

EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 2020                                | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | $45^\circ$ | $-26^\circ$ | 2020                                | $\alpha_{2000}$                     | $\delta_{2000}$ | $\Delta$ | $r$      | $\beta$ | $V$   | $\psi$ | $45^\circ$ | $-26^\circ$ |    |    |
|-------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|------------|-------------|-------------------------------------|-------------------------------------|-----------------|----------|----------|---------|-------|--------|------------|-------------|----|----|
| <b>363205 2001 US<sub>151</sub></b> |                 |                 |          |       |         |      |        |            |             | <b>41429 2000 GE<sub>2</sub></b>    |                                     |                 |          |          |         |       |        |            |             |    |    |
| 2                                   | 11              | 10 55.09        | +1 6.8   | 2.556 | 3.482   | 6.6  | 22.3   | 156 W      | 46          | 63                                  | 2                                   | 11              | 11 9.39  | +7 0.5   | 0.894   | 1.839 | 12.7   | 22.3       | 156 W       | 52 | 57 |
| 2                                   | 21              | 10 47.29        | +1 52.9  | 2.521 | 3.494   | 3.4  | 22.2   | 168 W      | 47          | 62                                  | 2                                   | 21              | 10 54.86 | +8 22.3  | 0.792   | 1.774 | 5.7    | 21.7       | 170 W       | 53 | 56 |
| 3                                   | 2               | 10 38.97        | +2 46.0  | 2.516 | 3.504   | 1.6  | 22.0   | 174 E      | 48          | 61                                  | 3                                   | 2               | 10 35.14 | +10 7.0  | 0.716   | 1.706 | 3.0    | 21.2       | 175 E       | 55 | 54 |
| 3                                   | 12              | 10 30.87        | +3 41.4  | 2.543 | 3.514   | 4.1  | 22.2   | 165 E      | 49          | 60                                  | 3                                   | 12              | 10 12.07 | +11 59.6 | 0.667   | 1.634 | 12.6   | 21.4       | 159 E       | 57 | 52 |
| 3                                   | 22              | 10 23.65        | +4 34.7  | 2.600 | 3.523   | 7.1  | 22.4   | 154 E      | 50          | 59                                  | 3                                   | 22              | 9 48.75  | +13 40.5 | 0.642   | 1.558 | 22.5   | 21.6       | 143 E       | 59 | 50 |
| <b>409829 2006 OX<sub>21</sub></b>  |                 |                 |          |       |         |      |        |            |             | <b>282141 2001 QQ<sub>170</sub></b> |                                     |                 |          |          |         |       |        |            |             |    |    |
| 2                                   | 11              | 10 55.89        | +15 32.8 | 2.300 | 3.247   | 5.8  | 22.3   | 160 W      | 61          | 48                                  | 2                                   | 11              | 11 9.44  | +4 46.5  | 1.837   | 2.762 | 8.7    | 22.4       | 155 W       | 50 | 59 |
| 2                                   | 16              | 10 51.70        | +16 3.8  | 2.285 | 3.252   | 4.3  | 22.2   | 166 W      | 61          | 48                                  | 2                                   | 21              | 11 0.82  | +5 44.3  | 1.771   | 2.745 | 4.5    | 22.1       | 167 W       | 51 | 58 |
| 2                                   | 21              | 10 47.25        | +16 34.3 | 2.278 | 3.256   | 3.0  | 22.2   | 170 W      | 62          | 47                                  | 3                                   | 2               | 10 50.91 | +6 50.4  | 1.735   | 2.727 | 0.2    | 21.7       | 180 E       | 52 | 57 |
| 2                                   | 26              | 10 42.66        | +17 3.4  | 2.278 | 3.261   | 2.5  | 22.1   | 172 W      | 62          | 47                                  | 3                                   | 12              | 10 40.73 | +7 57.5  | 1.729   | 2.707 | 4.7    | 22.1       | 167 E       | 53 | 56 |
| 3                                   | 2               | 10 38.03        | +17 30.6 | 2.286 | 3.265   | 3.3  | 22.2   | 169 E      | 63          | 46                                  | 3                                   | 22              | 10 31.38 | +8 58.9  | 1.752   | 2.687 | 9.1    | 22.3       | 155 E       | 54 | 55 |
| 3                                   | 7               | 10 33.48        | +17 55.0 | 2.302 | 3.268   | 4.7  | 22.3   | 164 E      | 63          | 46                                  | <b>448142 2008 SG<sub>137</sub></b> |                 |          |          |         |       |        |            |             |    |    |
| 3                                   | 12              | 10 29.11        | +18 16.4 | 2.325 | 3.272   | 6.2  | 22.4   | 159 E      | 63          | 46                                  | 2                                   | 11              | 11 11.73 | +12 17.9 | 1.917   | 2.849 | 8.0    | 22.3       | 156 W       | 57 | 52 |
| 3                                   | 17              | 10 25.01        | +18 34.3 | 2.355 | 3.275   | 7.8  | 22.5   | 153 E      | 64          | 45                                  | 2                                   | 16              | 11 7.22  | +12 44.2 | 1.897   | 2.854 | 6.0    | 22.2       | 162 W       | 58 | 51 |
| <b>453235 2008 PU<sub>3</sub></b>   |                 |                 |          |       |         |      |        |            |             | 2                                   | 21                                  | 11 2.34         | +13 10.9 | 1.884    | 2.859   | 4.1   | 22.1   | 168 W      | 58          | 51 |    |
| 2                                   | 11              | 10 58.82        | +2 36.2  | 1.857 | 2.774   | 9.2  | 22.8   | 153 W      | 42          | 67                                  | 2                                   | 26              | 10 57.21 | +13 36.9 | 1.879   | 2.863 | 2.6    | 22.0       | 173 W       | 59 | 50 |
| 2                                   | 21              | 10 49.78        | +1 53.5  | 1.813 | 2.779   | 5.5  | 22.6   | 164 W      | 43          | 66                                  | 3                                   | 2               | 10 51.95 | +14 1.6  | 1.881   | 2.868 | 2.3    | 22.0       | 173 E       | 59 | 50 |
| 3                                   | 2               | 10 39.89        | +0 56.9  | 1.799 | 2.782   | 3.1  | 22.4   | 171 E      | 44          | 65                                  | 3                                   | 7               | 10 46.72 | +14 24.1 | 1.891   | 2.872 | 3.7    | 22.1       | 169 E       | 59 | 50 |
| 3                                   | 12              | 10 30.20        | +0 7.4   | 1.814 | 2.785   | 5.3  | 22.6   | 165 E      | 45          | 64                                  | 3                                   | 12              | 10 41.64 | +14 43.9 | 1.909   | 2.876 | 5.6    | 22.2       | 164 E       | 60 | 49 |
| 3                                   | 22              | 10 21.71        | +1 12.7  | 1.857 | 2.787   | 9.0  | 22.8   | 154 E      | 46          | 63                                  | 3                                   | 17              | 10 36.84 | +15 0.3  | 1.933   | 2.880 | 7.5    | 22.4       | 158 E       | 60 | 49 |
| <b>469393 2001 TZ<sub>90</sub></b>  |                 |                 |          |       |         |      |        |            |             | 3                                   | 22                                  | 10 32.42        | +15 13.2 | 1.965    | 2.883   | 9.3   | 22.5   | 152 E      | 60          | 49 |    |
| 2                                   | 11              | 11 0.81         | +8 2.4   | 2.645 | 3.528   | 8.2  | 22.6   | 149 W      | 37          | 72                                  | <b>455170 1999 ND<sub>5</sub></b>   |                 |          |          |         |       |        |            |             |    |    |
| 2                                   | 21              | 10 53.68        | +7 24.8  | 2.550 | 3.492   | 5.8  | 22.4   | 159 W      | 38          | 71                                  | 2                                   | 11              | 11 13.05 | +13 18.1 | 1.994   | 2.924 | 7.8    | 22.4       | 156 W       | 58 | 51 |
| 3                                   | 2               | 10 45.64        | +6 31.4  | 2.483 | 3.454   | 3.9  | 22.2   | 166 E      | 38          | 71                                  | 2                                   | 16              | 11 8.74  | +13 56.7 | 1.970   | 2.925 | 6.0    | 22.3       | 162 W       | 59 | 50 |
| 3                                   | 12              | 10 37.39        | +5 25.5  | 2.448 | 3.415   | 4.5  | 22.2   | 164 E      | 40          | 69                                  | 2                                   | 21              | 11 4.04  | +14 35.6 | 1.954   | 2.926 | 4.3    | 22.2       | 167 W       | 60 | 49 |
| 3                                   | 22              | 10 29.64        | +4 11.9  | 2.442 | 3.376   | 7.0  | 22.3   | 156 E      | 41          | 68                                  | 2                                   | 26              | 10 59.06 | +15 14.0 | 1.945   | 2.927 | 3.0    | 22.1       | 171 W       | 60 | 49 |
| <b>523815 2009 HW<sub>44</sub></b>  |                 |                 |          |       |         |      |        |            |             | 3                                   | 2                                   | 10 53.93        | +15 50.8 | 1.944    | 2.927   | 2.9   | 22.1   | 171 W      | 61          | 48 |    |
| 2                                   | 11              | 11 2.61         | +65 11.1 | 3.220 | 3.895   | 11.7 | 23.7   | 127 W      | 70          | —                                   | 3                                   | 7               | 10 48.78 | +16 25.1 | 1.950   | 2.927 | 4.2    | 22.2       | 168 E       | 61 | 48 |
| 2                                   | 16              | 10 53.35        | +65 32.7 | 3.243 | 3.909   | 11.8 | 23.7   | 126 W      | 69          | —                                   | 3                                   | 12              | 10 43.74 | +16 56.1 | 1.965   | 2.927 | 5.9    | 22.3       | 162 E       | 62 | 47 |
| 2                                   | 21              | 10 43.71        | +65 45.8 | 3.272 | 3.923   | 11.9 | 23.8   | 125 W      | 69          | —                                   | 3                                   | 17              | 10 38.94 | +17 23.3 | 1.986   | 2.927 | 7.7    | 22.4       | 157 E       | 62 | 47 |
| 2                                   | 26              | 10 33.98        | +65 50.0 | 3.305 | 3.936   | 12.1 | 23.8   | 123 W      | 69          | —                                   | 3                                   | 22              | 10 34.48 | +17 46.2 | 2.014   | 2.926 | 9.5    | 22.5       | 151 E       | 63 | 46 |
| 3                                   | 2               | 10 24.46        | +65 45.5 | 3.343 | 3.949   | 12.4 | 23.8   | 121 E      | 69          | —                                   | <b>290070 2005 QG<sub>71</sub></b>  |                 |          |          |         |       |        |            |             |    |    |
| 3                                   | 7               | 10 15.41        | +65 32.6 | 3.385 | 3.962   | 12.7 | 23.9   | 119 E      | 69          | —                                   | 2                                   | 11              | 11 14.11 | +8 36.1  | 1.961   | 2.886 | 8.3    | 21.6       | 155 W       | 54 | 55 |
| 3                                   | 12              | 10 7.07         | +65 12.0 | 3.431 | 3.974   | 12.9 | 23.9   | 116 E      | 70          | —                                   | 2                                   | 21              | 11 4.74  | +9 21.3  | 1.907   | 2.881 | 4.3    | 21.4       | 167 W       | 54 | 55 |
| 3                                   | 17              | 9 59.59         | +64 44.5 | 3.481 | 3.986   | 13.2 | 24.0   | 114 E      | 70          | —                                   | 3                                   | 2               | 10 54.16 | +10 9.0  | 1.884   | 2.874 | 1.0    | 21.1       | 177 W       | 55 | 54 |
| <b>506297 2017 MS<sub>6</sub></b>   |                 |                 |          |       |         |      |        |            |             | 3                                   | 12                                  | 10 43.42        | +10 53.0 | 1.891    | 2.866   | 4.7   | 21.4   | 166 E      | 56          | 53 |    |
| 2                                   | 11              | 11 2.83         | +15 5.1  | 2.698 | 3.636   | 5.6  | 23.0   | 159 W      | 60          | 49                                  | 3                                   | 22              | 10 33.56 | +11 28.3 | 1.927   | 2.857 | 8.8    | 21.6       | 154 E       | 56 | 53 |
| 2                                   | 21              | 10 55.17        | +16 7.8  | 2.647 | 3.622   | 3.0  | 22.8   | 169 W      | 61          | 48                                  | 4                                   | 1               | 10 25.46 | +11 51.3 | 1.990   | 2.847 | 12.4   | 21.8       | 142 E       | 57 | 52 |
| 3                                   | 2               | 10 46.73        | +17 7.8  | 2.627 | 3.607   | 2.7  | 22.8   | 170 E      | 62          | 47                                  | <b>212359 2006 EV<sub>52</sub></b>  |                 |          |          |         |       |        |            |             |    |    |
| 3                                   | 12              | 10 38.25        | +18 0.0  | 2.638 | 3.591   | 5.2  | 22.9   | 161 E      | 63          | 46                                  | 2                                   | 11              | 11 14.66 | +1 47.7  | 2.502   | 3.407 | 7.7    | 21.8       | 152 W       | 47 | 62 |
| 3                                   | 22              | 10 30.44        | +18 40.7 | 2.678 | 3.574   | 8.1  | 23.1   | 150 E      | 64          | 45                                  | 2                                   | 21              | 11 5.48  | +3 2.2   | 2.430   | 3.395 | 4.3    | 21.6       | 165 W       | 48 | 61 |
| <b>302132 2001 QD<sub>243</sub></b> |                 |                 |          |       |         |      |        |            |             | 3                                   | 2                                   | 10 55.22        | +4 25.8  | 2.391    | 3.381   | 0.8   | 21.3   | 177 W      | 49          | 60 |    |
| 2                                   | 11              | 11 5.43         | +3 28.4  | 1.971 | 2.897   | 8.2  | 22.9   | 155 W      | 48          | 61                                  | 3                                   | 12              | 10 44.70 | +5 52.4  | 2.386   | 3.365 | 3.3    | 21.4       | 169 E       | 51 | 58 |
| 2                                   | 21              | 10 57.05        | +4 36.5  | 1.912 | 2.886   | 4.2  | 22.6   | 168 W      | 50          | 59                                  | 3                                   | 22              | 10 34.75 | +7 15.8  | 2.413   | 3.348 | 7.0    | 21.7       | 156 E       | 52 | 57 |
| 3                                   | 2               | 10 47.59        | +5 53.3  | 1.884 | 2.875   | 0.6  | 22.3   | 178 E      | 51          | 58                                  | 4                                   | 1               | 10 26.13 | +8 30.5  | 2.470   | 3.328 | 10.2   | 21.8       | 144 E       | 54 | 55 |
| 3                                   | 12              | 10 38.04        | +7 11.7  | 1.886 | 2.862   | 4.6  | 22.6   | 167 E      | 52          | 57                                  | <b>282044 1998 SF<sub>107</sub></b> |                 |          |          |         |       |        |            |             |    |    |
| 3                                   | 22              | 10 29.36        | +8 24.8  | 1.917 | 2.848   | 8.7  | 22.8   | 154 E      | 53          | 56                                  | 2                                   | 11              | 11 15.01 | +1 43.4  | 1.797   | 2.700 | 10.4   | 21.6       | 151 W       | 43 | 66 |
| <b>391814 2008 SB<sub>4</sub></b>   |                 |                 |          |       |         |      |        |            |             | 2                                   | 21                                  | 11 6.77         | +0 39.5  | 1.756    | 2.716   | 6.3   | 21.4   | 163 W      | 44          | 65 |    |
| 2                                   | 11              | 11 5.95         | +10 47.1 | 1.708 | 2.647   | 8.2  | 22.2   | 158 W      | 56          | 53                                  | 3                                   | 2               | 10 57.42 | +0 37.9  | 1.743   | 2.730 | 2.4    | 21.2       | 173 W       | 46 | 63 |
| 2                                   | 16              | 11 1.58         | +11 17.5 | 1.678 | 2.640   | 6.1  | 22.1   | 164 W      | 56          | 53                                  | 3                                   | 12              | 10 48.02 | +2 1.4   | 1.760   | 2.743 | 3.7    | 21.3       | 170 E       | 47 | 62 |
| 2                                   | 21              | 10 56.76        | +11 49.1 | 1.655 | 2.634   | 3.9  | 22.0   | 170 W      | 57          | 52                                  | 3                                   | 22              | 10 39.56 | +3 23.1  | 1.806   | 2.756 | 7.7    | 21.5       | 158 E       | 48 | 61 |
| 2                                   | 26              | 10 51.62        | +12 21.0 | 1.640 | 2.627   | 2.1  | 21.8   | 174 W      | 57          | 52                                  | 4                                   | 1               | 10 32.89 | +4 36.0  | 1.879   | 2.767 | 11.5   | 21.8       | 146 E       | 50 | 59 |
| 3                                   | 2               | 10 46.31        | +12 52.1 | 1.632 | 2.620   | 2.2  | 21.8   | 174 E      | 58          | 51                                  | <b>452415 2002 TL<sub>181</sub></b> |                 |          |          |         |       |        |            |             |    |    |
| 3                                   | 7               | 10 40.98        | +13 21.4 | 1.631 | 2.612   | 4.1  | 21.9   | 169 E      | 58          | 51                                  | 2                                   | 11              | 11 16.97 | +0 48.8  | 1.767   | 2.676 | 10.2   | 22.2       | 151 W       | 46 | 63 |
| 3                                   | 12              | 10 35.78        | +13 48.2 | 1.638 | 2.605   | 6.3  | 22.0   | 163 E      | 59          | 50                                  | 2                                   | 21              | 11 8.53  | +1 40.8  | 1.711   | 2.675 | 6.0    | 22.0       | 164 W       | 47 | 62 |
| 3                                   | 17              | 10 30.86        | +14 11.6 | 1.651 | 2.597   | 8.6  | 22.1   | 157 E      | 59          | 50                                  | 3                                   | 2               | 10 58.75 | +2 44.7  | 1.684   | 2.673 | 1.8    | 21.7       | 175 W       | 48 | 61 |
| 3                                   | 22              | 10 26.35        | +14 31.3 | 1.671 | 2.589   | 10.7 | 22.3   | 151 E      | 60          | 49                                  | 3                                   | 12              | 10 48.71 | +3 53.8  | 1.686   | 2.670 | 3.7    | 21.8       | 170 E       | 49 | 60 |
| 3                                   | 27              | 10 22.35        | +14 46.8 | 1.698 | 2.581   | 12.7 | 22.4   | 145 E      | 60          | 49                                  | 3                                   | 22              | 10 39.49 | +5 0.7   | 1.717   | 2.666 | 8.1    | 22.1       | 158 E       | 50 | 59 |
| <b>430439 2000 LF<sub>6</sub></b>   |                 |                 |          |       |         |      |        |            |             | 4                                   | 1                                   | 10 32.04        | +5 58.9  | 1.774    | 2.661   | 12.2  | 22.3   | 146 E      | 51          | 58 |    |
| 2                                   | 11              | 11 9.08         | +34 32.2 | 1.012 | 1.934   | 14.4 | 22.1   | 151 W      | 80          | 29                                  | <b>387514 1999 RM<sub>190</sub></b> |                 |          |          |         |       |        |            |             |    |    |
| 2                                   | 16              | 11 6.29         | +36 9.5  | 0.970 | 1.897   | 14.4 | 21.9   | 152 W      | 81          | 28                                  | 2                                   | 11              | 11 17.68 | +7 10.3  | 1.725   | 2.647 | 9.5    | 21.9       | 154 W       | 52 | 57 |
| 2                                   | 21              | 11 2.53         | +37 45.8 | 0.933 | 1.861   | 14.9 | 21.8   | 151 W      | 83          | 26                                  | 2                                   | 21              | 11 8.95  | +8 10.5  | 1.670   | 2.640 | 5.1    | 21.6       | 166 W       | 53 | 56 |
| 2                                   | 26              | 10 57.86        | +39 18.1 | 0.901 | 1.824   | 16.1 | 21.8   | 149 W      | 84          | 25                                  | 3                                   | 2               | 10 58.79 | +9 16.1  | 1.643   | 2.633 | 1.0    | 21.3       | 177 W       | 54 | 55 |
| 3                                   | 2               | 10 52.44        | +40 43.2 | 0.875 | 1.787   | 17.8 | 21.7   | 146 W      | 86          | 23                                  | 3                                   | 12              | 10 48.30 | +10 19.4 | 1.645   | 2.625 | 4.6    | 21.6       | 168 E       | 55 | 54 |
| 3                                   | 7               |                 |          |       |         |      |        |            |             |                                     |                                     |                 |          |          |         |       |        |            |             |    |    |

EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 2020                               | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | $45^\circ$ | $-26^\circ$ | 2020                                | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$      | $\beta$ | $V$   | $\psi$ | $45^\circ$ | $-26^\circ$ |    |    |
|------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|------------|-------------|-------------------------------------|-----------------|-----------------|----------|----------|---------|-------|--------|------------|-------------|----|----|
| <b>401146 2011 VD<sub>9</sub></b>  |                 |                 |          |       |         |      |        |            |             | <b>190274 3117 P-L</b>              |                 |                 |          |          |         |       |        |            |             |    |    |
| 2                                  | 11              | 11 19.23        | -26 49.3 | 2.185 | 2.936   | 14.5 | 21.6   | 132 W      | 18          | 89                                  | 2               | 11              | 11 26.93 | -3 25.4  | 1.820   | 2.702 | 11.4   | 21.7       | 147 W       | 42 | 67 |
| 2                                  | 21              | 11 11.35        | -26 33.3 | 2.121 | 2.948   | 12.4 | 21.4   | 140 W      | 18          | 89                                  | 2               | 21              | 11 18.78 | -2 56.4  | 1.749   | 2.694 | 7.6    | 21.4       | 159 W       | 42 | 67 |
| 3                                  | 2               | 11 2.27         | -25 45.9 | 2.079 | 2.959   | 10.5 | 21.3   | 147 W      | 19          | 90                                  | 3               | 2               | 11 9.03  | -2 11.3  | 1.705   | 2.686 | 3.8    | 21.2       | 170 W       | 43 | 66 |
| 3                                  | 12              | 10 52.95        | -24 28.7 | 2.063 | 2.970   | 9.4  | 21.3   | 151 E      | 21          | 88                                  | 3               | 12              | 10 58.68 | -1 14.9  | 1.691   | 2.677 | 3.3    | 21.1       | 171 E       | 44 | 65 |
| 3                                  | 22              | 10 44.34        | -22 47.3 | 2.073 | 2.979   | 9.5  | 21.3   | 150 E      | 22          | 87                                  | 3               | 22              | 10 48.84 | -0 13.8  | 1.705   | 2.666 | 7.1    | 21.3       | 161 E       | 45 | 64 |
| 4                                  | 1               | 10 37.31        | -20 50.2 | 2.110 | 2.988   | 10.9 | 21.4   | 146 E      | 24          | 85                                  | 4               | 1               | 10 40.53 | +0 44.9  | 1.747   | 2.655 | 11.1   | 21.5       | 149 E       | 46 | 63 |
| <b>455172 1999 QJ</b>              |                 |                 |          |       |         |      |        |            |             | <b>488602 2002 RV<sub>49</sub></b>  |                 |                 |          |          |         |       |        |            |             |    |    |
| 2                                  | 11              | 11 19.93        | +7 56.1  | 2.424 | 3.336   | 7.6  | 22.5   | 154 W      | 53          | 56                                  | 2               | 11              | 11 26.95 | +8 15.5  | 1.806   | 2.717 | 9.8    | 21.9       | 152 W       | 53 | 56 |
| 2                                  | 21              | 11 9.40         | +8 7.4   | 2.386 | 3.354   | 4.1  | 22.3   | 166 W      | 53          | 56                                  | 2               | 21              | 11 17.99 | +8 59.6  | 1.746   | 2.711 | 5.7    | 21.6       | 164 W       | 54 | 55 |
| 3                                  | 2               | 10 57.99        | +8 20.1  | 2.381 | 3.371   | 0.5  | 22.0   | 178 W      | 53          | 56                                  | 3               | 2               | 11 7.45  | +9 47.4  | 1.715   | 2.704 | 1.7    | 21.3       | 175 W       | 55 | 54 |
| 3                                  | 12              | 10 46.62        | +8 30.6  | 2.408 | 3.387   | 3.4  | 22.3   | 168 E      | 54          | 55                                  | 3               | 12              | 10 56.42 | +10 32.1 | 1.714   | 2.697 | 4.0    | 21.5       | 169 E       | 56 | 53 |
| 3                                  | 22              | 10 36.13        | +8 36.0  | 2.468 | 3.402   | 6.9  | 22.5   | 156 E      | 54          | 55                                  | 3               | 22              | 10 46.05 | +11 8.0  | 1.742   | 2.688 | 8.3    | 21.7       | 157 E       | 56 | 53 |
| <b>363012 1988 PH<sub>4</sub></b>  |                 |                 |          |       |         |      |        |            |             | <b>415760 2000 RD<sub>103</sub></b> |                 |                 |          |          |         |       |        |            |             |    |    |
| 2                                  | 11              | 11 20.15        | +0 21.9  | 2.860 | 3.751   | 7.4  | 22.3   | 151 W      | 45          | 64                                  | 2               | 11              | 11 27.73 | -5 16.7  | 2.149   | 3.017 | 10.6   | 21.9       | 146 W       | 40 | 69 |
| 2                                  | 21              | 11 13.35        | +1 13.9  | 2.795 | 3.750   | 4.6  | 22.1   | 162 W      | 46          | 63                                  | 2               | 21              | 11 20.22 | -4 42.1  | 2.082   | 3.018 | 7.3    | 21.7       | 157 W       | 40 | 69 |
| 3                                  | 2               | 11 5.66         | +2 13.9  | 2.761 | 3.748   | 1.6  | 21.9   | 174 W      | 47          | 62                                  | 3               | 2               | 11 11.40 | -3 52.3  | 2.042   | 3.018 | 3.9    | 21.5       | 168 W       | 41 | 68 |
| 3                                  | 12              | 10 57.73        | +3 17.7  | 2.758 | 3.745   | 2.1  | 21.9   | 172 E      | 48          | 61                                  | 3               | 12              | 11 2.13  | -2 51.4  | 2.032   | 3.017 | 3.0    | 21.4       | 171 E       | 42 | 67 |
| 3                                  | 22              | 10 50.18        | +4 20.8  | 2.787 | 3.741   | 5.1  | 22.1   | 160 E      | 49          | 60                                  | 3               | 22              | 10 53.28 | -1 45.4  | 2.052   | 3.015 | 5.9    | 21.6       | 162 E       | 43 | 66 |
| 4                                  | 1               | 10 43.61        | +5 18.8  | 2.846 | 3.737   | 8.0  | 22.3   | 149 E      | 50          | 59                                  | 4               | 1               | 10 45.71 | -0 40.6  | 2.101   | 3.012 | 9.3    | 21.8       | 151 E       | 44 | 65 |
| <b>347900 2002 VR<sub>3</sub></b>  |                 |                 |          |       |         |      |        |            |             | <b>455578 2004 RA<sub>216</sub></b> |                 |                 |          |          |         |       |        |            |             |    |    |
| 2                                  | 11              | 11 21.27        | -1 16.8  | 1.735 | 2.633   | 11.0 | 22.0   | 149 W      | 44          | 65                                  | 2               | 11              | 11 28.47 | -7 10.1  | 1.997   | 2.860 | 11.5   | 22.1       | 145 W       | 38 | 71 |
| 2                                  | 21              | 11 12.51        | -0 35.2  | 1.693 | 2.649   | 6.8  | 21.8   | 161 W      | 44          | 65                                  | 2               | 21              | 11 20.13 | -6 55.2  | 1.942   | 2.873 | 8.1    | 21.9       | 156 W       | 38 | 71 |
| 3                                  | 2               | 11 2.48         | +0 19.8  | 1.678 | 2.664   | 2.7  | 21.5   | 173 W      | 45          | 64                                  | 3               | 2               | 11 10.47 | -6 23.2  | 1.914   | 2.885 | 4.9    | 21.7       | 166 W       | 39 | 70 |
| 3                                  | 12              | 10 52.28        | +1 21.5  | 1.693 | 2.678   | 3.5  | 21.6   | 171 E      | 46          | 63                                  | 3               | 12              | 11 0.43  | -5 38.0  | 1.916   | 2.896 | 3.9    | 21.7       | 169 E       | 39 | 70 |
| 3                                  | 22              | 10 43.00        | +2 23.0  | 1.736 | 2.691   | 7.6  | 21.9   | 159 E      | 47          | 62                                  | 3               | 22              | 10 51.00 | -4 45.1  | 1.947   | 2.906 | 6.4    | 21.9       | 161 E       | 40 | 69 |
| 4                                  | 1               | 10 35.57        | +3 17.9  | 1.807 | 2.703   | 11.5 | 22.1   | 147 E      | 48          | 61                                  | 4               | 1               | 10 43.06 | -3 50.7  | 2.005   | 2.916 | 9.8    | 22.1       | 150 E       | 41 | 68 |
| <b>488901 2005 TQ<sub>78</sub></b> |                 |                 |          |       |         |      |        |            |             | <b>283461 Leacipaola</b>            |                 |                 |          |          |         |       |        |            |             |    |    |
| 2                                  | 11              | 11 22.15        | -2 19.1  | 1.604 | 2.501   | 11.8 | 21.7   | 149 W      | 43          | 66                                  | 2               | 11              | 11 28.86 | -1 10.8  | 1.998   | 2.882 | 10.5   | 22.3       | 148 W       | 44 | 65 |
| 2                                  | 21              | 11 14.41        | -1 31.9  | 1.525 | 2.480   | 7.6  | 21.4   | 161 W      | 43          | 66                                  | 2               | 21              | 11 20.52 | -0 42.6  | 1.939   | 2.887 | 6.8    | 22.0       | 160 W       | 44 | 65 |
| 3                                  | 2               | 11 4.84         | +0 26.0  | 1.473 | 2.458   | 3.3  | 21.1   | 172 W      | 45          | 64                                  | 3               | 2               | 11 10.79 | -0 2.5   | 1.907   | 2.891 | 2.9    | 21.8       | 171 W       | 45 | 64 |
| 3                                  | 12              | 10 54.53        | +0 52.3  | 1.448 | 2.435   | 3.7  | 21.1   | 171 E      | 46          | 63                                  | 3               | 12              | 11 0.62  | +0 44.9  | 1.906   | 2.894 | 2.6    | 21.8       | 172 E       | 46 | 63 |
| 3                                  | 22              | 10 44.71        | +2 14.4  | 1.452 | 2.411   | 8.3  | 21.3   | 160 E      | 47          | 62                                  | 3               | 22              | 10 51.01 | +1 33.9  | 1.934   | 2.895 | 6.4    | 22.0       | 161 E       | 47 | 62 |
| 4                                  | 1               | 10 36.58        | +3 31.5  | 1.481 | 2.386   | 13.0 | 21.5   | 148 E      | 49          | 60                                  | 4               | 1               | 10 42.85 | +2 18.8  | 1.991   | 2.896 | 10.1   | 22.3       | 149 E       | 47 | 62 |
| <b>285872 2001 NR<sub>5</sub></b>  |                 |                 |          |       |         |      |        |            |             | <b>396614 2001 SR<sub>115</sub></b> |                 |                 |          |          |         |       |        |            |             |    |    |
| 2                                  | 11              | 11 22.92        | +12 21.5 | 1.714 | 2.636   | 9.5  | 21.5   | 154 W      | 57          | 52                                  | 2               | 11              | 11 28.89 | -4 55.2  | 1.589   | 2.469 | 13.0   | 22.1       | 146 W       | 40 | 69 |
| 2                                  | 16              | 11 19.14        | +13 0.9  | 1.679 | 2.627   | 7.6  | 21.4   | 159 W      | 58          | 51                                  | 2               | 21              | 11 21.57 | -4 9.9   | 1.488   | 2.431 | 9.0    | 21.8       | 157 W       | 41 | 68 |
| 2                                  | 21              | 11 14.84        | +13 41.8 | 1.650 | 2.618   | 5.6  | 21.2   | 165 W      | 59          | 50                                  | 3               | 2               | 11 12.04 | -3 0.9   | 1.413   | 2.393 | 4.7    | 21.4       | 169 W       | 42 | 67 |
| 2                                  | 26              | 11 10.10        | +14 23.0 | 1.629 | 2.609   | 3.9  | 21.1   | 170 W      | 59          | 50                                  | 3               | 12              | 11 1.29  | -1 32.9  | 1.365   | 2.353 | 3.6    | 21.3       | 172 E       | 43 | 66 |
| 3                                  | 2               | 11 5.07         | +15 3.3  | 1.615 | 2.599   | 3.2  | 21.0   | 172 W      | 60          | 49                                  | 3               | 22              | 10 50.57 | +0 5.6   | 1.346   | 2.312 | 8.0    | 21.4       | 161 E       | 45 | 64 |
| 3                                  | 7               | 10 59.88        | +15 41.7 | 1.608 | 2.589   | 4.1  | 21.1   | 169 E      | 61          | 48                                  | 4               | 1               | 10 41.25 | +1 44.3  | 1.353   | 2.269 | 13.0   | 21.6       | 149 E       | 47 | 62 |
| 3                                  | 12              | 10 54.70        | +16 17.0 | 1.608 | 2.580   | 5.9  | 21.2   | 165 E      | 61          | 48                                  |                 |                 |          |          |         |       |        |            |             |    |    |
| 3                                  | 17              | 10 49.66        | +16 48.4 | 1.616 | 2.569   | 8.0  | 21.3   | 159 E      | 62          | 47                                  |                 |                 |          |          |         |       |        |            |             |    |    |
| 3                                  | 22              | 10 44.92        | +17 15.2 | 1.630 | 2.559   | 10.1 | 21.4   | 153 E      | 62          | 47                                  |                 |                 |          |          |         |       |        |            |             |    |    |
| 3                                  | 27              | 10 40.61        | +17 36.8 | 1.650 | 2.549   | 12.1 | 21.4   | 148 E      | 63          | 46                                  |                 |                 |          |          |         |       |        |            |             |    |    |
| 4                                  | 1               | 10 36.84        | +17 53.0 | 1.676 | 2.538   | 14.1 | 21.5   | 142 E      | 63          | 46                                  |                 |                 |          |          |         |       |        |            |             |    |    |
| <b>240313 2003 GO<sub>35</sub></b> |                 |                 |          |       |         |      |        |            |             | <b>391033 2005 TR<sub>15</sub></b>  |                 |                 |          |          |         |       |        |            |             |    |    |
| 2                                  | 11              | 11 24.95        | +38 58.6 | 1.804 | 2.677   | 12.0 | 21.4   | 146 W      | 84          | 25                                  | 2               | 11              | 11 31.81 | -3 2.2   | 1.191   | 2.085 | 15.2   | 21.9       | 146 W       | 42 | 67 |
| 2                                  | 16              | 11 19.33        | +39 36.4 | 1.779 | 2.664   | 11.6 | 21.4   | 147 W      | 85          | 24                                  | 2               | 21              | 11 24.99 | -2 29.4  | 1.082   | 2.032 | 10.6   | 21.5       | 158 W       | 43 | 66 |
| 2                                  | 21              | 11 13.02        | +40 8.2  | 1.760 | 2.651   | 11.4 | 21.3   | 148 W      | 85          | 24                                  | 3               | 2               | 11 14.99 | -1 28.6  | 0.995   | 1.978 | 5.2    | 21.0       | 170 W       | 44 | 65 |
| 2                                  | 26              | 11 6.21         | +40 32.5 | 1.747 | 2.638   | 11.6 | 21.3   | 148 W      | 86          | 23                                  | 3               | 12              | 11 2.79  | -0 3.5   | 0.934   | 1.923 | 3.8    | 20.7       | 173 E       | 45 | 64 |
| 3                                  | 2               | 10 59.07        | +40 48.3 | 1.741 | 2.624   | 12.1 | 21.3   | 146 W      | 86          | 23                                  | 3               | 22              | 10 50.00 | +1 36.8  | 0.898   | 1.868 | 10.0   | 20.9       | 161 E       | 47 | 62 |
| 3                                  | 7               | 10 51.83        | +40 54.6 | 1.741 | 2.610   | 12.9 | 21.3   | 144 E      | 86          | 23                                  | 4               | 1               | 10 38.59 | +3 18.9  | 0.884   | 1.812 | 16.9   | 21.0       | 148 E       | 48 | 61 |
| 3                                  | 12              | 10 44.72        | +40 51.2 | 1.747 | 2.596   | 13.9 | 21.4   | 141 E      | 86          | 23                                  | 4               | 11              | 10 30.32 | +4 49.2  | 0.890   | 1.755 | 23.4   | 21.2       | 136 E       | 50 | 59 |
| 3                                  | 17              | 10 37.94        | +40 38.0 | 1.758 | 2.582   | 15.0 | 21.4   | 138 E      | 86          | 23                                  | 4               | 21              | 10 26.77 | +5 58.3  | 0.909   | 1.698 | 29.0   | 21.3       | 125 E       | 51 | 58 |
| 3                                  | 22              | 10 31.67        | +40 15.5 | 1.775 | 2.568   | 16.2 | 21.5   | 134 E      | 85          | 24                                  | 5               | 1               | 10 26.77 | +6 41.3  | 0.937   | 1.641 | 33.8   | 21.4       | 115 E       | 52 | 57 |
| 3                                  | 27              | 10 26.09        | +39 44.2 | 1.797 | 2.553   | 17.5 | 21.5   | 130 E      | 85          | 24                                  |                 |                 |          |          |         |       |        |            |             |    |    |
| 4                                  | 1               | 10 21.30        | +39 5.1  | 1.823 | 2.538   | 18.7 | 21.6   | 126 E      | 84          | 25                                  |                 |                 |          |          |         |       |        |            |             |    |    |
| <b>426386 2013 PC<sub>21</sub></b> |                 |                 |          |       |         |      |        |            |             | <b>495331 2014 KF<sub>91</sub></b>  |                 |                 |          |          |         |       |        |            |             |    |    |
| 2                                  | 11              | 11 25.61        | +13 7.5  | 2.767 | 3.674   | 7.0  | 22.3   | 153 W      | 58          | 51                                  | 2               | 11              | 11 32.80 | -10 0.7  | 1.127   | 1.999 | 17.7   | 21.8       | 142 W       | 35 | 74 |
| 2                                  | 21              | 11 18.81        | +14 17.2 | 2.731 | 3.691   | 4.3  | 22.1   | 164 W      | 59          | 50                                  | 2               | 16              | 11 30.31 | -10 8.5  | 1.069   | 1.973 | 15.8   | 21.6       | 147 W       | 35 | 74 |
| 3                                  | 2               | 11 11.12        | +15 25.4 | 2.725 | 3.706   | 2.5  | 22.0   | 171 W      | 60          | 49                                  | 2               | 21              | 11 26.93 | -10 8.6  | 1.016   | 1.946 | 13.7   | 21.4       | 152 W       | 35 | 74 |
| 3                                  | 12              | 11 3.21         | +16 26.7 | 2.751 | 3.721   | 3.9  | 22.1   | 165 E      | 61          | 48                                  | 2               | 26              | 11 22.72 | -10 0.4  | 0.967   | 1.919 | 11.5   | 21.1       | 157 W       | 35 | 74 |
| 3                                  | 22              | 10 55.73        | +17 17.2 | 2.807 | 3.735   | 6.4  | 22.3   | 155 E      | 62          | 47                                  | 3               | 2               | 11 17.74 | -9 43.2  | 0.925   | 1.892 | 9.4    | 20.9       | 162 W       | 35 | 74 |
| 4                                  | 1               | 10 49.28        | +17 54.2 | 2.891 | 3.748   | 9.0  | 22.5   | 144 E      | 63          | 46                                  | 3               | 7               | 11 12.15 | -9 17.0  | 0.887   | 1.864 | 7.7    | 20.7       | 165 W       | 36 | 73 |
| <b>286168 2001 UY<sub>11</sub></b> |                 |                 |          |       |         |      |        |            |             | <b>511033 2005 TR<sub>15</sub></b>  |                 |                 |          |          |         |       |        |            |             |    |    |
| 2                                  | 11              | 11 25.73        | -7 7.2   | 2.085 | 2.949   | 11.0 | 21.7   | 145 W      | 38          | 71                                  | 2               | 11              | 11 31.81 | -3 2.2   | 1.191   | 2.085 | 15.2   | 21.9       | 146 W       | 42 | 67 |
| 2                                  | 21              | 11 18.13        | -6 29.2  | 2.014 | 2.947   | 7.7  | 21.5   | 156 W      | 39          | 70                                  | 2               | 21              | 11 24.99 | -2 29.4  | 1.082   | 2.032 |        |            |             |    |    |

EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 2020                               | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$ | $\beta$ | $V$   | $\psi$ | $45^\circ$ | $-26^\circ$ | 2020                                | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$                            | $r$ | $\beta$ | $V$   | $\psi$ | $45^\circ$ | $-26^\circ$ |       |      |      |       |    |    |
|------------------------------------|-----------------|-----------------|----------|-----|---------|-------|--------|------------|-------------|-------------------------------------|-----------------|-----------------|-------------------------------------|-----|---------|-------|--------|------------|-------------|-------|------|------|-------|----|----|
| <b>495331 2014 KF<sub>91</sub></b> |                 |                 |          |     |         |       |        |            |             | <b>269780 1999 TF<sub>145</sub></b> |                 |                 |                                     |     |         |       |        |            |             |       |      |      |       |    |    |
| <i>(continuation)</i>              |                 |                 |          |     |         |       |        |            |             |                                     |                 |                 |                                     |     |         |       |        |            |             |       |      |      |       |    |    |
| 5                                  | 31              | 11              | 3.17     | +1  | 37.4    | 0.876 | 1.413  | 45.5       | 21.3        | 97 E                                | 41*             | 62              | 2                                   | 11  | 11      | 44.14 | +2     | 41.8       | 1.695       | 2.574 | 12.3 | 21.5 | 146 W | 48 | 61 |
| 6                                  | 5               | 11              | 11.86    | +1  | 28.7    | 0.886 | 1.391  | 46.7       | 21.3        | 94 E                                | 39*             | 63              | 2                                   | 21  | 11      | 36.63 | +3     | 21.3       | 1.612       | 2.556 | 8.3  | 21.2 | 158 W | 48 | 61 |
| 6                                  | 10              | 11              | 21.38    | +1  | 13.7    | 0.896 | 1.369  | 47.8       | 21.3        | 91 E                                | 37*             | 63              | 3                                   | 2   | 11      | 26.97 | +4     | 12.6       | 1.554       | 2.538 | 3.6  | 20.9 | 171 W | 49 | 60 |
| 6                                  | 15              | 11              | 31.69    | +0  | 52.5    | 0.904 | 1.349  | 48.8       | 21.4        | 89 E                                | 35*             | 63              | 3                                   | 12  | 11      | 16.11 | +5     | 9.6        | 1.526       | 2.518 | 1.5  | 20.7 | 176 E | 50 | 59 |
| 6                                  | 20              | 11              | 42.77    | +0  | 25.5    | 0.912 | 1.330  | 49.7       | 21.4        | 87 E                                | 33*             | 64              | 3                                   | 22  | 11      | 5.25  | +6     | 5.0        | 1.527       | 2.498 | 6.5  | 21.0 | 163 E | 51 | 58 |
| 6                                  | 25              | 11              | 54.57    | +0  | 7.1     | 0.920 | 1.312  | 50.5       | 21.4        | 85 E                                | 32*             | 64*             | 4                                   | 1   | 10      | 55.64 | +6     | 51.7       | 1.554       | 2.477 | 11.2 | 21.2 | 151 E | 52 | 57 |
| 6                                  | 30              | 12              | 7.06     | +0  | 44.8    | 0.926 | 1.296  | 51.2       | 21.4        | 84 E                                | 30*             | 65*             | 4                                   | 11  | 10      | 48.25 | +7     | 24.6       | 1.606       | 2.454 | 15.4 | 21.4 | 139 E | 52 | 57 |
| 7                                  | 5               | 12              | 20.22    | -1  | 27.3    | 0.932 | 1.281  | 51.8       | 21.4        | 82 E                                | 29*             | 65*             | <b>390638 2002 LZ<sub>62</sub></b>  |     |         |       |        |            |             |       |      |      |       |    |    |
| 7                                  | 10              | 12              | 34.01    | -2  | 14.0    | 0.938 | 1.268  | 52.3       | 21.4        | 81 E                                | 28*             | 65*             | 2                                   | 11  | 11      | 45.61 | +5     | 50.4       | 1.547       | 2.434 | 12.8 | 22.1 | 147 W | 51 | 58 |
| 7                                  | 15              | 12              | 48.42    | -3  | 4.5     | 0.943 | 1.256  | 52.7       | 21.4        | 80 E                                | 27*             | 66*             | 2                                   | 21  | 11      | 38.12 | +6     | 33.8       | 1.460       | 2.409 | 8.5  | 21.8 | 159 W | 52 | 57 |
| 7                                  | 20              | 13              | 3.43     | -3  | 58.2    | 0.949 | 1.247  | 53.1       | 21.4        | 79 E                                | 26*             | 66*             | 3                                   | 2   | 11      | 28.16 | +7     | 27.0       | 1.399       | 2.383 | 3.7  | 21.5 | 171 W | 52 | 57 |
| 7                                  | 25              | 13              | 19.02    | -4  | 54.7    | 0.954 | 1.239  | 53.3       | 21.4        | 78 E                                | 26*             | 66*             | 3                                   | 12  | 11      | 18.75 | +8     | 22.6       | 1.365       | 2.356 | 2.5  | 21.3 | 174 E | 53 | 56 |
| 7                                  | 30              | 13              | 35.18    | -5  | 53.2    | 0.961 | 1.233  | 53.4       | 21.4        | 77 E                                | 25*             | 66*             | 3                                   | 22  | 11      | 5.20  | +9     | 12.5       | 1.360       | 2.328 | 7.6  | 21.5 | 162 E | 54 | 55 |
| 8                                  | 4               | 13              | 51.87    | -6  | 53.0    | 0.967 | 1.230  | 53.4       | 21.4        | 77 E                                | 25*             | 66*             | 4                                   | 1   | 10      | 54.93 | +9     | 49.4       | 1.381       | 2.300 | 12.7 | 21.8 | 150 E | 55 | 54 |
| 8                                  | 9               | 14              | 9.07     | -7  | 53.3    | 0.975 | 1.228  | 53.3       | 21.4        | 76 E                                | 25*             | 66*             | <b>385268 2001 RC<sub>12</sub></b>  |     |         |       |        |            |             |       |      |      |       |    |    |
| 8                                  | 14              | 14              | 26.74    | -8  | 53.3    | 0.984 | 1.229  | 53.1       | 21.5        | 76 E                                | 25*             | 67*             | 2                                   | 11  | 11      | 46.20 | -21    | 29.7       | 2.796       | 3.532 | 12.0 | 21.5 | 132 W | 24 | 85 |
| 8                                  | 19              | 14              | 44.86    | -9  | 52.1    | 0.994 | 1.231  | 52.8       | 21.5        | 76 E                                | 25*             | 67*             | 2                                   | 21  | 11      | 39.13 | -20    | 51.7       | 2.756       | 3.587 | 9.8  | 21.4 | 142 W | 24 | 85 |
| 2                                  | 11              | 11              | 35.03    | +13 | 18.9    | 1.860 | 2.764  | 10.0       | 22.1        | 151 W                               | 58              | 51              | 3                                   | 2   | 11      | 31.06 | -19    | 52.8       | 2.740       | 3.641 | 7.5  | 21.3 | 151 W | 25 | 84 |
| 2                                  | 16              | 11              | 31.48    | +13 | 58.3    | 1.826 | 2.760  | 8.2        | 22.0        | 156 W                               | 59              | 50              | 3                                   | 12  | 11      | 22.67 | -18    | 36.0       | 2.753       | 3.693 | 5.8  | 21.3 | 158 E | 26 | 83 |
| 2                                  | 21              | 11              | 27.40    | +14 | 38.7    | 1.799 | 2.756  | 6.4        | 21.9        | 162 W                               | 60              | 49              | 3                                   | 22  | 11      | 14.64 | -17    | 5.9        | 2.796       | 3.745 | 5.4  | 21.3 | 159 E | 28 | 81 |
| 2                                  | 26              | 11              | 22.90    | +15 | 19.2    | 1.779 | 2.751  | 4.9        | 21.8        | 166 W                               | 60              | 49              | 4                                   | 1   | 11      | 7.60  | -15    | 28.7       | 2.870       | 3.795 | 6.6  | 21.5 | 154 E | 30 | 79 |
| 3                                  | 2               | 11              | 18.07    | +15 | 58.6    | 1.767 | 2.747  | 3.9        | 21.7        | 169 W                               | 61              | 48              | <b>326318 1999 VK<sub>85</sub></b>  |     |         |       |        |            |             |       |      |      |       |    |    |
| 3                                  | 7               | 11              | 13.07    | +16 | 35.9    | 1.762 | 2.742  | 4.1        | 21.7        | 169 W                               | 62              | 47              | 2                                   | 11  | 11      | 47.34 | +22    | 46.5       | 3.104       | 3.973 | 7.6  | 21.8 | 148 W | 68 | 41 |
| 3                                  | 12              | 11              | 8.01     | +17 | 10.1    | 1.764 | 2.737  | 5.3        | 21.8        | 165 E                               | 62              | 47              | 2                                   | 16  | 11      | 44.24 | +23    | 20.4       | 3.075       | 3.974 | 6.7  | 21.7 | 152 W | 68 | 41 |
| 3                                  | 17              | 11              | 3.05     | +17 | 40.2    | 1.774 | 2.731  | 7.0        | 21.8        | 160 E                               | 63              | 46              | 2                                   | 21  | 11      | 40.79 | +23    | 53.5       | 3.053       | 3.975 | 5.9  | 21.7 | 156 W | 69 | 40 |
| 3                                  | 22              | 10              | 58.31    | +18 | 5.8     | 1.790 | 2.726  | 8.9        | 21.9        | 155 E                               | 63              | 46              | 2                                   | 26  | 11      | 37.04 | +24    | 25.0       | 3.038       | 3.975 | 5.3  | 21.6 | 158 W | 69 | 40 |
| 3                                  | 27              | 10              | 53.93    | +18 | 26.3    | 1.813 | 2.720  | 10.7       | 22.0        | 149 E                               | 63              | 46              | 3                                   | 2   | 11      | 33.06 | +24    | 54.2       | 3.030       | 3.975 | 4.9  | 21.6 | 160 W | 70 | 39 |
| 4                                  | 1               | 10              | 50.01    | +18 | 41.4    | 1.841 | 2.714  | 12.5       | 22.1        | 144 E                               | 64              | 45              | 3                                   | 7   | 11      | 28.94 | +25    | 20.6       | 3.030       | 3.975 | 5.0  | 21.6 | 159 W | 70 | 39 |
| 4                                  | 6               | 10              | 46.65    | +18 | 51.2    | 1.876 | 2.707  | 14.2       | 22.2        | 138 E                               | 64              | 45              | 3                                   | 12  | 11      | 24.75 | +25    | 43.6       | 3.038       | 3.975 | 5.5  | 21.7 | 158 E | 71 | 38 |
| 2                                  | 11              | 11              | 36.56    | +3  | 34.2    | 2.737 | 3.613  | 8.3        | 22.0        | 148 W                               | 49              | 60              | 3                                   | 17  | 11      | 20.58 | +26    | 2.9        | 3.053       | 3.974 | 6.2  | 21.7 | 154 E | 71 | 38 |
| 2                                  | 21              | 11              | 28.62    | +4  | 12.5    | 2.683 | 3.629  | 5.2        | 21.8        | 160 W                               | 49              | 60              | 3                                   | 22  | 11      | 16.51 | +26    | 18.0       | 3.075       | 3.973 | 7.1  | 21.8 | 151 E | 71 | 38 |
| 3                                  | 2               | 11              | 19.64    | +4  | 56.2    | 2.659 | 3.644  | 2.0        | 21.6        | 173 W                               | 50              | 59              | 3                                   | 27  | 11      | 12.62 | +26    | 29.0       | 3.104       | 3.973 | 8.0  | 21.8 | 146 E | 71 | 38 |
| 3                                  | 12              | 11              | 10.28    | +5  | 41.2    | 2.667 | 3.658  | 1.4        | 21.5        | 175 E                               | 51              | 58              | 4                                   | 1   | 11      | 8.98  | +26    | 35.6       | 3.140       | 3.971 | 9.0  | 21.9 | 142 E | 72 | 37 |
| 3                                  | 22              | 11              | 1.27     | +6  | 23.3    | 2.708 | 3.670  | 4.7        | 21.8        | 162 E                               | 51              | 58              | 4                                   | 6   | 11      | 5.66  | +26    | 37.9       | 3.181       | 3.970 | 9.9  | 22.0 | 137 E | 72 | 37 |
| 4                                  | 1               | 10              | 53.27    | +6  | 59.0    | 2.779 | 3.681  | 7.7        | 22.0        | 150 E                               | 52              | 57              | <b>461432 2001 WT<sub>15</sub></b>  |     |         |       |        |            |             |       |      |      |       |    |    |
| 2                                  | 11              | 11              | 38.91    | -7  | 21.2    | 2.468 | 3.306  | 10.5       | 21.7        | 142 W                               | 38              | 71              | 2                                   | 11  | 11      | 47.81 | -35    | 1.8        | 2.886       | 3.503 | 13.9 | 21.4 | 121 W | 10 | 81 |
| 2                                  | 21              | 11              | 32.93    | -6  | 23.4    | 2.374 | 3.290  | 7.6        | 21.5        | 154 W                               | 39              | 70              | 2                                   | 21  | 11      | 40.25 | -35    | 33.7       | 2.815       | 3.525 | 12.5 | 21.3 | 129 W | 9  | 80 |
| 3                                  | 2               | 11              | 25.57    | -5  | 8.4     | 2.306 | 3.274  | 4.5        | 21.3        | 165 W                               | 40              | 69              | 3                                   | 2   | 11      | 31.20 | -35    | 39.6       | 2.764       | 3.546 | 11.2 | 21.2 | 136 W | 9  | 80 |
| 3                                  | 12              | 11              | 17.49    | -3  | 40.2    | 2.269 | 3.257  | 2.3        | 21.1        | 172 E                               | 41              | 68              | 3                                   | 12  | 11      | 21.41 | -35    | 18.1       | 2.736       | 3.566 | 10.0 | 21.2 | 141 E | 10 | 81 |
| 3                                  | 22              | 11              | 9.43     | -2  | 4.7     | 2.263 | 3.239  | 4.3        | 21.2        | 166 E                               | 43              | 66              | 3                                   | 22  | 11      | 11.75 | -34    | 30.5       | 2.732       | 3.585 | 9.4  | 21.2 | 144 E | 10 | 81 |
| 4                                  | 1               | 11              | 2.15     | -0  | 28.7    | 2.288 | 3.219  | 7.6        | 21.4        | 155 E                               | 45              | 64              | 4                                   | 1   | 11      | 3.04  | -33    | 20.8       | 2.754       | 3.603 | 9.6  | 21.2 | 143 E | 12 | 83 |
| 2                                  | 11              | 11              | 41.55    | +1  | 26.1    | 0.438 | 1.372  | 23.6       | 21.7        | 146 W                               | 46              | 63              | 4                                   | 11  | 10      | 55.97 | -31    | 55.8       | 2.801       | 3.620 | 10.4 | 21.3 | 139 E | 13 | 84 |
| 2                                  | 16              | 11              | 38.23    | +3  | 33.3    | 0.424 | 1.379  | 19.1       | 21.5        | 153 W                               | 49              | 60              | 4                                   | 21  | 10      | 50.92 | -30    | 22.6       | 2.871       | 3.636 | 11.6 | 21.4 | 133 E | 15 | 86 |
| 2                                  | 21              | 11              | 33.55    | +5  | 54.0    | 0.415 | 1.385  | 14.3       | 21.3        | 160 W                               | 51              | 58              | <b>488738 2004 RM<sub>162</sub></b> |     |         |       |        |            |             |       |      |      |       |    |    |
| 2                                  | 26              | 11              | 27.75    | +8  | 23.5    | 0.410 | 1.392  | 9.5        | 21.1        | 167 W                               | 53              | 56              | 2                                   | 11  | 11      | 49.57 | -8     | 34.4       | 1.765       | 2.596 | 14.3 | 22.3 | 140 W | 36 | 73 |
| 3                                  | 2               | 11              | 21.15    | +10 | 55.3    | 0.409 | 1.397  | 5.7        | 20.9        | 172 W                               | 56              | 53              | 2                                   | 21  | 11      | 43.07 | -8     | 28.2       | 1.664       | 2.572 | 10.9 | 22.0 | 151 W | 37 | 72 |
| 3                                  | 7               | 11              | 14.18    | +13 | 22.4    | 0.414 | 1.403  | 5.7        | 21.0        | 172 W                               | 58              | 51              | 3                                   | 2   | 11      | 34.30 | -8     | 0.9        | 1.587       | 2.546 | 7.1  | 21.8 | 161 W | 37 | 72 |
| 3                                  | 12              | 11              | 7.26     | +15 | 38.6    | 0.423 | 1.408  | 9.4        | 21.2        | 167 E                               | 61              | 48              | 3                                   | 12  | 11      | 24.07 | -7     | 14.1       | 1.537       | 2.520 | 4.2  | 21.5 | 169 E | 38 | 71 |
| 3                                  | 17              | 11              | 0.81     | +17 | 39.0    | 0.436 | 1.413  | 13.9       | 21.4        | 160 E                               | 63              | 46              | 3                                   | 22  | 11      | 13.48 | -6     | 12.4       | 1.515       | 2.493 | 5.6  | 21.5 | 166 E | 39 | 70 |
| 3                                  | 22              | 10              | 55.19    | +19 | 20.3    | 0.454 | 1.418  | 18.2       | 21.7        | 154 E                               | 64              | 45              | 4                                   | 1   | 11      | 3.77  | -5     | 3.3        | 1.520       | 2.465 | 9.7  | 21.7 | 155 E | 40 | 69 |
| 3                                  | 27              | 10              | 50.69    | +20 | 41.3    | 0.476 | 1.422  | 22.2       | 21.9        | 147 E                               | 66              | 43              | <b>357063 2001 PO<sub>59</sub></b>  |     |         |       |        |            |             |       |      |      |       |    |    |
| 4                                  | 1               | 10              | 47.51    | +21 | 42.2    | 0.500 | 1.425  | 25.8       | 22.1        | 142 E                               | 67              | 42              | 2                                   | 11  | 11      | 50.22 | -0     | 48.6       | 2.041       | 2.893 | 11.8 | 22.2 | 143 W | 44 | 65 |
| 4                                  | 6               | 10              | 45.71    | +22 | 24.4    | 0.528 | 1.429  | 29.0       | 22.4        | 136 E                               | 67              | 42              | 2                                   | 21  | 11      | 42.92 | -0     | 23.1       | 1.959       | 2.887 | 8.3  | 21.9 | 155 W | 45 | 64 |
| 2                                  | 11              | 11              | 42.49    | -13 | 59.6    | 2.758 | 3.550  | 10.8       | 21.8        | 138 W                               | 31              | 78              | 3                                   | 2   | 11      | 33.78 | +0     | 14.5       | 1.903       | 2.879 | 4.3  | 21.7 | 167 W | 45 | 64 |
| 2                                  | 21              | 11              | 35.86    | -13 | 52.1    | 2.678 | 3.556  | 8.5        | 21.7        | 148 W                               | 31              | 78              | 3                                   | 12  | 11      | 23.62 | +1     | 0.1        | 1.877       | 2.870 | 0.9  | 21.4 | 177 E | 46 | 63 |
| 3                                  | 2               | 11              | 27.99    | -13 | 27.6    | 2.625 | 3.560  | 6.1        | 21.5        | 157 W                               | 32              | 77              | 3                                   | 22  | 11      | 13.42 | +1     | 48.3       | 1.881       | 2.860 | 4.6  | 21.7 | 167 E | 47 | 62 |
| 3                                  | 12              | 11              | 19.51    | -12 | 47.8    | 2.600 | 3.564  | 4.5        | 21.4        | 164 E                               | 32              | 77              | 4                                   | 1   | 11      | 4.18  | +2     |            |             |       |      |      |       |    |    |

EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 2020                                | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | 45° | -26° | 2020   | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | 45° | -26° |
|-------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|-----|------|--|-----------------|-----------------|----------|-------|---------|------|--------|-----|------|
| <b>276033 2002 AJ<sub>129</sub></b> |                 |                 |          |       |         |      |        |     |      | <b>444628 2006 WQ<sub>1</sub> (continuation)</b> |                 |                 |          |       |         |      |        |     |      |
| 2 11                                | 11 50.96        | +11 32.0        | 1.510    | 2.398 | 13.0    | 22.3 | 147 W  | 57  | 52   | 3 12   | 11 19.33        | +32 26.2        | 0.823    | 1.758 | 16.0    | 21.0 | 151 E  | 77  | 32   |
| 2 16                                | 11 42.36        | +12 51.1        | 1.493    | 2.419 | 10.4    | 22.2 | 154 W  | 58  | 51   | 3 17   | 11 11.43        | +33 30.4        | 0.830    | 1.750 | 18.2    | 21.1 | 147 E  | 79  | 30   |
| 2 21                                | 11 33.02        | +14 10.8        | 1.485    | 2.440 | 7.8     | 22.0 | 161 W  | 59  | 50   | 3 22   | 11 3.85         | +34 18.2        | 0.842    | 1.740 | 20.5    | 21.1 | 142 E  | 79  | 30   |
| 2 26                                | 11 23.14        | +15 28.7        | 1.486    | 2.459 | 5.5     | 22.0 | 166 W  | 60  | 49   | 3 27   | 10 56.93        | +34 49.4        | 0.859    | 1.730 | 23.0    | 21.3 | 137 E  | 80  | 29   |
| 3 2                                 | 11 12.98        | +16 42.7        | 1.496    | 2.477 | 4.3     | 21.9 | 169 W  | 62  | 47   | 4 1  | 10 50.95        | +35 4.8         | 0.879    | 1.720 | 25.3    | 21.4 | 133 E  | 80  | 29   |
| 3 7                                 | 11 2.80         | +17 50.7        | 1.516    | 2.494 | 5.0     | 22.0 | 167 E  | 63  | 46   | 4 6  | 10 46.11        | +35 5.5         | 0.902    | 1.709 | 27.5    | 21.5 | 128 E  | 80  | 29   |
| 3 12                                | 10 52.86        | +18 51.3        | 1.545    | 2.510 | 7.0     | 22.2 | 162 E  | 64  | 45   | <b>349928 2009 WD<sub>106</sub></b>              |                 |                 |          |       |         |      |        |     |      |
| 3 17                                | 10 43.41        | +19 43.4        | 1.583    | 2.524 | 9.3     | 22.3 | 156 E  | 65  | 44   | 2 11   | 12 9.87         | -16 57.3        | 1.235    | 2.022 | 21.7    | 21.6 | 131 W  | 28  | 81   |
| 3 22                                | 10 34.64        | +20 26.7        | 1.630    | 2.538 | 11.5    | 22.5 | 149 E  | 65  | 44   | 2 16   | 12 6.37         | -17 41.8        | 1.145    | 1.975 | 20.5    | 21.4 | 136 W  | 27  | 82   |
| <b>363829 2005 PQ<sub>6</sub></b>   |                 |                 |          |       |         |      |        |     |      | 2 21   | 12 1.45         | -18 23.4        | 1.059    | 1.928 | 19.0    | 21.1 | 141 W  | 27  | 82   |
| 2 11                                | 11 51.55        | +33 23.2        | 2.675    | 3.520 | 9.5     | 21.6 | 144 W  | 78  | 31   | 2 26   | 11 54.92        | -19 0.8         | 0.978    | 1.879 | 17.4    | 20.8 | 145 W  | 26  | 83   |
| 2 16                                | 11 48.33        | +34 22.2        | 2.660    | 3.525 | 8.9     | 21.6 | 146 W  | 79  | 30   | 3 2  | 11 46.59        | -19 32.5        | 0.902    | 1.829 | 15.7    | 20.5 | 150 W  | 25  | 84   |
| 2 21                                | 11 44.64        | +35 18.4        | 2.651    | 3.530 | 8.5     | 21.5 | 148 W  | 80  | 29   | 3 7  | 11 36.33        | -19 56.3        | 0.832    | 1.778 | 14.2    | 20.3 | 154 W  | 25  | 84   |
| 2 26                                | 11 40.54        | +36 10.9        | 2.649    | 3.534 | 8.3     | 21.5 | 149 W  | 81  | 28   | 3 12   | 11 24.00        | -20 9.7         | 0.768    | 1.725 | 13.3    | 20.0 | 156 E  | 25  | 84   |
| 3 2                                 | 11 36.14        | +36 58.6        | 2.655    | 3.539 | 8.4     | 21.5 | 149 W  | 82  | 27   | 3 17   | 11 9.60         | -20 9.6         | 0.711    | 1.671 | 13.7    | 19.8 | 157 E  | 25  | 84   |
| 3 7                                 | 11 31.53        | +37 40.7        | 2.667    | 3.543 | 8.7     | 21.6 | 147 W  | 83  | 26   | 3 22   | 10 53.22        | -19 52.9        | 0.661    | 1.616 | 15.8    | 19.6 | 154 E  | 25  | 84   |
| 3 12                                | 11 26.83        | +38 16.6        | 2.686    | 3.547 | 9.2     | 21.6 | 145 E  | 83  | 26   | 3 27   | 10 35.17        | -19 17.1        | 0.618    | 1.559 | 19.5    | 19.5 | 149 E  | 26  | 83   |
| 3 17                                | 11 22.14        | +38 46.0        | 2.712    | 3.551 | 9.9     | 21.7 | 142 E  | 84  | 25   | 4 1  | 10 15.92        | -18 20.8        | 0.582    | 1.500 | 24.4    | 19.4 | 142 E  | 27  | 82   |
| 3 22                                | 11 17.58        | +39 8.5         | 2.744    | 3.554 | 10.7    | 21.7 | 139 E  | 84  | 25   | 4 6  | 9 56.07         | -17 4.3         | 0.553    | 1.440 | 30.1    | 19.4 | 134 E  | 28  | 81   |
| 3 27                                | 11 13.25        | +39 24.2        | 2.781    | 3.557 | 11.4    | 21.8 | 135 E  | 84  | 25   | 4 11   | 9 36.19         | -15 30.0        | 0.531    | 1.378 | 36.4    | 19.4 | 125 E  | 29  | 80   |
| 4 1                                 | 11 9.25         | +39 33.3        | 2.824    | 3.561 | 12.2    | 21.8 | 131 E  | 85  | 24   | 4 16   | 9 16.80         | -13 41.3        | 0.514    | 1.315 | 43.1    | 19.4 | 116 E  | 31  | 78   |
| 4 6                                 | 11 5.66         | +39 36.0        | 2.872    | 3.563 | 13.0    | 21.9 | 127 E  | 85  | 24   | 4 21   | 8 58.25         | -11 42.1        | 0.500    | 1.250 | 50.1    | 19.4 | 107 E  | 33* | 76   |
| <b>326113 2011 UG<sub>108</sub></b> |                 |                 |          |       |         |      |        |     |      | 4 26   | 8 40.67         | -9 36.4         | 0.490    | 1.183 | 57.3    | 19.5 | 99 E   | 33* | 74   |
| 2 11                                | 11 53.77        | +12 21.7        | 1.802    | 2.679 | 11.8    | 21.6 | 146 W  | 57  | 52   | 5 1  | 8 23.92         | -7 26.7         | 0.481    | 1.114 | 64.8    | 19.5 | 90 E   | 32* | 71*  |
| 2 16                                | 11 50.82        | +13 0.3         | 1.759    | 2.670 | 10.1    | 21.5 | 152 W  | 58  | 51   | 5 6  | 8 7.60          | -5 13.6         | 0.473    | 1.043 | 72.7    | 19.6 | 81 E   | 29* | 67*  |
| 2 21                                | 11 47.25        | +13 40.9        | 1.722    | 2.661 | 8.3     | 21.4 | 157 W  | 59  | 50   | 5 11   | 7 51.11         | -2 55.4         | 0.464    | 0.970 | 81.3    | 19.7 | 72 E   | 25* | 61*  |
| 2 26                                | 11 43.12        | +14 22.5        | 1.692    | 2.652 | 6.6     | 21.3 | 162 W  | 59  | 50   | 5 16   | 7 33.65         | -0 28.7         | 0.456    | 0.896 | 90.8    | 19.9 | 62 E   | 21* | 54*  |
| 3 2                                 | 11 38.54        | +15 3.9         | 1.669    | 2.642 | 5.1     | 21.2 | 166 W  | 60  | 49   | 5 21   | 7 14.22         | +2 11.9         | 0.448    | 0.821 | 101.8   | 20.1 | 53 E   | 15* | 45*  |
| 3 7                                 | 11 33.62        | +15 43.9        | 1.654    | 2.633 | 4.4     | 21.1 | 168 W  | 61  | 48   | 5 26   | 6 51.76         | +5 12.0         | 0.443    | 0.744 | 114.8   | 20.7 | 42 E   | 9*  | 35*  |
| 3 12                                | 11 28.49        | +16 21.3        | 1.645    | 2.623 | 4.9     | 21.1 | 167 E  | 61  | 48   | <b>249091 2007 VV<sub>93</sub></b>               |                 |                 |          |       |         |      |        |     |      |
| 3 17                                | 11 23.31        | +16 55.2        | 1.644    | 2.613 | 6.3     | 21.1 | 163 E  | 62  | 47   | 2 11   | 12 21.46        | -30 35.7        | 2.171    | 2.797 | 17.8    | 21.3 | 120 W  | 14  | 85   |
| 3 22                                | 11 18.20        | +17 24.7        | 1.649    | 2.602 | 8.1     | 21.2 | 159 E  | 62  | 47   | 2 16   | 12 19.70        | -30 54.9        | 2.108    | 2.786 | 17.0    | 21.2 | 124 W  | 14  | 85   |
| 3 27                                | 11 13.34        | +17 48.9        | 1.662    | 2.592 | 10.0    | 21.3 | 153 E  | 63  | 46   | 2 21   | 12 17.27        | -31 8.0         | 2.048    | 2.775 | 16.2    | 21.1 | 129 W  | 14  | 85   |
| 4 1                                 | 11 8.86         | +18 7.5         | 1.680    | 2.581 | 11.9    | 21.4 | 148 E  | 63  | 46   | 2 26   | 12 14.20        | -31 14.1        | 1.992    | 2.764 | 15.2    | 21.0 | 133 W  | 14  | 85   |
| 4 6                                 | 11 4.87         | +18 20.2        | 1.704    | 2.570 | 13.8    | 21.5 | 142 E  | 63  | 46   | 3 2  | 12 10.54        | -31 12.5        | 1.941    | 2.752 | 14.2    | 20.9 | 137 W  | 14  | 85   |
| <b>241281 2007 UF<sub>2</sub></b>   |                 |                 |          |       |         |      |        |     |      | 3 7  | 12 6.37         | -31 2.7         | 1.895    | 2.740 | 13.1    | 20.8 | 141 W  | 14  | 85   |
| 2 11                                | 11 54.04        | +19 51.9        | 2.136    | 3.008 | 10.4    | 21.4 | 146 W  | 65  | 44   | 3 12   | 12 1.78         | -30 44.3        | 1.854    | 2.728 | 12.0    | 20.7 | 145 W  | 14  | 85   |
| 2 16                                | 11 50.71        | +20 31.0        | 2.100    | 3.004 | 9.1     | 21.3 | 151 W  | 66  | 43   | 3 17   | 11 56.89        | -30 17.0        | 1.819    | 2.716 | 11.1    | 20.7 | 148 W  | 15  | 86   |
| 2 21                                | 11 46.84        | +21 10.0        | 2.071    | 2.999 | 7.8     | 21.2 | 156 W  | 66  | 43   | 3 22   | 11 51.83        | -29 40.8        | 1.790    | 2.703 | 10.4    | 20.6 | 151 E  | 15  | 86   |
| 2 26                                | 11 42.49        | +21 47.8        | 2.049    | 2.995 | 6.8     | 21.1 | 159 W  | 67  | 42   | 3 27   | 11 46.75        | -28 56.1        | 1.767    | 2.691 | 10.0    | 20.5 | 152 E  | 16  | 87   |
| 3 2                                 | 11 37.77        | +22 23.2        | 2.034    | 2.990 | 6.1     | 21.1 | 161 W  | 67  | 42   | 4 1  | 11 41.81        | -28 3.6         | 1.751    | 2.678 | 9.9     | 20.5 | 152 E  | 17  | 88   |
| 3 7                                 | 11 32.78        | +22 55.4        | 2.026    | 2.984 | 6.0     | 21.1 | 162 W  | 68  | 41   | 4 6  | 11 37.16        | -27 4.5         | 1.742    | 2.664 | 10.4    | 20.5 | 151 E  | 18  | 89   |
| 3 12                                | 11 27.65        | +23 23.3        | 2.026    | 2.979 | 6.6     | 21.1 | 160 E  | 68  | 41   | 4 11   | 11 32.93        | -26 0.1         | 1.739    | 2.651 | 11.1    | 20.5 | 149 E  | 19  | 90   |
| 3 17                                | 11 22.51        | +23 46.4        | 2.033    | 2.973 | 7.6     | 21.2 | 157 E  | 69  | 40   | 4 16   | 11 29.21        | -24 51.7        | 1.743    | 2.637 | 12.2    | 20.5 | 146 E  | 20  | 89   |
| 3 22                                | 11 17.49        | +24 4.2         | 2.046    | 2.967 | 8.9     | 21.2 | 153 E  | 69  | 40   | 4 21   | 11 26.11        | -23 40.9        | 1.753    | 2.623 | 13.5    | 20.6 | 143 E  | 21  | 88   |
| 3 27                                | 11 12.71        | +24 16.1        | 2.067    | 2.961 | 10.3    | 21.3 | 148 E  | 69  | 40   | 4 26   | 11 23.68        | -22 29.2        | 1.768    | 2.609 | 14.8    | 20.6 | 139 E  | 23  | 86   |
| 4 1                                 | 11 8.29         | +24 22.2        | 2.093    | 2.954 | 11.7    | 21.4 | 143 E  | 69  | 40   | 5 1  | 11 21.97        | -21 18.1        | 1.789    | 2.594 | 16.2    | 20.7 | 134 E  | 24  | 85   |
| 4 6                                 | 11 4.32         | +24 22.5        | 2.125    | 2.948 | 13.1    | 21.4 | 138 E  | 69  | 40   | 5 6  | 11 21.00        | -20 9.0         | 1.815    | 2.580 | 17.5    | 20.8 | 130 E  | 25  | 84   |
| <b>162210 1999 SM<sub>5</sub></b>   |                 |                 |          |       |         |      |        |     |      | 5 11   | 11 20.75        | -19 2.8         | 1.845    | 2.565 | 18.7    | 20.8 | 125 E  | 26  | 83   |
| 2 11                                | 11 54.77        | +1 52.7         | 1.111    | 1.983 | 17.9    | 21.7 | 142 W  | 43  | 66   | 5 16   | 11 21.21        | -18 0.3         | 1.878    | 2.550 | 19.9    | 20.9 | 121 E  | 27* | 82   |
| 2 16                                | 11 47.80        | +1 56.1         | 0.955    | 1.892 | 13.5    | 21.2 | 153 W  | 43  | 66   | 5 21   | 11 22.37        | -17 2.3         | 1.915    | 2.534 | 20.9    | 21.0 | 117 E  | 27* | 81   |
| 3 2                                 | 11 35.51        | +1 36.4         | 0.820    | 1.797 | 7.6     | 20.5 | 166 W  | 43  | 66   | 5 26   | 11 24.18        | -16 9.1         | 1.955    | 2.519 | 21.9    | 21.0 | 112 E  | 27* | 80   |
| 3 7                                 | 11 17.43        | +0 50.8         | 0.708    | 1.700 | 3.0     | 19.8 | 175 E  | 44  | 65   | 6 1  | 11 26.62        | -15 21.2        | 1.997    | 2.503 | 22.7    | 21.1 | 108 E  | 27* | 79   |
| 3 12                                | 11 17.43        | +0 50.8         | 0.708    | 1.700 | 3.0     | 19.8 | 175 E  | 44  | 65   | 6 6  | 11 29.64        | -14 38.6        | 2.041    | 2.487 | 23.3    | 21.1 | 104 E  | 26* | 79   |
| 3 22                                | 10 54.03        | +0 19.4         | 0.622    | 1.600 | 11.1    | 19.8 | 162 E  | 45  | 64   | 6 10   | 11 33.21        | -14 1.3         | 2.085    | 2.471 | 23.9    | 21.2 | 100 E  | 25* | 78   |
| 3 27                                | 10 40.89        | +1 1.5          | 0.588    | 1.548 | 16.4    | 19.8 | 154 E  | 46  | 63   | 6 15   | 11 37.28        | -13 29.2        | 2.131    | 2.455 | 24.3    | 21.2 | 96 E   | 23* | 77   |
| 4 1                                 | 10 27.28        | +1 45.8         | 0.561    | 1.496 | 22.1    | 19.8 | 146 E  | 47  | 62   | 6 20   | 11 41.82        | -13 2.2         | 2.178    | 2.438 | 24.6    | 21.3 | 92 E   | 22* | 77   |
| 4 6                                 | 10 13.62        | +2 30.4         | 0.538    | 1.444 | 28.0    | 19.8 | 137 E  | 48  | 61   | 6 25   | 11 46.81        | -12 40.1        | 2.224    | 2.421 | 24.8    | 21.3 | 89 E   | 20* | 76*  |
| 4 11                                | 10 0.30         | +3 13.2         | 0.520    | 1.390 | 34.0    | 19.8 | 129 E  | 48  | 61   | 7 0  | 11 51.82        | -12 22.8        | 2.270    | 2.404 | 24.9    | 21.3 | 85 E   | 19* | 75*  |
| 4 16                                | 9 47.64         | +3 52.7         | 0.505    | 1.336 | 40.0    | 19.8 | 121 E  | 49  | 60   | 7 5  | 11 57.97        | -12 9.8         | 2.316    | 2.387 | 24.9    | 21.4 | 81 E   | 17* | 73*  |
| 4 21                                | 9 35.87         | +4 27.6         | 0.492    | 1.282 | 46.0    | 19.8 | 113 E  | 49  | 60   | 7 10   | 12 4.09         | -12 1.0         | 2.361    | 2.370 | 24.8    | 21.4 | 78 E   | 16* | 71*  |
| 5 1                                 | 9 15.27         | +5 21.4         | 0.468    | 1.173 | 58.2    | 19.9 | 99 E   | 48* | 59   | 7 15   | 12 10.55        | -11 56.0        | 2.406    | 2.352 | 24.6    | 21.4 | 75 E   | 14* | 68*  |
| 5 11                                | 8 57.42         | +5 56.7         | 0.440    | 1.064 | 71.0    | 19.9 | 85 E   | 42* | 58*  | 7 20   | 12 17.31        | -11 54.6        | 2.449    | 2.335 | 24.4    | 21.4 | 72 E   | 13* | 65*  |

EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 20/21   | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | 45°-26° | 2020                               | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | 45°-26° |
|---|-----------------|-----------------|----------|-------|---------|------|--------|---------|------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|---------|
| <b>249091 2007 VV<sub>93</sub></b> (continuation) |                 |                 |          |       |         |      |        |         | <b>396795 2004 NJ<sub>8</sub></b>  |                 |                 |          |       |         |      |        |         |
| 10 18   | 15 1.06         | -16 34.8        | 2.878    | 1.997 | 11.1    | 21.0 | 23 E   | 4* 17*  | 2 11                               | 12 26.98        | -33 38.9        | 2.399    | 2.979 | 17.2    | 21.4 | 117 W  | 11 82   |
| 10 23   | 15 12.26        | -16 50.7        | 2.879    | 1.978 | 10.1    | 20.9 | 20 E   | 4* 14*  | 2 21                               | 12 21.60        | -34 45.3        | 2.291    | 2.973 | 15.8    | 21.2 | 125 W  | 10 81   |
| 10 28   | 15 23.68        | -17 5.0         | 2.878    | 1.959 | 9.1     | 20.9 | 18 E   | 3* 12*  | 3 2                                | 12 13.66        | -35 27.5        | 2.198    | 2.966 | 14.1    | 21.1 | 133 W  | 10 81   |
| 11 2  | 15 35.31        | -17 17.2        | 2.874    | 1.940 | 8.1     | 20.8 | 16 E   | 3* 9*   | 3 12                               | 12 3.70         | -35 40.4        | 2.125    | 2.958 | 12.4    | 20.9 | 140 W  | 9 80    |
| 11 7  | 15 47.15        | -17 27.2        | 2.868    | 1.921 | 7.1     | 20.7 | 14 E   | 3* 7*   | 3 22                               | 11 52.56        | -35 20.9        | 2.075    | 2.948 | 11.1    | 20.8 | 145 E  | 10 81   |
| 11 12   | 15 59.20        | -17 34.6        | 2.860    | 1.903 | 6.2     | 20.7 | 12 E   | 2* 4*   | 4 1                                | 11 41.40        | -34 29.4        | 2.050    | 2.938 | 10.7    | 20.8 | 147 E  | 11 82   |
| 11 17   | 16 11.46        | -17 39.3        | 2.850    | 1.884 | 5.2     | 20.6 | 10 E   | 2* 2*   | 4 11                               | 11 31.38        | -33 10.9        | 2.049    | 2.927 | 11.4    | 20.8 | 145 E  | 12 83   |
| 11 22   | 16 23.92        | -17 40.8        | 2.838    | 1.866 | 4.3     | 20.5 | 8 E    | 1*      | 4 21                               | 11 23.43        | -31 34.0        | 2.073    | 2.914 | 12.9    | 20.9 | 140 E  | 13 84   |
| 11 27   | 16 36.56        | -17 39.1        | 2.824    | 1.848 | 3.6     | 20.4 | 7 E    | —       | 5 1                                | 11 18.12        | -29 48.5        | 2.119    | 2.901 | 14.7    | 21.0 | 133 E  | 15 86   |
| 12 7  | 17 2.37         | -17 24.5        | 2.791    | 1.812 | 3.0     | 20.3 | 5 E    | —       | 5 11                               | 11 15.67        | -28 4.1         | 2.184    | 2.886 | 16.6    | 21.1 | 125 E  | 17 88   |
| 12 17   | 17 28.83        | -16 53.7        | 2.751    | 1.778 | 3.8     | 20.3 | 7 W    | —       | 5 21                               | 11 16.00        | -26 27.9        | 2.264    | 2.870 | 18.3    | 21.2 | 117 E  | 18* 90  |
| 12 27   | 17 55.83        | -16 5.2         | 2.707    | 1.746 | 5.5     | 20.3 | 10 W   | 4*      | 5 31                               | 11 18.90        | -25 4.9         | 2.356    | 2.854 | 19.6    | 21.3 | 109 E  | 17* 89  |
| 1 6   | 18 23.25        | -14 57.7        | 2.659    | 1.715 | 7.4     | 20.3 | 13 W   | 7*      | 6 10                               | 11 24.06        | -23 58.0        | 2.455    | 2.836 | 20.5    | 21.4 | 101 E  | 15* 88  |
| 1 16  | 18 50.99        | -13 30.5        | 2.608    | 1.686 | 9.3     | 20.3 | 16 W   | 9*      | <b>412976 1987 WC</b>              |                 |                 |          |       |         |      |        |         |
| <b>358604 2007 VQ<sub>3</sub></b>                 |                 |                 |          |       |         |      |        |         | 2 11                               | 12 27.29        | +35 41.4        | 0.760    | 1.622 | 25.0    | 21.4 | 136 W  | 81 28   |
| 2 11  | 12 25.04        | + 3 29.0        | 2.170    | 2.945 | 13.9    | 21.3 | 134 W  | 42 67   | 2 16                               | 12 20.92        | +36 59.6        | 0.749    | 1.630 | 23.3    | 21.3 | 139 W  | 82 27   |
| 2 21  | 12 20.90        | + 2 40.1        | 2.059    | 2.929 | 11.0    | 21.1 | 146 W  | 42 67   | 2 21                               | 12 12.81        | +38 10.1        | 0.741    | 1.638 | 21.8    | 21.3 | 142 W  | 83 26   |
| 3 2   | 12 14.60        | + 1 34.6        | 1.972    | 2.913 | 7.4     | 20.8 | 158 W  | 43 66   | 2 26                               | 12 3.18         | +39 8.6         | 0.738    | 1.645 | 20.8    | 21.2 | 144 W  | 84 25   |
| 3 12  | 12 6.62         | + 0 16.1        | 1.911    | 2.895 | 3.4     | 20.5 | 170 W  | 45 64   | 3 2                                | 11 52.40        | +39 51.4        | 0.740    | 1.651 | 20.3    | 21.2 | 145 W  | 85 24   |
| 3 22  | 11 57.69        | + 1 9.5         | 1.881    | 2.877 | 0.9     | 20.3 | 177 E  | 46 63   | 3 7                                | 11 40.96        | +40 15.7        | 0.746    | 1.657 | 20.4    | 21.3 | 144 W  | 85 24   |
| 3 27  | 11 53.14        | + 1 52.7        | 1.877    | 2.867 | 3.1     | 20.5 | 171 E  | 47 62   | 3 12                               | 11 29.41        | +40 20.0        | 0.757    | 1.662 | 21.1    | 21.3 | 143 W  | 85 24   |
| 4 1   | 11 48.71        | + 2 34.8        | 1.880    | 2.857 | 5.2     | 20.6 | 165 E  | 48 61   | 3 17                               | 11 18.27        | +40 4.4         | 0.772    | 1.666 | 22.2    | 21.4 | 141 E  | 85 24   |
| 4 6   | 11 44.51        | + 3 15.0        | 1.891    | 2.847 | 7.3     | 20.7 | 159 E  | 48 61   | 3 22                               | 11 8.02         | +39 30.1        | 0.792    | 1.670 | 23.6    | 21.5 | 138 E  | 85 24   |
| 4 11  | 11 40.64        | + 3 52.4        | 1.909    | 2.837 | 9.3     | 20.8 | 153 E  | 49 60   | 3 27                               | 10 59.04        | +38 39.3        | 0.816    | 1.673 | 25.2    | 21.6 | 134 E  | 84 25   |
| 4 16  | 11 37.18        | + 4 26.4        | 1.932    | 2.826 | 11.2    | 20.9 | 147 E  | 49 60   | 4 1                                | 10 51.57        | +37 34.7        | 0.844    | 1.676 | 26.9    | 21.8 | 131 E  | 83 26   |
| 4 21  | 11 34.22        | + 4 56.4        | 1.962    | 2.815 | 13.0    | 21.0 | 141 E  | 50 59   | 4 6                                | 10 45.70        | +36 19.3        | 0.875    | 1.678 | 28.5    | 21.9 | 127 E  | 81 28   |
| 4 26  | 11 31.81        | + 5 22.2        | 1.997    | 2.804 | 14.6    | 21.1 | 135 E  | 50 59   | 4 11                               | 10 41.41        | +34 55.7        | 0.908    | 1.680 | 30.0    | 22.0 | 123 E  | 80 29   |
| 5 1   | 11 29.99        | + 5 43.5        | 2.036    | 2.793 | 16.0    | 21.1 | 130 E  | 51 58   | <b>212188 2005 GX<sub>94</sub></b> |                 |                 |          |       |         |      |        |         |
| 5 6   | 11 28.77        | + 6 0.1         | 2.080    | 2.781 | 17.3    | 21.2 | 125 E  | 51 58   | 2 11                               | 12 27.99        | -10 5.2         | 2.361    | 3.096 | 14.0    | 21.4 | 131 W  | 35 74   |
| 5 11  | 11 28.16        | + 6 12.2        | 2.126    | 2.769 | 18.5    | 21.3 | 120 E  | 51 58   | 2 21                               | 12 24.24        | - 9 30.5        | 2.237    | 3.075 | 11.5    | 21.2 | 142 W  | 35 74   |
| 5 16  | 11 28.14        | + 6 19.8        | 2.175    | 2.757 | 19.4    | 21.4 | 115 E  | 51* 58  | 3 2                                | 12 18.42        | - 8 36.5        | 2.135    | 3.053 | 8.4     | 21.0 | 153 W  | 36 73   |
| 5 21  | 11 28.72        | + 6 23.1        | 2.227    | 2.745 | 20.3    | 21.4 | 110 E  | 51* 58  | 3 12                               | 12 10.96        | - 7 24.8        | 2.059    | 3.030 | 4.9     | 20.7 | 165 W  | 38 71   |
| <b>416301 2003 RL<sub>26</sub></b>                |                 |                 |          |       |         |      |        |         | 3 22                               | 12 2.48         | - 5 59.1        | 2.013    | 3.006 | 1.8     | 20.4 | 175 E  | 39 70   |
| 2 11  | 12 25.36        | -24 36.3        | 1.896    | 2.571 | 18.8    | 21.5 | 123 W  | 20 89   | 3 27                               | 11 58.12        | - 5 12.8        | 2.001    | 2.994 | 2.3     | 20.4 | 173 E  | 40 69   |
| 2 16  | 12 24.35        | -24 42.9        | 1.830    | 2.557 | 17.8    | 21.4 | 128 W  | 20 89   | 4 1                                | 11 53.83        | - 4 25.5        | 1.997    | 2.981 | 4.0     | 20.5 | 168 E  | 41 68   |
| 2 21  | 12 22.65        | -24 42.7        | 1.768    | 2.543 | 16.6    | 21.3 | 133 W  | 20 89   | 4 6                                | 11 49.72        | - 3 38.2        | 2.000    | 2.968 | 5.9     | 20.6 | 162 E  | 41 68   |
| 2 26  | 12 20.29        | -24 35.0        | 1.709    | 2.528 | 15.4    | 21.1 | 137 W  | 20 89   | 4 11                               | 11 45.89        | - 2 51.7        | 2.010    | 2.955 | 7.8     | 20.7 | 156 E  | 42 67   |
| 3 2   | 12 17.29        | -24 18.9        | 1.656    | 2.514 | 14.0    | 21.0 | 142 W  | 21 88   | 4 16                               | 11 42.42        | - 2 7.0         | 2.027    | 2.942 | 9.7     | 20.8 | 150 E  | 43 66   |
| 3 7   | 12 13.73        | -23 54.1        | 1.608    | 2.499 | 12.5    | 20.9 | 147 W  | 21 88   | 4 21                               | 11 39.40        | - 1 24.9        | 2.051    | 2.929 | 11.5    | 20.9 | 145 E  | 44 65   |
| 3 12  | 12 9.69         | -23 20.2        | 1.565    | 2.484 | 11.0    | 20.7 | 152 W  | 22 87   | 4 26                               | 11 36.88        | - 0 45.9        | 2.080    | 2.915 | 13.1    | 21.0 | 139 E  | 44 65   |
| 3 17  | 12 5.28         | -22 37.1        | 1.528    | 2.469 | 9.6     | 20.6 | 156 W  | 22 87   | 5 1                                | 11 34.91        | - 0 10.7        | 2.114    | 2.901 | 14.6    | 21.1 | 133 E  | 45 64   |
| 3 22  | 12 0.63         | -21 45.2        | 1.498    | 2.453 | 8.4     | 20.5 | 159 E  | 23 86   | 5 6                                | 11 33.51        | - 0 20.5        | 2.153    | 2.887 | 16.0    | 21.1 | 128 E  | 45 64   |
| 3 27  | 11 55.90        | -20 44.9        | 1.474    | 2.438 | 7.8     | 20.4 | 161 E  | 24 85   | 5 11                               | 11 32.69        | + 0 47.3        | 2.196    | 2.872 | 17.2    | 21.2 | 123 E  | 46 63   |
| 4 1   | 11 51.24        | -19 37.4        | 1.457    | 2.422 | 7.9     | 20.4 | 160 E  | 25 84   | 5 16                               | 11 32.46        | + 1 9.8         | 2.241    | 2.858 | 18.2    | 21.3 | 118 E  | 46* 63  |
| 4 6   | 11 46.83        | -18 24.2        | 1.447    | 2.406 | 8.8     | 20.4 | 158 E  | 27 82   | 5 21                               | 11 32.80        | + 1 27.9        | 2.290    | 2.843 | 19.1    | 21.3 | 113 E  | 46* 63  |
| 4 11  | 11 42.80        | -17 6.8         | 1.444    | 2.390 | 10.2    | 20.4 | 155 E  | 28 81   | 5 26                               | 11 33.70        | + 1 41.6        | 2.340    | 2.828 | 19.9    | 21.4 | 108 E  | 45* 62  |
| 4 16  | 11 39.27        | -15 47.1        | 1.447    | 2.374 | 11.9    | 20.5 | 151 E  | 29 80   | 5 31                               | 11 35.14        | + 1 51.0        | 2.392    | 2.812 | 20.5    | 21.5 | 104 E  | 44* 62  |
| 4 21  | 11 36.34        | -14 26.9        | 1.457    | 2.358 | 13.8    | 20.6 | 146 E  | 31 78   | <b>357355 2003 RV<sub>8</sub></b>  |                 |                 |          |       |         |      |        |         |
| 4 26  | 11 34.11        | -13 7.8         | 1.472    | 2.342 | 15.7    | 20.6 | 141 E  | 32 77   | 2 11                               | 12 31.72        | -14 12.0        | 2.045    | 2.762 | 16.4    | 21.3 | 128 W  | 31 78   |
| 5 1   | 11 32.61        | -11 51.6        | 1.493    | 2.325 | 17.5    | 20.7 | 136 E  | 33 76   | 2 21                               | 12 28.82        | -13 29.6        | 1.915    | 2.736 | 13.8    | 21.1 | 139 W  | 32 77   |
| 5 6   | 11 31.89        | -10 39.3        | 1.518    | 2.308 | 19.3    | 20.8 | 131 E  | 34 75   | 3 2                                | 12 23.50        | -12 20.6        | 1.806    | 2.710 | 10.5    | 20.8 | 150 W  | 33 76   |
| 5 11  | 11 31.92        | - 9 32.1        | 1.547    | 2.292 | 20.9    | 20.9 | 126 E  | 35 74   | 3 12                               | 12 16.17        | -10 45.1        | 1.721    | 2.682 | 6.7     | 20.5 | 162 W  | 34 75   |
| 5 16  | 11 32.71        | - 8 30.5        | 1.580    | 2.275 | 22.3    | 20.9 | 121 E  | 36 73   | 3 22                               | 12 7.49         | - 8 46.6        | 1.663    | 2.654 | 3.1     | 20.2 | 172 W  | 36 73   |
| 5 21  | 11 34.23        | - 7 35.1        | 1.615    | 2.258 | 23.6    | 21.0 | 117 E  | 37 72   | 3 27                               | 12 2.94         | - 7 40.9        | 1.646    | 2.639 | 2.8     | 20.2 | 173 E  | 37 72   |
| 5 26  | 11 36.46        | - 6 46.0        | 1.653    | 2.241 | 24.8    | 21.1 | 112 E  | 37* 71  | 4 1                                | 11 58.43        | - 6 32.7        | 1.636    | 2.624 | 4.2     | 20.2 | 169 E  | 38 71   |
| 5 31  | 11 39.36        | - 6 3.4         | 1.693    | 2.223 | 25.7    | 21.2 | 108 E  | 37* 70  | 4 6                                | 11 54.10        | - 5 23.4        | 1.634    | 2.609 | 6.3     | 20.3 | 163 E  | 40 69   |
| 6 5   | 11 42.88        | - 5 27.2        | 1.734    | 2.206 | 26.5    | 21.2 | 104 E  | 36* 69  | 4 11                               | 11 50.07        | - 4 14.4        | 1.639    | 2.594 | 8.5     | 20.4 | 158 E  | 41 68   |
| 6 10  | 11 46.98        | - 4 57.1        | 1.777    | 2.189 | 27.2    | 21.3 | 100 E  | 34* 69  | 4 16                               | 11 46.45        | - 3 7.2         | 1.651    | 2.578 | 10.6    | 20.5 | 152 E  | 42 67   |
| 6 15  | 11 51.63        | - 4 32.9        | 1.820    | 2.171 | 27.7    | 21.3 | 96 E   | 33* 69  | 4 21                               | 11 43.32        | - 2 2.8         | 1.669    | 2.563 | 12.8    | 20.6 | 146 E  | 43 66   |
| 6 20  | 11 56.78        | - 4 14.2        | 1.863    | 2.154 | 28.1    | 21.4 | 92 E   | 31* 68  | 4 26                               | 11 40.78        | - 1 2.6         | 1.693    | 2.547 | 14.7    | 20.7 | 140 E  | 44 65   |
| 6 25  | 12 2.41         | - 4 0.9         | 1.906    | 2.137 | 28.4    | 21.4 | 89 E   | 30* 68  | 5 1                                | 11 38.88        | - 0 7.1         | 1.722    | 2.531 | 16.5    | 20.8 | 134 E  | 45 64   |
| 6 30  | 12 8.49         | - 3 52.6        | 1.948    | 2.119 | 28.6    | 21.4 | 85 E   | 28* 68* | 5 6                                | 11 37.64        | + 0 42.8        | 1.755    | 2.514 | 18.2    | 20.9 | 129 E  | 46 63   |
| 7 5   | 12 14.97        | - 3 48.8        | 1.990    | 2.102 | 28.6    | 21.5 | 82 E   | 26* 67* | 5 11                               | 11 37.07        | + 1 27.0        | 1.792    | 2.498 | 19.7    | 20.9 | 124 E  | 46 63   |
| 7 10  | 12 21.83        | - 3 49.3        | 2.032    | 2.084 | 28.6    | 21.5 | 79 E   | 25* 66* | 5 16                               | 11 37.17        | + 2 5.3         | 1.833    | 2.481 | 21.0    | 21.0 | 119 E  | 47 62   |
| <b>340093 2005 WR<sub>56</sub></b>                |                 |                 |          |       |         |      |        |         | 5 21                               | 11 37.94        | + 2 37.6        | 1.876    | 2.464 | 22.1    | 21.1 | 114 E  | 47* 61  |
| 2 11  | 12 25.92        | + 4 24.3        | 1.943    | 2.747 | 14.2    | 21.  |        |         |                                    |                 |                 |          |       |         |      |        |         |

EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 2020                                | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | $45^\circ$ - $26^\circ$ | 2020  | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | $45^\circ$ - $26^\circ$ |
|-------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|-------------------------|---|-----------------|-----------------|----------|-------|---------|------|--------|-------------------------|
| <b>308273 2005 GL<sub>156</sub></b> |                 |                 |          |       |         |      |        |                         | <b>483483 2002 RR<sub>28</sub></b> (continuation) |                 |                 |          |       |         |      |        |                         |
| 2 11                                | 12 35.50        | -1 52.1         | 2.453    | 3.203 | 13.1    | 21.3 | 133 W  | 43 66                   | 5 11  | 11 23.25        | -5 23.9         | 1.692    | 2.394 | 20.8    | 21.1 | 123 E  | 40 69                   |
| 2 21                                | 12 31.42        | -1 19.0         | 2.325    | 3.177 | 10.6    | 21.1 | 144 W  | 44 65                   | 5 21  | 11 20.87        | -6 2.4          | 1.781    | 2.367 | 23.2    | 21.2 | 113 E  | 38* 70                  |
| 3 2                                 | 12 25.23        | -0 32.8         | 2.221    | 3.150 | 7.5     | 20.9 | 156 W  | 44 65                   | 5 31  | 11 21.56        | -6 51.9         | 1.878    | 2.339 | 24.9    | 21.4 | 104 E  | 35* 71                  |
| 3 12                                | 12 17.31        | +0 23.4         | 2.144    | 3.122 | 3.9     | 20.6 | 168 W  | 45 64                   | 6 10  | 11 24.99        | -7 52.4         | 1.977    | 2.310 | 25.9    | 21.5 | 96 E   | 29* 72                  |
| 3 22                                | 12 8.25         | +1 25.5         | 2.097    | 3.093 | 0.7     | 20.3 | 178 W  | 46 63                   | <b>289282 2004 XB<sub>167</sub></b>               |                 |                 |          |       |         |      |        |                         |
| 3 27                                | 12 3.54         | +1 56.9         | 2.085    | 3.078 | 2.2     | 20.4 | 173 E  | 47 62                   | 2 11  | 12 57.36        | +6 6.3          | 2.015    | 2.752 | 16.0    | 21.5 | 130 W  | 51 58                   |
| 4 1                                 | 11 58.86        | +2 27.6         | 2.080    | 3.062 | 4.2     | 20.5 | 167 E  | 47 62                   | 2 21  | 12 53.90        | +7 13.8         | 1.942    | 2.776 | 13.1    | 21.3 | 140 W  | 52 57                   |
| 4 6                                 | 11 54.33        | +2 56.9         | 2.083    | 3.047 | 6.1     | 20.6 | 161 E  | 48 61                   | 3 2   | 12 47.94        | +8 30.7         | 1.889    | 2.799 | 9.8     | 21.2 | 151 W  | 54 55                   |
| 4 11                                | 11 50.04        | +3 23.9         | 2.093    | 3.031 | 8.0     | 20.7 | 155 E  | 48 61                   | 3 12  | 12 39.98        | +9 50.0         | 1.862    | 2.821 | 6.5     | 21.0 | 161 W  | 55 54                   |
| 4 16                                | 11 46.09        | +3 48.3         | 2.110    | 3.015 | 9.9     | 20.8 | 149 E  | 49 60                   | 3 22  | 12 30.75        | +11 4.2         | 1.863    | 2.842 | 4.6     | 20.9 | 167 W  | 56 53                   |
| 4 21                                | 11 42.55        | +4 9.6          | 2.133    | 2.999 | 11.6    | 20.8 | 143 E  | 49 60                   | 4 1   | 12 21.20        | +12 5.7         | 1.893    | 2.862 | 6.0     | 21.0 | 163 E  | 57 52                   |
| 4 26                                | 11 39.50        | +4 27.3         | 2.161    | 2.982 | 13.2    | 20.9 | 138 E  | 49 60                   | 4 11  | 12 12.35        | +12 49.0        | 1.951    | 2.881 | 9.0     | 21.3 | 153 E  | 58 51                   |
| 5 1                                 | 11 36.98        | +4 41.3         | 2.195    | 2.965 | 14.6    | 21.0 | 132 E  | 50 59                   | 4 21  | 12 4.99         | +13 11.7        | 2.034    | 2.899 | 12.1    | 21.5 | 143 E  | 58 51                   |
| 5 6                                 | 11 35.03        | +4 51.4         | 2.232    | 2.948 | 15.9    | 21.1 | 127 E  | 50 59                   | <b>308128 2004 XK<sub>133</sub></b>               |                 |                 |          |       |         |      |        |                         |
| 5 11                                | 11 33.66        | +4 57.6         | 2.274    | 2.930 | 17.1    | 21.1 | 121 E  | 50 59                   | 2 11  | 12 57.61        | +2 48.7         | 2.195    | 2.917 | 15.3    | 21.5 | 129 W  | 48 61                   |
| 5 16                                | 11 32.87        | +4 59.9         | 2.318    | 2.913 | 18.1    | 21.2 | 116 E  | 50 59                   | 2 21  | 12 54.04        | +3 21.4         | 2.092    | 2.917 | 12.7    | 21.3 | 140 W  | 48 61                   |
| 5 21                                | 11 32.66        | +4 58.4         | 2.365    | 2.895 | 19.0    | 21.2 | 112 E  | 50* 59                  | 3 2   | 12 48.04        | +4 4.2          | 2.009    | 2.915 | 9.5     | 21.1 | 151 W  | 49 60                   |
| 5 26                                | 11 33.02        | +4 53.3         | 2.413    | 2.876 | 19.7    | 21.3 | 107 E  | 48* 59                  | 3 12  | 12 39.96        | +4 53.1         | 1.951    | 2.913 | 6.0     | 20.8 | 162 W  | 50 59                   |
| 5 31                                | 11 33.93        | +4 44.6         | 2.463    | 2.858 | 20.3    | 21.3 | 102 E  | 47* 59                  | 3 22  | 12 30.44        | +5 42.6         | 1.922    | 2.910 | 3.0     | 20.6 | 171 W  | 51 58                   |
| 6 5                                 | 11 35.37        | +4 32.6         | 2.514    | 2.839 | 20.7    | 21.4 | 98 E   | 44* 59                  | 4 1   | 12 20.38        | +6 26.7         | 1.922    | 2.906 | 4.2     | 20.7 | 168 E  | 51 58                   |
| 6 10                                | 11 37.31        | +4 17.4         | 2.565    | 2.820 | 21.1    | 21.4 | 94 E   | 42* 60                  | 4 11  | 12 10.77        | +6 59.8         | 1.952    | 2.902 | 7.7     | 20.9 | 157 E  | 52 57                   |
| 6 15                                | 11 39.71        | +3 59.2         | 2.616    | 2.801 | 21.3    | 21.5 | 90 E   | 39* 60                  | 4 21  | 12 2.49         | +7 18.5         | 2.008    | 2.896 | 11.2    | 21.1 | 146 E  | 52 57                   |
| 6 20                                | 11 42.56        | +3 38.3         | 2.666    | 2.781 | 21.4    | 21.5 | 86 E   | 36* 60                  | 5 1   | 11 56.18        | +7 21.1         | 2.087    | 2.889 | 14.3    | 21.3 | 135 E  | 52 57                   |
| <b>100933 1998 MK<sub>30</sub></b>  |                 |                 |          |       |         |      |        |                         | 5 11  | 11 52.19        | +7 7.7          | 2.184    | 2.881 | 16.8    | 21.5 | 125 E  | 52 57                   |
| 2 11                                | 12 46.23        | -7 45.7         | 2.851    | 3.542 | 12.7    | 21.4 | 128 W  | 37 72                   | <b>206999 2004 TJ<sub>220</sub></b>               |                 |                 |          |       |         |      |        |                         |
| 2 21                                | 12 42.41        | -7 20.2         | 2.735    | 3.540 | 10.6    | 21.2 | 139 W  | 38 71                   | 2 11  | 12 58.63        | +4 56.9         | 2.119    | 2.846 | 15.6    | 21.5 | 129 W  | 50 59                   |
| 3 2                                 | 12 36.75        | -6 41.4         | 2.641    | 3.537 | 7.9     | 21.0 | 150 W  | 38 71                   | 2 21  | 12 54.71        | +5 39.4         | 2.033    | 2.862 | 12.8    | 21.3 | 140 W  | 51 58                   |
| 3 12                                | 12 29.61        | -5 50.9         | 2.573    | 3.533 | 4.9     | 20.8 | 162 W  | 39 70                   | 3 2   | 12 48.34        | +6 30.9         | 1.969    | 2.877 | 9.6     | 21.1 | 151 W  | 52 57                   |
| 3 22                                | 12 21.50        | -4 51.7         | 2.535    | 3.528 | 1.6     | 20.6 | 174 W  | 40 69                   | 3 12  | 12 39.94        | +7 25.9         | 1.930    | 2.891 | 6.1     | 20.9 | 162 W  | 52 57                   |
| 4 1                                 | 12 13.09        | -3 48.1         | 2.528    | 3.521 | 2.1     | 20.6 | 173 E  | 41 68                   | 3 22  | 12 30.24        | +8 18.4         | 1.919    | 2.904 | 3.7     | 20.8 | 169 W  | 53 56                   |
| 4 11                                | 12 5.09         | -2 45.1         | 2.552    | 3.514 | 5.4     | 20.8 | 161 E  | 42 67                   | 4 1   | 12 20.17        | +9 2.0          | 1.938    | 2.916 | 5.0     | 20.9 | 165 E  | 54 55                   |
| 4 21                                | 11 58.12        | -1 47.6         | 2.605    | 3.506 | 8.5     | 21.0 | 149 E  | 43 66                   | 4 11  | 12 10.73        | +9 31.5         | 1.986    | 2.927 | 8.2     | 21.1 | 155 E  | 55 54                   |
| 5 1                                 | 11 52.67        | -0 59.4         | 2.684    | 3.497 | 11.1    | 21.2 | 138 E  | 44 65                   | 4 21  | 12 2.74         | +9 44.6         | 2.060    | 2.938 | 11.4    | 21.3 | 145 E  | 55 54                   |
| 5 11                                | 11 49.03        | -0 22.9         | 2.783    | 3.486 | 13.4    | 21.3 | 127 E  | 45 64                   | <b>326333 2000 KX<sub>4</sub></b>                 |                 |                 |          |       |         |      |        |                         |
| 5 21                                | 11 47.31        | +0 0.8          | 2.897    | 3.475 | 15.0    | 21.5 | 117 E  | 45* 64                  | 2 11  | 12 59.26        | +9 9.7          | 2.478    | 3.202 | 13.7    | 21.5 | 130 W  | 54 55                   |
| <b>397131 2005 WS<sub>56</sub></b>  |                 |                 |          |       |         |      |        |                         | 2 21  | 12 56.31        | +10 6.4         | 2.345    | 3.169 | 11.5    | 21.3 | 140 W  | 55 54                   |
| 2 11                                | 12 54.03        | -13 31.1        | 2.095    | 2.765 | 17.3    | 21.4 | 123 W  | 31 78                   | 3 2   | 12 51.06        | +11 11.6        | 2.234    | 3.135 | 9.0     | 21.0 | 150 W  | 56 53                   |
| 2 21                                | 12 51.14        | -13 36.7        | 1.980    | 2.760 | 14.9    | 21.2 | 134 W  | 31 78                   | 3 12  | 12 43.74        | +12 20.2        | 2.149    | 3.100 | 6.5     | 20.8 | 159 W  | 57 52                   |
| 3 2                                 | 12 45.68        | -13 23.6        | 1.884    | 2.755 | 11.9    | 21.0 | 145 W  | 32 77                   | 3 22  | 12 34.80        | +13 25.6        | 2.093    | 3.063 | 5.1     | 20.7 | 164 W  | 58 51                   |
| 3 12                                | 12 37.98        | -12 50.9        | 1.810    | 2.749 | 8.3     | 20.8 | 156 W  | 32 77                   | 4 1   | 12 25.00        | +14 20.8        | 2.065    | 3.026 | 6.3     | 20.7 | 161 E  | 59 50                   |
| 3 22                                | 12 28.66        | -12 0.0         | 1.761    | 2.742 | 4.6     | 20.5 | 167 W  | 33 76                   | 4 11  | 12 15.27        | +14 59.9        | 2.067    | 2.988 | 9.1     | 20.8 | 152 E  | 60 49                   |
| 4 1                                 | 12 18.66        | -10 54.7        | 1.742    | 2.734 | 3.1     | 20.4 | 171 E  | 34 75                   | 4 21  | 12 6.48         | +15 19.2        | 2.094    | 2.949 | 12.2    | 20.9 | 142 E  | 60 49                   |
| 4 6                                 | 12 13.76        | -10 18.8        | 1.743    | 2.730 | 4.4     | 20.5 | 168 E  | 35 74                   | 5 1   | 11 59.39        | +15 17.5        | 2.143    | 2.909 | 15.1    | 21.0 | 131 E  | 60 49                   |
| 4 11                                | 12 9.08         | -9 42.0         | 1.752    | 2.725 | 6.3     | 20.6 | 163 E  | 35 74                   | 5 11  | 11 54.49        | +14 55.8        | 2.210    | 2.867 | 17.5    | 21.1 | 121 E  | 60 49                   |
| 4 16                                | 12 4.75         | -9 5.1          | 1.767    | 2.720 | 8.2     | 20.7 | 157 E  | 36 73                   | 5 21  | 11 51.99        | +14 16.3        | 2.289    | 2.825 | 19.4    | 21.2 | 112 E  | 59* 50                  |
| 4 21                                | 12 0.88         | -8 29.3         | 1.789    | 2.715 | 10.2    | 20.8 | 152 E  | 37 72                   | 5 31  | 11 51.89        | +13 21.6        | 2.376    | 2.781 | 20.8    | 21.3 | 103 E  | 56* 51                  |
| 4 26                                | 11 57.53        | -7 55.3         | 1.817    | 2.710 | 12.0    | 20.9 | 146 E  | 37 72                   | 6 10  | 11 54.07        | +12 14.1        | 2.466    | 2.737 | 21.7    | 21.4 | 94 E   | 51* 52                  |
| 5 1                                 | 11 54.79        | -7 23.9         | 1.850    | 2.704 | 13.7    | 21.0 | 140 E  | 38 71                   | 6 20  | 11 58.32        | +10 56.1        | 2.556    | 2.691 | 22.1    | 21.5 | 86 E   | 44* 53                  |
| 5 6                                 | 11 52.67        | -6 55.8         | 1.889    | 2.698 | 15.3    | 21.1 | 135 E  | 38 71                   | 6 30  | 12 4.44         | +9 29.2         | 2.644    | 2.645 | 22.2    | 21.5 | 79 E   | 38* 54*                 |
| 5 11                                | 11 51.21        | -6 31.2         | 1.931    | 2.692 | 16.8    | 21.2 | 130 E  | 38 71                   | <b>244689 2003 PW<sub>5</sub></b>                 |                 |                 |          |       |         |      |        |                         |
| 5 16                                | 11 50.39        | -6 10.6         | 1.978    | 2.685 | 18.0    | 21.3 | 125 E  | 39 70                   | 2 11  | 13 10.53        | -11 34.2        | 1.716    | 2.377 | 20.9    | 21.3 | 121 W  | 33 76                   |
| 5 21                                | 11 50.22        | -5 54.0         | 2.028    | 2.679 | 19.1    | 21.3 | 120 E  | 39* 70                  | 2 21  | 13 11.66        | -11 51.5        | 1.580    | 2.345 | 18.7    | 21.0 | 130 W  | 33 76                   |
| 5 26                                | 11 50.68        | -5 41.5         | 2.080    | 2.672 | 20.1    | 21.4 | 115 E  | 39* 70                  | 3 2   | 13 9.91         | -11 49.9        | 1.458    | 2.312 | 15.7    | 20.7 | 141 W  | 33 76                   |
| <b>515010 2009 SK<sub>2</sub></b>   |                 |                 |          |       |         |      |        |                         | 3 12  | 13 5.19         | -11 27.5        | 1.354    | 2.280 | 11.8    | 20.4 | 152 W  | 34 75                   |
| 2 11                                | 12 54.89        | +57 58.6        | 1.369    | 2.076 | 23.6    | 22.3 | 123 W  | 77 6                    | 3 22  | 12 57.76        | -10 43.8        | 1.273    | 2.246 | 7.2     | 20.0 | 164 W  | 34 75                   |
| 2 16                                | 12 46.61        | +59 15.5        | 1.334    | 2.053 | 23.6    | 22.2 | 124 W  | 76 5                    | 4 1   | 12 48.35        | -9 40.9         | 1.216    | 2.213 | 2.4     | 19.6 | 175 W  | 35 74                   |
| 2 21                                | 12 35.65        | +60 24.7        | 1.303    | 2.029 | 23.8    | 22.1 | 124 W  | 75 4                    | 4 6   | 12 43.27        | -9 4.2          | 1.197    | 2.196 | 2.3     | 19.6 | 175 E  | 36 73                   |
| 2 26                                | 12 21.98        | +61 21.9        | 1.275    | 2.005 | 24.2    | 22.1 | 124 W  | 74 3                    | 4 11  | 12 38.18        | -8 25.5         | 1.185    | 2.179 | 4.6     | 19.7 | 170 E  | 37 72                   |
| 3 2                                 | 12 5.82         | +62 2.5         | 1.252    | 1.979 | 24.7    | 22.0 | 124 W  | 73 2                    | 4 16  | 12 33.26        | -7 45.9         | 1.179    | 2.162 | 7.3     | 19.8 | 164 E  | 37 72                   |
| 3 7                                 | 11 47.72        | +62 22.0        | 1.232    | 1.954 | 25.4    | 22.0 | 123 W  | 73 2                    | 4 21  | 12 28.66        | -7 6.7          | 1.179    | 2.145 | 10.1    | 19.9 | 158 E  | 38 71                   |
| 3 12                                | 11 28.54        | +62 17.4        | 1.217    | 1.927 | 26.2    | 21.9 | 121 E  | 73 2                    | 4 26  | 12 24.58        | -6 29.3         | 1.186    | 2.128 | 12.8    | 20.0 | 152 E  | 39 70                   |
| 3 17                                | 11 9.30         | +61 46.9        | 1.205    | 1.900 | 27.2    | 21.9 | 119 E  | 73 2                    | 5 1   | 12 21.13        | -5 54.9         | 1.197    | 2.110 | 15.4    | 20.1 | 146 E  | 39 70                   |
| 3 22                                | 10 51.06        | +60 50.4        | 1.198    | 1.873 | 28.3    | 21.9 | 117 E  | 74 3                    | 5 6   | 12 18.42        | -5 24.5         | 1.213    | 2.093 | 17.8    | 20.2 | 141 E  | 40 69                   |
| 3 27                                | 10 34.67        | +59 29.8        | 1.194    | 1.845 | 29.5    | 21.9 | 114 E  | 76 5                    | 5 11  | 12 16.51        | -4 58.8         | 1.234    | 2.076 | 20.0    | 20.2 | 135 E  | 40 69                   |
| 4 1                                 | 10 20.68        | +57 47.9        | 1.194    | 1.816 | 30.8    | 21.9 | 111 E  | 77 6                    | 5 21  | 12 15.22        | -4 23.3         | 1.285    | 2.042 | 23.9    | 20.4 | 125 E  | 41 68                   |
| 4 6                                 | 10 9.29         | +55 48.6        | 1.196    | 1.786 | 32.1    | 21.9 | 108 E  | 79 8                    | 5 31  | 12 17.34        | -4 10.2         | 1.347    | 2.008 | 27.0    | 20.6 | 116 E  | 40* 68                  |
| <b>483483 2002 RR<sub>28</sub></b>  |                 |                 |          |       |         |      |        |                         |   |                 |                 |          |       |         |      |        |                         |

EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 20/21                              | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | $45^\circ$ | $-26^\circ$ | 20/21                              | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | $45^\circ$ | $-26^\circ$ |
|------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|------------|-------------|------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|------------|-------------|
| <b>244689 2003 PW<sub>5</sub></b>  |                 |                 |          |       |         |      |        |            |             | <b>204627 2005 WK<sub>54</sub></b> |                 |                 |          |       |         |      |        |            |             |
| <i>(continuation)</i>              |                 |                 |          |       |         |      |        |            |             | <i>(continuation)</i>              |                 |                 |          |       |         |      |        |            |             |
| 9 8                                | 14 48.70        | -15 27.8        | 2.006    | 1.718 | 30.1    | 21.2 | 59 E   | 15*        | 53*         | 5 21                               | 12 20.03        | -6 59.7         | 1.396    | 2.163 | 21.9    | 20.5 | 127 E  | 38         | 71          |
| 9 18                               | 15 12.86        | -16 57.7        | 2.058    | 1.698 | 29.1    | 21.2 | 55 E   | 14*        | 49*         | 5 31                               | 12 20.18        | -6 35.2         | 1.461    | 2.128 | 25.0    | 20.6 | 117 E  | 38*        | 71          |
| 9 28                               | 15 38.32        | -18 20.2        | 2.108    | 1.680 | 27.9    | 21.2 | 52 E   | 14*        | 45*         | 6 10                               | 12 23.50        | -6 31.5         | 1.534    | 2.092 | 27.4    | 20.8 | 109 E  | 36*        | 71          |
| 10 8                               | 16 4.98         | -19 32.2        | 2.156    | 1.665 | 26.5    | 21.2 | 48 E   | 14*        | 42*         | 6 20                               | 12 29.70        | -6 47.2         | 1.610    | 2.056 | 29.1    | 20.9 | 101 E  | 33*        | 71          |
| 10 18                              | 16 32.74        | -20 30.7        | 2.203    | 1.654 | 25.2    | 21.2 | 45 E   | 13*        | 38*         | 6 30                               | 12 38.48        | -7 20.5         | 1.687    | 2.020 | 30.2    | 21.0 | 93 E   | 29*        | 71          |
| 10 28                              | 17 1.44         | -21 13.2        | 2.249    | 1.645 | 23.7    | 21.2 | 42 E   | 13*        | 35*         | 7 10                               | 12 49.52        | -8 8.9          | 1.763    | 1.983 | 30.8    | 21.0 | 87 E   | 25*        | 72*         |
| 11 7                               | 17 30.88        | -21 37.4        | 2.293    | 1.639 | 22.1    | 21.1 | 39 E   | 13*        | 31*         | 7 20                               | 13 2.58         | -9 10.2         | 1.837    | 1.946 | 31.0    | 21.1 | 80 E   | 22*        | 70*         |
| 11 17                              | 18 0.83         | -21 41.5        | 2.338    | 1.636 | 20.5    | 21.1 | 35 E   | 13*        | 27*         | 7 30                               | 13 17.47        | -10 21.9        | 1.906    | 1.910 | 30.9    | 21.1 | 75 E   | 19*        | 67*         |
| 11 27                              | 18 31.04        | -21 24.7        | 2.382    | 1.636 | 18.8    | 21.1 | 32 E   | 13*        | 23*         | 8 9                                | 13 34.04        | -11 41.8        | 1.970    | 1.873 | 30.5    | 21.1 | 69 E   | 17*        | 63*         |
| 12 7                               | 19 1.23         | -20 46.7        | 2.427    | 1.640 | 17.1    | 21.1 | 29 E   | 13*        | 20*         | 8 19                               | 13 52.19        | -13 7.3         | 2.030    | 1.837 | 29.8    | 21.2 | 65 E   | 15*        | 58*         |
| 12 17                              | 19 31.17        | -19 48.1        | 2.471    | 1.647 | 15.3    | 21.1 | 26 E   | 13*        | 16*         | 8 29                               | 14 11.87        | -14 36.2        | 2.083    | 1.802 | 29.0    | 21.1 | 60 E   | 13*        | 54*         |
| 12 27                              | 20 0.65         | -18 30.3        | 2.515    | 1.657 | 13.5    | 21.1 | 23 E   | 12*        | 12*         | 9 8                                | 14 33.03        | -16 5.8         | 2.131    | 1.767 | 28.0    | 21.1 | 55 E   | 12*        | 49*         |
| 1 6                                | 20 29.49        | -16 55.2        | 2.559    | 1.669 | 11.6    | 21.1 | 20 E   | 11*        | 8*          | 9 18                               | 14 55.67        | -17 33.4        | 2.173    | 1.734 | 26.9    | 21.1 | 51 E   | 12*        | 45*         |
| 1 16                               | 20 57.59        | -15 5.0         | 2.602    | 1.685 | 9.8     | 21.0 | 17 E   | 9*         | 5*          | 9 28                               | 15 19.78        | -18 56.4        | 2.211    | 1.702 | 25.7    | 21.1 | 47 E   | 11*        | 41*         |
| <b>446876 2002 AB<sub>30</sub></b> |                 |                 |          |       |         |      |        |            |             | <b>298747 2004 GU<sub>76</sub></b> |                 |                 |          |       |         |      |        |            |             |
| 2 11                               | 13 11.42        | +1 58.0         | 1.586    | 2.302 | 20.5    | 21.4 | 125 W  | 47         | 62          | 2 11                               | 13 25.15        | +2 45.5         | 1.788    | 2.459 | 19.9    | 21.3 | 122 W  | 48         | 61          |
| 2 21                               | 13 9.66         | +3 7.0          | 1.524    | 2.337 | 17.1    | 21.3 | 136 W  | 48         | 61          | 2 21                               | 13 26.12        | +3 33.0         | 1.656    | 2.431 | 17.6    | 21.0 | 132 W  | 49         | 60          |
| 3 2                                | 13 4.81         | +4 30.7         | 1.479    | 2.372 | 13.2    | 21.1 | 147 W  | 50         | 59          | 3 2                                | 13 24.17        | +4 37.5         | 1.540    | 2.401 | 14.7    | 20.8 | 142 W  | 50         | 59          |
| 3 12                               | 12 57.32        | +6 2.1          | 1.456    | 2.406 | 9.0     | 20.9 | 158 W  | 51         | 58          | 3 12                               | 13 19.21        | +5 55.4         | 1.444    | 2.370 | 11.2    | 20.5 | 152 W  | 51         | 58          |
| 3 22                               | 12 48.04        | +7 31.6         | 1.459    | 2.439 | 5.4     | 20.8 | 167 W  | 53         | 56          | 3 17                               | 13 15.66        | +6 37.6         | 1.405    | 2.355 | 9.4     | 20.3 | 157 W  | 52         | 57          |
| 4 1                                | 12 38.10        | +8 49.5         | 1.489    | 2.472 | 5.4     | 20.9 | 167 E  | 54         | 55          | 3 27                               | 13 11.46        | +7 20.4         | 1.372    | 2.339 | 7.7     | 20.2 | 162 W  | 52         | 57          |
| 4 11                               | 12 28.75        | +9 47.9         | 1.546    | 2.504 | 8.6     | 21.1 | 158 E  | 55         | 54          | 3 27                               | 13 6.73         | +8 2.7          | 1.345    | 2.323 | 6.4     | 20.1 | 165 W  | 53         | 56          |
| 4 21                               | 12 20.99        | +10 22.8        | 1.629    | 2.535 | 12.3    | 21.4 | 148 E  | 55         | 54          | 4 1                                | 13 1.58         | +8 43.0         | 1.325    | 2.307 | 6.1     | 20.0 | 166 W  | 54         | 55          |
| <b>129813 1999 NJ</b>              |                 |                 |          |       |         |      |        |            |             | <b>458734 2011 OC<sub>3</sub></b>  |                 |                 |          |       |         |      |        |            |             |
| 2 11                               | 13 13.08        | +1 21.8         | 1.885    | 2.577 | 18.4    | 21.3 | 125 W  | 46         | 63          | 2 11                               | 13 31.17        | -2 16.3         | 1.534    | 2.193 | 23.1    | 21.4 | 119 W  | 43         | 66          |
| 2 21                               | 13 13.02        | +2 2.8          | 1.754    | 2.549 | 16.0    | 21.0 | 135 W  | 47         | 62          | 2 21                               | 13 35.05        | -1 43.3         | 1.408    | 2.166 | 20.9    | 21.2 | 128 W  | 43         | 66          |
| 3 2                                | 13 10.18        | +2 59.9         | 1.640    | 2.520 | 12.9    | 20.7 | 145 W  | 48         | 61          | 3 2                                | 13 35.99        | -0 49.0         | 1.295    | 2.139 | 17.9    | 20.8 | 138 W  | 44         | 65          |
| 3 12                               | 13 4.62         | +4 9.6          | 1.548    | 2.490 | 9.3     | 20.4 | 156 W  | 49         | 60          | 3 12                               | 13 33.74        | +0 25.3         | 1.199    | 2.112 | 14.1    | 20.5 | 149 W  | 45         | 64          |
| 3 17                               | 13 0.92         | +4 47.4         | 1.511    | 2.474 | 7.4     | 20.3 | 161 W  | 50         | 59          | 3 22                               | 13 28.31        | +1 55.2         | 1.123    | 2.085 | 9.8     | 20.2 | 159 W  | 47         | 62          |
| 3 22                               | 12 56.68        | +5 26.0         | 1.481    | 2.459 | 5.7     | 20.2 | 166 W  | 50         | 59          | 3 27                               | 13 24.54        | +2 43.5         | 1.094    | 2.071 | 7.7     | 20.0 | 164 W  | 48         | 61          |
| 3 27                               | 12 52.04        | +6 4.3          | 1.457    | 2.443 | 4.5     | 20.1 | 169 W  | 51         | 58          | 4 1                                | 13 20.20        | +3 32.3         | 1.070    | 2.057 | 6.0     | 19.9 | 168 W  | 49         | 60          |
| 4 1                                | 12 47.12        | +6 41.0         | 1.440    | 2.428 | 4.6     | 20.0 | 169 W  | 52         | 57          | 4 6                                | 13 15.47        | +4 19.8         | 1.053    | 2.044 | 5.6     | 19.8 | 169 W  | 49         | 60          |
| 4 6                                | 12 42.07        | +7 14.9         | 1.430    | 2.412 | 5.9     | 20.1 | 166 E  | 52         | 57          | 4 11                               | 13 10.50        | +5 4.5          | 1.042    | 2.030 | 6.6     | 19.8 | 166 E  | 50         | 59          |
| 4 11                               | 12 37.06        | +7 45.1         | 1.426    | 2.396 | 7.9     | 20.1 | 161 E  | 53         | 56          | 4 16                               | 13 5.49         | +5 44.8         | 1.037    | 2.016 | 8.7     | 19.9 | 162 E  | 51         | 58          |
| 4 16                               | 12 32.22        | +8 10.5         | 1.429    | 2.380 | 10.0    | 20.2 | 156 E  | 53         | 56          | 4 21                               | 13 0.63         | +6 19.3         | 1.037    | 2.002 | 11.2    | 20.0 | 157 E  | 51         | 58          |
| 4 21                               | 12 27.72        | +8 30.6         | 1.439    | 2.363 | 12.2    | 20.3 | 150 E  | 54         | 55          | 4 26                               | 12 56.12        | +6 47.0         | 1.043    | 1.988 | 13.8    | 20.1 | 152 E  | 52         | 57          |
| 5 1                                | 12 20.20        | +8 52.8         | 1.473    | 2.331 | 16.4    | 20.5 | 139 E  | 54         | 55          | 5 1                                | 12 52.14        | +7 7.0          | 1.055    | 1.975 | 16.4    | 20.2 | 146 E  | 52         | 57          |
| 5 11                               | 12 15.28        | +8 50.3         | 1.525    | 2.297 | 20.0    | 20.6 | 129 E  | 54         | 55          |                                    |                 |                 |          |       |         |      |        |            |             |
| 5 21                               | 12 13.27        | +8 24.6         | 1.591    | 2.263 | 23.0    | 20.8 | 119 E  | 53         | 56          |                                    |                 |                 |          |       |         |      |        |            |             |
| 5 31                               | 12 14.23        | +7 38.2         | 1.665    | 2.229 | 25.3    | 20.9 | 110 E  | 52*        | 56          |                                    |                 |                 |          |       |         |      |        |            |             |
| 6 10                               | 12 17.99        | +6 34.2         | 1.745    | 2.195 | 26.9    | 21.0 | 102 E  | 48*        | 57          |                                    |                 |                 |          |       |         |      |        |            |             |
| 6 20                               | 12 24.26        | +5 15.4         | 1.827    | 2.161 | 28.0    | 21.1 | 95     | 43*        | 59          |                                    |                 |                 |          |       |         |      |        |            |             |
| 6 30                               | 12 32.78        | +3 44.3         | 1.909    | 2.126 | 28.5    | 21.2 | 88     | 38*        | 60          |                                    |                 |                 |          |       |         |      |        |            |             |
| 7 10                               | 12 43.28        | +2 3.0          | 1.989    | 2.091 | 28.7    | 21.3 | 81 E   | 33*        | 62*         |                                    |                 |                 |          |       |         |      |        |            |             |
| 7 20                               | 12 55.52        | +0 13.3         | 2.065    | 2.057 | 28.5    | 21.3 | 75 E   | 28*        | 61*         |                                    |                 |                 |          |       |         |      |        |            |             |
| 7 30                               | 13 9.36         | +1 43.0         | 2.137    | 2.023 | 28.1    | 21.3 | 70 E   | 25*        | 59*         |                                    |                 |                 |          |       |         |      |        |            |             |
| 8 9                                | 13 24.65        | +3 44.4         | 2.204    | 1.989 | 27.4    | 21.3 | 64     | 22*        | 56*         |                                    |                 |                 |          |       |         |      |        |            |             |
| 8 19                               | 13 41.29        | +5 49.4         | 2.265    | 1.956 | 26.5    | 21.3 | 59     | 19*        | 52*         |                                    |                 |                 |          |       |         |      |        |            |             |
| 8 29                               | 13 59.25        | +7 56.2         | 2.320    | 1.924 | 25.4    | 21.3 | 55     | 17*        | 48*         |                                    |                 |                 |          |       |         |      |        |            |             |
| 9 8                                | 14 18.48        | -10 3.1         | 2.370    | 1.892 | 24.2    | 21.3 | 50 E   | 15*        | 44*         |                                    |                 |                 |          |       |         |      |        |            |             |
| 9 18                               | 14 38.99        | -12 8.3         | 2.414    | 1.862 | 22.8    | 21.3 | 46 E   | 14*        | 40*         |                                    |                 |                 |          |       |         |      |        |            |             |
| 9 28                               | 15 0.77         | -14 9.7         | 2.453    | 1.833 | 21.4    | 21.2 | 42 E   | 12*        | 35*         |                                    |                 |                 |          |       |         |      |        |            |             |
| 10 8                               | 15 23.83        | -16 4.9         | 2.486    | 1.805 | 19.9    | 21.2 | 38     | 11*        | 31*         |                                    |                 |                 |          |       |         |      |        |            |             |
| 10 18                              | 15 48.16        | -17 51.8        | 2.515    | 1.779 | 18.3    | 21.1 | 34     | 10*        | 28*         |                                    |                 |                 |          |       |         |      |        |            |             |
| 10 28                              | 16 13.75        | -19 27.7        | 2.539    | 1.755 | 16.6    | 21.0 | 30 E   | 9*         | 24*         |                                    |                 |                 |          |       |         |      |        |            |             |
| 11 7                               | 16 40.52        | -20 50.1        | 2.559    | 1.733 | 14.9    | 21.0 | 27 E   | 8*         | 20*         |                                    |                 |                 |          |       |         |      |        |            |             |
| 11 17                              | 17 8.41         | -21 56.5        | 2.576    | 1.713 | 13.2    | 20.9 | 23 E   | 7*         | 16*         |                                    |                 |                 |          |       |         |      |        |            |             |
| 11 27                              | 17 37.25        | -22 44.5        | 2.590    | 1.696 | 11.4    | 20.8 | 20 E   | 6*         | 12*         |                                    |                 |                 |          |       |         |      |        |            |             |
| 12 7                               | 18 6.87         | -23 12.4        | 2.602    | 1.681 | 9.6     | 20.7 | 17 E   | 4*         | 9*          |                                    |                 |                 |          |       |         |      |        |            |             |
| 12 17                              | 18 37.04        | -23 18.7        | 2.612    | 1.669 | 7.8     | 20.7 | 13 E   | 3*         | 6*          |                                    |                 |                 |          |       |         |      |        |            |             |
| 12 27                              | 19 7.50         | -23 2.8         | 2.620    | 1.661 | 6.0     | 20.6 | 10 E   | 1*         | 3*          |                                    |                 |                 |          |       |         |      |        |            |             |
| 1 6                                | 19 37.98        | -22 24.8        | 2.627    | 1.655 | 4.2     | 20.5 | 7 E    | —          | —           |                                    |                 |                 |          |       |         |      |        |            |             |
| 1 16                               | 20 8.25         | -21 25.6        | 2.632    | 1.652 | 2.4     | 20.4 | 4 E    | —          | —           |                                    |                 |                 |          |       |         |      |        |            |             |
| <b>204627 2005 WK<sub>54</sub></b> |                 |                 |          |       |         |      |        |            |             | <b>458734 2011 OC<sub>3</sub></b>  |                 |                 |          |       |         |      |        |            |             |
| 2 11                               | 13 24.02        | -13 27.2        | 1.866    | 2.474 | 20.8    | 21.3 | 117 W  | 32         | 77          | 2 11                               | 13 31.17        | -2 16.3         | 1.534    | 2.193 | 23.1    | 21.4 | 119 W  | 43         | 66          |
| 2 21                               | 13 24.94        | -13 51.3        | 1.725    | 2.447 | 18.9    | 21.1 | 127 W  | 31         | 78          | 2 21                               | 13 35.05        | -1 43.3         | 1.408    | 2.166 | 20.9    | 21.2 | 128 W  | 43         | 66          |
| 3 2                                | 13 22.99        | -13 58.5        | 1.598    | 2.419 | 16.2    | 20.8 | 137 W  | 31         | 78          | 3 2                                | 13 35.99        | -0 49.0         | 1.295    | 2.139 | 17.9    | 20.8 | 138 W  | 44         | 65          |
| 3 12                               | 13 18.04        | -13 46.5        | 1.489    | 2.390 | 12.7    | 20.5 | 148 W  | 31         | 78          | 3 12                               | 13 33.74        | +0 25.3         | 1.199    | 2.112 | 14.1    | 20.5 | 149 W  | 45         | 64          |
| 3 22                               | 13 10.27        | -13 14.0        | 1.400    | 2.360 | 8.5     | 20.2 | 160 W  | 32         | 77          | 3 22                               | 13 28.31        | +1 55.2         | 1.123    | 2.085 | 9.8     | 20.2 | 159 W  | 47         | 62          |
| 4 1                                | 13 0.32         | -12 21.7        | 1.337    | 2.329 | 3.9     | 19.8 | 171 W  | 33         | 76          | 3 27                               | 13 24.54        | +2 43.5         | 1.094    | 2.071 | 7.7     | 20.0 | 164 W  | 48         | 61          |
| 4 6                                | 12 54.87        | -11 49.4        | 1.316    | 2.314 | 2.4     | 19.7 | 174 E  | 33         | 76          | 4 1                                | 13 20.20        | +3 32.3         | 1.070    | 2.057 | 6.0     | 19.9 | 168 W  | 49         | 60          |
| 4 11                               | 12 49.32        | -11 14.1        | 1.301    | 2.298 | 3.4     | 19.7 | 172 E  | 34         | 75          | 4 6                                | 13 15.47        | +4 19.8         | 1.053    | 2.044 | 5.6     | 19.8 | 169 W  | 49         | 60          |
| 4 16                               | 12 43.84        | -10 36.9        | 1.293    | 2.282 | 5.7     | 19.8 | 167 E  | 34         | 75          | 4 11                               | 13 10.50        | +5 4.5          | 1.042    | 2.030 | 6.6     | 19.8 | 166 E  | 50         | 59          |
| 4 21                               | 12 38.62        | -9 59.0         | 1.291    | 2.265 | 8.3     | 19.9 | 161 E  | 35         | 74          | 4 16                               | 13 5.49         | +5 44.8         | 1.037    | 2.016 | 8.7     | 19.9 | 162 E  | 51         | 58          |
| 4 26                               | 12 33.82        | -9 21.7         | 1.296    | 2.249 | 10.9    | 20.0 | 15     |            |             |                                    |                 |                 |          |       |         |      |        |            |             |

EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 20/21                              | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | 45° | -26° | 20/21                              | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | 45° | -26° |
|------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|-----|------|------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|-----|------|
| <b>458734 2011 OC<sub>3</sub></b>  |                 |                 |          |       |         |      |        |     |      | <b>496436 2014 LZ<sub>26</sub></b> |                 |                 |          |       |         |      |        |     |      |
| <i>(continuation)</i>              |                 |                 |          |       |         |      |        |     |      | <i>(continuation)</i>              |                 |                 |          |       |         |      |        |     |      |
| 5 11                               | 12 46.27        | +7 22.8         | 1.090    | 1.947 | 21.1    | 20.4 | 136 E  | 52  | 57   | 5 6                                | 12 48.63        | -20 19.7        | 0.914    | 1.859 | 15.6    | 19.3 | 150 E  | 25  | 84   |
| 5 21                               | 12 43.67        | +7 7.1          | 1.139    | 1.920 | 25.1    | 20.6 | 126 E  | 52  | 57   | 5 11                               | 12 44.42        | -19 27.0        | 0.913    | 1.835 | 18.4    | 19.4 | 145 E  | 26  | 83   |
| 5 31                               | 12 44.57        | +6 23.0         | 1.199    | 1.894 | 28.4    | 20.7 | 117 E  | 51* | 58   | 5 16                               | 12 41.17        | -18 35.1        | 0.917    | 1.811 | 21.2    | 19.4 | 140 E  | 26  | 83   |
| 6 10                               | 12 48.83        | +5 15.0         | 1.264    | 1.868 | 30.8    | 20.9 | 110 E  | 49* | 59   | 5 21                               | 12 38.99        | -17 45.6        | 0.925    | 1.787 | 23.8    | 19.5 | 135 E  | 27  | 82   |
| 6 20                               | 12 56.10        | +3 47.6         | 1.334    | 1.843 | 32.6    | 21.0 | 102 E  | 45* | 60   | 5 26                               | 12 37.93        | -17 0.0         | 0.936    | 1.763 | 26.3    | 19.6 | 129 E  | 28  | 81   |
| 6 30                               | 13 6.07         | +2 4.5          | 1.406    | 1.818 | 33.8    | 21.1 | 96     | 40* | 62   | 5 31                               | 12 38.02        | -16 19.4        | 0.950    | 1.739 | 28.6    | 19.7 | 125 E  | 29* | 80   |
| 7 10                               | 13 18.38        | +0 9.4          | 1.478    | 1.795 | 34.5    | 21.2 | 90     | 36* | 64   | 6 10                               | 12 41.53        | -15 16.2        | 0.982    | 1.693 | 32.7    | 19.8 | 116 E  | 28* | 79   |
| 7 20                               | 13 32.76        | +1 54.7         | 1.549    | 1.773 | 34.8    | 21.3 | 85 E   | 32* | 66*  | 6 20                               | 12 49.21        | -14 38.2        | 1.020    | 1.647 | 35.9    | 19.9 | 108 E  | 27* | 79   |
| 7 30                               | 13 48.99        | +4 5.2          | 1.619    | 1.752 | 34.8    | 21.4 | 80 E   | 29* | 66*  | 6 30                               | 13 0.67         | -14 25.0        | 1.059    | 1.602 | 38.5    | 20.0 | 101 E  | 25* | 78   |
| 8 9                                | 14 6.89         | -6 19.1         | 1.687    | 1.733 | 34.5    | 21.5 | 75 E   | 26* | 65*  | 7 10                               | 13 15.51        | -14 33.8        | 1.098    | 1.560 | 40.5    | 20.1 | 95 E   | 22* | 79   |
| <b>276785 2004 KA<sub>1</sub></b>  |                 |                 |          |       |         |      |        |     |      | <b>496436 2014 LZ<sub>26</sub></b> |                 |                 |          |       |         |      |        |     |      |
| 2 11                               | 13 34.84        | +14 31.1        | 1.309    | 2.015 | 24.5    | 21.4 | 122 W  | 60  | 49   | 7 20                               | 13 33.36        | -15 0.8         | 1.136    | 1.519 | 42.0    | 20.1 | 90 E   | 21* | 79*  |
| 2 21                               | 13 36.46        | +16 11.9        | 1.222    | 2.012 | 21.9    | 21.2 | 131 W  | 61  | 48   | 7 30                               | 13 54.01        | -15 41.8        | 1.171    | 1.482 | 43.0    | 20.2 | 85 E   | 19* | 77*  |
| 3 2                                | 13 34.10        | +18 7.3         | 1.150    | 2.007 | 18.9    | 21.0 | 139 W  | 63  | 46   | 8 9                                | 14 17.20        | -16 32.0        | 1.205    | 1.448 | 43.8    | 20.2 | 81 E   | 18* | 74*  |
| 3 12                               | 13 27.62        | +20 5.7         | 1.096    | 2.002 | 15.9    | 20.8 | 147 W  | 65  | 44   | 8 19                               | 14 42.79        | -17 26.6        | 1.236    | 1.417 | 44.2    | 20.2 | 77 E   | 18* | 71*  |
| 3 22                               | 13 17.41        | +21 52.0        | 1.062    | 1.995 | 13.8    | 20.6 | 152 W  | 67  | 42   | 8 29                               | 15 10.64        | -18 20.4        | 1.267    | 1.392 | 44.3    | 20.2 | 74 E   | 18* | 68*  |
| 4 1                                | 13 4.61         | +23 8.8         | 1.049    | 1.987 | 13.8    | 20.6 | 152 W  | 68  | 41   | 9 8                                | 15 40.56        | -19 8.1         | 1.297    | 1.371 | 44.3    | 20.3 | 72 E   | 18* | 66*  |
| 4 11                               | 12 51.03        | +23 42.8        | 1.059    | 1.978 | 15.9    | 20.7 | 147 E  | 69  | 40   | 9 18                               | 16 12.33        | -19 44.4        | 1.328    | 1.356 | 44.0    | 20.3 | 70 E   | 19* | 63*  |
| 4 21                               | 12 38.60        | +23 29.2        | 1.090    | 1.968 | 19.2    | 20.8 | 140 E  | 68  | 41   | 9 28                               | 16 45.68        | -20 4.5         | 1.361    | 1.347 | 43.4    | 20.3 | 68 E   | 20* | 61*  |
| 5 1                                | 12 28.92        | +22 30.9        | 1.138    | 1.957 | 22.6    | 21.0 | 132 E  | 68  | 41   | 10 8                               | 17 20.22        | -20 4.2         | 1.398    | 1.344 | 42.7    | 20.3 | 66 E   | 21* | 59*  |
| 5 11                               | 12 22.86        | +20 56.6        | 1.199    | 1.945 | 25.8    | 21.2 | 123 E  | 66  | 43   | 10 18                              | 17 55.51        | -19 40.6        | 1.439    | 1.347 | 41.7    | 20.4 | 64 E   | 22* | 57*  |
| 5 21                               | 12 20.59        | +18 55.6        | 1.272    | 1.933 | 28.3    | 21.4 | 115 E  | 64  | 45   | 10 28                              | 18 31.10        | -18 52.3        | 1.485    | 1.357 | 40.6    | 20.4 | 63 E   | 24* | 54*  |
| <b>96080 7649 P-L</b>              |                 |                 |          |       |         |      |        |     |      | <b>496436 2014 LZ<sub>26</sub></b> |                 |                 |          |       |         |      |        |     |      |
| 2 11                               | 13 36.37        | -6 44.1         | 2.084    | 2.675 | 19.3    | 21.3 | 117 W  | 38  | 71   | 11 12                              | 19 23.97        | -16 54.1        | 1.568    | 1.382 | 38.6    | 20.5 | 60 E   | 26* | 50*  |
| 2 21                               | 13 37.35        | -6 31.6         | 1.943    | 2.654 | 17.4    | 21.1 | 127 W  | 38  | 71   | 11 17                              | 19 41.27        | -16 3.4         | 1.599    | 1.393 | 37.8    | 20.6 | 60 E   | 27* | 48*  |
| 3 2                                | 13 35.68        | -6 3.2          | 1.817    | 2.631 | 14.9    | 20.8 | 137 W  | 39  | 70   | 11 22                              | 19 58.35        | -15 7.7         | 1.632    | 1.405 | 37.0    | 20.6 | 59 E   | 28* | 46*  |
| 3 12                               | 13 31.32        | -5 19.2         | 1.709    | 2.607 | 11.6    | 20.6 | 148 W  | 40  | 69   | 11 27                              | 20 15.16        | -14 7.5         | 1.667    | 1.418 | 36.2    | 20.6 | 58 E   | 29* | 44*  |
| 3 22                               | 13 24.41        | -4 21.5         | 1.624    | 2.583 | 7.6     | 20.3 | 160 W  | 41  | 68   | 12 2                               | 20 31.68        | -13 3.1         | 1.703    | 1.433 | 35.3    | 20.7 | 57 E   | 30* | 42*  |
| 3 27                               | 13 20.16        | -3 48.7         | 1.591    | 2.570 | 5.4     | 20.1 | 166 W  | 41  | 68   | 12 7                               | 20 47.90        | -11 55.1        | 1.742    | 1.449 | 34.4    | 20.7 | 56 E   | 31* | 40*  |
| 4 1                                | 13 15.50        | -3 14.3         | 1.564    | 2.557 | 3.3     | 19.9 | 172 W  | 42  | 67   | 12 12                              | 21 3.80         | -10 44.1        | 1.782    | 1.465 | 33.5    | 20.8 | 55 E   | 32* | 38*  |
| 4 6                                | 13 10.56        | -2 39.2         | 1.545    | 2.544 | 1.8     | 19.8 | 175 W  | 42  | 67   | 12 17                              | 21 19.40        | -9 30.4         | 1.824    | 1.483 | 32.6    | 20.8 | 54 E   | 33* | 36*  |
| 4 11                               | 13 5.49         | -2 4.4          | 1.533    | 2.531 | 2.8     | 19.8 | 173 E  | 43  | 66   | 12 22                              | 21 34.68        | -8 14.6         | 1.868    | 1.501 | 31.6    | 20.9 | 53 E   | 34* | 34*  |
| 4 16                               | 13 0.41         | -1 30.7         | 1.528    | 2.517 | 5.0     | 19.9 | 167 E  | 43  | 66   | 12 27                              | 21 49.64        | -6 57.1         | 1.913    | 1.521 | 30.7    | 20.9 | 52 E   | 34* | 32*  |
| 4 21                               | 12 55.49        | -0 59.3         | 1.530    | 2.504 | 7.3     | 20.0 | 162 E  | 44  | 65   | 1 1                                | 22 4.29         | -5 38.4         | 1.959    | 1.541 | 29.7    | 21.0 | 51 E   | 35* | 30*  |
| 4 26                               | 12 50.86        | -0 30.9         | 1.538    | 2.490 | 9.6     | 20.1 | 156 E  | 44  | 65   | 1 6                                | 22 18.64        | -4 18.8         | 2.007    | 1.561 | 28.7    | 21.0 | 50 E   | 35* | 28*  |
| 5 1                                | 12 46.65        | -0 6.3          | 1.553    | 2.475 | 11.9    | 20.2 | 150 E  | 45  | 64   | 1 11                               | 22 32.72        | -2 58.9         | 2.056    | 1.582 | 27.6    | 21.1 | 48 E   | 35* | 26*  |
| <b>496436 2014 LZ<sub>26</sub></b> |                 |                 |          |       |         |      |        |     |      | <b>466220 2012 TO<sub>5</sub></b>  |                 |                 |          |       |         |      |        |     |      |
| 5 11                               | 12 39.89        | +0 29.2         | 1.598    | 2.447 | 15.9    | 20.4 | 138 E  | 45  | 64   | 2 11                               | 13 38.95        | +7 17.0         | 2.178    | 2.803 | 17.8    | 21.4 | 120 W  | 52  | 57   |
| 5 21                               | 12 35.74        | +0 45.1         | 1.662    | 2.417 | 19.4    | 20.6 | 128 E  | 46  | 63   | 2 21                               | 13 39.53        | +7 54.0         | 2.026    | 2.761 | 16.1    | 21.1 | 129 W  | 53  | 56   |
| 5 31                               | 12 34.42        | +0 41.0         | 1.738    | 2.386 | 22.1    | 20.8 | 118 E  | 46* | 63   | 3 2                                | 13 37.48        | +8 42.0         | 1.891    | 2.718 | 13.8    | 20.8 | 139 W  | 54  | 55   |
| 6 10                               | 12 35.89        | +0 18.3         | 1.823    | 2.355 | 24.1    | 20.9 | 109 E  | 43* | 64   | 3 12                               | 13 32.69        | +9 37.3         | 1.775    | 2.674 | 11.1    | 20.6 | 149 W  | 55  | 54   |
| 6 20                               | 12 39.93        | +0 20.8         | 1.913    | 2.323 | 25.5    | 21.0 | 100 E  | 39* | 64   | 3 22                               | 13 25.25        | +10 34.0        | 1.683    | 2.630 | 8.4     | 20.3 | 157 W  | 56  | 53   |
| 6 30                               | 12 46.31        | -1 14.2         | 2.005    | 2.291 | 26.3    | 21.1 | 93     | 35* | 65   | 3 27                               | 13 20.67        | +11 0.6         | 1.646    | 2.607 | 7.4     | 20.2 | 160 W  | 56  | 53   |
| 7 10                               | 12 54.76        | -2 19.7         | 2.096    | 2.258 | 26.7    | 21.2 | 86 E   | 31* | 66*  | 4 1                                | 13 15.64        | +11 24.6        | 1.616    | 2.585 | 6.9     | 20.1 | 162 W  | 56  | 53   |
| 7 20                               | 13 5.04         | -3 35.1         | 2.184    | 2.224 | 26.6    | 21.2 | 79 E   | 27* | 66*  | 4 6                                | 13 10.29        | +11 44.8        | 1.593    | 2.562 | 7.1     | 20.1 | 162 W  | 57  | 52   |
| 7 30                               | 13 16.97        | -4 58.8         | 2.267    | 2.190 | 26.3    | 21.3 | 73 E   | 23* | 63*  | 4 11                               | 13 4.74         | +12 0.5         | 1.576    | 2.539 | 8.0     | 20.1 | 159 E  | 57  | 52   |
| 8 9                                | 13 30.39        | -6 28.9         | 2.344    | 2.156 | 25.6    | 21.3 | 67 E   | 20* | 59*  | 4 16                               | 12 59.16        | +12 10.8        | 1.567    | 2.516 | 9.4     | 20.1 | 156 E  | 57  | 52   |
| 8 19                               | 13 45.18        | -8 3.6          | 2.419    | 2.121 | 24.7    | 21.3 | 61 E   | 18* | 59*  | 4 21                               | 12 53.68        | +12 15.1        | 1.563    | 2.492 | 11.1    | 20.1 | 151 E  | 57  | 52   |
| 8 29                               | 14 1.29         | -9 41.6         | 2.479    | 2.086 | 23.6    | 21.3 | 56 E   | 16* | 49*  | 5 1                                | 12 43.66        | +12 4.2         | 1.574    | 2.445 | 14.8    | 20.3 | 142 E  | 57  | 52   |
| 9 8                                | 14 18.63        | -11 21.0        | 2.535    | 2.051 | 22.3    | 21.3 | 51 E   | 14* | 44*  | 5 11                               | 12 35.71        | +11 27.5        | 1.606    | 2.398 | 18.4    | 20.4 | 132 E  | 56  | 53   |
| 9 18                               | 14 37.20        | -13 0.2         | 2.584    | 2.016 | 20.9    | 21.2 | 46 E   | 13* | 40*  | 5 21                               | 12 30.43        | +10 27.1        | 1.654    | 2.350 | 21.5    | 20.5 | 122 E  | 55  | 54   |
| 9 28                               | 14 56.98        | -14 37.4        | 2.624    | 1.981 | 19.4    | 21.2 | 41 E   | 11* | 35*  | 5 31                               | 12 28.12        | +9 6.4          | 1.713    | 2.301 | 24.0    | 20.6 | 113 E  | 54* | 55   |
| 10 8                               | 15 17.97        | -16 10.7        | 2.656    | 1.947 | 17.8    | 21.1 | 37 E   | 10* | 30*  | 6 10                               | 12 28.76        | +7 29.1         | 1.779    | 2.253 | 25.9    | 20.7 | 104 E  | 50* | 57   |
| 10 18                              | 15 40.16        | -17 38.0        | 2.681    | 1.912 | 16.1    | 21.0 | 32 E   | 9*  | 26*  | 6 20                               | 12 32.17        | +5 38.3         | 1.849    | 2.204 | 27.3    | 20.8 | 96 E   | 44* | 58   |
| 10 28                              | 16 3.55         | -18 57.4        | 2.699    | 1.879 | 14.3    | 20.9 | 28 E   | 8*  | 21*  | 6 30                               | 12 38.11        | +3 36.4         | 1.919    | 2.155 | 28.1    | 20.8 | 89 E   | 38* | 60   |
| 11 7                               | 16 28.10        | -20 6.4         | 2.709    | 1.846 | 12.5    | 20.8 | 24 E   | 7*  | 17*  | 7 10                               | 12 46.31        | +1 25.5         | 1.988    | 2.106 | 28.6    | 20.9 | 82 E   | 33* | 62*  |
| 11 17                              | 16 53.78        | -21 3.0         | 2.713    | 1.814 | 10.6    | 20.7 | 20 E   | 5*  | 13*  | 7 20                               | 12 56.56        | -0 52.9         | 2.053    | 2.058 | 28.6    | 20.9 | 76 E   | 28* | 62*  |
| 11 27                              | 17 20.51        | -21 44.9        | 2.712    | 1.784 | 8.8     | 20.6 | 16 E   | 4*  | 8*   | 7 30                               | 13 8.68         | -3 17.5         | 2.114    | 2.010 | 28.4    | 20.9 | 70 E   | 23* | 60*  |
| 12 7                               | 17 48.15        | -22 10.1        | 2.705    | 1.755 | 6.9     | 20.5 | 12 E   | 2*  | 5*   | 8 9                                | 13 22.53        | -5 47.1         | 2.169    | 1.962 | 27.8    | 20.9 | 65 E   | 20* | 57*  |
| 12 17                              | 18 16.60        | -22 16.9        | 2.694    | 1.727 | 4.9     | 20.4 | 9 E    | 1*  | 1*   | 8 19                               | 13 38.04        | -8 20.5         | 2.218    | 1.916 | 27.1    | 20.9 | 60 E   | 17* | 53*  |
| 12 27                              | 18 45.64        | -22 4.0         | 2.679    | 1.702 | 3.0     | 20.2 | 5 E    | —   | —    | 8 29                               | 13 55.18        | -10 56.4        | 2.261    | 1.871 | 26.2    | 20.8 | 55 E   | 14* | 49*  |
| 1 6                                | 19 15.08        | -21 30.6        | 2.661    | 1.678 | 1.2     | 20.0 | 2 E    | —   | —    | 9 8                                | 14 13.94        | -13 33.0        | 2.298    | 1.827 | 25.1    | 20.8 | 50 E   | 12* | 44*  |
| 1 16                               | 19 44.73        | -20 36.5        | 2.640    | 1.657 | 0.9     | 19.9 | 2 W    | —   | —    | 9 18                               | 14 34.37        | -16 8.7         | 2.328    | 1.785 | 23.9    | 20.7 | 46 E   | 10* | 40*  |



EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 2020                    | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | 45° | -26° | 2020                    | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | 45° | -26° |
|-------------------------|-----------------|-----------------|----------|-------|---------|------|--------|-----|------|-------------------------|-----------------|-----------------|----------|-------|---------|------|--------|-----|------|
| <b>307984 2004 QV13</b> |                 |                 |          |       |         |      |        |     |      | <b>401994 2003 BS27</b> |                 |                 |          |       |         |      |        |     |      |
| 2 11                    | 13 39.67        | -39 18.2        | 2.622    | 2.985 | 18.9    | 21.4 | 102 W  | 6   | 77   | 2 11                    | 13 45.29        | -1 45.1         | 2.199    | 2.778 | 18.6    | 21.5 | 116 W  | 43  | 66   |
| 2 16                    | 13 39.84        | -40 7.4         | 2.560    | 2.985 | 18.6    | 21.4 | 106 W  | 5   | 76   | 2 21                    | 13 45.05        | -0 47.3         | 2.116    | 2.816 | 16.4    | 21.4 | 126 W  | 44  | 65   |
| 2 21                    | 13 39.31        | -40 53.8        | 2.500    | 2.985 | 18.1    | 21.3 | 110 W  | 4   | 75   | 3 2                     | 13 42.25        | +0 24.5         | 2.048    | 2.854 | 13.7    | 21.2 | 137 W  | 45  | 64   |
| 2 26                    | 13 38.04        | -41 36.8        | 2.443    | 2.985 | 17.6    | 21.2 | 114 W  | 3   | 74   | 3 12                    | 13 37.08        | +1 46.4         | 2.000    | 2.891 | 10.5    | 21.1 | 148 W  | 47  | 62   |
| 3 2                     | 13 36.01        | -42 15.7        | 2.388    | 2.985 | 17.0    | 21.2 | 118 W  | 3   | 74   | 3 22                    | 13 29.95        | +3 12.7         | 1.976    | 2.927 | 7.1     | 20.9 | 159 W  | 48  | 61   |
| 3 7                     | 13 33.21        | -42 49.8        | 2.336    | 2.984 | 16.4    | 21.1 | 122 W  | 2   | 73   | 4 1                     | 13 21.53        | +4 36.6         | 1.980    | 2.962 | 4.5     | 20.8 | 167 W  | 50  | 59   |
| 3 12                    | 13 29.67        | -43 18.3        | 2.288    | 2.983 | 15.6    | 21.0 | 126 W  | 2   | 73   | 4 11                    | 13 12.70        | +5 50.7         | 2.014    | 2.996 | 4.7     | 20.9 | 166 E  | 51  | 58   |
| 3 17                    | 13 25.42        | -43 40.6        | 2.244    | 2.982 | 14.8    | 21.0 | 130 W  | 1   | 72   | 4 21                    | 13 4.32         | +6 49.6         | 2.076    | 3.029 | 7.3     | 21.1 | 157 E  | 52  | 57   |
| 3 22                    | 13 20.53        | -43 55.7        | 2.204    | 2.980 | 14.0    | 20.9 | 134 W  | 1   | 72   | 5 1                     | 12 57.15        | +7 29.8         | 2.165    | 3.061 | 10.3    | 21.4 | 147 E  | 52  | 57   |
| 3 27                    | 13 15.10        | -44 3.1         | 2.170    | 2.978 | 13.2    | 20.8 | 137 W  | 1   | 72   | <b>154658 2004 FA18</b> |                 |                 |          |       |         |      |        |     |      |
| 4 1                     | 13 9.26         | -44 2.2         | 2.140    | 2.976 | 12.5    | 20.8 | 140 W  | 1   | 72   | 2 11                    | 13 52.07        | +15 13.2        | 0.870    | 1.594 | 33.1    | 21.4 | 118 W  | 60  | 49   |
| 4 6                     | 13 3.18         | -43 52.8        | 2.117    | 2.974 | 11.8    | 20.7 | 143 W  | 1   | 72   | 2 16                    | 13 50.64        | +15 56.2        | 0.825    | 1.595 | 31.3    | 21.2 | 123 W  | 61  | 48   |
| 4 11                    | 12 57.00        | -43 34.9        | 2.099    | 2.972 | 11.3    | 20.7 | 144 E  | 1   | 72   | 2 21                    | 13 47.55        | +16 45.8        | 0.783    | 1.595 | 29.2    | 21.1 | 128 W  | 62  | 47   |
| 4 16                    | 12 50.92        | -43 8.9         | 2.087    | 2.969 | 11.0    | 20.6 | 145 E  | 2   | 73   | 2 26                    | 13 42.62        | +17 41.0        | 0.743    | 1.594 | 26.9    | 20.9 | 133 W  | 63  | 46   |
| 4 21                    | 12 45.08        | -42 35.3        | 2.082    | 2.966 | 11.0    | 20.6 | 146 E  | 2   | 73   | 3 2                     | 13 35.65        | +18 39.9        | 0.706    | 1.591 | 24.3    | 20.7 | 139 W  | 64  | 45   |
| 4 26                    | 12 39.66        | -41 54.9        | 2.082    | 2.963 | 11.3    | 20.6 | 145 E  | 3   | 74   | 3 7                     | 13 26.55        | +19 40.0        | 0.673    | 1.587 | 21.6    | 20.5 | 144 W  | 65  | 44   |
| 5 1                     | 12 34.77        | -41 9.0         | 2.089    | 2.959 | 11.7    | 20.7 | 143 E  | 4   | 75   | 3 12                    | 13 15.27        | +20 37.6        | 0.645    | 1.582 | 18.9    | 20.3 | 149 W  | 66  | 43   |
| 5 6                     | 12 30.53        | -40 18.8        | 2.101    | 2.955 | 12.4    | 20.7 | 141 E  | 5   | 76   | 3 17                    | 13 1.94         | +21 28.6        | 0.623    | 1.575 | 16.7    | 20.1 | 153 W  | 66  | 43   |
| 5 11                    | 12 27.00        | -39 25.5        | 2.119    | 2.951 | 13.1    | 20.7 | 138 E  | 6   | 77   | 3 22                    | 12 46.85        | +22 8.0         | 0.606    | 1.567 | 15.5    | 20.0 | 155 W  | 67  | 42   |
| 5 16                    | 12 24.22        | -38 30.6        | 2.143    | 2.947 | 14.0    | 20.8 | 135 E  | 6   | 77   | 3 27                    | 12 30.54        | +22 31.2        | 0.596    | 1.558 | 15.8    | 20.0 | 155 W  | 68  | 41   |
| 5 21                    | 12 22.21        | -37 35.1        | 2.171    | 2.943 | 14.9    | 20.9 | 132 E  | 7   | 78   | 4 1                     | 12 13.74        | +22 35.1        | 0.592    | 1.547 | 17.6    | 20.0 | 152 E  | 68  | 41   |
| 5 26                    | 12 20.98        | -36 40.3        | 2.205    | 2.938 | 15.8    | 20.9 | 128 E  | 8   | 79   | 4 6                     | 11 57.21        | +22 18.2        | 0.594    | 1.535 | 20.6    | 20.1 | 147 E  | 67  | 42   |
| 5 31                    | 12 20.50        | -35 47.1        | 2.242    | 2.933 | 16.6    | 21.0 | 124 E  | 9   | 80   | 4 11                    | 11 41.68        | +21 41.6        | 0.603    | 1.522 | 24.1    | 20.2 | 142 E  | 67  | 42   |
| 6 5                     | 12 20.75        | -34 56.3        | 2.283    | 2.928 | 17.4    | 21.0 | 120 E  | 9   | 81   | 4 16                    | 11 27.68        | +20 47.9        | 0.616    | 1.507 | 27.7    | 20.4 | 136 E  | 66  | 43   |
| 6 10                    | 12 21.68        | -34 8.6         | 2.327    | 2.922 | 18.2    | 21.1 | 116 E  | 9   | 82   | 4 21                    | 11 15.60        | +19 40.3        | 0.634    | 1.491 | 31.3    | 20.5 | 130 E  | 65  | 44   |
| 6 15                    | 12 23.25        | -33 24.3        | 2.374    | 2.916 | 18.8    | 21.2 | 112 E  | 9   | 83   | 4 26                    | 11 5.58         | +18 22.4        | 0.655    | 1.473 | 34.7    | 20.7 | 124 E  | 63  | 46   |
| 6 20                    | 12 25.44        | -32 43.9        | 2.424    | 2.910 | 19.3    | 21.2 | 108 E  | 8   | 83   | 5 1                     | 10 57.64        | +16 57.2        | 0.679    | 1.454 | 37.8    | 20.8 | 118 E  | 62  | 47   |
| 6 25                    | 12 28.18        | -32 7.4         | 2.475    | 2.904 | 19.8    | 21.3 | 105 E  | 7   | 84   | 5 6                     | 10 51.66        | +15 27.3        | 0.704    | 1.434 | 40.5    | 20.9 | 112 E  | 60  | 49   |
| 6 30                    | 12 31.45        | -31 35.2        | 2.528    | 2.897 | 20.2    | 21.3 | 101 E  | 6   | 84   | 5 11                    | 10 47.44        | +13 54.4        | 0.730    | 1.412 | 43.0    | 21.0 | 107 E  | 59  | 50   |
| 7 5                     | 12 35.21        | -31 7.1         | 2.582    | 2.891 | 20.4    | 21.4 | 97 E   | 5   | 85   | 5 16                    | 10 44.81        | +12 19.7        | 0.757    | 1.389 | 45.2    | 21.1 | 103 E  | 56  | 52   |
| 7 10                    | 12 39.40        | -30 43.0        | 2.637    | 2.884 | 20.6    | 21.4 | 93 E   | 4   | 85   | 5 21                    | 10 43.56        | +10 43.8        | 0.783    | 1.365 | 47.2    | 21.2 | 98 E   | 52  | 53   |
| 7 15                    | 12 44.01        | -30 22.9        | 2.693    | 2.876 | 20.7    | 21.5 | 90 E   | 3   | 80*  | 5 26                    | 10 43.54        | +9 7.0          | 0.808    | 1.339 | 49.0    | 21.3 | 94 E   | 48  | 55   |
| <b>234145 2000 EW70</b> |                 |                 |          |       |         |      |        |     |      | <b>133090 2003 MS9</b>  |                 |                 |          |       |         |      |        |     |      |
| 2 11                    | 13 41.25        | -17 46.2        | 0.333    | 1.151 | 53.0    | 21.2 | 111 W  | 27  | 82   | 2 11                    | 13 55.22        | -13 12.1        | 2.723    | 3.198 | 16.9    | 21.5 | 110 W  | 32  | 77   |
| 2 16                    | 13 58.47        | -18 49.8        | 0.296    | 1.134 | 53.8    | 20.9 | 112 W  | 26  | 83   | 2 21                    | 13 55.58        | -13 14.8        | 2.575    | 3.187 | 15.6    | 21.3 | 120 W  | 32  | 77   |
| 2 21                    | 14 18.67        | -19 50.9        | 0.261    | 1.115 | 55.1    | 20.6 | 112 W  | 25  | 84   | 3 2                     | 13 53.69        | -13 4.8         | 2.440    | 3.175 | 13.7    | 21.1 | 131 W  | 32  | 77   |
| 2 26                    | 14 43.18        | -20 46.8        | 0.227    | 1.095 | 57.1    | 20.3 | 112 W  | 24  | 85   | 3 12                    | 13 49.52        | -12 41.5        | 2.322    | 3.162 | 11.2    | 20.9 | 142 W  | 32  | 77   |
| 3 2                     | 15 14.03        | -21 31.5        | 0.196    | 1.073 | 60.4    | 20.1 | 110 W  | 23  | 86   | 3 22                    | 13 43.22        | -12 4.9         | 2.226    | 3.148 | 8.2     | 20.7 | 153 W  | 33  | 76   |
| 3 4                     | 15 28.75        | -21 43.5        | 0.184    | 1.064 | 62.2    | 20.0 | 108 W  | 23  | 86   | 4 1                     | 13 35.17        | -11 16.6        | 2.156    | 3.132 | 4.7     | 20.4 | 165 W  | 34  | 75   |
| 3 6                     | 15 45.13        | -21 50.1        | 0.173    | 1.055 | 64.3    | 19.9 | 107 W  | 23  | 86   | 4 11                    | 13 26.03        | -10 19.5        | 2.115    | 3.116 | 0.9     | 20.1 | 177 W  | 35  | 74   |
| 3 8                     | 16 3.39         | -21 49.5        | 0.163    | 1.045 | 66.8    | 19.8 | 104 W  | 23  | 86   | 4 16                    | 13 21.31        | -9 49.1         | 2.105    | 3.107 | 1.3     | 20.2 | 176 E  | 35  | 74   |
| 3 10                    | 16 23.72        | -21 39.3        | 0.154    | 1.036 | 69.8    | 19.8 | 102 W  | 23  | 86   | 4 21                    | 13 16.63        | -9 18.4         | 2.104    | 3.098 | 3.2     | 20.3 | 170 E  | 36  | 73   |
| 3 12                    | 16 46.23        | -21 16.4        | 0.145    | 1.026 | 73.2    | 19.7 | 99 W   | 24  | 85   | 4 26                    | 13 12.10        | -8 48.0         | 2.110    | 3.089 | 5.2     | 20.4 | 164 E  | 36  | 73   |
| 3 14                    | 17 10.93        | -20 37.6        | 0.138    | 1.016 | 77.1    | 19.7 | 95 W   | 24  | 84*  | 5 1                     | 13 7.82         | -8 18.7         | 2.123    | 3.080 | 7.0     | 20.5 | 158 E  | 37  | 72   |
| 3 16                    | 17 37.64        | -19 40.0        | 0.132    | 1.005 | 81.6    | 19.8 | 91 W   | 25  | 82*  | 5 11                    | 13 0.38         | -7 26.0         | 2.168    | 3.060 | 10.6    | 20.7 | 146 E  | 38  | 71   |
| 3 18                    | 18 5.97         | -18 21.5        | 0.128    | 0.995 | 86.4    | 19.9 | 86 W   | 26  | 77*  | 5 21                    | 12 54.83        | -6 44.1         | 2.238    | 3.039 | 13.6    | 20.8 | 135 E  | 38  | 71   |
| 3 20                    | 18 35.28        | -16 42.2        | 0.126    | 0.984 | 91.6    | 20.0 | 81 W   | 26  | 72*  | 5 31                    | 12 51.47        | -6 15.8         | 2.325    | 3.018 | 16.1    | 21.0 | 125 E  | 39  | 70   |
| 3 22                    | 19 4.80         | -14 44.8        | 0.125    | 0.974 | 96.9    | 20.2 | 76 W   | 26  | 67*  | 6 10                    | 12 50.38        | -6 1.9          | 2.426    | 2.995 | 17.9    | 21.1 | 115 E  | 38  | 70   |
| 3 23                    | 19 19.38        | -13 40.8        | 0.126    | 0.968 | 99.6    | 20.3 | 73 W   | 26  | 65*  | 6 20                    | 12 51.48        | -6 2.1          | 2.536    | 2.971 | 19.3    | 21.3 | 105 E  | 35  | 70   |
| 3 24                    | 19 33.72        | -12 34.3        | 0.127    | 0.963 | 102.2   | 20.5 | 71 W   | 26  | 62*  | 6 30                    | 12 54.61        | -6 15.5         | 2.650    | 2.946 | 20.1    | 21.4 | 97 E   | 31  | 70   |
| 3 25                    | 19 47.72        | -11 26.2        | 0.128    | 0.957 | 104.8   | 20.6 | 68 W   | 26  | 59*  | 7 10                    | 12 59.58        | -6 40.8         | 2.766    | 2.919 | 20.4    | 21.4 | 88 E   | 28  | 71*  |
| 3 26                    | 20 1.32         | -10 17.3        | 0.130    | 0.951 | 107.2   | 20.8 | 66 W   | 26  | 57*  | <b>457059 2008 EG</b>   |                 |                 |          |       |         |      |        |     |      |
| 3 27                    | 20 14.45        | -9 8.4          | 0.132    | 0.946 | 109.6   | 20.9 | 63 W   | 26  | 54*  | 2 11                    | 14 0.41         | -35 1.0         | 0.602    | 1.243 | 51.4    | 21.3 | 100 W  | 10  | 81   |
| 3 28                    | 20 27.08        | -8 0.4          | 0.135    | 0.940 | 111.8   | 21.1 | 61 W   | 25  | 52*  | 2 13                    | 14 6.08         | -37 10.6        | 0.573    | 1.225 | 52.5    | 21.2 | 100 W  | 8   | 79   |
| 3 29                    | 20 39.19        | -6 53.8         | 0.138    | 0.934 | 113.9   | 21.3 | 59 W   | 25  | 50*  | 2 15                    | 14 12.44        | -39 31.0        | 0.545    | 1.206 | 53.8    | 21.1 | 100 W  | 5   | 76   |
| 3 30                    | 20 50.74        | -5 49.1         | 0.142    | 0.929 | 115.9   | 21.4 | 57 W   | 24  | 48*  | 2 17                    | 14 19.70        | -42 3.0         | 0.519    | 1.187 | 55.2    | 21.0 | 99 W   | 3   | 74   |
| <b>152739 1998 WC32</b> |                 |                 |          |       |         |      |        |     |      |                         |                 |                 |          |       |         |      |        |     |      |
| 2 11                    | 13 42.51        | -6 29.7         | 2.167    | 2.737 | 19.0    | 21.4 | 115 W  | 39  | 70   | 2 19                    | 14 28.13        | -44 47.6        | 0.493    | 1.168 | 56.9    | 20.9 | 98 W   | -   | 71   |
| 2 21                    | 13 42.65        | -6 32.4         | 2.036    | 2.729 | 17.2    | 21.2 | 125 W  | 38  | 71   | 2 21                    | 14 38.13        | -47 45.4        | 0.468    | 1.147 | 58.7    | 20.8 | 97 W   | -   | 68   |
| 3 2                     | 13 40.13        | -6 22.2         | 1.920    | 2.721 | 14.7    | 21.0 | 136 W  | 39  | 70   |                         |                 |                 |          |       |         |      |        |     |      |
| 3 12                    | 13 34.92        | -5 59.6         | 1.822    | 2.711 | 11.4    | 20.8 | 147 W  | 39  | 70   |                         |                 |                 |          |       |         |      |        |     |      |
| 3 22                    | 13 27.24        | -5 26.2         | 1.746    | 2.700 | 7.6     | 20.5 | 159 W  | 40  | 69   |                         |                 |                 |          |       |         |      |        |     |      |
| 4 1                     | 13 17.68        | -4 45.3         | 1.697    | 2.689 | 3.3     | 20.2 | 171 W  | 40  | 69   |                         |                 |                 |          |       |         |      |        |     |      |
| 4 6                     | 13 12.47        | -4 23.6         | 1.683    | 2.683 | 1.4     | 20.1 | 176 W  | 41  | 68   |                         |                 |                 |          |       |         |      |        |     |      |
| 4 11                    | 13 7.16         | -4 2.1          | 1.677    | 2.676 | 1.9     | 20.1 | 175 E  | 41  | 68   |                         |                 |                 |          |       |         |      |        |     |      |
| 4 16                    | 13 1.87         | -3 41.4         | 1.677    | 2.670 | 4.1     | 20.2 | 169 W  | 41  | 68   |                         |                 |                 |          |       |         |      |        |     |      |
|                         |                 |                 |          |       |         |      |        |     |      |                         |                 |                 |          |       |         |      |        |     |      |

EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 20/21                               | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$  | $r$   | $\beta$ | $V$   | $\psi$ | 45°   | -26° | 20/21                              | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$       | $\beta$ | $V$   | $\psi$ | 45°  | -26°  |     |     |
|-------------------------------------|-----------------|-----------------|-----------|-------|---------|-------|--------|-------|------|------------------------------------|-----------------|-----------------|----------|-----------|---------|-------|--------|------|-------|-----|-----|
| <b>457059 2008 EG</b>               |                 |                 |           |       |         |       |        |       |      | <b>159533 2001 HH<sub>31</sub></b> |                 |                 |          |           |         |       |        |      |       |     |     |
| <i>(continuation)</i>               |                 |                 |           |       |         |       |        |       |      | <i>(continuation)</i>              |                 |                 |          |           |         |       |        |      |       |     |     |
| 2                                   | 22              | 14 43.88        | -49 19.3  | 0.457 | 1.137   | 59.8  | 20.7   | 97 W  | -    | 67                                 | 4               | 6               | 13 39.23 | +11 36.7  | 1.060   | 2.028 | 9.9    | 19.9 | 160 W | 57  | 52  |
| 2                                   | 23              | 14 50.26        | -50 56.5  | 0.446 | 1.126   | 60.9  | 20.7   | 96 W  | -    | 65                                 | 4               | 11              | 13 31.82 | +12 4.4   | 1.049   | 2.018 | 10.1   | 19.9 | 159 W | 57  | 52  |
| 2                                   | 24              | 14 57.37        | -52 36.7  | 0.435 | 1.116   | 62.0  | 20.6   | 95 W  | -    | 63                                 | 4               | 16              | 13 24.19 | +12 24.4  | 1.044   | 2.007 | 11.1   | 19.9 | 157 E | 57  | 52  |
| 2                                   | 25              | 15 5.36         | -54 19.9  | 0.425 | 1.105   | 63.3  | 20.6   | 94 W  | -    | 62                                 | 4               | 21              | 13 16.59 | +12 35.6  | 1.045   | 1.996 | 12.9   | 20.0 | 154 E | 58  | 51  |
| 2                                   | 26              | 15 14.40        | -56 5.4   | 0.415 | 1.094   | 64.6  | 20.6   | 93 W  | -    | 60                                 | 4               | 26              | 13 9.28  | +12 37.4  | 1.052   | 1.985 | 15.0   | 20.0 | 149 E | 58  | 51  |
| 2                                   | 27              | 15 24.70        | -57 52.8  | 0.405 | 1.083   | 66.0  | 20.5   | 92 W  | -    | 58                                 | 5               | 1               | 13 2.49  | +12 29.5  | 1.065   | 1.973 | 17.3   | 20.1 | 144 E | 57  | 52  |
| 2                                   | 28              | 15 36.52        | -59 41.1  | 0.397 | 1.072   | 67.5  | 20.5   | 91 W  | -    | 56                                 | 5               | 11              | 12 51.20 | +11 46.5  | 1.104   | 1.948 | 21.8   | 20.3 | 134 E | 57  | 52  |
| 2                                   | 29              | 15 50.19        | -61 29.3  | 0.389 | 1.060   | 69.1  | 20.5   | 89 W  | -    | 55                                 | 5               | 21              | 12 43.62 | +10 32.0  | 1.158   | 1.921 | 25.7   | 20.5 | 124 E | 56  | 53  |
| 3                                   | 1               | 16 6.08         | -63 15.6  | 0.381 | 1.049   | 70.8  | 20.5   | 88 W  | -    | 53                                 | 5               | 31              | 12 40.07 | + 8 52.8  | 1.223   | 1.893 | 29.0   | 20.7 | 115 E | 54* | 55  |
| 3                                   | 2               | 16 24.61        | -64 57.9  | 0.374 | 1.037   | 72.5  | 20.5   | 86 W  | -    | 51*                                | 6               | 10              | 12 40.33 | + 6 55.2  | 1.294   | 1.863 | 31.4   | 20.9 | 107 E | 50* | 57  |
| 3                                   | 3               | 16 46.26        | -66 33.4  | 0.368 | 1.025   | 74.3  | 20.5   | 85 W  | -    | 49*                                | 6               | 20              | 12 44.00 | + 4 44.3  | 1.368   | 1.831 | 33.2   | 21.0 | 99 E  | 45* | 59  |
| 3                                   | 4               | 17 11.40        | -67 58.6  | 0.363 | 1.013   | 76.2  | 20.5   | 83 W  | -    | 47*                                | 6               | 30              | 12 50.66 | + 2 23.4  | 1.443   | 1.798 | 34.4   | 21.1 | 92 E  | 39* | 62  |
| 3                                   | 5               | 17 40.27        | -69 9.3   | 0.359 | 1.001   | 78.2  | 20.5   | 81 W  | -    | 45*                                | 7               | 10              | 12 59.89 | + 0 5.1   | 1.515   | 1.763 | 35.1   | 21.2 | 86 E  | 33* | 64* |
| 3                                   | 6               | 18 12.67        | -70 0.9   | 0.355 | 0.988   | 80.2  | 20.5   | 79 W  | -    | 43*                                | 7               | 20              | 13 11.39 | + 2 39.2  | 1.584   | 1.727 | 35.4   | 21.2 | 80 E  | 28* | 65* |
| 3                                   | 7               | 18 47.84        | -70 29.1  | 0.352 | 0.976   | 82.3  | 20.6   | 77 W  | -    | 42*                                | 8               | 30              | 13 24.94 | + 5 17.7  | 1.647   | 1.690 | 35.4   | 21.3 | 75 E  | 24* | 64* |
| 3                                   | 8               | 19 24.40        | -70 30.7  | 0.350 | 0.963   | 84.4  | 20.6   | 75 W  | -    | 40*                                | 7               | 9               | 13 40.37 | + 7 59.3  | 1.705   | 1.652 | 35.1   | 21.3 | 70 E  | 21* | 62* |
| 3                                   | 9               | 20 0.57         | -70 4.5   | 0.349 | 0.950   | 86.6  | 20.6   | 73 W  | -    | 38*                                | 8               | 19              | 13 57.62 | + 10 42.4 | 1.756   | 1.613 | 34.6   | 21.3 | 65 E  | 18* | 58* |
| 3                                   | 10              | 20 34.72        | -69 11.8  | 0.349 | 0.937   | 88.8  | 20.7   | 71 W  | -    | 36*                                | 8               | 29              | 14 16.69 | + 13 25.8 | 1.800   | 1.573 | 34.0   | 21.3 | 61 E  | 15* | 54* |
| 3                                   | 11              | 21 5.67         | -67 55.8  | 0.350 | 0.924   | 90.9  | 20.8   | 68 W  | -    | 34*                                | 9               | 8               | 14 37.60 | + 16 7.5  | 1.837   | 1.533 | 33.3   | 21.2 | 57 E  | 13* | 51* |
| 3                                   | 12              | 21 32.92        | -66 20.5  | 0.352 | 0.911   | 93.1  | 20.8   | 66 W  | -    | 32*                                | 9               | 18              | 15 0.46  | + 18 45.2 | 1.867   | 1.492 | 32.4   | 21.2 | 53 E  | 11* | 47* |
| 3                                   | 13              | 21 56.47        | -64 30.3  | 0.354 | 0.897   | 95.2  | 20.9   | 64 W  | -    | 30*                                | 9               | 28              | 15 25.39 | + 21 16.2 | 1.890   | 1.452 | 31.6   | 21.1 | 49 E  | 10* | 43* |
| 3                                   | 14              | 22 16.63        | -62 29.1  | 0.358 | 0.883   | 97.3  | 21.0   | 62 W  | -    | 28*                                | 10              | 8               | 15 52.51 | + 23 36.9 | 1.906   | 1.413 | 30.7   | 21.1 | 46 E  | 9*  | 40* |
| 3                                   | 15              | 22 33.83        | -60 20.4  | 0.362 | 0.869   | 99.4  | 21.1   | 60 W  | -    | 27*                                | 10              | 18              | 16 21.95 | + 25 43.1 | 1.916   | 1.374 | 29.9   | 21.0 | 43 E  | 8*  | 37* |
| 3                                   | 16              | 22 48.52        | -58 6.9   | 0.368 | 0.855   | 101.4 | 21.2   | 57 W  | -    | 25*                                | 10              | 28              | 16 53.79 | + 27 29.8 | 1.921   | 1.337 | 29.0   | 20.9 | 41 E  | 7*  | 35* |
| 3                                   | 17              | 23 1.13         | -55 50.8  | 0.374 | 0.840   | 103.3 | 21.3   | 55 W  | -    | 24*                                | 11              | 7               | 17 27.98 | + 28 51.3 | 1.922   | 1.303 | 28.3   | 20.8 | 39 E  | 7*  | 32* |
| 3                                   | 18              | 23 11.99        | -53 33.9  | 0.381 | 0.826   | 105.1 | 21.4   | 53 W  | -    | 22*                                | 11              | 17              | 18 4.37  | + 29 41.7 | 1.920   | 1.271 | 27.6   | 20.8 | 37 E  | 7*  | 30* |
| 3                                   | 19              | 23 21.41        | -51 17.5  | 0.388 | 0.811   | 106.9 | 21.5   | 51 W  | -    | 21*                                | 11              | 27              | 18 42.59 | + 29 55.4 | 1.916   | 1.243 | 27.1   | 20.7 | 35 E  | 7*  | 29* |
| 3                                   | 20              | 23 29.63        | -49 2.6   | 0.397 | 0.796   | 108.5 | 21.6   | 49 W  | -    | 20*                                | 12              | 7               | 19 22.08 | + 29 27.7 | 1.911   | 1.219 | 26.6   | 20.6 | 34 E  | 8*  | 27* |
| 3                                   | 21              | 23 36.85        | -46 49.9  | 0.406 | 0.781   | 110.1 | 21.7   | 47 W  | -    | 18*                                | 12              | 17              | 20 2.21  | + 28 16.2 | 1.908   | 1.200 | 26.1   | 20.6 | 32 E  | 9*  | 25* |
| 3                                   | 22              | 23 43.21        | -44 39.9  | 0.416 | 0.765   | 111.6 | 21.8   | 46 W  | -    | 17*                                | 12              | 27              | 20 42.26 | + 26 20.6 | 1.907   | 1.186 | 25.7   | 20.5 | 32 E  | 10* | 24* |
| 3                                   | 23              | 23 48.87        | -42 33.1  | 0.427 | 0.749   | 113.0 | 21.9   | 44 W  | -    | 17*                                | 1               | 6               | 21 21.61 | + 23 43.8 | 1.911   | 1.178 | 25.3   | 20.5 | 31 E  | 11* | 22* |
| 3                                   | 23              | 23 48.87        | -42 33.1  | 0.427 | 0.749   | 113.0 | 21.9   | 44 W  | -    | 17*                                | 1               | 16              | 21 59.86 | + 20 30.8 | 1.920   | 1.176 | 24.8   | 20.5 | 30 E  | 13* | 21* |
| <b>105943 2000 SY<sub>233</sub></b> |                 |                 |           |       |         |       |        |       |      | <b>92278 2000 CB<sub>110</sub></b> |                 |                 |          |           |         |       |        |      |       |     |     |
| 2                                   | 11              | 14 1.92         | - 5 31.4  | 2.183 | 2.699   | 20.0  | 21.3   | 111 W | 39   | 70                                 | 2               | 11              | 14 14.05 | -21 1.5   | 1.647   | 2.101 | 27.2   | 21.3 | 103 W | 24  | 85  |
| 2                                   | 21              | 14 4.49         | - 5 23.6  | 2.035 | 2.675   | 18.6  | 21.1   | 120 W | 40   | 69                                 | 2               | 21              | 14 23.18 | -22 41.8  | 1.509   | 2.072 | 26.6   | 21.1 | 110 W | 22  | 87  |
| 3                                   | 2               | 14 4.55         | - 5 2.0   | 1.898 | 2.651   | 16.5  | 20.9   | 130 W | 40   | 69                                 | 3               | 2               | 14 30.06 | -24 16.3  | 1.378   | 2.043 | 25.3   | 20.8 | 118 W | 21  | 88  |
| 3                                   | 12              | 14 1.91         | - 4 27.3  | 1.777 | 2.625   | 13.8  | 20.6   | 141 W | 41   | 68                                 | 3               | 12              | 14 34.19 | -25 43.3  | 1.257   | 2.014 | 23.3   | 20.5 | 127 W | 19  | 90  |
| 3                                   | 22              | 13 56.53        | - 3 41.1  | 1.676 | 2.599   | 10.3  | 20.4   | 152 W | 41   | 68                                 | 3               | 22              | 14 35.01 | -26 59.8  | 1.147   | 1.985 | 20.6   | 20.2 | 136 W | 18  | 89  |
| 4                                   | 1               | 13 48.67        | - 2 46.6  | 1.598 | 2.572   | 6.4   | 20.1   | 163 W | 42   | 67                                 | 3               | 27              | 14 34.03 | -27 32.7  | 1.098   | 1.971 | 18.9   | 20.0 | 140 W | 17  | 88  |
| 4                                   | 6               | 13 44.01        | - 2 17.9  | 1.570 | 2.558   | 4.5   | 19.9   | 168 W | 43   | 66                                 | 4               | 1               | 14 32.10 | -28 1.1   | 1.053   | 1.957 | 17.1   | 19.9 | 145 W | 17  | 88  |
| 4                                   | 11              | 13 39.02        | - 1 49.4  | 1.548 | 2.544   | 3.2   | 19.8   | 172 W | 43   | 66                                 | 4               | 11              | 14 29.24 | -28 24.2  | 1.012   | 1.942 | 15.1   | 19.7 | 150 W | 17  | 88  |
| 4                                   | 16              | 13 33.81        | - 1 21.9  | 1.533 | 2.529   | 3.5   | 19.8   | 171 E | 44   | 65                                 | 4               | 16              | 14 25.50 | -28 41.2  | 0.976   | 1.928 | 13.0   | 19.5 | 154 W | 16  | 87  |
| 4                                   | 21              | 13 28.53        | - 0 56.2  | 1.525 | 2.515   | 5.1   | 19.8   | 167 E | 44   | 65                                 | 4               | 16              | 14 20.97 | -28 51.5  | 0.945   | 1.915 | 11.0   | 19.4 | 159 W | 16  | 87  |
| 4                                   | 26              | 13 23.34        | - 0 33.3  | 1.524 | 2.500   | 7.2   | 19.9   | 162 E | 44   | 65                                 | 4               | 21              | 14 15.80 | -28 54.4  | 0.919   | 1.901 | 9.2    | 19.2 | 162 W | 16  | 87  |
| 5                                   | 1               | 13 18.40        | - 0 13.9  | 1.529 | 2.485   | 9.4   | 20.0   | 156 E | 45   | 64                                 | 4               | 26              | 14 10.20 | -28 49.5  | 0.898   | 1.887 | 8.1    | 19.1 | 165 E | 16  | 87  |
| 5                                   | 11              | 13 9.74         | + 0 12.1  | 1.559 | 2.454   | 13.7  | 20.2   | 145 E | 45   | 64                                 | 5               | 1               | 14 4.44  | -28 37.1  | 0.883   | 1.874 | 8.1    | 19.1 | 165 E | 16  | 87  |
| 5                                   | 21              | 13 3.35         | + 0 19.1  | 1.608 | 2.423   | 17.5  | 20.4   | 134 E | 45   | 64                                 | 5               | 6               | 13 58.77 | -28 18.0  | 0.873   | 1.861 | 9.2    | 19.1 | 163 E | 17  | 88  |
| 5                                   | 31              | 12 59.71        | + 0 6.4   | 1.674 | 2.391   | 20.6  | 20.5   | 124 E | 45   | 64                                 | 5               | 11              | 13 53.45 | -27 53.1  | 0.868   | 1.848 | 11.1   | 19.1 | 159 E | 17  | 88  |
| 6                                   | 10              | 12 58.95        | + 0 24.7  | 1.751 | 2.358   | 23.1  | 20.7   | 114 E | 44*  | 64                                 | 5               | 16              | 13 48.72 | -27 23.9  | 0.868   | 1.835 | 13.5   | 19.2 | 155 E | 18  | 89  |
| 6                                   | 20              | 13 0.96         | + 1 12.2  | 1.836 | 2.325   | 24.9  | 20.8   | 106 E | 41*  | 65                                 | 5               | 21              | 13 44.79 | -26 51.8  | 0.874   | 1.823 | 16.0   | 19.3 | 150 E | 18  | 89  |
| 6                                   | 30              | 13 5.55         | + 2 13.8  | 1.924 | 2.291   | 26.1  | 20.9   | 98 E  | 36*  | 66                                 | 5               | 26              | 13 41.81 | -26 18.7  | 0.883   | 1.811 | 18.5   | 19.4 | 145 E | 19  | 90  |
| 7                                   | 10              | 13 12.44        | + 3 27.2  | 2.013 | 2.256   | 26.8  | 21.0   | 90 E  | 32*  | 67                                 | 5               | 31              | 13 39.91 | -25 46.2  | 0.897   | 1.799 | 21.0   | 19.5 | 141 E | 19  | 90  |
| 7                                   | 20              | 13 21.41        | + 4 50.3  | 2.100 | 2.221   | 27.0  | 21.1   | 83 E  | 28*  | 68*                                | 6               | 5               | 13 39.13 | -25 15.8  | 0.914   | 1.787 | 23.3   | 19.6 | 136 E | 20  | 89  |
| 7                                   | 30              | 13 32.24        | + 6 21.2  | 2.184 | 2.186   | 26.9  | 21.1   | 77 E  | 24*  | 66*                                | 6               | 10              | 13 39.47 | -24 48.4  | 0.934   | 1.776 | 25.4   | 19.7 | 131 E | 20  | 89  |
| 8                                   | 9               | 13 44.75        | + 7 58.1  | 2.263 | 2.150   | 26.4  | 21.1   | 71 E  | 21*  | 62*                                | 6               | 15              | 13 40.93 | -24 24.7  | 0.956   | 1.766 | 27.3   | 19.8 | 127 E | 20* | 88  |
| 8                                   | 19              | 13 58.81        | + 9 39.3  | 2.336 | 2.114   | 25.7  | 21.1   | 65 E  | 19*  | 58*                                | 6               | 20              | 13 43.47 | -24 5.3   | 0.981   | 1.755 | 29.1   | 19.9 | 123 E | 20* | 88  |
| 8                                   | 29              | 14 14.33        | + 11 23.4 | 2.402 | 2.078   | 24.7  | 21.1   | 59 E  | 16*  | 53*                                | 6               | 30              | 13 51.58 | -23 40.3  | 1.037   | 1.736 | 31.9   | 20.0 | 115 E | 20* | 88  |
| 9                                   | 8               | 14 31.25        | + 13 8.4  | 2.461 | 2.042   | 23.6  | 21.1   | 54 E  | 15*  | 48*                                | 7               | 10              | 14 3.33  | -23 32.9  | 1.099   | 1.718 | 34.1   | 20.2 | 109 E | 18* | 88  |
| 9                                   | 18              | 14 49.52        | + 14 52.7 | 2.513 | 2.006   | 22.3  | 21.1   | 49 E  | 13*  | 43*                                | 7               | 20              | 14 18.20 | -23 40.4  | 1.164   | 1.703 | 35.6   | 20.3 | 103 E | 17* | 88  |
| 9                                   | 28              | 15 9.14         | + 16 34.6 | 2.557 | 1.970   | 20.8  | 21.0   | 44 E  | 11*  |                                    |                 |                 |          |           |         |       |        |      |       |     |     |



EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 20/21                               | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | $45^\circ$ | $-26^\circ$ | 20/21                              | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | $45^\circ$ | $-26^\circ$ |
|-------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|------------|-------------|------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|------------|-------------|
| <b>190327 1998 QE<sub>85</sub></b>  |                 |                 |          |       |         |      |        |            |             | <b>210012 2006 KT<sub>1</sub></b>  |                 |                 |          |       |         |      |        |            |             |
| (continuation)                      |                 |                 |          |       |         |      |        |            |             | (continuation)                     |                 |                 |          |       |         |      |        |            |             |
| 6 30                                | 13 31.28        | -8 4.4          | 2.250    | 2.708 | 21.2    | 21.4 | 106 E  | 33*        | 72          | 11 7                               | 18 27.76        | -22 55.3        | 1.560    | 1.223 | 39.4    | 19.6 | 52 E   | 18*        | 44*         |
| 7 5                                 | 13 33.37        | -8 10.1         | 2.311    | 2.703 | 21.6    | 21.4 | 101 E  | 32*        | 72          | 11 17                              | 19 7.83         | -23 16.5        | 1.569    | 1.215 | 39.1    | 19.6 | 51 E   | 18*        | 43*         |
| 7 10                                | 13 35.94        | -8 19.1         | 2.373    | 2.698 | 21.9    | 21.5 | 97 E   | 30*        | 72          | 11 22                              | 19 28.31        | -23 11.6        | 1.577    | 1.214 | 38.8    | 19.6 | 50 E   | 19*        | 42*         |
| <b>238496 2004 RZ<sub>345</sub></b> |                 |                 |          |       |         |      |        |            |             | <b>307525 2003 AB<sub>83</sub></b> |                 |                 |          |       |         |      |        |            |             |
| 2 11                                | 14 28.33        | -8 30.4         | 1.795    | 2.246 | 25.3    | 21.5 | 104 W  | 36         | 73          | 2 11                               | 14 34.88        | +21 24.6        | 3.272    | 3.712 | 14.6    | 21.4 | 109 W  | 66         | 43          |
| 2 21                                | 14 37.20        | -8 22.1         | 1.650    | 2.216 | 24.5    | 21.3 | 112 W  | 37         | 72          | 2 21                               | 14 35.25        | +22 41.9        | 3.167    | 3.720 | 13.7    | 21.3 | 117 W  | 68         | 41          |
| 3 2                                 | 14 43.94        | -7 56.2         | 1.512    | 2.186 | 23.1    | 21.0 | 120 W  | 37         | 72          | 3 2                                | 14 33.50        | +24 4.7         | 3.075    | 3.727 | 12.7    | 21.2 | 124 W  | 69         | 40          |
| 3 12                                | 14 48.12        | -7 11.7         | 1.385    | 2.155 | 20.9    | 20.7 | 129 W  | 38         | 71          | 3 12                               | 14 29.57        | +25 27.9        | 3.001    | 3.733 | 11.5    | 21.2 | 131 W  | 70         | 39          |
| 3 22                                | 14 49.36        | -6 8.6          | 1.271    | 2.125 | 18.0    | 20.4 | 139 W  | 39         | 70          | 3 22                               | 14 23.58        | +26 45.5        | 2.947    | 3.738 | 10.5    | 21.1 | 137 W  | 72         | 37          |
| 4 1                                 | 14 47.38        | -4 48.6         | 1.174    | 2.094 | 14.3    | 20.1 | 149 W  | 40         | 69          | 4 1                                | 14 15.80        | +27 51.0        | 2.916    | 3.742 | 9.8     | 21.0 | 141 W  | 73         | 36          |
| 4 6                                 | 14 45.18        | -4 3.7          | 1.133    | 2.078 | 12.3    | 19.9 | 154 W  | 41         | 68          | 4 11                               | 14 6.77         | +28 38.3        | 2.910    | 3.745 | 9.6     | 21.0 | 141 W  | 74         | 35          |
| 4 11                                | 14 42.25        | -3 16.6         | 1.097    | 2.063 | 10.2    | 19.7 | 159 W  | 42         | 67          | 4 21                               | 13 57.14        | +29 3.1         | 2.929    | 3.747 | 10.1    | 21.1 | 139 W  | 74         | 35          |
| 4 16                                | 14 38.64        | -2 28.4         | 1.067    | 2.048 | 8.3     | 19.6 | 163 W  | 43         | 66          | 5 1                                | 13 47.65        | +29 3.1         | 2.972    | 3.748 | 11.1    | 21.1 | 135 E  | 74         | 35          |
| 4 21                                | 14 34.46        | -1 40.4         | 1.042    | 2.032 | 6.9     | 19.4 | 166 W  | 43         | 66          | 5 11                               | 13 39.01        | +28 38.7        | 3.036    | 3.747 | 12.2    | 21.1 | 128 E  | 74         | 35          |
| 4 26                                | 14 29.87        | -0 54.3         | 1.024    | 2.017 | 6.5     | 19.4 | 167 W  | 44         | 65          | 5 21                               | 13 31.75        | +27 52.3        | 3.120    | 3.746 | 13.4    | 21.3 | 121 E  | 73         | 36          |
| 5 1                                 | 14 25.05        | -0 11.4         | 1.011    | 2.001 | 7.5     | 19.4 | 165 E  | 45         | 64          | 5 31                               | 13 26.24        | +26 47.3        | 3.220    | 3.744 | 14.4    | 21.4 | 114 E  | 72         | 37          |
| 5 6                                 | 14 20.20        | +0 26.6         | 1.004    | 1.986 | 9.4     | 19.4 | 161 E  | 45         | 64          | <b>234360 2001 MV<sub>25</sub></b> |                 |                 |          |       |         |      |        |            |             |
| 5 11                                | 14 15.50        | +0 58.7         | 1.003    | 1.971 | 11.8    | 19.5 | 157 E  | 46         | 63          | 2 11                               | 14 39.50        | -5 22.7         | 2.044    | 2.448 | 23.2    | 21.5 | 102 W  | 40         | 69*         |
| 5 16                                | 14 11.14        | +1 23.8         | 1.007    | 1.956 | 14.3    | 19.6 | 151 E  | 46         | 63          | 2 21                               | 14 46.51        | -5 10.2         | 1.894    | 2.423 | 22.5    | 21.3 | 110 W  | 40         | 69          |
| 5 21                                | 14 7.29         | +1 41.2         | 1.016    | 1.941 | 16.8    | 19.7 | 146 E  | 47         | 62          | 3 2                                | 14 51.31        | -4 43.2         | 1.752    | 2.397 | 21.2    | 21.1 | 119 W  | 40         | 69          |
| 5 31                                | 14 1.65         | +1 51.8         | 1.046    | 1.911 | 21.5    | 19.9 | 136 E  | 47         | 62          | 3 12                               | 14 53.52        | -4 1.7          | 1.621    | 2.369 | 19.2    | 20.8 | 128 W  | 41         | 68          |
| 6 10                                | 13 59.32        | +1 31.0         | 1.090    | 1.882 | 25.6    | 20.0 | 127 E  | 47         | 62          | 3 22                               | 14 52.81        | -3 6.8          | 1.503    | 2.342 | 16.5    | 20.5 | 138 W  | 42         | 67          |
| 6 20                                | 14 0.51         | +0 42.5         | 1.143    | 1.854 | 28.9    | 20.2 | 118 E  | 45*        | 63          | 4 1                                | 14 48.99        | -2 1.2          | 1.403    | 2.313 | 13.1    | 20.2 | 148 W  | 43         | 66          |
| 6 30                                | 14 5.17         | -0 29.0         | 1.203    | 1.827 | 31.4    | 20.4 | 110 E  | 43*        | 64          | 4 6                                | 14 45.95        | -1 26.0         | 1.360    | 2.298 | 11.3    | 20.1 | 153 W  | 44         | 65          |
| 7 10                                | 14 13.01        | -1 58.4         | 1.268    | 1.801 | 33.3    | 20.5 | 104 E  | 40*        | 66          | 4 11                               | 14 42.21        | -0 50.3         | 1.324    | 2.284 | 9.5     | 19.9 | 158 W  | 44         | 65          |
| 7 20                                | 14 23.70        | -3 41.2         | 1.334    | 1.777 | 34.6    | 20.6 | 97 E   | 36*        | 68          | 4 16                               | 14 37.86        | -0 15.1         | 1.293    | 2.269 | 7.9     | 19.8 | 162 W  | 45         | 64          |
| 7 30                                | 14 36.98        | -5 33.4         | 1.402    | 1.754 | 35.4    | 20.7 | 92 E   | 33*        | 70          | 4 21                               | 14 32.99        | +0 18.7         | 1.268    | 2.254 | 6.7     | 19.7 | 165 W  | 45         | 64          |
| 8 9                                 | 14 52.56        | -7 31.0         | 1.469    | 1.732 | 35.7    | 20.8 | 86 E   | 30*        | 71*         | 4 26                               | 14 27.77        | +0 49.7         | 1.250    | 2.238 | 6.6     | 19.6 | 165 W  | 46         | 63          |
| 8 19                                | 15 10.23        | -9 30.6         | 1.536    | 1.713 | 35.8    | 20.9 | 82 E   | 28*        | 70*         | 5 1                                | 14 22.35        | +1 16.8         | 1.239    | 2.223 | 7.4     | 19.6 | 163 E  | 46         | 63          |
| 8 29                                | 15 29.83        | -11 28.9        | 1.603    | 1.696 | 35.5    | 20.9 | 77 E   | 26*        | 68*         | 5 6                                | 14 16.92        | +1 39.1         | 1.233    | 2.207 | 9.1     | 19.7 | 160 E  | 47         | 62          |
| 9 8                                 | 15 51.18        | -13 22.5        | 1.669    | 1.681 | 35.0    | 21.0 | 73 E   | 24*        | 65*         | 5 11                               | 14 11.64        | +1 55.7         | 1.234    | 2.192 | 11.1    | 19.8 | 155 E  | 47         | 62          |
| 9 18                                | 16 14.16        | -15 8.3         | 1.735    | 1.668 | 34.3    | 21.0 | 69 E   | 23*        | 62*         | 5 21                               | 14 2.22         | +2 9.9          | 1.251    | 2.160 | 15.6    | 19.9 | 145 E  | 47         | 62          |
| 9 28                                | 16 38.65        | -16 43.1        | 1.800    | 1.658 | 33.4    | 21.1 | 66 E   | 22*        | 58*         | 5 31                               | 13 55.18        | +1 57.3         | 1.288    | 2.128 | 19.7    | 20.1 | 135 E  | 47         | 62          |
| 10 8                                | 17 4.45         | -18 4.0         | 1.865    | 1.651 | 32.3    | 21.1 | 62 E   | 21*        | 55*         | 6 10                               | 13 51.20        | +1 19.3         | 1.340    | 2.096 | 23.3    | 20.2 | 125 E  | 46         | 63          |
| 10 18                               | 17 31.41        | -19 8.2         | 1.930    | 1.646 | 31.1    | 21.1 | 59 E   | 21*        | 51*         | 6 20                               | 13 50.48        | +0 19.4         | 1.403    | 2.063 | 26.2    | 20.4 | 116 E  | 45*        | 64          |
| 10 28                               | 17 59.30        | -19 53.7        | 1.995    | 1.644 | 29.7    | 21.2 | 55 E   | 20*        | 47*         | 6 30                               | 13 52.98        | +0 58.7         | 1.473    | 2.030 | 28.5    | 20.5 | 108 E  | 42*        | 65          |
| 11 7                                | 18 27.88        | -20 18.8        | 2.061    | 1.646 | 28.3    | 21.2 | 52 E   | 20*        | 43*         | 7 10                               | 13 58.46        | -2 31.2         | 1.546    | 1.998 | 30.0    | 20.6 | 100 E  | 38*        | 67          |
| 11 17                               | 18 56.88        | -20 22.6        | 2.128    | 1.649 | 26.7    | 21.2 | 49 E   | 20*        | 39*         | 7 20                               | 14 6.66         | -4 14.4         | 1.621    | 1.965 | 31.1    | 20.7 | 93 E   | 34*        | 68          |
| 11 27                               | 19 26.04        | -20 4.8         | 2.195    | 1.656 | 25.0    | 21.3 | 45 E   | 20*        | 35*         | 7 30                               | 14 17.30        | -6 5.6          | 1.696    | 1.933 | 31.0    | 20.8 | 87 E   | 30*        | 70*         |
| 12 7                                | 19 55.11        | -19 26.2        | 2.262    | 1.665 | 23.3    | 21.3 | 42 E   | 20*        | 31*         | 8 9                                | 14 30.16        | -8 2.1          | 1.769    | 1.900 | 31.8    | 20.9 | 81 E   | 27*        | 69*         |
| 12 17                               | 20 23.86        | -18 28.0        | 2.329    | 1.677 | 21.5    | 21.3 | 39 E   | 20*        | 27*         | 8 19                               | 14 45.03        | -10 1.3         | 1.839    | 1.869 | 31.7    | 20.9 | 76 E   | 25*        | 67*         |
| 12 27                               | 20 52.14        | -17 12.0        | 2.396    | 1.692 | 19.6    | 21.3 | 35 E   | 18*        | 23*         | 8 29                               | 15 1.80         | -12 1.0         | 1.905    | 1.838 | 31.2    | 21.0 | 71 E   | 22*        | 63*         |
| 1 6                                 | 21 19.79        | -15 40.6        | 2.463    | 1.708 | 17.7    | 21.3 | 32 E   | 18*        | 19*         | 9 8                                | 15 20.35        | -13 58.8        | 1.968    | 1.808 | 30.6    | 21.0 | 66 E   | 20*        | 59*         |
| 1 16                                | 21 46.76        | -13 56.2        | 2.528    | 1.727 | 15.7    | 21.4 | 28 E   | 17*        | 16*         | 9 18                               | 15 40.61        | -15 52.3        | 2.026    | 1.779 | 29.7    | 21.0 | 61 E   | 19*        | 55*         |
| <b>210012 2006 KT<sub>1</sub></b>   |                 |                 |          |       |         |      |        |            |             | <b>120644 1996 RM<sub>3</sub></b>  |                 |                 |          |       |         |      |        |            |             |
| 2 11                                | 14 34.68        | -5 22.2         | 2.197    | 2.606 | 21.6    | 21.4 | 103 W  | 40         | 69          | 2 11                               | 14 46.19        | -20 5.2         | 3.331    | 3.575 | 15.9    | 21.4 | 96 W   | 25         | 84*         |
| 2 21                                | 14 40.77        | -4 59.0         | 2.022    | 2.560 | 21.0    | 21.2 | 112 W  | 40         | 69          | 2 21                               | 14 48.51        | -20 35.2        | 3.181    | 3.576 | 15.4    | 21.3 | 106 W  | 24         | 85          |
| 3 2                                 | 14 44.78        | -4 19.5         | 1.856    | 2.512 | 19.8    | 20.9 | 121 W  | 41         | 68          | 3 2                                | 14 48.87        | -20 57.9        | 3.038    | 3.577 | 14.5    | 21.2 | 115 W  | 24         | 85          |
| 3 12                                | 14 46.34        | -3 23.2         | 1.751    | 2.463 | 17.9    | 20.6 | 130 W  | 42         | 67          | 3 12                               | 14 47.15        | -21 12.3        | 2.905    | 3.577 | 13.0    | 21.0 | 126 W  | 24         | 85          |
| 3 22                                | 14 45.08        | -2 10.3         | 1.562    | 2.413 | 15.4    | 20.3 | 140 W  | 43         | 66          | 3 22                               | 14 43.31        | -21 17.5        | 2.788    | 3.576 | 11.1    | 20.9 | 136 W  | 24         | 85          |
| 4 1                                 | 14 40.77        | -0 43.0         | 1.441    | 2.361 | 12.2    | 20.0 | 150 W  | 44         | 65          | 4 1                                | 14 37.48        | -21 12.3        | 2.691    | 3.574 | 8.7     | 20.7 | 147 W  | 24         | 85          |
| 4 6                                 | 14 37.48        | +0 4.6          | 1.389    | 2.335 | 10.5    | 19.8 | 155 W  | 45         | 64          | 4 11                               | 14 29.99        | -20 56.7        | 2.619    | 3.571 | 5.9     | 20.5 | 159 W  | 24         | 85          |
| 4 11                                | 14 33.47        | +0 53.6         | 1.343    | 2.308 | 8.9     | 19.7 | 159 W  | 46         | 63          | 4 21                               | 14 21.36        | -20 31.2        | 2.575    | 3.568 | 3.0     | 20.3 | 169 W  | 24         | 85          |
| 4 16                                | 14 28.83        | +1 43.1         | 1.304    | 2.281 | 7.6     | 19.5 | 163 W  | 47         | 62          | 5 1                                | 14 12.30        | -19 57.6        | 2.561    | 3.564 | 2.0     | 20.2 | 173 E  | 25         | 84          |
| 4 21                                | 14 23.64        | +2 31.7         | 1.271    | 2.254 | 7.0     | 19.4 | 164 W  | 48         | 61          |                                    |                 |                 |          |       |         |      |        |            |             |
| 4 26                                | 14 18.04        | +3 18.0         | 1.244    | 2.226 | 7.5     | 19.4 | 163 W  | 48         | 61          |                                    |                 |                 |          |       |         |      |        |            |             |
| 5 1                                 | 14 12.21        | +4 0.5          | 1.224    | 2.198 | 8.9     | 19.4 | 160 E  | 49         | 60          |                                    |                 |                 |          |       |         |      |        |            |             |
| 5 6                                 | 14 6.32         | +4 37.9         | 1.210    | 2.170 | 10.9    | 19.4 | 156 E  | 50         | 59          |                                    |                 |                 |          |       |         |      |        |            |             |
| 5 11                                | 14 0.55         | +5 9.1          | 1.202    | 2.142 | 13.2    | 19.4 | 151 E  | 50         | 59          |                                    |                 |                 |          |       |         |      |        |            |             |
| 5 16                                | 13 55.09        | +5 33.2         | 1.199    | 2.113 | 15.6    | 19.5 | 146 E  | 51         | 58          |                                    |                 |                 |          |       |         |      |        |            |             |
| 5 21                                | 13 50.09        | +5 49.6         | 1.202    | 2.084 | 18.0    | 19.5 | 140 E  | 51         | 58          |                                    |                 |                 |          |       |         |      |        |            |             |
| 5 31                                | 13 42.08        | +5 58.4         | 1.220    | 2.026 | 22.6    | 19.6 | 130 E  | 51         | 58          |                                    |                 |                 |          |       |         |      |        |            |             |
| 6 10                                | 13 37.28        | +5 36.0         | 1.251    | 1.966 | 26.6    | 19.8 | 120 E  | 51         | 58          |                                    |                 |                 |          |       |         |      |        |            |             |
| 6 20                                | 13 36.02        | +4 45.8         | 1.290    | 1.906 | 29.9    | 19.8 | 111 E  | 49*        | 59          |                                    |                 |                 |          |       |         |      |        |            |             |
| 6 30                                | 13 38.32        | +3 31.7         | 1.333    | 1.845 | 32.5    | 19.9 | 103 E  | 45*        | 60          |                                    |                 |                 |          |       |         |      |        |            |             |
| 7 10                                | 13 43.98        | +1 57.9         | 1.375    | 1.785 | 34.6    | 20.0 | 95 E   | 40*        | 62          |                                    |                 |                 |          |       |         |      |        |            |             |
| 7 20                                | 13 52.75        | +0 8.0          | 1.416    | 1.724 | 36.1    | 20.0 | 89 E   | 36*        | 64          |                                    |                 |                 |          |       |         |      |        |            |             |
| 7 30                                | 14 4.43         | +1 55.2         | 1.452    | 1.663 | 37.3    | 20.0 | 83 E   | 32*        | 65*         |                                    |                 |                 |          |       |         |      |        |            |             |
| 8 9                                 | 14 18.82        | -4 8.9          | 1.483    | 1.604 | 38.1    | 20.0 | 77 E   | 29*        | 65*         |                                    |                 |                 |          |       |         |      |        |            |             |
| 8 19                                | 14 35.82        | -6 30.7         | 1.508    | 1.545 | 38.7    | 20.0 | 73 E   |            |             |                                    |                 |                 |          |       |         |      |        |            |             |

EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

Table with columns for year (2020, 2021), alpha (alpha2000), delta (delta2000), Delta, r, beta, V, psi, 45-26 degrees. It lists data for 120644 1996 RM3, 371527 2006 UB216, 234382 2001 QC67, and 420302 2011 XZ1.

EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 20/21   | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | $45^{\circ}$ - $26^{\circ}$ | 20/21  | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | $45^{\circ}$ - $26^{\circ}$ |
|---|-----------------|-----------------|----------|-------|---------|------|--------|-----------------------------|--|-----------------|-----------------|----------|-------|---------|------|--------|-----------------------------|
| <b>420302 2011 XZ<sub>1</sub></b> <i>(continuation)</i> |                 |                 |          |       |         |      |        |                             | <b>164400 2005 GN<sub>59</sub></b> <i>(continuation)</i> |                 |                 |          |       |         |      |        |                             |
| 9 13  | 23 23.58        | +28 46.3        | 0.289    | 1.260 | 25.5    | 16.5 | 147 E  | 74 35                       | 4 26   | 15 0.84         | -16 21.8        | 1.320    | 2.315 | 5.0     | 20.1 | 168 W  | 29 80                       |
| 9 18  | 23 25.34        | +27 41.2        | 0.308    | 1.281 | 23.0    | 16.6 | 150 E  | 73 36                       | 5 1  | 14 53.60        | -15 37.5        | 1.321    | 2.326 | 2.1     | 20.0 | 175 W  | 29 80                       |
| 9 23  | 23 27.07        | +26 24.2        | 0.330    | 1.305 | 20.8    | 16.7 | 152 E  | 71 38                       | 5 6  | 14 46.37        | -14 52.4        | 1.329    | 2.337 | 1.0     | 19.9 | 178 E  | 30 79                       |
| 9 28  | 23 29.00        | +25 0.1         | 0.353    | 1.329 | 19.2    | 16.8 | 154 E  | 70 39                       | 5 11   | 14 39.35        | -14 7.8         | 1.344    | 2.348 | 3.7     | 20.1 | 171 E  | 31 78                       |
| 10 3  | 23 31.23        | +23 32.8        | 0.380    | 1.354 | 18.3    | 17.0 | 155 E  | 69 40                       | 5 16   | 14 32.72        | -13 24.8        | 1.367    | 2.357 | 6.5     | 20.3 | 165 E  | 32 77                       |
| 10 8  | 23 33.85        | +22 5.7         | 0.410    | 1.381 | 18.1    | 17.2 | 155 E  | 67 42                       | 5 21   | 14 26.64        | -12 44.5        | 1.396    | 2.366 | 9.1     | 20.5 | 158 E  | 32 77                       |
| 10 13   | 23 36.91        | +20 41.6        | 0.443    | 1.408 | 18.5    | 17.4 | 153 E  | 66 43                       | 5 26   | 14 21.24        | -12 7.9         | 1.432    | 2.375 | 11.5    | 20.7 | 152 E  | 33 76                       |
| 10 18   | 23 40.45        | +19 22.8        | 0.480    | 1.436 | 19.4    | 17.7 | 151 E  | 64 45                       | 5 31   | 14 16.60        | -11 35.8        | 1.474    | 2.383 | 13.8    | 20.8 | 146 E  | 33 76                       |
| 10 23   | 23 44.50        | +18 11.0        | 0.520    | 1.465 | 20.6    | 17.9 | 149 E  | 63 46                       | 6 5  | 14 12.79        | -11 8.4         | 1.521    | 2.390 | 15.8    | 21.0 | 140 E  | 34 75                       |
| 10 28   | 23 49.03        | +17 7.4         | 0.564    | 1.494 | 21.9    | 18.2 | 146 E  | 62 47                       | 6 10   | 14 9.80         | -10 46.1        | 1.572    | 2.397 | 17.6    | 21.1 | 135 E  | 34 75                       |
| 11 7  | 23 59.38        | +15 26.1        | 0.662    | 1.554 | 24.6    | 18.7 | 139 E  | 60 49                       | 6 15   | 14 7.64         | -10 28.8        | 1.628    | 2.403 | 19.1    | 21.2 | 129 E  | 35 74                       |
| 11 17   | 0 11.22         | +14 18.2        | 0.773    | 1.614 | 26.9    | 19.2 | 132 E  | 59 50                       | 6 20   | 14 6.29         | -10 16.6        | 1.687    | 2.409 | 20.5    | 21.4 | 124 E  | 35* 74                      |
| 11 27   | 0 24.32         | +13 40.8        | 0.897    | 1.675 | 28.7    | 19.6 | 125 E  | 59 50                       | 6 25   | 14 5.71         | -10 9.1         | 1.749    | 2.413 | 21.6    | 21.5 | 119 E  | 34* 74                      |
| 12 7  | 0 38.39         | +13 28.7        | 1.033    | 1.736 | 29.8    | 20.1 | 119 E  | 58 51                       | <b>477885 2011 JT<sub>9</sub></b>                        |                 |                 |          |       |         |      |        |                             |
| 12 17   | 0 53.23         | +13 37.0        | 1.178    | 1.797 | 30.5    | 20.4 | 112 E  | 59 50*                      | 2 11   | 15 35.35        | +2 48.7         | 1.947    | 2.193 | 26.7    | 21.5 | 91 W   | 48 58*                      |
| 12 27   | 1 8.71          | +14 1.2         | 1.332    | 1.857 | 30.6    | 20.8 | 106 E  | 59 49*                      | 2 21   | 15 50.82        | +3 24.8         | 1.780    | 2.130 | 27.5    | 21.2 | 96 W   | 48 60*                      |
| 1 6   | 1 24.69         | +14 37.3        | 1.493    | 1.917 | 30.4    | 21.1 | 99 E   | 60 47*                      | 3 2  | 16 5.68         | +4 17.8         | 1.619    | 2.067 | 28.0    | 21.0 | 102 W  | 49 60                       |
| 1 16  | 1 41.08         | +15 21.7        | 1.659    | 1.975 | 29.8    | 21.4 | 93 E   | 60 44*                      | 3 12   | 16 19.70        | +5 27.8         | 1.465    | 2.003 | 28.2    | 20.7 | 108 W  | 50 59                       |
| <b>255535 2006 HS<sub>56</sub></b>                      |                 |                 |          |       |         |      |        |                             | 3 22   | 16 32.61        | +6 54.6         | 1.320    | 1.940 | 28.2    | 20.4 | 113 W  | 52 57                       |
| 2 11  | 15 21.53        | -11 44.4        | 1.810    | 2.067 | 28.5    | 21.4 | 90 W   | 33 73*                      | 4 1  | 16 44.05        | +8 36.6         | 1.183    | 1.876 | 28.0    | 20.1 | 118 W  | 54 55                       |
| 2 21  | 15 36.25        | -12 41.7        | 1.665    | 2.033 | 28.9    | 21.2 | 97 W   | 32 76*                      | 4 11   | 16 53.69        | +10 30.0        | 1.057    | 1.813 | 27.5    | 19.7 | 123 W  | 55 54                       |
| 3 2   | 15 49.84        | -13 33.5        | 1.523    | 1.999 | 28.9    | 21.0 | 103 W  | 31 78*                      | 4 16   | 16 57.70        | +11 29.4        | 0.998    | 1.781 | 27.2    | 19.6 | 126 W  | 56 53                       |
| 3 12  | 16 1.96         | -14 20.7        | 1.387    | 1.965 | 28.3    | 20.7 | 110 W  | 31 78                       | 4 21   | 17 1.09         | +12 29.5        | 0.942    | 1.750 | 26.9    | 19.4 | 128 W  | 57 52                       |
| 3 22  | 16 12.20        | -15 5.2         | 1.258    | 1.932 | 27.2    | 20.4 | 117 W  | 30 79                       | 4 26   | 17 3.80         | +13 28.8        | 0.889    | 1.719 | 26.6    | 19.2 | 130 W  | 58 51                       |
| 4 1   | 16 20.01        | -15 49.0        | 1.138    | 1.900 | 25.4    | 20.1 | 125 W  | 29 80                       | 5 1  | 17 5.80         | +14 25.9        | 0.838    | 1.689 | 26.2    | 19.0 | 132 W  | 59 50                       |
| 4 11  | 16 24.90        | -16 34.9        | 1.029    | 1.869 | 22.7    | 19.8 | 134 W  | 28 81                       | 5 6  | 17 7.05         | +15 18.9        | 0.791    | 1.659 | 25.9    | 18.9 | 134 W  | 60 49                       |
| 4 21  | 16 26.31        | -17 25.6        | 0.932    | 1.838 | 19.1    | 19.4 | 143 W  | 28 81                       | 5 11   | 17 7.51         | +16 6.0         | 0.746    | 1.629 | 25.6    | 18.7 | 136 W  | 61 48                       |
| 5 1   | 16 23.86        | -18 23.0        | 0.851    | 1.809 | 14.4    | 19.1 | 153 W  | 27 82                       | 5 16   | 17 7.18         | +16 44.8        | 0.704    | 1.600 | 25.4    | 18.5 | 137 W  | 62 47                       |
| 5 11  | 16 17.64        | -19 28.2        | 0.788    | 1.782 | 8.8     | 18.6 | 164 W  | 26 83                       | 5 21   | 17 6.04         | +17 12.7        | 0.664    | 1.572 | 25.3    | 18.4 | 138 W  | 62 47                       |
| 5 16  | 16 13.30        | -20 3.3         | 0.764    | 1.768 | 5.6     | 18.4 | 170 W  | 25 84                       | 5 26   | 17 4.14         | +17 26.7        | 0.628    | 1.544 | 25.3    | 18.2 | 139 W  | 62 47                       |
| 5 21  | 16 8.32         | -20 39.6        | 0.745    | 1.756 | 2.2     | 18.1 | 176 W  | 24 85                       | 5 31   | 17 1.59         | +17 23.6        | 0.594    | 1.518 | 25.4    | 18.0 | 140 W  | 62 47                       |
| 5 26  | 16 2.94         | -21 16.8        | 0.731    | 1.743 | 1.2     | 18.0 | 178 E  | 24 85                       | 6 5  | 16 58.51        | +17 0.6         | 0.563    | 1.492 | 25.7    | 17.9 | 140 W  | 62 47                       |
| 5 31  | 15 57.43        | -21 54.4        | 0.722    | 1.732 | 4.7     | 18.2 | 172 E  | 23 86                       | 6 10   | 16 55.05        | +16 14.8        | 0.534    | 1.467 | 26.1    | 17.8 | 140 E  | 61 48                       |
| 6 5   | 15 52.07        | -22 32.1        | 0.718    | 1.720 | 8.2     | 18.3 | 166 E  | 22 87                       | 6 15   | 16 51.42        | +15 3.4         | 0.508    | 1.444 | 26.7    | 17.6 | 140 E  | 60 49                       |
| 6 10  | 15 47.11        | -23 9.7         | 0.720    | 1.710 | 11.6    | 18.5 | 160 E  | 22 87                       | 6 20   | 16 47.85        | +13 24.2        | 0.485    | 1.421 | 27.6    | 17.5 | 140 E  | 58 51                       |
| 6 15  | 15 42.82        | -23 47.0        | 0.726    | 1.700 | 14.9    | 18.6 | 155 E  | 21 88                       | 6 25   | 16 44.60        | +11 15.8        | 0.465    | 1.401 | 28.7    | 17.4 | 139 E  | 56 53                       |
| 6 20  | 15 39.39        | -24 24.0        | 0.736    | 1.690 | 18.0    | 18.7 | 149 E  | 21 88                       | 6 30   | 16 41.98        | +8 37.6         | 0.448    | 1.381 | 29.6    | 17.4 | 138 E  | 54 55                       |
| 6 25  | 15 37.01        | -25 0.7         | 0.750    | 1.681 | 20.9    | 18.8 | 144 E  | 20 89                       | 7 5  | 16 40.23        | +5 30.6         | 0.434    | 1.363 | 31.1    | 17.3 | 136 E  | 51 52                       |
| 6 30  | 15 35.80        | -25 37.5        | 0.767    | 1.673 | 23.5    | 19.0 | 139 E  | 19 90                       | 7 10   | 16 39.56        | +1 57.2         | 0.423    | 1.347 | 32.6    | 17.3 | 134 E  | 47 68                       |
| 7 10  | 15 37.07        | -26 51.1        | 0.811    | 1.659 | 28.0    | 19.2 | 130 E  | 18 89                       | 7 15   | 16 40.17        | -1 59.1         | 0.416    | 1.333 | 34.2    | 17.2 | 133 E  | 43 66                       |
| 7 20  | 15 43.21        | -28 4.5         | 0.864    | 1.647 | 31.5    | 19.4 | 122 E  | 17* 88                      | 7 20   | 16 42.25        | -6 13.5         | 0.412    | 1.321 | 35.8    | 17.2 | 130 E  | 39 70                       |
| 7 30  | 15 53.96        | -29 16.3        | 0.925    | 1.639 | 34.1    | 19.6 | 115 E  | 15* 87                      | 7 25   | 16 45.95        | -10 39.6        | 0.412    | 1.311 | 37.5    | 17.3 | 128 E  | 34 75                       |
| 8 9   | 16 8.79         | -30 24.0        | 0.991    | 1.633 | 35.9    | 19.8 | 109 E  | 14* 86                      | 7 30   | 16 51.40        | -15 10.6        | 0.415    | 1.303 | 39.1    | 17.3 | 126 E  | 30 79                       |
| 8 19  | 16 27.15        | -31 24.2        | 1.062    | 1.631 | 37.1    | 20.0 | 104 E  | 13* 85                      | 8 4  | 16 58.68        | -19 39.2        | 0.423    | 1.298 | 40.6    | 17.4 | 124 E  | 25 84                       |
| 8 24  | 16 37.50        | -31 50.4        | 1.100    | 1.631 | 37.4    | 20.1 | 101 E  | 12* 84                      | 8 9  | 17 7.81         | -23 58.7        | 0.433    | 1.294 | 41.9    | 17.5 | 121 E  | 21 88                       |
| 8 29  | 16 48.54        | -32 13.4        | 1.138    | 1.632 | 37.7    | 20.2 | 99 E   | 12* 84                      | 8 14   | 17 18.84        | -28 3.0         | 0.448    | 1.293 | 43.1    | 17.6 | 119 E  | 17 88                       |
| 9 3   | 17 0.19         | -32 32.8        | 1.177    | 1.634 | 37.8    | 20.2 | 96 E   | 11* 83*                     | 8 19   | 17 31.76        | -31 47.2        | 0.465    | 1.294 | 44.0    | 17.7 | 117 E  | 13 84                       |
| 9 8   | 17 12.38        | -32 48.2        | 1.217    | 1.637 | 37.9    | 20.3 | 94 E   | 11* 83*                     | 8 24   | 17 46.55        | -35 7.5         | 0.486    | 1.298 | 44.6    | 17.8 | 116 E  | 10 81                       |
| 9 13  | 17 25.05        | -32 59.1        | 1.258    | 1.640 | 37.8    | 20.4 | 92 E   | 11* 82*                     | 8 29   | 18 3.08         | -38 1.3         | 0.510    | 1.303 | 45.1    | 17.9 | 114 E  | 7 78                        |
| 9 18  | 17 38.13        | -33 5.4         | 1.299    | 1.644 | 37.7    | 20.5 | 90 E   | 11* 81*                     | 9 3  | 18 21.15        | -40 26.9        | 0.537    | 1.311 | 45.3    | 18.1 | 112 E  | 5 76                        |
| 9 23  | 17 51.57        | -33 6.7         | 1.342    | 1.649 | 37.5    | 20.5 | 88 E   | 11* 79*                     | 9 8  | 18 40.49        | -42 23.7        | 0.566    | 1.321 | 45.4    | 18.2 | 111 E  | 3 74                        |
| 9 28  | 18 5.28         | -33 2.9         | 1.386    | 1.654 | 37.2    | 20.6 | 86 E   | 11* 78*                     | 9 13   | 19 0.78         | -43 51.8        | 0.598    | 1.333 | 45.2    | 18.3 | 110 E  | 1 72                        |
| 10 3  | 18 19.21        | -32 53.8        | 1.430    | 1.661 | 36.8    | 20.7 | 84 E   | 12* 77*                     | 9 18   | 19 21.68        | -44 52.2        | 0.632    | 1.347 | 45.0    | 18.5 | 109 E  | — 71                        |
| 10 8  | 18 33.29        | -32 39.3        | 1.476    | 1.668 | 36.4    | 20.7 | 82 E   | 12* 75*                     | 9 23   | 19 42.81        | -45 26.5        | 0.668    | 1.363 | 44.6    | 18.6 | 108 E  | — 71                        |
| 10 13   | 18 47.46        | -32 19.5        | 1.522    | 1.675 | 36.0    | 20.8 | 80 E   | 12* 74*                     | 9 28   | 20 3.81         | -45 36.9        | 0.707    | 1.381 | 44.1    | 18.7 | 107 E  | — 70                        |
| 10 18   | 19 1.67         | -31 54.4        | 1.569    | 1.684 | 35.4    | 20.9 | 79 E   | 13* 72*                     | 10 3   | 20 24.36        | -45 25.6        | 0.747    | 1.400 | 43.5    | 18.9 | 106 E  | — 71                        |
| 10 23   | 19 15.88        | -31 24.1        | 1.617    | 1.693 | 34.9    | 20.9 | 77 E   | 13* 71*                     | 10 8   | 20 44.21        | -44 55.4        | 0.790    | 1.421 | 42.9    | 19.0 | 105 E  | — 71                        |
| 10 28   | 19 30.03        | -30 48.8        | 1.666    | 1.703 | 34.3    | 21.0 | 75 E   | 14* 69*                     | 10 13  | 21 1.20         | -44 8.8         | 0.835    | 1.443 | 42.2    | 19.1 | 104 E  | 1 72                        |
| 11 2  | 19 44.08        | -30 8.6         | 1.716    | 1.713 | 33.6    | 21.0 | 73 E   | 15* 67*                     | 10 18  | 21 21.27        | -43 8.3         | 0.882    | 1.467 | 41.5    | 19.3 | 103 E  | 2 73                        |
| 11 7  | 19 57.99        | -29 23.9        | 1.766    | 1.724 | 33.0    | 21.1 | 71 E   | 15* 65*                     | 10 23  | 21 38.39        | -41 56.3        | 0.932    | 1.492 | 40.8    | 19.4 | 101 E  | 3 74                        |
| 11 12   | 20 11.75        | -28 34.8        | 1.817    | 1.735 | 32.3    | 21.2 | 69 E   | 16* 63*                     | 10 28  | 21 54.57        | -40 35.0        | 0.983    | 1.517 | 40.1    | 19.6 | 100 E  | 4 75                        |
| 11 17   | 20 25.34        | -27 41.7        | 1.869    | 1.747 | 31.5    | 21.2 | 67 E   | 17* 61*                     | 11 2   | 22 9.85         | -39 6.3         | 1.037    | 1.544 | 39.4    | 19.7 | 99 E   | 6 77                        |
| 11 22   | 20 38.73        | -26 44.8        | 1.921    | 1.760 | 30.7    | 21.3 | 66 E   | 18* 58*                     | 11 7   | 22 24.29        | -37 31.9        | 1.092    | 1.572 | 38.7    | 19.8 | 98 E   | 7 78                        |
| 11 27   | 20 51.91        | -25 44.6        | 1.974    | 1.772 | 29.9    | 21.3 | 64 E   | 19* 56*                     | 11 12  | 22              |                 |          |       |         |      |        |                             |

EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 2020                               | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | $45^\circ$ – $26^\circ$ | 20/21  | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | $45^\circ$ – $26^\circ$ |     |
|------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|-------------------------|--|-----------------|-----------------|----------|-------|---------|------|--------|-------------------------|-----|
| <b>385250 2001 DH<sub>47</sub></b> |                 |                 |          |       |         |      |        |                         | <b>415802 2001 JT<sub>2</sub></b> (continuation) |                 |                 |          |       |         |      |        |                         |     |
| 2 11                               | 15 37.55        | +3 17.0         | 1.093    | 1.476 | 42.0    | 21.5 | 90 W   | 48 57*                  | 10 28  | 18 7.58         | -62 20.6        | 1.629    | 1.498 | 36.8    | 20.7 | 64 E   | -                       | 43* |
| 2 21                               | 16 2.39         | +5 53.8         | 1.031    | 1.478 | 41.9    | 21.3 | 94 W   | 51 57*                  | 11 2   | 18 38.90        | -62 10.5        | 1.648    | 1.510 | 36.3    | 20.8 | 64 E   | -                       | 44* |
| 3 2                                | 16 25.53        | +8 59.1         | 0.976    | 1.480 | 41.6    | 21.2 | 98 W   | 54 55*                  | 11 7   | 19 10.10        | -61 37.4        | 1.667    | 1.522 | 35.8    | 20.8 | 64 E   | -                       | 45* |
| 3 12                               | 16 46.52        | +12 28.2        | 0.927    | 1.483 | 41.1    | 21.1 | 101 W  | 57 52                   | 11 12  | 19 40.45        | -60 41.8        | 1.689    | 1.535 | 35.4    | 20.8 | 64 E   | -                       | 47* |
| 3 22                               | 17 4.85         | +16 15.2        | 0.883    | 1.487 | 40.5    | 21.0 | 104 W  | 61 48                   | 11 17  | 20 9.37         | -59 25.1        | 1.711    | 1.549 | 34.9    | 20.9 | 64 E   | -                       | 48* |
| 4 1                                | 17 19.93        | +20 11.8        | 0.845    | 1.491 | 39.7    | 20.9 | 108 W  | 65 44                   | 11 22  | 20 36.46        | -57 49.6        | 1.736    | 1.564 | 34.3    | 20.9 | 63     | -                       | 49* |
| 4 11                               | 17 31.21        | +24 7.6         | 0.813    | 1.495 | 38.9    | 20.8 | 110 W  | 69 40                   | 11 27  | 21 1.54         | -55 58.0        | 1.762    | 1.579 | 33.8    | 20.9 | 63     | -                       | 50* |
| 4 21                               | 17 38.13        | +27 51.2        | 0.785    | 1.499 | 38.1    | 20.7 | 113 W  | 73 36                   | 12 2   | 21 24.59        | -53 52.8        | 1.791    | 1.595 | 33.2    | 21.0 | 62 E   | -                       | 52* |
| 5 1                                | 17 40.19        | +31 8.4         | 0.762    | 1.503 | 37.2    | 20.6 | 116 W  | 76 33                   | 12 7   | 21 45.71        | -51 36.9        | 1.822    | 1.611 | 32.6    | 21.0 | 62 E   | -                       | 52* |
| 5 11                               | 17 37.23        | +33 43.3        | 0.742    | 1.508 | 36.3    | 20.5 | 118 W  | 79 30                   | 12 12  | 22 5.09         | -49 12.6        | 1.856    | 1.628 | 32.0    | 21.1 | 61 E   | -                       | 53* |
| 5 21                               | 17 29.58        | +35 19.7        | 0.728    | 1.512 | 35.5    | 20.5 | 120 W  | 80 29                   | 12 17  | 22 22.90        | -46 42.3        | 1.892    | 1.646 | 31.3    | 21.1 | 60 E   | -                       | 53* |
| 5 26                               | 17 24.31        | +35 40.6        | 0.722    | 1.515 | 35.1    | 20.4 | 121 W  | 81 28                   | 12 22  | 22 39.34        | -44 7.8         | 1.931    | 1.664 | 30.6    | 21.2 | 60 E   | 1*                      | 53* |
| 5 31                               | 17 18.38        | +35 41.2        | 0.718    | 1.517 | 34.8    | 20.4 | 121 W  | 81 28                   | 12 27  | 22 54.60        | -41 31.0        | 1.973    | 1.682 | 29.9    | 21.2 | 58     | 3*                      | 52* |
| 6 5                                | 17 12.06        | +35 20.4        | 0.715    | 1.520 | 34.5    | 20.4 | 122 W  | 80 29                   | 1  | 23 8.83         | -38 53.3        | 2.016    | 1.701 | 29.1    | 21.3 | 57 E   | 6*                      | 51* |
| 6 10                               | 17 5.64         | +34 37.9        | 0.714    | 1.522 | 34.3    | 20.4 | 122 E  | 80 29                   | 1  | 23 22.17        | -36 15.8        | 2.062    | 1.720 | 28.3    | 21.3 | 56 E   | 8*                      | 50* |
| 6 15                               | 16 59.41        | +33 33.7        | 0.715    | 1.524 | 34.2    | 20.4 | 123 E  | 79 30                   | 1 11   | 23 34.77        | -33 39.6        | 2.111    | 1.740 | 27.5    | 21.4 | 55 E   | 10*                     | 49* |
| 6 20                               | 16 53.62        | +32 8.5         | 0.717    | 1.527 | 34.1    | 20.4 | 123 E  | 77 32                   | 1 16   | 23 46.72        | -31 5.3         | 2.161    | 1.759 | 26.6    | 21.4 | 53 E   | 12*                     | 47* |
| 6 25                               | 16 48.55        | +30 23.8        | 0.722    | 1.529 | 34.2    | 20.4 | 122 E  | 75 34                   | <b>165139 2000 NJ<sub>10</sub></b>               |                 |                 |          |       |         |      |        |                         |     |
| 6 30                               | 16 44.36        | +28 21.6        | 0.729    | 1.532 | 34.3    | 20.5 | 122 E  | 73 36                   | 2 11   | 15 51.67        | -17 59.3        | 2.310    | 2.379 | 24.2    | 21.4 | 82 W   | 27                      | 71* |
| 7 5                                | 16 41.20        | +26 4.5         | 0.738    | 1.534 | 34.6    | 20.5 | 121 E  | 71 38                   | 2 21   | 16 5.06         | -18 25.7        | 2.150    | 2.346 | 24.9    | 21.3 | 89 W   | 27                      | 78* |
| 7 10                               | 16 39.11        | +23 35.2        | 0.750    | 1.536 | 34.9    | 20.5 | 120 E  | 69 40                   | 3 2  | 16 17.33        | -18 43.5        | 1.990    | 2.312 | 25.2    | 21.1 | 96 W   | 26                      | 83* |
| 7 15                               | 16 38.13        | +20 56.5        | 0.764    | 1.539 | 35.3    | 20.6 | 119 E  | 66 43                   | 3 12   | 16 28.16        | -18 52.8        | 1.834    | 2.277 | 25.1    | 20.9 | 103 W  | 26                      | 83  |
| 7 20                               | 16 38.25        | +18 11.0        | 0.781    | 1.541 | 35.8    | 20.7 | 117 E  | 63 46                   | 3 22   | 16 37.20        | -18 53.7        | 1.682    | 2.242 | 24.5    | 20.6 | 111 W  | 26                      | 83  |
| 7 25                               | 16 39.45        | +15 21.4        | 0.800    | 1.543 | 36.3    | 20.7 | 116 E  | 60 49                   | 4 1  | 16 44.00        | -18 46.6        | 1.537    | 2.207 | 23.2    | 20.4 | 119 W  | 26                      | 83  |
| 7 30                               | 16 41.69        | +12 30.4        | 0.822    | 1.545 | 36.9    | 20.8 | 114 E  | 58 51                   | 4 11   | 16 48.14        | -18 31.8        | 1.403    | 2.171 | 21.3    | 20.1 | 128 W  | 26                      | 83  |
| 8 4                                | 16 44.91        | +9 40.0         | 0.847    | 1.547 | 37.4    | 20.9 | 112 E  | 55* 54                  | 4 21   | 16 49.18        | -18 10.0        | 1.280    | 2.134 | 18.5    | 19.7 | 138 W  | 27                      | 82  |
| 8 9                                | 16 49.04        | +6 52.4         | 0.874    | 1.550 | 37.9    | 21.0 | 110 E  | 52* 57                  | 5 1  | 16 46.80        | -17 41.7        | 1.174    | 2.097 | 14.8    | 19.4 | 148 W  | 27                      | 82  |
| 8 14                               | 16 54.03        | +4 8.8          | 0.904    | 1.552 | 38.4    | 21.1 | 108 E  | 49* 60                  | 5 11   | 16 41.00        | -17 8.3         | 1.086    | 2.060 | 10.2    | 19.0 | 159 W  | 28                      | 81  |
| 8 19                               | 16 59.81        | +1 30.6         | 0.936    | 1.554 | 38.8    | 21.2 | 106 E  | 46* 62                  | 5 21   | 16 32.19        | -16 31.5        | 1.019    | 2.023 | 5.1     | 18.6 | 170 W  | 28                      | 81  |
| 8 24                               | 17 6.35         | -1 1.1          | 0.970    | 1.556 | 39.2    | 21.3 | 103 E  | 44* 65                  | 5 26   | 16 26.96        | -16 12.9        | 0.994    | 2.005 | 3.1     | 18.4 | 174 W  | 29                      | 80  |
| 8 29                               | 17 13.59        | -3 25.5         | 1.006    | 1.557 | 39.5    | 21.3 | 101 E  | 41* 67                  | 5 31   | 16 21.43        | -15 54.8        | 0.975    | 1.986 | 3.3     | 18.4 | 173 E  | 29                      | 80  |
| 9 3                                | 17 21.48        | -5 42.1         | 1.044    | 1.559 | 39.7    | 21.4 | 99 E   | 39* 70                  | 6 5  | 16 15.80        | -15 38.0        | 0.962    | 1.968 | 5.7     | 18.4 | 169 E  | 29                      | 80  |
| <b>415802 2001 JT<sub>2</sub></b>  |                 |                 |          |       |         |      |        |                         | 6 10   | 16 10.30        | -15 23.0        | 0.955    | 1.949 | 8.6     | 18.5 | 163 E  | 30                      | 79  |
| 2 11                               | 15 51.30        | +19 17.0        | 1.822    | 2.087 | 28.2    | 21.4 | 91 W   | 64 41*                  | 6 15   | 16 5.13         | -15 10.5        | 0.953    | 1.931 | 11.6    | 18.6 | 157 E  | 30                      | 79  |
| 2 21                               | 16 1.44         | +19 17.1        | 1.683    | 2.047 | 28.7    | 21.2 | 97 W   | 64 44*                  | 6 20   | 16 0.50         | -15 1.1         | 0.956    | 1.913 | 14.6    | 18.7 | 152 E  | 30                      | 79  |
| 3 2                                | 16 9.25         | +19 25.1        | 1.544    | 2.006 | 28.8    | 21.0 | 102 W  | 64 45                   | 6 25   | 15 56.59        | -14 55.3        | 0.964    | 1.895 | 17.4    | 18.8 | 146 E  | 30                      | 79  |
| 3 12                               | 16 14.18        | +19 37.2        | 1.406    | 1.965 | 28.6    | 20.8 | 109 W  | 65 44                   | 6 30   | 15 53.54        | -14 53.5        | 0.976    | 1.877 | 20.1    | 18.9 | 141 E  | 30                      | 79  |
| 3 22                               | 16 15.47        | +19 48.0        | 1.271    | 1.924 | 27.8    | 20.5 | 116 W  | 65 44                   | 7 10   | 15 50.34        | -15 2.4         | 1.011    | 1.842 | 24.8    | 19.1 | 131 E  | 30                      | 79  |
| 3 27                               | 16 14.46        | +19 50.3        | 1.206    | 1.904 | 27.2    | 20.3 | 119 W  | 65 44                   | 7 20   | 15 51.26        | -15 27.2        | 1.056    | 1.807 | 28.7    | 19.3 | 121 E  | 29*                     | 79  |
| 4 1                                | 16 12.20        | +19 48.4        | 1.142    | 1.883 | 26.4    | 20.2 | 123 W  | 65 44                   | 7 30   | 15 56.27        | -16 5.8         | 1.109    | 1.774 | 31.7    | 19.4 | 113 E  | 29*                     | 80  |
| 4 6                                | 16 8.56         | +19 40.4        | 1.081    | 1.862 | 25.5    | 20.0 | 127 W  | 65 44                   | 8 9  | 16 5.12         | -16 54.8        | 1.166    | 1.742 | 34.0    | 19.6 | 106 E  | 27*                     | 81  |
| 4 11                               | 16 3.43         | +19 24.1        | 1.023    | 1.842 | 24.3    | 19.8 | 131 W  | 64 45                   | 8 19   | 16 17.45        | -17 50.1        | 1.225    | 1.712 | 35.7    | 19.7 | 99 E   | 25*                     | 82  |
| 4 16                               | 15 56.73        | +18 56.8        | 0.968    | 1.822 | 22.9    | 19.6 | 135 W  | 64 45                   | 8 29   | 16 32.94        | -18 47.7        | 1.286    | 1.684 | 36.8    | 19.8 | 94 E   | 24*                     | 83* |
| 4 21                               | 15 48.39        | +18 15.4        | 0.918    | 1.801 | 21.5    | 19.4 | 139 W  | 63 46                   | 9 8  | 16 51.24        | -19 43.3        | 1.347    | 1.658 | 37.4    | 19.9 | 88 E   | 23*                     | 80* |
| 4 26                               | 15 38.44        | +17 16.5        | 0.872    | 1.781 | 19.9    | 19.3 | 143 W  | 62 47                   | 9 18   | 17 12.04        | -20 32.8        | 1.407    | 1.634 | 37.7    | 19.9 | 84 E   | 22*                     | 77* |
| 5 1                                | 15 27.01        | +15 57.2        | 0.832    | 1.761 | 18.5    | 19.1 | 146 W  | 61 48                   | 9 28   | 17 35.06        | -21 12.4        | 1.467    | 1.614 | 37.6    | 20.0 | 79 E   | 22*                     | 72* |
| 5 6                                | 15 14.33        | +14 14.9        | 0.798    | 1.741 | 17.5    | 18.9 | 149 W  | 59 50                   | 10 8   | 17 59.98        | -21 38.4        | 1.527    | 1.596 | 37.2    | 20.0 | 75 E   | 22*                     | 68* |
| 5 11                               | 15 0.74         | +12 8.6         | 0.772    | 1.722 | 17.1    | 18.8 | 150 E  | 57 52                   | 10 18  | 18 26.49        | -21 47.8        | 1.587    | 1.581 | 36.7    | 20.1 | 71 E   | 22*                     | 64* |
| 5 16                               | 14 46.66        | +9 39.1         | 0.754    | 1.703 | 17.7    | 18.8 | 149 E  | 55 54                   | 10 28  | 18 54.26        | -21 38.0        | 1.646    | 1.570 | 35.9    | 20.1 | 68 E   | 22*                     | 60* |
| 5 21                               | 14 32.58        | +6 49.1         | 0.744    | 1.684 | 19.3    | 18.8 | 147 E  | 52 57                   | 11 7   | 19 22.91        | -21 7.4         | 1.707    | 1.562 | 34.9    | 20.2 | 65 E   | 23*                     | 56* |
| 5 26                               | 14 19.01        | +3 43.0         | 0.742    | 1.666 | 21.6    | 18.8 | 143 E  | 49 60                   | 11 17  | 19 52.12        | -20 15.3        | 1.768    | 1.558 | 33.8    | 20.2 | 61 E   | 24*                     | 52* |
| 5 31                               | 14 6.38         | +0 26.6         | 0.748    | 1.647 | 24.3    | 18.9 | 138 E  | 45 64                   | 11 27  | 20 21.55        | -19 1.9         | 1.831    | 1.558 | 32.6    | 20.3 | 58 E   | 25*                     | 47* |
| 6 5                                | 13 55.00        | -2 54.3         | 0.761    | 1.630 | 27.2    | 19.0 | 133 E  | 42 67                   | 12 7   | 20 50.91        | -17 28.5        | 1.896    | 1.561 | 31.2    | 20.3 | 55 E   | 26*                     | 43* |
| 6 10                               | 13 45.09        | -6 14.5         | 0.782    | 1.613 | 30.1    | 19.1 | 127 E  | 39 70                   | 12 17  | 21 19.99        | -15 36.9        | 1.963    | 1.569 | 29.8    | 20.3 | 52 E   | 27*                     | 38* |
| 6 15                               | 13 36.74        | -9 30.1         | 0.807    | 1.596 | 32.7    | 19.2 | 122 E  | 35* 74                  | 12 27  | 21 48.61        | -13 29.8        | 2.032    | 1.579 | 28.2    | 20.4 | 49 E   | 28*                     | 34* |
| 6 20                               | 13 29.98        | -12 38.8        | 0.838    | 1.580 | 35.1    | 19.4 | 117 E  | 31* 77                  | 1  | 22 16.67        | -11 10.3        | 2.103    | 1.594 | 26.6    | 20.4 | 46 E   | 28*                     | 30* |
| 6 25                               | 13 24.79        | -15 39.4        | 0.872    | 1.565 | 37.1    | 19.5 | 112 E  | 27* 80                  | 1 16   | 22 44.14        | -8 41.3         | 2.177    | 1.611 | 24.8    | 20.5 | 43 E   | 28*                     | 26* |
| 6 30                               | 13 21.08        | -18 31.5        | 0.909    | 1.550 | 38.8    | 19.6 | 107 E  | 23* 83                  | <b>462107 2007 RH<sub>11</sub></b>               |                 |                 |          |       |         |      |        |                         |     |
| 7 10                               | 13 17.72        | -23 52.0        | 0.989    | 1.523 | 41.3    | 19.8 | 99 E   | 14* 88                  | 2 11   | 16 1.00         | -32 8.4         | 2.173    | 2.176 | 26.2    | 21.4 | 77 W   | 13*                     | 71* |
| 7 20                               | 13 19.15        | -28 46.0        | 1.072    | 1.499 | 42.6    | 20.0 | 92 E   | 7* 84*                  | 2 21   | 16 17.60        | -34 55.9        | 2.020    | 2.140 | 27.3    | 21.2 | 83 W   | 10                      | 76* |
| 7 30                               | 13 24.83        | -33 20.4        | 1.153    | 1.479 | 43.2    | 20.1 | 86 E   | 1* 74*                  | 3 2  | 16 34.13        | -37 54.0        | 1.871    | 2.103 | 28.1    | 21.0 | 89 W   | 7                       | 77* |
| 8 4                                | 13 29.15        | -35 32.2        | 1.192    | 1.471 | 43.2    | 20.2 | 83 E   | - 70*                   | 3 12   | 16 50.49        | -41 5.2         | 1.726    | 2.066 | 28.6    | 20.8 | 95 W   | 4                       | 75  |
| 8 9                                | 13 34.41        | -37 41.0        | 1.230    | 1.463 | 43.1    | 20.2 | 81 E   | - 66*                   | 3 22   | 17 6.53         | -44 32.3        | 1.589    | 2.029 | 28.8    | 20.6 | 101 W  | -                       | 71  |
| 8 14                               | 13 40.6         |                 |          |       |         |      |        |                         |  |                 |                 |          |       |         |      |        |                         |     |

EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 2020   | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | 45°-26° | 20/21  | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | 45°-26° |     |
|--|-----------------|-----------------|----------|-------|---------|------|--------|---------|--|-----------------|-----------------|----------|-------|---------|------|--------|---------|-----|
| <p><b>462107 2007 RH<sub>11</sub></b> (continuation)</p> |                 |                 |          |       |         |      |        |         | <p><b>462107 2007 RH<sub>11</sub></b> (continuation)</p> |                 |                 |          |       |         |      |        |         |     |
| 5 23   | 18 8.09         | -71 45.0        | 1.015    | 1.804 | 27.2    | 19.3 | 126 W  | 44      | 12 27  | 22 55.75        | -8 1.6          | 1.805    | 1.680 | 32.5    | 20.6 | 67 E   | 37*     | 47* |
| 5 25   | 18 6.72         | -72 37.7        | 1.006    | 1.797 | 27.3    | 19.3 | 126 W  | 43      | 1 6  | 23 14.94        | + 3 42.0        | 1.922    | 1.709 | 30.7    | 20.7 | 63 E   | 40*     | 40* |
| 5 27   | 18 4.82         | -73 29.0        | 0.998    | 1.790 | 27.4    | 19.3 | 126 W  | 43      | 1 16   | 23 34.03        | + 0 24.0        | 2.040    | 1.741 | 28.8    | 20.8 | 58 E   | 42*     | 33* |
| 5 29   | 18 2.35         | -74 18.8        | 0.991    | 1.783 | 27.5    | 19.3 | 126 W  | 42      | <p><b>252902 2002 JX<sub>127</sub></b></p>               |                 |                 |          |       |         |      |        |         |     |
| 5 31   | 17 59.26        | -75 6.9         | 0.983    | 1.776 | 27.7    | 19.2 | 126 W  | 41      | 2 11   | 16 7.42         | -14 39.5        | 2.156    | 2.191 | 26.2    | 21.4 | 79 W   | 30*     | 66* |
| 6 2  | 17 55.47        | -75 53.0        | 0.977    | 1.770 | 27.8    | 19.2 | 125 W  | 40      | 2 21   | 16 23.71        | -15 15.9        | 2.007    | 2.157 | 27.2    | 21.2 | 85 W   | 30      | 73* |
| 6 4  | 17 50.94        | -76 36.9        | 0.971    | 1.763 | 28.0    | 19.2 | 125 W  | 39      | 3 2  | 16 39.27        | -15 44.9        | 1.858    | 2.123 | 27.8    | 21.0 | 91 W   | 29      | 78* |
| 6 6  | 17 45.60        | -77 18.4        | 0.965    | 1.757 | 28.2    | 19.2 | 125 W  | 39      | 3 12   | 16 53.85        | -16 7.2         | 1.712    | 2.089 | 28.1    | 20.8 | 98 W   | 29      | 80  |
| 6 8  | 17 39.42        | -77 57.3        | 0.960    | 1.750 | 28.5    | 19.2 | 125 W  | 38      | 3 22   | 17 7.18         | -16 24.2        | 1.570    | 2.055 | 28.0    | 20.6 | 104 W  | 29      | 80  |
| 6 10   | 17 32.34        | -78 33.4        | 0.956    | 1.744 | 28.7    | 19.2 | 124 W  | 37      | 4 1  | 17 18.87        | -16 37.6        | 1.433    | 2.022 | 27.4    | 20.3 | 111 W  | 28      | 81  |
| 6 15   | 17 10.74        | -79 49.3        | 0.946    | 1.728 | 29.4    | 19.1 | 123 E  | 36      | 4 21   | 17 28.54        | -16 49.5        | 1.303    | 1.989 | 26.2    | 20.1 | 119 W  | 28      | 81  |
| 6 20   | 16 44.47        | -80 42.6        | 0.939    | 1.712 | 30.1    | 19.1 | 122 E  | 35      | 4 11   | 17 35.72        | -17 3.0         | 1.183    | 1.956 | 24.3    | 19.8 | 127 W  | 28      | 81  |
| 6 25   | 16 16.26        | -81 11.8        | 0.934    | 1.697 | 30.9    | 19.1 | 121 E  | 35      | 5 1  | 17 39.92        | -17 21.1        | 1.073    | 1.925 | 21.6    | 19.4 | 135 W  | 28      | 81  |
| 6 30   | 15 50.11        | -81 18.8        | 0.931    | 1.683 | 31.7    | 19.1 | 120 E  | 35      | 5 11   | 17 40.73        | -17 47.3        | 0.977    | 1.894 | 17.9    | 19.1 | 145 W  | 27      | 82  |
| 7 1  | 15 45.46        | -81 17.8        | 0.930    | 1.680 | 31.9    | 19.1 | 119 E  | 35      | 5 21   | 17 37.91        | -18 24.2        | 0.897    | 1.864 | 13.3    | 18.7 | 155 W  | 27      | 82  |
| 7 2  | 15 41.06        | -81 16.2        | 0.930    | 1.677 | 32.0    | 19.1 | 119 E  | 35      | 5 31   | 17 31.62        | -19 13.0        | 0.836    | 1.836 | 7.8     | 18.3 | 166 W  | 26      | 83  |
| 7 3  | 15 36.93        | -81 13.9        | 0.929    | 1.674 | 32.2    | 19.1 | 119 E  | 35      | 6 5  | 17 27.41        | -19 41.6        | 0.813    | 1.822 | 4.8     | 18.1 | 171 W  | 25      | 84  |
| 7 4  | 15 33.08        | -81 11.0        | 0.929    | 1.672 | 32.4    | 19.1 | 118 E  | 35      | 6 10   | 17 22.71        | -20 12.8        | 0.794    | 1.809 | 2.0     | 17.8 | 176 W  | 25      | 84  |
| 7 5  | 15 29.53        | -81 7.6         | 0.929    | 1.669 | 32.5    | 19.1 | 118 E  | 35      | 6 15   | 17 17.72        | -20 45.9        | 0.782    | 1.796 | 2.6     | 17.8 | 175 E  | 24      | 85  |
| 7 6  | 15 26.27        | -81 3.6         | 0.929    | 1.666 | 32.7    | 19.1 | 118 E  | 35      | 6 20   | 17 12.66        | -21 20.5        | 0.774    | 1.783 | 5.7     | 18.0 | 170 E  | 24      | 85  |
| 7 7  | 15 23.32        | -80 59.1        | 0.929    | 1.663 | 32.8    | 19.1 | 117 E  | 35      | 6 25   | 17 7.81         | -21 56.0        | 0.772    | 1.771 | 9.0     | 18.1 | 164 E  | 23      | 86  |
| 7 8  | 15 20.69        | -80 54.2        | 0.929    | 1.661 | 33.0    | 19.1 | 117 E  | 35      | 6 30   | 17 3.43         | -22 32.2        | 0.774    | 1.760 | 12.2    | 18.2 | 159 E  | 22      | 87  |
| 7 9  | 15 18.36        | -80 48.9        | 0.929    | 1.658 | 33.2    | 19.1 | 117 E  | 35      | 7 5  | 16 59.75        | -23 8.5         | 0.781    | 1.749 | 15.3    | 18.3 | 153 E  | 22      | 87  |
| 7 10   | 15 16.34        | -80 43.2        | 0.929    | 1.655 | 33.3    | 19.1 | 117 E  | 35      | 7 10   | 16 56.93        | -23 44.8        | 0.792    | 1.739 | 18.2    | 18.4 | 148 E  | 21      | 88  |
| 7 12   | 15 13.23        | -80 30.7        | 0.929    | 1.650 | 33.6    | 19.1 | 116 E  | 35      | 7 15   | 16 55.13        | -24 20.7        | 0.808    | 1.729 | 21.0    | 18.6 | 143 E  | 21      | 88  |
| 7 14   | 15 11.31        | -80 17.0        | 0.929    | 1.645 | 33.9    | 19.1 | 115 E  | 36      | 7 20   | 16 54.43        | -24 56.2        | 0.826    | 1.719 | 23.5    | 18.7 | 138 E  | 20      | 89  |
| 7 16   | 15 10.53        | -80 2.2         | 0.929    | 1.640 | 34.2    | 19.1 | 115 E  | 36      | 8 30   | 16 56.59        | -26 4.9         | 0.873    | 1.703 | 27.7    | 18.9 | 129 E  | 19      | 90  |
| 7 18   | 15 10.85        | -79 46.5        | 0.930    | 1.635 | 34.5    | 19.1 | 114 E  | 36      | 8 9  | 17 3.43         | -27 9.5         | 0.929    | 1.689 | 31.1    | 19.1 | 121 E  | 18      | 89  |
| 7 20   | 15 12.18        | -79 30.0        | 0.931    | 1.630 | 34.8    | 19.1 | 114 E  | 36      | 8 19   | 17 14.60        | -28 7.6         | 0.992    | 1.677 | 33.3    | 19.3 | 114 E  | 17*     | 88  |
| 7 21   | 15 13.20        | -79 21.5        | 0.931    | 1.628 | 35.0    | 19.1 | 113 E  | 37      | 8 29   | 17 29.66        | -28 56.5        | 1.061    | 1.669 | 35.3    | 19.5 | 107 E  | 16*     | 87  |
| 7 22   | 15 14.46        | -79 12.8        | 0.932    | 1.626 | 35.1    | 19.1 | 113 E  | 37      | 9 8  | 17 48.00        | -29 33.4        | 1.134    | 1.664 | 36.4    | 19.7 | 102 E  | 15*     | 86  |
| 7 23   | 15 15.93        | -79 3.9         | 0.932    | 1.623 | 35.2    | 19.1 | 113 E  | 37      | 9 13   | 17 58.22        | -29 46.3        | 1.172    | 1.662 | 36.7    | 19.7 | 99 E   | 15*     | 86  |
| 7 24   | 15 17.62        | -78 54.8        | 0.933    | 1.621 | 35.4    | 19.1 | 113 E  | 37      | 9 18   | 18 9.05         | -29 55.1        | 1.211    | 1.661 | 36.9    | 19.8 | 97 E   | 15*     | 86  |
| 7 25   | 15 19.50        | -78 45.5        | 0.933    | 1.619 | 35.5    | 19.2 | 112 E  | 37      | 9 23   | 18 20.42        | -29 59.6        | 1.251    | 1.661 | 37.0    | 19.9 | 94 E   | 15*     | 86* |
| 7 26   | 15 21.58        | -78 36.1        | 0.934    | 1.616 | 35.6    | 19.2 | 112 E  | 37      | 9 28   | 18 32.26        | -29 59.4        | 1.292    | 1.662 | 37.0    | 20.0 | 92 E   | 15*     | 85* |
| 7 27   | 15 23.84        | -78 26.5        | 0.934    | 1.614 | 35.8    | 19.2 | 112 E  | 38      | 10 3   | 18 44.50        | -29 54.3        | 1.334    | 1.664 | 37.0    | 20.0 | 90 E   | 15*     | 83* |
| 7 28   | 15 26.28        | -78 16.7        | 0.935    | 1.612 | 35.9    | 19.2 | 111 E  | 38      | 10 8   | 18 57.06        | -29 44.2        | 1.376    | 1.666 | 36.8    | 20.1 | 88 E   | 15*     | 81* |
| 7 29   | 15 28.88        | -78 6.7         | 0.935    | 1.610 | 36.0    | 19.2 | 111 E  | 38      | 10 13  | 19 9.88         | -29 29.0        | 1.419    | 1.669 | 36.6    | 20.2 | 85 E   | 16*     | 79* |
| 7 30   | 15 31.64        | -77 56.6        | 0.936    | 1.608 | 36.2    | 19.2 | 111 E  | 38      | 10 18  | 19 22.91        | -29 8.6         | 1.463    | 1.673 | 36.3    | 20.2 | 83 E   | 16*     | 77* |
| 8 1  | 15 37.59        | -77 35.6        | 0.937    | 1.604 | 36.4    | 19.2 | 110 E  | 38      | 10 23  | 19 36.10        | -28 43.1        | 1.508    | 1.678 | 35.9    | 20.3 | 81 E   | 16*     | 75* |
| 8 3  | 15 44.07        | -77 13.7        | 0.939    | 1.600 | 36.6    | 19.2 | 110 E  | 39      | 10 28  | 19 49.38        | -28 12.5        | 1.553    | 1.683 | 35.5    | 20.3 | 79 E   | 17*     | 73* |
| 8 5  | 15 51.02        | -76 50.8        | 0.940    | 1.596 | 36.9    | 19.2 | 109 E  | 39      | 11 2   | 20 2.71         | -27 36.9        | 1.599    | 1.689 | 35.0    | 20.4 | 77 E   | 17*     | 71* |
| 8 7  | 15 58.37        | -76 26.8        | 0.942    | 1.592 | 37.1    | 19.2 | 109 E  | 40      | 11 7   | 20 16.03        | -26 56.5        | 1.646    | 1.696 | 34.5    | 20.