 52.1        | 0.977    | 1.489 | 42.4    | 21.0 | 97 W   | —          | 41*         | 12 3  | 21 48.67        | -5 29.4         | 0.187    | 0.961 | 92.2    | 18.0 | 77 E   | —          | 40          |
| 8 28   | 5 15.01         | -75 6.0         | 0.967    | 1.474 | 42.9    | 20.9 | 96 W   | —          | 40*         | 12 4  | 21 46.78        | -1 11.9         | 0.190    | 0.961 | 91.9    | 18.1 | 77 E   | —          | 44          |
| 8 30   | 5 22.41         | -75 20.1        | 0.956    | 1.458 | 43.5    | 20.9 | 96 W   | —          | 40*         | 12 5  | 21 44.93        | + 2 57.0        | 0.193    | 0.962 | 91.4    | 18.1 | 77 E   | —          | 48*         |
| 9 1  | 5 29.49         | -75 34.3        | 0.946    | 1.443 | 44.2    | 20.9 | 95 W   | —          | 40*         | 12 6  | 21 43.13        | + 6 55.3        | 0.198    | 0.962 | 90.9    | 18.1 | 78 E   | —          | 52*         |
| 9 3  | 5 36.23         | -75 48.8        | 0.935    | 1.428 | 44.8    | 20.8 | 94 W   | —          | 40*         | 12 7  | 21 41.36        | +10 41.6        | 0.203    | 0.963 | 90.3    | 18.2 | 78 E   | —          | 56*         |
| 9 5  | 5 42.61         | -76 3.6         | 0.924    | 1.413 | 45.4    | 20.8 | 94 W   | —          | 39*         | 12 8  | 21 39.64        | +14 15.1        | 0.210    | 0.964 | 89.6    | 18.2 | 78 E   | —          | 59*         |
| 9 7  | 5 48.61         | -76 18.8        | 0.913    | 1.398 | 46.0    | 20.8 | 93 W   | —          | 39*         | 12 9  | 21 37.95        | +17 35.4        | 0.217    | 0.965 | 88.9    | 18.2 | 78 E   | —          | 62*         |
| 9 9  | 5 54.21         | -76 34.5        | 0.901    | 1.383 | 46.7    | 20.7 | 93 W   | —          | 39*         | 12 10                                       | 21 36.29        | +20 42.5        | 0.224    | 0.966 | 88.1    | 18.3 | 79 E   | —          | 65*         |
| 9 11   | 5 59.38         | -76 50.7        | 0.890    | 1.368 | 47.3    | 20.7 | 92 W   | —          | 39*         | 12 11                                       | 21 34.67        | +23 36.8        | 0.232    | 0.968 | 87.3    | 18.3 | 79 E   | —          | 28*         |
| 9 13   | 6 4.11          | -77 7.6         | 0.877    | 1.353 | 48.0    | 20.7 | 92 W   | —          | 38*         | 12 12                                       | 21 33.08        | +26 18.8        | 0.241    | 0.970 | 86.5    | 18.4 | 79 E   | —          | 70*         |
| 9 15   | 6 8.37          | -77 25.2        | 0.865    | 1.338 | 48.7    | 20.6 | 91 W   | —          | 38*         | 12 13                                       | 21 31.52        | +28 49.1        | 0.250    | 0.971 | 85.6    | 18.4 | 80 E   | —          | 19*         |
| 9 17   | 6 12.12         | -77 43.4        | 0.852    | 1.323 | 49.4    | 20.6 | 91 W   | —          | 38*         | 12 14                                       | 21 29.99        | +31 8.6         | 0.260    | 0.973 | 84.8    | 18.5 | 80 E   | —          | 73*         |
| 9 19   | 6 15.34         | -78 2.5         | 0.839    | 1.309 | 50.1    | 20.6 | 90 W   | —          | 38*         | 12 15                                       | 21 28.50        | +33 18.0        | 0.269    | 0.976 | 84.0    | 18.5 | 80 E   | —          | 74*         |
| 9 21   | 6 17.98         | -78 22.4        | 0.825    | 1.294 | 50.9    | 20.5 | 90 W   | —          | 37*         | 12 16                                       | 21 27.03        | +35 18.1        | 0.279    | 0.978 | 83.1    | 18.6 | 81 E   | —          | 74*         |
| 9 23   | 6 19.98         | -78 43.2        | 0.811    | 1.279 | 51.6    | 20.5 | 89 W   | —          | 37*         | 12 17                                       | 21 25.59        | +37 9.7         | 0.290    | 0.980 | 82.3    | 18.6 | 81 E   | —          | 75*         |
| 9 24   | 6 20.72         | -78 54.0        | 0.803    | 1.272 | 52.0    | 20.5 | 89 W   | —          | 37*         | 12 18                                       | 21 24.18        | +38 53.5        | 0.300    | 0.983 | 81.4    | 18.7 | 81 E   | —          | 75*         |
| 9 25   | 6 21.27         | -79 5.0         | 0.796    | 1.265 | 52.4    | 20.4 | 89 W   | —          | 37*         | 12 19                                       | 21 22.81        | +40 30.1        | 0.311    | 0.986 | 80.6    | 18.7 | 81 E   | —          | 75*         |
| 9 26   | 6 21.63         | -79 16.3        | 0.789    | 1.258 | 52.8    | 20.4 | 88 W   | —          | 37*         | 12 20                                       | 21 21.46        | +42 0.3         | 0.321    | 0.989 | 79.8    | 18.8 | 81 E   | —          | 74*         |
| 9 27   | 6 21.77         | -79 27.8        | 0.781    | 1.251 | 53.2    | 20.4 | 88 W   | —          | 36*         | 12 21                                       | 21 20.15        | +43 24.5        | 0.332    | 0.992 | 79.0    | 18.8 | 82 E   | —          | 4*          |
| 9 28   | 6 21.69         | -79 39.5        | 0.773    | 1.244 | 53.6    | 20.4 | 88 W   | —          | 36*         | 12 22                                       | 21 18.87        | +44 43.4        | 0.343    | 0.995 | 78.2    | 18.9 | 82 E   | —          | 73*         |
| 9 29   | 6 21.36         | -79 51.6        | 0.765    | 1.237 | 54.1    | 20.4 | 88 W   | —          | 36*         | 12 24                                       | 21 16.40        | +47 6.8         | 0.365    | 1.002 | 76.6    | 19.0 | 82 E   | —          | 71*         |
| 9 30   | 6 20.77         | -80 3.8         | 0.757    | 1.229 | 54.5    | 20.3 | 88 W   | —          | 36*         | 12 26                                       | 21 14.06        | +49 14.0        | 0.388    | 1.009 | 75.1    | 19.1 | 83 E   | —          | 69*         |
| 10 1   | 6 19.90         | -80 16.3        | 0.749    | 1.222 | 54.9    | 20.3 | 87 W   | —          | 36*         | 12 28                                       | 21 11.86        | +51 7.7         | 0.410    | 1.017 | 73.6    | 19.2 | 83 E   | —          | 67*         |
| 10 2   | 6 18.72         | -80 29.1        | 0.741    | 1.216 | 55.3    | 20.3 | 87 W   | —          | 35*         | 12 30                                       | 21 9.79         | +52 50.3        | 0.432    | 1.025 | 72.2    | 19.3 | 83 E   | —          | 65*         |
| 10 3   | 6 17.21         | -80 42.0        | 0.733    | 1.209 | 55.8    | 20.3 | 87 W   | —          | 35*         | 1 1   | 21 7.85         | +54 23.6        | 0.455    | 1.034 | 70.8    | 19.3 | 83 E   | —          | 64*         |
| 10 4   | 6 15.33         | -80 55.2        | 0.725    | 1.202 | 56.2    | 20.2 | 87 W   | —          | 35*         | 1 3   | 21 6.05         | +55 49.2        | 0.477    | 1.044 | 69.4    | 19.4 | 84 E   | —          | 62*         |
| 10 5   | 6 13.04         | -81 8.6         | 0.716    | 1.195 | 56.7    | 20.2 | 87 W   | —          | 35*         | 1 5   | 21 4.37         | +57 8.5         | 0.498    | 1.054 | 68.1    | 19.5 | 84 E   | —          | 60*         |
| 10 6   | 6 10.32         | -81 22.2        | 0.707    | 1.188 | 57.1    | 20.2 | 86 W   | —          | 35*         | 1 7   | 21 2.81         | +58 22.5        | 0.520    | 1.064 | 66.8    | 19.6 | 84 E   | —          | 59*         |
| 10 7   | 6 7.12          | -81 35.9        | 0.699    | 1.181 | 57.6    | 20.2 | 86 W   | —          | 34          | 1 9   | 21 1.36         | +59 32.0        | 0.541    | 1.074 | 65.6    | 19.6 | 84 E   | —          | 57*         |
| 10 8   | 6 3.37          | -81 49.8        | 0.690    | 1.175 | 58.1    | 20.1 | 86 W   | —          | 34          | 1 11  | 21 0.02         | +60 38.0        | 0.562    | 1.086 | 64.4    | 19.7 | 85 E   | —          | 56*         |
| 10 9   | 5 59.04         | -82 3.7         | 0.681    | 1.168 | 58.5    | 20.1 | 86 W   | —          | 34          | 1 13  | 20 58.78        | +61 40.9        | 0.582    | 1.097 |         |      |        |            |             |

EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 21/22                               | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | $45^\circ$ | $-26^\circ$ | 21/22                              | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | $45^\circ$ | $-26^\circ$ |
|-------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|------------|-------------|------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|------------|-------------|
| <b>158985 2004 RB<sub>330</sub></b> |                 |                 |          |       |         |      |        |            |             | <b>337118 1999 TX<sub>2</sub></b>  |                 |                 |          |       |         |      |        |            |             |
| <i>(continuation)</i>               |                 |                 |          |       |         |      |        |            |             | <i>(continuation)</i>              |                 |                 |          |       |         |      |        |            |             |
| 10 28                               | 3 27.44         | +20 12.1        | 1.234    | 2.194 | 9.0     | 20.2 | 160 W  | 65         | 44          | 8 14                               | 3 28.16         | - 1 47.8        | 1.210    | 1.604 | 39.1    | 21.3 | 92 W   | 39*        | 66          |
| 11 2                                | 3 22.03         | +19 38.8        | 1.232    | 2.209 | 6.1     | 20.1 | 166 W  | 65         | 44          | 8 19                               | 3 32.89         | - 4 56.1        | 1.173    | 1.627 | 38.2    | 21.2 | 96 W   | 38*        | 69          |
| 11 7                                | 3 16.37         | +19 3.4         | 1.237    | 2.224 | 3.3     | 19.9 | 173 W  | 64         | 45          | 8 24                               | 3 36.89         | - 8 19.7        | 1.139    | 1.649 | 37.1    | 21.2 | 100 W  | 36*        | 72          |
| 11 12                               | 3 10.67         | +18 26.9        | 1.249    | 2.239 | 0.4     | 19.7 | 179 W  | 63         | 46          | 8 29                               | 3 40.06         | -11 57.9        | 1.108    | 1.670 | 35.9    | 21.1 | 104 W  | 33*        | 76          |
| 11 17                               | 3 5.14          | +17 50.4        | 1.267    | 2.253 | 2.5     | 20.0 | 174 E  | 63         | 46          | 9 3                                | 3 42.30         | -15 49.7        | 1.082    | 1.690 | 34.7    | 21.0 | 108 W  | 29*        | 80          |
| 11 22                               | 2 59.96         | +17 15.1        | 1.293    | 2.268 | 5.2     | 20.2 | 168 E  | 62         | 47          | 9 8                                | 3 43.48         | -19 52.7        | 1.062    | 1.709 | 33.3    | 21.0 | 111 W  | 25         | 84          |
| 11 27                               | 2 55.28         | +16 41.7        | 1.325    | 2.282 | 7.8     | 20.4 | 162 E  | 62         | 47          | 9 13                               | 3 43.46         | -24 3.4         | 1.047    | 1.726 | 32.0    | 20.9 | 114 W  | 21         | 88          |
| 12 2                                | 2 51.23         | +16 11.4        | 1.363    | 2.297 | 10.3    | 20.5 | 155 E  | 61         | 48          | 9 18                               | 3 42.12         | -28 17.4        | 1.039    | 1.743 | 30.9    | 20.9 | 117 W  | 17         | 88          |
| 12 7                                | 2 47.91         | +15 44.7        | 1.407    | 2.311 | 12.5    | 20.7 | 150 E  | 61         | 48          | 9 23                               | 3 39.32         | -32 29.5        | 1.038    | 1.759 | 29.9    | 20.9 | 119 W  | 13         | 84          |
| 12 12                               | 2 45.37         | +15 22.2        | 1.457    | 2.325 | 14.5    | 20.9 | 144 E  | 60         | 49          | 9 28                               | 3 34.94         | -36 34.1        | 1.043    | 1.774 | 29.2    | 20.9 | 120 W  | 8          | 79          |
| 12 17                               | 2 43.64         | +15 4.1         | 1.512    | 2.339 | 16.3    | 21.0 | 138 E  | 60         | 49          | 10 3                               | 3 28.85         | -40 25.3        | 1.056    | 1.787 | 28.8    | 20.9 | 121 W  | 5          | 76          |
| 12 22                               | 2 42.72         | +14 50.6        | 1.571    | 2.353 | 17.9    | 21.2 | 133    | 60         | 49          | 10 8                               | 3 21.03         | -43 57.8        | 1.076    | 1.800 | 28.7    | 21.0 | 120 W  | 1          | 72          |
| 12 27                               | 2 42.57         | +14 41.5        | 1.634    | 2.366 | 19.2    | 21.3 | 128 E  | 60         | 49          | 10 13                              | 3 11.52         | -47 7.0         | 1.102    | 1.812 | 28.7    | 21.1 | 119 W  | —          | 69          |
| 1                                   | 2 43.18         | +14 36.7        | 1.701    | 2.380 | 20.4    | 21.4 | 123 E  | 60         | 49          | 10 18                              | 3 0.49          | -49 49.7        | 1.133    | 1.822 | 29.0    | 21.1 | 118 W  | —          | 66          |
| <b>323686 2005 GW<sub>20</sub></b>  |                 |                 |          |       |         |      |        |            |             | <b>371336 2006 KD<sub>1</sub></b>  |                 |                 |          |       |         |      |        |            |             |
| 7 25                                | 2 49.27         | +22 4.1         | 2.231    | 2.209 | 26.4    | 21.5 | 76 W   | 51*        | 42*         | 7 25                               | 3 16.98         | + 2 55.5        | 1.857    | 1.870 | 31.6    | 21.4 | 75 W   | 32*        | 59*         |
| 8 4                                 | 3 5.83          | +22 26.1        | 2.082    | 2.174 | 27.5    | 21.3 | 81 W   | 57*        | 42*         | 7 30                               | 3 28.75         | + 2 35.5        | 1.754    | 1.816 | 33.0    | 21.3 | 77 W   | 34*        | 60*         |
| 8 14                                | 3 21.84         | +22 32.9        | 1.933    | 2.139 | 28.2    | 21.1 | 87 W   | 62*        | 41          | 8 4                                | 3 41.22         | + 2 8.8         | 1.653    | 1.760 | 34.4    | 21.1 | 79 W   | 35*        | 60*         |
| 8 24                                | 3 37.05         | +22 22.3        | 1.785    | 2.104 | 28.7    | 20.9 | 93 W   | 65*        | 42          | 8 9                                | 3 54.49         | + 1 34.5        | 1.554    | 1.703 | 35.9    | 21.0 | 80 W   | 36*        | 61*         |
| 9 3                                 | 3 51.17         | +21 51.7        | 1.638    | 2.069 | 28.7    | 20.7 | 100 W  | 66*        | 42          | 8 14                               | 4 8.69          | + 0 51.5        | 1.457    | 1.646 | 37.5    | 20.8 | 81 W   | 37*        | 62*         |
| 9 13                                | 4 3.78          | +20 58.1        | 1.496    | 2.034 | 28.2    | 20.5 | 107 W  | 67*        | 43          | 8 19                               | 4 23.97         | - 0 1.1         | 1.363    | 1.587 | 39.2    | 20.6 | 82 W   | 38*        | 63*         |
| 9 18                                | 4 9.39          | +20 21.7        | 1.427    | 2.016 | 27.8    | 20.3 | 111 W  | 65         | 44          | 8 24                               | 4 40.54         | - 1 4.5         | 1.273    | 1.526 | 41.1    | 20.5 | 83 W   | 38*        | 64*         |
| 9 23                                | 4 14.46         | +19 38.2        | 1.360    | 1.999 | 27.2    | 20.2 | 115 W  | 65         | 44          | 8 29                               | 4 58.63         | - 2 19.8        | 1.187    | 1.465 | 43.2    | 20.3 | 83 W   | 37*        | 65*         |
| 9 28                                | 4 18.92         | +18 47.3        | 1.296    | 1.982 | 26.4    | 20.0 | 119 W  | 64         | 45          | 9 3                                | 5 18.48         | - 3 48.0        | 1.107    | 1.403 | 45.5    | 20.1 | 83 W   | 37*        | 66*         |
| 10 3                                | 4 22.69         | +17 48.5        | 1.233    | 1.964 | 25.4    | 19.9 | 123 W  | 63         | 46          | 9 13                               | 6 4.63          | - 7 23.8        | 0.967    | 1.274 | 51.2    | 19.7 | 80 W   | 34*        | 67*         |
| 10 13                               | 4 27.92         | +15 25.8        | 1.118    | 1.930 | 22.8    | 19.6 | 132 W  | 60         | 49          | 9 23                               | 7 1.21          | -11 41.5        | 0.862    | 1.141 | 58.2    | 19.5 | 75 W   | 29*        | 65*         |
| 10 23                               | 4 29.70         | +12 28.7        | 1.018    | 1.897 | 19.3    | 19.2 | 141 W  | 57         | 52          | 10 3                               | 8 8.98          | -15 59.0        | 0.805    | 1.004 | 66.1    | 19.3 | 67 W   | 24*        | 59*         |
| 11 2                                | 4 27.81         | + 8 59.9        | 0.936    | 1.864 | 15.3    | 18.9 | 150 W  | 54         | 55          | 10 5                               | 8 23.69         | -16 44.4        | 0.799    | 0.976 | 67.7    | 19.2 | 65 W   | 23*        | 57*         |
| 11 7                                | 4 25.51         | + 7 6.2         | 0.903    | 1.848 | 13.3    | 18.7 | 155 W  | 52         | 57          | 10 7                               | 8 38.69         | -17 26.2        | 0.796    | 0.948 | 69.3    | 19.2 | 63 W   | 22*        | 55*         |
| 11 12                               | 4 22.41         | + 5 9.0         | 0.877    | 1.832 | 11.7    | 18.5 | 158 W  | 50         | 59          | 10 9                               | 8 53.92         | -18 3.9         | 0.796    | 0.921 | 70.8    | 19.2 | 60 W   | 21*        | 53*         |
| 11 17                               | 4 18.66         | + 3 10.9        | 0.856    | 1.817 | 10.7    | 18.4 | 160 W  | 48         | 61          | 10 11                              | 9 9.32          | -18 36.9        | 0.797    | 0.893 | 72.2    | 19.2 | 58 W   | 20*        | 51*         |
| 11 22                               | 4 14.41         | + 1 14.7        | 0.841    | 1.802 | 10.7    | 18.4 | 160 W  | 46         | 63          | 10 13                              | 9 24.83         | -19 4.9         | 0.801    | 0.866 | 73.4    | 19.2 | 56 W   | 19*        | 49*         |
| 11 27                               | 4 9.87          | - 0 36.3        | 0.833    | 1.787 | 11.8    | 18.4 | 158 E  | 44         | 65          | 10 18                              | 10 3.69         | -19 51.2        | 0.820    | 0.798 | 76.0    | 19.1 | 51 W   | 17*        | 44*         |
| 12 2                                | 4 5.26          | - 2 19.2        | 0.830    | 1.773 | 13.6    | 18.4 | 155 E  | 43         | 66          | 10 23                              | 10 42.00        | -20 3.0         | 0.852    | 0.732 | 77.4    | 19.1 | 46 W   | 15*        | 39*         |
| 12 7                                | 4 0.83          | - 3 51.3        | 0.833    | 1.759 | 16.0    | 18.5 | 151 E  | 41         | 68          | 10 28                              | 11 19.20        | -19 43.4        | 0.897    | 0.671 | 77.2    | 19.0 | 41 W   | 14*        | 34*         |
| 12 12                               | 3 56.82         | - 5 10.6        | 0.841    | 1.746 | 18.5    | 18.6 | 146 E  | 40         | 69          | 11 2                               | 11 55.08        | -18 58.0        | 0.953    | 0.616 | 75.1    | 18.9 | 37 W   | 14*        | 29*         |
| 12 17                               | 3 53.42         | - 6 16.1        | 0.854    | 1.733 | 21.0    | 18.7 | 141 E  | 39         | 70          | 11 4                               | 12 9.08         | -18 34.2        | 0.978    | 0.597 | 73.7    | 18.8 | 35 W   | 14*        | 27*         |
| 12 22                               | 3 50.80         | - 7 7.5         | 0.871    | 1.720 | 23.4    | 18.8 | 136 E  | 38         | 71          | 11 6                               | 12 22.90        | -18 8.0         | 1.004    | 0.580 | 71.9    | 18.7 | 34 W   | 14*        | 26*         |
| 12 27                               | 3 49.06         | - 7 45.0        | 0.891    | 1.708 | 25.6    | 18.9 | 131 E  | 37         | 72          | 11 8                               | 12 36.55        | -17 39.9        | 1.031    | 0.565 | 69.9    | 18.7 | 32 W   | 14*        | 24*         |
| 1                                   | 3 48.28         | - 8 9.3         | 0.914    | 1.697 | 27.6    | 19.0 | 127 E  | 37         | 72          | 11 10                              | 12 50.05        | -17 10.3        | 1.060    | 0.553 | 67.5    | 18.6 | 31 W   | 14*        | 22*         |
| 1 6                                 | 3 48.52         | - 8 21.4        | 0.939    | 1.686 | 29.5    | 19.1 | 123 E  | 37         | 72          | 11 12                              | 13 3.40         | -16 39.8        | 1.089    | 0.543 | 64.9    | 18.6 | 30 W   | 14*        | 21*         |
| 1 11                                | 3 49.78         | - 8 22.7        | 0.966    | 1.676 | 31.1    | 19.2 | 118 E  | 37         | 72          | 11 14                              | 13 16.62        | -16 9.0         | 1.120    | 0.537 | 62.1    | 18.5 | 29 W   | 14*        | 19*         |
| 1 16                                | 3 52.05         | - 8 14.5        | 0.995    | 1.666 | 32.4    | 19.3 | 115 E  | 37         | 72          | 11 16                              | 13 29.69        | -15 38.1        | 1.150    | 0.534 | 59.1    | 18.5 | 28 W   | 14*        | 17*         |
| 1 21                                | 3 55.29         | - 7 58.1        | 1.025    | 1.657 | 33.6    | 19.4 | 111 E  | 37         | 72          | 11 18                              | 13 42.61        | -15 7.6         | 1.181    | 0.534 | 56.1    | 18.4 | 27 W   | 14*        | 16*         |
| 7 25                                | 2 53.76         | +42 42.8        | 3.773    | 3.559 | 15.6    | 21.5 | 70 W   | 61*        | 21*         | 11 20                              | 13 55.36        | -14 37.9        | 1.212    | 0.537 | 53.1    | 18.4 | 26 W   | 14*        | 14*         |
| 8 4                                 | 3 2.14          | +44 11.8        | 3.640    | 3.552 | 16.2    | 21.4 | 77 W   | 69*        | 20          | 11 22                              | 14 7.92         | -14 9.1         | 1.244    | 0.543 | 50.1    | 18.4 | 25 W   | 14*        | 13*         |
| 8 14                                | 3 9.12          | +45 40.2        | 3.503    | 3.543 | 16.5    | 21.4 | 84 W   | 77*        | 18          | 11 27                              | 14 38.38        | -13 2.1         | 1.321    | 0.572 | 43.4    | 18.5 | 23 W   | 14*        | 10*         |
| 8 24                                | 3 14.36         | +47 7.3         | 3.365    | 3.535 | 16.6    | 21.3 | 91 W   | 85*        | 17          | 12 2                               | 15 7.21         | -12 2.5         | 1.396    | 0.615 | 37.9    | 18.6 | 23 W   | 15*        | 7*          |
| 9 3                                 | 3 17.50         | +48 31.9        | 3.228    | 3.525 | 16.4    | 21.2 | 99 W   | 86*        | 15          | 12 7                               | 15 34.22        | -11 9.1         | 1.469    | 0.670 | 33.7    | 18.8 | 22 W   | 15*        | 6*          |
| 9 13                                | 3 18.12         | +49 51.9        | 3.094    | 3.514 | 15.9    | 21.0 | 106 W  | 85         | 14          | 12 12                              | 15 59.37        | -10 20.3        | 1.540    | 0.731 | 30.7    | 19.0 | 22 W   | 15*        | 4*          |
| 9 23                                | 3 15.86         | +51 4.3         | 2.969    | 3.503 | 15.1    | 20.9 | 114 W  | 84         | 13          | 12 17                              | 16 22.70        | - 9 34.7        | 1.609    | 0.797 | 28.4    | 19.2 | 23 W   | 16*        | 3*          |
| 10 3                                | 3 10.46         | +52 4.7         | 2.854    | 3.490 | 14.1    | 20.8 | 122 W  | 83         | 12          | 12 22                              | 16 44.32        | - 8 51.0        | 1.676    | 0.865 | 26.7    | 19.4 | 23 W   | 17*        | 3*          |
| 10 13                               | 3 1.93          | +52 47.5        | 2.755    | 3.477 | 12.8    | 20.7 | 130 W  | 82         | 11          | 12 27                              | 17 4.38         | - 8 8.4         | 1.741    | 0.934 | 24.5    | 19.6 | 24 W   | 18*        | 3*          |
| 10 23                               | 2 50.74         | +53 6.9         | 2.674    | 3.463 | 11.4    | 20.5 | 136 W  | 82         | 11          | 1                                  | 17 23.01        | - 7 26.1        | 1.803    | 1.003 | 24.5    | 19.8 | 25 W   | 19*        | 4*          |
| 11 2                                | 2 37.80         | +52 58.2        | 2.615    | 3.448 | 10.3    | 20.4 | 142 W  | 82         | 11          | 1 6                                | 17 40.34        | - 6 43.8        | 1.863    | 1.072 | 23.8    | 20.0 | 26 W   | 19*        | 5*          |
| 11 7                                | 2 31.09         | +52 42.6        | 2.594    | 3.441 | 9.9     | 20.4 | 143 E  | 82         | 11          | 1 11                               | 17 56.49        | - 6 1.1         | 1.921    | 1.140 | 23.3    | 20.2 | 27 W   | 20*        | 6*          |
| 11 12                               | 2 24.46         | +52 19.5        | 2.580    | 3.433 | 9.7     | 20.4 | 144 E  | 83         | 12          | 1 16                               | 18 11.57        | - 5 17.8        | 1.975    | 1.207 | 22.9    | 20.4 | 29 W   | 21*        | 8*          |
| 11 17                               | 2 18.11         | +51 49.4        | 2.573    | 3.425 | 9.7     | 20.4 | 144 E  | 83         | 12          | 1 21                               | 18 25.67        | - 4 34.0        | 2.027    | 1.273 | 22.7    | 20.5 | 30 W   | 22*        | 10*         |
| 11 22                               | 2 12.19         | +51 13.0        | 2.572    | 3.416 | 9.9     | 20.4 | 143 E  | 84         | 13          | <b>306839 2001 SG<sub>35</sub></b> |                 |                 |          |       |         |      |        |            |             |
| 11 27                               | 2 6.84          | +50 31.2        | 2.577    | 3.408 | 10.3    | 20.4 | 142 E  | 84         | 13          | 7 25                               | 3 49.31         | +18 0.5         | 1.762    | 1.583 | 34.8    | 21.5 | 63 W   | 38*        | 42*         |
| 12 2                                | 2 2.18          | +49 45.0        | 2.588    | 3.399 | 10.9    | 20.4 | 139 E  | 85         | 14          | 8 4                                | 4 16.65         | +19 11.6        | 1.698    | 1.583 | 35.8    | 21.4 | 66 W   | 43*        | 41*         |
| 12 7                                | 1 58.27         | +48 55.5        | 2.606    | 3.390 | 11.5    | 20.4 | 137 E  | 86         | 15          | 8 14                               | 4 43.64         | +20 5.0         | 1.635    | 1.586 | 36.6    | 21.4 | 69 W   | 48*        | 41*         |
|                                     |                 |                 |          |       |         |      |        |            |             |                                    |                 |                 |          |       |         |      |        |            |             |



EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 21/22  | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | 45° | -26° | 21/22                               | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | 45° | -26° |
|--|-----------------|-----------------|----------|-------|---------|------|--------|-----|------|-------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|-----|------|
| <b>306839</b> 2001 SG <sub>35</sub> (continuation) |                 |                 |          |       |         |      |        |     |      | <b>99942</b> Apophis (continuation) |                 |                 |          |       |         |      |        |     |      |
| 10 23  | 7 15.64         | +19 47.4        | 1.183    | 1.693 | 35.1    | 20.8 | 102 W  | 65  | 44*  | 9 18                                | 8 10.70         | +18 38.4        | 0.837    | 0.853 | 73.0    | 20.7 | 54 W   | 43* | 29*  |
| 11 2   | 7 27.49         | +19 24.6        | 1.118    | 1.718 | 33.1    | 20.6 | 109 W  | 64  | 45   | 9 23                                | 8 27.36         | +17 23.6        | 0.861    | 0.870 | 70.8    | 20.8 | 55 W   | 43* | 29*  |
| 11 12  | 7 35.49         | +19 9.0         | 1.057    | 1.746 | 30.4    | 20.4 | 117 W  | 64  | 45   | 9 28                                | 8 43.81         | +16 4.9         | 0.882    | 0.888 | 69.0    | 20.8 | 56 W   | 44* | 30*  |
| 11 22  | 7 39.19         | +19 4.4         | 1.002    | 1.774 | 26.7    | 20.3 | 126 W  | 64  | 45   | 10 3                                | 9 0.01          | +14 42.6        | 0.901    | 0.905 | 67.3    | 20.8 | 57 W   | 44* | 30*  |
| 12 2   | 7 38.27         | +19 13.4        | 0.957    | 1.805 | 22.1    | 20.1 | 137 W  | 64  | 45   | 10 8                                | 9 15.95         | +13 17.2        | 0.916    | 0.922 | 65.8    | 20.9 | 57 W   | 45* | 31*  |
| 12 12  | 7 32.75         | +19 36.3        | 0.925    | 1.836 | 16.5    | 19.8 | 148 W  | 65  | 44   | 10 13                               | 9 31.62         | +11 49.1        | 0.929    | 0.939 | 64.6    | 20.9 | 58 W   | 45* | 32*  |
| 12 17  | 7 28.47         | +19 52.2        | 0.916    | 1.852 | 13.4    | 19.7 | 154 W  | 65  | 44   | 10 18                               | 9 47.05         | +10 18.7        | 0.939    | 0.956 | 63.4    | 20.9 | 59 W   | 45* | 33*  |
| 12 22  | 7 23.39         | +20 10.1        | 0.912    | 1.868 | 10.2    | 19.6 | 160 W  | 65  | 44   | 10 23                               | 10 2.26         | +8 46.3         | 0.946    | 0.972 | 62.5    | 20.9 | 60 W   | 45* | 34*  |
| 12 27  | 7 17.70         | +20 29.4        | 0.913    | 1.884 | 6.8     | 19.5 | 167 W  | 65  | 44   | 10 28                               | 10 17.27        | +7 12.2         | 0.951    | 0.987 | 61.7    | 21.0 | 61 W   | 45* | 35*  |
| 1 1  | 7 11.64         | +20 49.2        | 0.921    | 1.901 | 3.4     | 19.3 | 173 W  | 66  | 43   | 11 2                                | 10 32.11        | +5 36.8         | 0.953    | 1.001 | 61.0    | 21.0 | 62 W   | 45* | 36*  |
| 1 6  | 7 5.51          | +21 8.8         | 0.935    | 1.918 | 0.7     | 19.2 | 179 E  | 66  | 43   | 11 7                                | 10 46.81        | +4 0.3          | 0.952    | 1.015 | 60.4    | 21.0 | 63 W   | 45* | 37*  |
| 1 11   | 6 59.57         | +21 27.4        | 0.955    | 1.935 | 3.4     | 19.5 | 173 E  | 66  | 43   | 11 12                               | 11 1.38         | +2 23.1         | 0.949    | 1.028 | 59.9    | 21.0 | 64 W   | 44* | 39*  |
| 1 16   | 6 54.10         | +21 44.7        | 0.981    | 1.952 | 6.5     | 19.7 | 167 E  | 67  | 42   | 11 17                               | 11 15.88        | +0 45.5         | 0.944    | 1.040 | 59.5    | 21.0 | 65 W   | 44* | 40*  |
| 1 21   | 6 49.29         | +22 0.4         | 1.013    | 1.969 | 9.5     | 19.9 | 161 E  | 67  | 42   | 11 22                               | 11 30.34        | -0 52.2         | 0.937    | 1.051 | 59.3    | 21.0 | 66 W   | 43* | 42*  |
| <b>429405</b> 2010 TE <sub>48</sub>                |                 |                 |          |       |         |      |        |     |      | <b>506074</b> 2015 UM <sub>67</sub> |                 |                 |          |       |         |      |        |     |      |
| 7 25   | 4 3.65          | +17 15.1        | 1.927    | 1.666 | 31.8    | 21.5 | 60 W   | 35* | 41*  | 7 25                                | 5 41.84         | +22 9.5         | 0.683    | 0.615 | 102.8   | 20.7 | 36 W   | 21* | 23*  |
| 8 4  | 4 29.75         | +17 45.4        | 1.862    | 1.670 | 32.8    | 21.4 | 63 W   | 40* | 41*  | 7 27                                | 5 40.19         | +21 43.6        | 0.707    | 0.639 | 97.8    | 20.6 | 39 W   | 23* | 25*  |
| 8 14   | 4 55.23         | +17 57.5        | 1.797    | 1.677 | 33.7    | 21.4 | 67 W   | 44* | 42*  | 7 29                                | 5 39.38         | +21 20.2        | 0.731    | 0.663 | 93.4    | 20.5 | 41 W   | 24* | 26*  |
| 8 24   | 5 19.81         | +17 52.0        | 1.731    | 1.687 | 34.4    | 21.4 | 70 W   | 49* | 43*  | 7 31                                | 5 39.26         | +20 58.8        | 0.754    | 0.687 | 89.4    | 20.5 | 43 W   | 25* | 28*  |
| 9 3  | 5 43.22         | +17 30.2        | 1.664    | 1.700 | 34.9    | 21.3 | 75 W   | 53* | 44*  | 8 2                                 | 5 39.70         | +20 39.3        | 0.776    | 0.713 | 85.9    | 20.5 | 44 W   | 27* | 29*  |
| 9 13   | 6 5.15          | +16 53.7        | 1.596    | 1.716 | 35.1    | 21.2 | 79 W   | 56* | 45*  | 8 4                                 | 5 40.57         | +20 21.4        | 0.797    | 0.738 | 82.7    | 20.5 | 46 W   | 29* | 30*  |
| 9 23   | 6 25.30         | +16 4.8         | 1.527    | 1.734 | 35.1    | 21.2 | 84 W   | 58* | 46*  | 8 9                                 | 5 44.11         | +19 42.1        | 0.845    | 0.803 | 75.9    | 20.6 | 50 W   | 33* | 32*  |
| 10 3   | 6 43.35         | +15 6.1         | 1.456    | 1.755 | 34.8    | 21.1 | 89 W   | 60* | 48*  | 8 14                                | 5 48.80         | +19 8.1         | 0.886    | 0.868 | 70.5    | 20.7 | 54 W   | 36* | 34*  |
| 10 13  | 6 58.95         | +14 0.9         | 1.386    | 1.778 | 34.0    | 21.0 | 95 W   | 59  | 49*  | 8 19                                | 5 53.98         | +18 37.3        | 0.920    | 0.933 | 66.2    | 20.8 | 58 W   | 39* | 36*  |
| 10 23  | 7 11.74         | +12 52.8        | 1.315    | 1.802 | 32.7    | 20.9 | 102 W  | 58  | 51*  | 8 24                                | 5 59.24         | +18 8.5         | 0.947    | 0.996 | 62.6    | 20.9 | 61 W   | 42* | 38*  |
| 11 2   | 7 21.33         | +11 45.7        | 1.247    | 1.829 | 30.9    | 20.7 | 109 W  | 57  | 52   | 8 29                                | 6 4.29          | +17 40.6        | 0.968    | 1.059 | 59.6    | 21.0 | 65 W   | 46* | 40*  |
| 11 12  | 7 27.30         | +10 44.2        | 1.183    | 1.856 | 28.3    | 20.6 | 117 W  | 56  | 53   | 9 3                                 | 6 8.93          | +17 13.2        | 0.982    | 1.120 | 56.9    | 21.1 | 68 W   | 49* | 41*  |
| 11 22  | 7 29.32         | +9 53.1         | 1.126    | 1.886 | 25.0    | 20.4 | 126 W  | 55  | 54   | 9 8                                 | 6 13.00         | +16 45.9        | 0.992    | 1.179 | 54.5    | 21.1 | 72 W   | 51* | 43*  |
| 12 2   | 7 27.26         | +9 17.2         | 1.079    | 1.916 | 20.9    | 20.2 | 136 W  | 54  | 55   | 9 13                                | 6 16.37         | +16 18.6        | 0.996    | 1.237 | 52.2    | 21.2 | 76 W   | 54* | 44*  |
| 12 12  | 7 21.30         | +9 0.8          | 1.047    | 1.948 | 16.0    | 20.0 | 147 W  | 54  | 55   | 9 18                                | 6 18.92         | +15 51.3        | 0.996    | 1.293 | 50.0    | 21.2 | 81 W   | 56* | 46*  |
| 12 22  | 7 12.26         | +9 6.3          | 1.035    | 1.980 | 10.9    | 19.8 | 158 W  | 54  | 55   | 9 23                                | 6 20.56         | +15 23.9        | 0.992    | 1.347 | 47.9    | 21.2 | 85 W   | 58* | 47*  |
| 1 1  | 7 1.49          | +9 33.2         | 1.045    | 2.013 | 6.8     | 19.7 | 166 W  | 55  | 54   | 9 28                                | 6 21.18         | +14 56.5        | 0.985    | 1.400 | 45.7    | 21.2 | 90 W   | 59* | 48*  |
| 1 6  | 6 55.99         | +9 53.6         | 1.059    | 2.029 | 6.2     | 19.7 | 167 E  | 55  | 54   | 10 3                                | 6 20.69         | +14 29.2        | 0.975    | 1.452 | 43.4    | 21.2 | 95 W   | 59* | 49*  |
| 1 11   | 6 50.72         | +10 17.8        | 1.080    | 2.046 | 7.0     | 19.8 | 165 E  | 55  | 54   | 10 8                                | 6 18.97         | +14 2.2         | 0.963    | 1.501 | 41.0    | 21.2 | 100 W  | 59  | 50*  |
| 1 16   | 6 45.89         | +10 45.0        | 1.106    | 2.063 | 8.7     | 20.0 | 162 E  | 56  | 53   | 10 13                               | 6 15.93         | +13 35.4        | 0.950    | 1.550 | 38.4    | 21.2 | 105 W  | 59  | 50   |
| 1 21   | 6 41.66         | +11 14.3        | 1.139    | 2.080 | 10.8    | 20.2 | 157 E  | 56  | 53   | 10 18                               | 6 11.50         | +13 9.2         | 0.937    | 1.597 | 35.5    | 21.1 | 111 W  | 58  | 51   |
| <b>112221</b> 2002 KH <sub>4</sub>                 |                 |                 |          |       |         |      |        |     |      | <b>3362</b> Khufu                   |                 |                 |          |       |         |      |        |     |      |
| 7 25   | 5 12.68         | +6 6.6          | 3.606    | 3.003 | 14.3    | 21.5 | 47 W   | 15* | 39*  | 7 25                                | 5 57.62         | +17 10.2        | 1.969    | 1.248 | 26.4    | 21.4 | 33 W   | 15* | 23*  |
| 8 4  | 5 24.04         | +4 45.0         | 3.468    | 2.976 | 15.9    | 21.4 | 53 W   | 21* | 44*  | 8 4                                 | 6 32.08         | +17 0.4         | 1.882    | 1.191 | 28.7    | 21.3 | 34 W   | 18* | 23*  |
| 8 14   | 5 34.88         | +3 8.5          | 3.320    | 2.947 | 17.3    | 21.4 | 60 W   | 27* | 49*  | 8 14                                | 7 8.92          | +16 24.0        | 1.795    | 1.127 | 31.0    | 21.2 | 35 W   | 20* | 23*  |
| 8 24   | 5 45.03         | +1 15.7         | 3.164    | 2.918 | 18.6    | 21.3 | 67 W   | 32* | 54*  | 8 24                                | 7 48.48         | +15 16.7        | 1.711    | 1.055 | 33.3    | 21.0 | 35 W   | 21* | 22*  |
| 9 3  | 5 54.34         | +0 55.0         | 3.004    | 2.887 | 19.6    | 21.2 | 74 W   | 36* | 59*  | 9 3                                 | 8 31.16         | +13 33.4        | 1.633    | 0.977 | 35.3    | 20.8 | 34 W   | 22* | 20*  |
| 9 13   | 6 2.60          | +3 25.1         | 2.841    | 2.854 | 20.3    | 21.1 | 81 W   | 38* | 63*  | 9 13                                | 9 17.30         | +11 9.4         | 1.565    | 0.892 | 36.9    | 20.5 | 32 W   | 21* | 18*  |
| 9 23   | 6 9.54          | +6 15.9         | 2.680    | 2.821 | 20.8    | 20.9 | 88 W   | 38* | 68*  | 9 23                                | 10 7.26         | +8 1.4          | 1.513    | 0.802 | 37.3    | 20.2 | 29 W   | 19* | 15*  |
| 10 3   | 6 14.89         | +9 28.2         | 2.523    | 2.786 | 21.0    | 20.8 | 94 W   | 36  | 73*  | 10 3                                | 11 1.33         | +4 9.6          | 1.480    | 0.710 | 36.4    | 19.9 | 25 W   | 16* | 12*  |
| 10 13  | 6 18.27         | +13 1.7         | 2.375    | 2.750 | 20.8    | 20.6 | 101 W  | 32  | 77   | 10 8                                | 11 29.99        | +1 58.6         | 1.472    | 0.666 | 34.7    | 19.7 | 22 W   | 14* | 9*   |
| 10 23  | 6 19.29         | +16 54.3        | 2.239    | 2.712 | 20.5    | 20.4 | 108 W  | 28  | 81   | 10 13                               | 11 59.75        | -0 20.6         | 1.469    | 0.625 | 32.2    | 19.5 | 19 W   | 12* | 7*   |
| 10 28  | 6 18.78         | +18 56.4        | 2.177    | 2.693 | 20.2    | 20.3 | 111 W  | 26  | 83   | 10 18                               | 12 30.62        | -2 46.2         | 1.472    | 0.588 | 28.6    | 19.2 | 16 W   | 9*  | 4*   |
| 11 2   | 6 17.52         | +21 1.2         | 2.119    | 2.673 | 19.9    | 20.3 | 113 W  | 24  | 85   | 10 23                               | 13 2.55         | +5 15.6         | 1.478    | 0.557 | 23.9    | 19.0 | 13 W   | 6*  | 2*   |
| 11 7   | 6 15.45         | +23 7.7         | 2.067    | 2.653 | 19.6    | 20.2 | 116 W  | 22  | 87   | 10 28                               | 13 35.46        | +7 45.6         | 1.489    | 0.536 | 18.3    | 18.8 | 10 W   | 3*  | —    |
| 11 12  | 6 12.52         | +25 14.2        | 2.019    | 2.633 | 19.4    | 20.1 | 118 W  | 20  | 89   | 11 2                                | 14 9.13         | +10 12.3        | 1.501    | 0.527 | 12.2    | 18.5 | 6 W    | —   | —    |
| 11 17  | 6 8.73          | +27 19.3        | 1.978    | 2.613 | 19.2    | 20.0 | 120 W  | 18  | 89   | 11 7                                | 14 43.27        | +12 31.0        | 1.514    | 0.529 | 7.2     | 18.3 | 4 W    | —   | —    |
| 11 22  | 6 4.05          | +29 20.9        | 1.942    | 2.592 | 19.1    | 20.0 | 121 W  | 16  | 87   |                                     |                 |                 |          |       |         |      |        |     |      |
| 11 27  | 5 58.49         | +31 17.3        | 1.912    | 2.571 | 19.1    | 19.9 | 122 W  | 14  | 85   |                                     |                 |                 |          |       |         |      |        |     |      |
| 12 2   | 5 52.10         | +33 6.4         | 1.888    | 2.549 | 19.2    | 19.9 | 122 W  | 12  | 83   |                                     |                 |                 |          |       |         |      |        |     |      |
| 12 7   | 5 44.95         | +34 46.0        | 1.870    | 2.527 | 19.4    | 19.9 | 121 W  | 10  | 81   |                                     |                 |                 |          |       |         |      |        |     |      |
| 12 12  | 5 37.19         | +36 14.6        | 1.857    | 2.505 | 19.8    | 19.8 | 120 W  | 9   | 80   |                                     |                 |                 |          |       |         |      |        |     |      |
| 12 17  | 5 28.98         | +37 30.7        | 1.850    | 2.482 | 20.3    | 19.8 | 119 E  | 7   | 78   |                                     |                 |                 |          |       |         |      |        |     |      |
| 12 22  | 5 20.50         | +38 33.4        | 1.847    | 2.459 | 20.8    | 19.8 | 117 E  | 6   | 77   |                                     |                 |                 |          |       |         |      |        |     |      |
| 12 27  | 5 11.98         | +39 22.2        | 1.850    | 2.436 | 21.4    | 19.8 | 115 E  | 6   | 77   |                                     |                 |                 |          |       |         |      |        |     |      |
| 1 1  | 5 3.64          | +39 57.1        | 1.855    | 2.413 | 22.1    | 19.8 | 113 E  | 5   | 76   |                                     |                 |                 |          |       |         |      |        |     |      |
| 1 6  | 4 55.71         | +40 18.6        | 1.865    | 2.389 | 22.7    | 19.8 | 110 E  | 5   | 76   |                                     |                 |                 |          |       |         |      |        |     |      |
| 1 11   | 4 48.38         | +40 27.6        | 1.877    | 2.365 | 23.4    | 19.8 | 107 E  | 5   | 76   |                                     |                 |                 |          |       |         |      |        |     |      |
| 1 16   | 4 41.82         | +40 25.3        | 1.891    | 2.340 | 24.0    | 19.9 | 105 E  | 5   | 76   |                                     |                 |                 |          |       |         |      |        |     |      |
| 1 21   | 4 36.14         | +40 13.2        | 1.906    | 2.316 | 24.6    | 19.9 | 102 E  | 5   | 76   |                                     |                 |                 |          |       |         |      |        |     |      |
| <b>99942</b> Apophis                               |                 |                 |          |       |         |      |        |     |      |                                     |                 |                 |          |       |         |      |        |     |      |
| 7 25   | 5 20.93         | +28 12.3        | 0.428    | 0.747 | 117.1   | 21.1 | 41 W   | 28* | 22*  |                                     |                 |                 |          |       |         |      |        |     |      |
| 7 30   | 5 31.67         | +27 27.3        | 0.469    | 0.746 | 111.2   | 20.9 | 43 W   | 30* | 23*  |                                     |                 |                 |          |       |         |      |        |     |      |
| 8 4  | 5 44.27         | +26 44.8        | 0.512    | 0.748 | 105.8   | 20.7 | 45 W   | 32* | 25*  |                                     |                 |                 |          |       |         |      |        |     |      |
| 8 9  | 5 58.32         | +26 3.1         | 0.554    | 0.752 | 100.7   | 20.7 | 47 W   | 34* | 25*  |                                     |                 |                 |          |       |         |      |        |     |      |
| 8 14   | 6 13.46         | +25 20.3        | 0.596    | 0.759 | 96.1    | 20.6 | 48 W   | 36* | 26*  |                                     |                 |                 |          |       |         |      |        |     |      |
| 8 19   | 6 29.39         | +24 35.1        | 0.636    | 0.768 | 91.8    | 20.6 | 49 W   | 37* | 27   |                                     |                 |                 |          |       |         |      |        |     |      |

EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 21/22                              | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | 45° | -26° | 2021  | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | 45° | -26° |
|------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|-----|------|---|-----------------|-----------------|----------|-------|---------|------|--------|-----|------|
| <b>3362 Khufu (continuation)</b>   |                 |                 |          |       |         |      |        |     |      | <b>289227 2004 XY<sub>60</sub> (continuation)</b> |                 |                 |          |       |         |      |        |     |      |
| 11 12                              | 15 17.53        | -14 37.3        | 1.528    | 0.544 | 6.8     | 18.4 | 4 E    | —   | —    | 8 6   | 7 0.40          | +10 28.8        | 1.029    | 0.539 | 73.2    | 20.2 | 31 W   | 10* | 23*  |
| 11 17                              | 15 51.52        | -16 27.2        | 1.543    | 0.569 | 10.4    | 18.7 | 6 E    | —   | —    | 8 8   | 7 0.81          | +9 51.1         | 1.053    | 0.578 | 70.1    | 20.3 | 32 W   | 11* | 25*  |
| 11 22                              | 16 24.94        | -17 58.0        | 1.560    | 0.602 | 14.2    | 19.0 | 9 E    | 1*  | —    | 8 10  | 7 1.77          | +9 17.2         | 1.075    | 0.615 | 67.5    | 20.4 | 34 W   | 13* | 26*  |
| 11 27                              | 16 57.50        | -19 8.4         | 1.580    | 0.641 | 17.3    | 19.2 | 11 E   | 3*  | 3*   | 8 12  | 7 3.15          | +8 46.4         | 1.095    | 0.649 | 65.3    | 20.5 | 36 W   | 14* | 27*  |
| 12 2                               | 17 28.99        | -19 58.1        | 1.604    | 0.684 | 19.5    | 19.5 | 13 E   | 4*  | 5*   | 8 14  | 7 4.86          | +8 17.9         | 1.113    | 0.682 | 63.5    | 20.6 | 37 W   | 15* | 29*  |
| 12 7                               | 17 59.24        | -20 28.0        | 1.631    | 0.728 | 20.9    | 19.7 | 15 E   | 5*  | 6*   | 8 19  | 7 10.15         | +7 14.3         | 1.150    | 0.757 | 60.0    | 20.7 | 40 W   | 18* | 31*  |
| 12 12                              | 18 28.15        | -20 39.6        | 1.661    | 0.774 | 21.7    | 19.9 | 17 E   | 7*  | 8*   | 8 24  | 7 16.41         | +6 17.6         | 1.175    | 0.824 | 57.6    | 20.9 | 43 W   | 21* | 34*  |
| 12 17                              | 18 55.63        | -20 34.9        | 1.695    | 0.820 | 22.0    | 20.1 | 18 E   | 8*  | 9*   | 8 29  | 7 23.26         | +5 24.8         | 1.191    | 0.882 | 55.9    | 21.0 | 46 W   | 23* | 36*  |
| 12 22                              | 19 21.69        | -20 16.0        | 1.732    | 0.865 | 21.9    | 20.2 | 19 E   | 8*  | 9*   | 9 3   | 7 30.46         | +4 33.7         | 1.198    | 0.933 | 54.8    | 21.1 | 49 W   | 26* | 38*  |
| 12 27                              | 19 46.34        | -19 45.1        | 1.771    | 0.909 | 21.5    | 20.4 | 20 E   | 9*  | 10*  | 9 8   | 7 37.89         | +3 42.9         | 1.197    | 0.978 | 54.1    | 21.2 | 52 W   | 28* | 40*  |
| 1 1                                | 20 9.63         | -19 4.1         | 1.812    | 0.952 | 20.9    | 20.5 | 20 E   | 10* | 10*  | 9 13  | 7 45.47         | +2 51.7         | 1.188    | 1.017 | 53.6    | 21.3 | 54 W   | 31* | 42*  |
| 1 6                                | 20 31.66        | -18 15.0        | 1.854    | 0.993 | 20.2    | 20.6 | 20 E   | 10* | 10*  | 9 18  | 7 53.16         | +1 59.2         | 1.173    | 1.051 | 53.4    | 21.3 | 57 W   | 33* | 43*  |
| 1 11                               | 20 52.48        | -17 19.4        | 1.897    | 1.032 | 19.3    | 20.7 | 20 E   | 10* | 9*   | 9 23  | 8 0.94          | +1 4.8          | 1.151    | 1.079 | 53.4    | 21.3 | 60 W   | 34* | 45*  |
| 1 16                               | 21 12.22        | -16 18.5        | 1.940    | 1.070 | 18.4    | 20.8 | 20 E   | 10* | 9*   | 9 28  | 8 8.82          | +0 8.0          | 1.123    | 1.103 | 53.5    | 21.3 | 62 W   | 36* | 47*  |
| 1 21                               | 21 30.95        | -15 13.7        | 1.983    | 1.106 | 17.3    | 20.9 | 20 E   | 10* | 9*   | 10 3  | 8 16.80         | -0 51.9         | 1.090    | 1.121 | 53.8    | 21.3 | 65 W   | 37* | 49*  |
| <b>285838 2001 FA<sub>1</sub></b>  |                 |                 |          |       |         |      |        |     |      | <b>523796 2016 LE<sub>51</sub></b>                |                 |                 |          |       |         |      |        |     |      |
| 7 25                               | 6 28.47         | +2 10.8         | 2.175    | 1.417 | 22.2    | 21.4 | 32 W   | —   | 26*  | 7 25  | 6 42.07         | +11 35.9        | 1.065    | 0.439 | 71.6    | 20.9 | 24 W   | 3*  | 18*  |
| 8 4                                | 7 1.92          | +1 24.9         | 2.121    | 1.374 | 23.2    | 21.3 | 32 W   | 2*  | 26*  | 7 30  | 7 17.45         | +14 54.3        | 1.160    | 0.392 | 59.0    | 20.4 | 19 W   | 4*  | 12*  |
| 8 14                               | 7 36.09         | +0 27.0         | 2.076    | 1.335 | 24.0    | 21.2 | 32 W   | 4*  | 26*  | 8 4   | 7 55.44         | +17 46.3        | 1.254    | 0.371 | 43.0    | 20.0 | 14 W   | 4*  | 7*   |
| 8 24                               | 8 10.77         | +0 40.5         | 2.038    | 1.300 | 24.5    | 21.2 | 32 W   | 6*  | 26*  | 8 9   | 8 35.41         | +19 48.9        | 1.338    | 0.385 | 27.8    | 19.8 | 10 W   | 3*  | 1*   |
| 9 3                                | 8 45.78         | +1 54.7         | 2.008    | 1.269 | 24.8    | 21.1 | 32 W   | 8*  | 25*  | 8 14  | 9 15.26         | +20 48.7        | 1.410    | 0.429 | 18.7    | 19.9 | 8 W    | 2*  | —    |
| 9 13                               | 9 20.95         | +3 12.2         | 1.985    | 1.243 | 25.0    | 21.0 | 31 W   | 10* | 25*  | 8 16  | 9 30.69         | +20 55.5        | 1.435    | 0.452 | 17.2    | 20.0 | 8 W    | 1*  | —    |
| 9 23                               | 9 56.12         | +4 29.5         | 1.966    | 1.224 | 25.1    | 21.0 | 31 W   | 12* | 24*  | 8 18  | 9 45.69         | +20 53.7        | 1.460    | 0.477 | 16.6    | 20.1 | 8 W    | —   | —    |
| 10 3                               | 10 31.20        | +5 43.3         | 1.952    | 1.211 | 25.2    | 20.9 | 31 W   | 14* | 23*  | 8 20  | 10 0.22         | +20 44.2        | 1.483    | 0.503 | 16.8    | 20.3 | 8 E    | 1*  | —    |
| 10 13                              | 11 6.10         | +6 50.7         | 1.940    | 1.205 | 25.5    | 20.9 | 31 W   | 16* | 22*  | 8 22  | 10 14.23        | +20 28.0        | 1.506    | 0.531 | 17.2    | 20.4 | 9 E    | 2*  | —    |
| 10 23                              | 11 40.75        | +7 48.5         | 1.930    | 1.207 | 25.9    | 20.9 | 32 W   | 18* | 21*  | 8 24  | 10 27.73        | +20 6.0         | 1.529    | 0.559 | 17.8    | 20.6 | 10 E   | 3*  | —    |
| 11 2                               | 12 15.12        | +8 34.7         | 1.919    | 1.216 | 26.5    | 20.9 | 33 W   | 20* | 21*  | 8 26  | 10 40.70        | +19 39.0        | 1.552    | 0.588 | 18.4    | 20.7 | 11 E   | 4*  | —    |
| 11 12                              | 12 49.13        | +9 6.9          | 1.906    | 1.231 | 27.3    | 21.0 | 35 W   | 22* | 21*  | 8 28  | 10 53.15        | +19 7.9         | 1.574    | 0.617 | 18.9    | 20.9 | 11 E   | 5*  | —    |
| 11 22                              | 13 22.70        | +9 23.0         | 1.893    | 1.254 | 28.3    | 21.0 | 37 W   | 24* | 21*  | 8 30  | 11 5.11         | +18 33.3        | 1.597    | 0.646 | 19.3    | 21.0 | 12 E   | 6*  | —    |
| 12 2                               | 13 55.75        | +9 21.7         | 1.877    | 1.282 | 29.3    | 21.1 | 40 W   | 26* | 22*  | 9 1   | 11 16.58        | +17 55.9        | 1.619    | 0.675 | 19.6    | 21.2 | 13 E   | 7*  | —    |
| 12 12                              | 14 28.14        | +9 1.2          | 1.860    | 1.315 | 30.4    | 21.2 | 42 W   | 28* | 24*  | 9 3   | 11 27.60        | +17 16.2        | 1.642    | 0.703 | 19.8    | 21.3 | 14 E   | 8*  | —    |
| 12 22                              | 14 59.69        | +8 20.7         | 1.841    | 1.352 | 31.4    | 21.2 | 46 W   | 31* | 26*  | 9 8   | 11 53.28        | +15 29.9        | 1.700    | 0.774 | 19.9    | 21.6 | 15 E   | 9*  | —    |
| 1 1                                | 15 30.25        | +7 19.6         | 1.820    | 1.393 | 32.3    | 21.3 | 49 W   | 33* | 29*  | 9 13  | 12 16.60        | +13 38.1        | 1.758    | 0.841 | 19.6    | 21.8 | 16 E   | 10* | 1*   |
| 1 11                               | 15 59.62        | +5 57.7         | 1.798    | 1.436 | 33.1    | 21.3 | 53 W   | 35* | 33*  | 9 18  | 12 37.90        | +11 44.7        | 1.818    | 0.906 | 18.9    | 22.0 | 17 E   | 11* | 2*   |
| 1 21                               | 16 27.59        | +4 15.6         | 1.775    | 1.481 | 33.7    | 21.4 | 57 W   | 37* | 36*  | 9 23  | 12 57.49        | +9 52.4         | 1.878    | 0.968 | 18.1    | 22.2 | 17 E   | 11* | 3*   |
| <b>337866 2001 WL<sub>15</sub></b> |                 |                 |          |       |         |      |        |     |      | <b>523661 2012 LF<sub>11</sub></b>                |                 |                 |          |       |         |      |        |     |      |
| 7 25                               | 6 56.66         | +21 6.7         | 2.041    | 1.129 | 16.9    | 21.4 | 19 W   | 7*  | 10*  | 7 25  | 7 37.67         | +18 26.3        | 1.459    | 0.486 | 19.9    | 21.1 | 9 W    | —   | 3*   |
| 8 4                                | 7 39.54         | +20 24.7        | 2.006    | 1.091 | 17.0    | 21.3 | 18 W   | 8*  | 8*   | 7 30  | 8 14.97         | +16 15.3        | 1.467    | 0.467 | 12.4    | 20.7 | 6 W    | —   | —    |
| 8 14                               | 8 22.89         | +19 1.5         | 1.982    | 1.062 | 16.8    | 21.2 | 18 W   | 9*  | 7*   | 8 4   | 8 52.02         | +13 47.7        | 1.472    | 0.464 | 8.0     | 20.5 | 4 W    | —   | —    |
| 8 24                               | 9 5.96          | +16 59.3        | 1.972    | 1.046 | 16.3    | 21.1 | 17 W   | 9*  | 5*   | 8 9   | 9 28.24         | +11 10.2        | 1.475    | 0.477 | 12.2    | 20.8 | 6 E    | —   | —    |
| 9 3                                | 9 48.09         | +14 23.8        | 1.973    | 1.042 | 15.6    | 21.1 | 16 W   | 9*  | 4*   | 8 14  | 10 3.19         | +8 29.3         | 1.477    | 0.505 | 18.9    | 21.1 | 9 E    | —   | —    |
| 9 13                               | 10 28.81        | +11 23.0        | 1.985    | 1.051 | 14.8    | 21.1 | 16 W   | 9*  | 3*   | 8 19  | 10 36.60        | +5 50.0         | 1.480    | 0.543 | 24.6    | 21.5 | 13 E   | —   | 7*   |
| 9 23                               | 11 7.84         | +8 6.2          | 2.008    | 1.072 | 14.2    | 21.2 | 15 W   | 9*  | 2*   | <b>387505 1998 KN<sub>3</sub></b>                 |                 |                 |          |       |         |      |        |     |      |
| 10 3                               | 11 45.10        | +4 42.6         | 2.038    | 1.105 | 13.8    | 21.3 | 15 W   | 9*  | 2*   | 7 25  | 7 39.35         | +21 53.0        | 1.158    | 0.223 | 45.9    | 17.2 | 9 W    | 1*  | 1*   |
| 10 13                              | 12 20.61        | +1 20.4         | 2.075    | 1.146 | 13.6    | 21.4 | 16 W   | 9*  | 2*   | 7 26  | 7 47.24         | +21 32.2        | 1.199    | 0.241 | 36.6    | 17.2 | 8 W    | 1*  | —    |
| <b>289227 2004 XY<sub>60</sub></b> |                 |                 |          |       |         |      |        |     |      | 7 27  | 7 55.18         | +21 9.4         | 1.236    | 0.262 | 29.1    | 17.2 | 7 W    | —   | —    |
| 7 25                               | 7 27.04         | +17 3.4         | 0.862    | 0.251 | 121.5   | 20.5 | 12 W   | —   | 6*   | 7 28  | 8 3.01          | +20 45.3        | 1.272    | 0.285 | 23.0    | 17.3 | 6 W    | —   | —    |
| 7 26                               | 7 21.06         | +16 12.4        | 0.873    | 0.279 | 113.1   | 20.2 | 15 W   | 1*  | 8*   | 7 29  | 8 10.65         | +20 20.2        | 1.304    | 0.309 | 18.1    | 17.4 | 5 W    | —   | —    |
| 7 27                               | 7 16.19         | +15 25.9        | 0.886    | 0.306 | 106.2   | 20.0 | 17 W   | 2*  | 10*  | 7 30  | 8 18.05         | +19 54.5        | 1.335    | 0.333 | 14.1    | 17.4 | 5 W    | —   | —    |
| 7 28                               | 7 12.25         | +14 43.5        | 0.901    | 0.333 | 100.4   | 19.9 | 19 W   | 3*  | 12*  | 7 31  | 8 25.20         | +19 28.4        | 1.365    | 0.358 | 10.8    | 17.5 | 4 W    | —   | —    |
| 7 29                               | 7 9.09          | +14 4.8         | 0.916    | 0.359 | 95.5    | 19.9 | 21 W   | 4*  | 14*  | 8 1   | 8 32.08         | +19 2.1         | 1.393    | 0.383 | 8.2     | 17.6 | 3 W    | —   | —    |
| 7 30                               | 7 6.58          | +13 29.6        | 0.931    | 0.384 | 91.3    | 19.9 | 22 W   | 5*  | 15*  | 8 2   | 8 38.71         | +18 35.7        | 1.420    | 0.408 | 6.0     | 17.7 | 2 W    | —   | —    |
| 7 31                               | 7 4.62          | +12 57.3        | 0.946    | 0.408 | 87.7    | 19.9 | 24 W   | 6*  | 17*  | 8 3   | 8 45.09         | +18 9.3         | 1.445    | 0.432 | 4.2     | 17.8 | 2 W    | —   | —    |
| 8 1                                | 7 3.12          | +12 27.7        | 0.961    | 0.432 | 84.5    | 20.0 | 25 W   | 6*  | 18*  | 8 4   | 8 51.24         | +17 43.0        | 1.471    | 0.457 | 2.7     | 17.8 | 1 W    | —   | —    |
| 8 2                                | 7 2.01          | +12 0.3         | 0.975    | 0.455 | 81.7    | 20.0 | 26 W   | 7*  | 19*  | 8 9   | 9 18.88         | +15 34.3        | 1.587    | 0.574 | 1.7     | 18.4 | 1 E    | —   | —    |
| 8 3                                | 7 1.22          | +11 35.0        | 0.990    | 0.477 | 79.2    | 20.0 | 27 W   | 8*  | 20*  | 8 14  | 9 42.35         | +13 32.6        | 1.694    | 0.683 | 3.3     | 19.0 | 2 E    | —   | —    |
| 8 4                                | 7 0.72          | +11 11.4        | 1.003    | 0.498 | 77.0    | 20.1 | 29 W   | 9*  | 21*  | 8 19  | 10 2.71         | +11 38.6        | 1.794    | 0.784 | 3.5     | 19.5 | 3 E    | —   | —    |
| <b>387505 1998 KN<sub>3</sub></b>  |                 |                 |          |       |         |      |        |     |      | 8 24  | 10 20.68        | +9 52.1         | 1.888    | 0.880 | 3.1     | 19.8 | 3 E    | —   | —    |
| <b>387505 1998 KN<sub>3</sub></b>  |                 |                 |          |       |         |      |        |     |      | 8 29  | 10 36.80        | +8 12.7         | 1.978    | 0.969 | 2.3     | 20.1 | 2 E    | —   | —    |
| <b>387505 1998 KN<sub>3</sub></b>  |                 |                 |          |       |         |      |        |     |      | 9 3   | 10 51.44        | +6 39.5         | 2.062    | 1.054 | 1.3     | 20.3 | 1 E    | —   | —    |
| <b>387505 1998 KN<sub>3</sub></b>  |                 |                 |          |       |         |      |        |     |      | 9 8   | 11 4.87         | +5 12.0         | 2.142    | 1.134 | 0.6     | 20.4 | 1 W    | —   | —    |
| <b>387505 1998 KN<sub>3</sub></b>  |                 |                 |          |       |         |      |        |     |      | 9 13  | 11 17.31        | +3 49.6         | 2.216    | 1.211 | 1.3     | 20.7 | 2 W    | —   | —    |
| <b>387505 1998 KN<sub>3</sub></b>  |                 |                 |          |       |         |      |        |     |      | 9 18  | 11 28.92        | +2 31.8         | 2.286    | 1.284 | 2.5     | 21.0 | 3 W    | —   | —    |
| <b>387505 1998 KN<sub>3</sub></b>  |                 |                 |          |       |         |      |        |     |      | 9 23  | 11 39.83        | +1 18.2         | 2.350    | 1.354 | 3.8     | 21.3 | 5 W    | —   | —    |
| <b>387505 1998 KN<sub>3</sub></b>  |                 |                 |          |       |         |      |        |     |      | 9 28  | 11 50.13        | +0 8.2          | 2.409    | 1.420 | 5.0     | 21.5 | 7 W    | —   | —    |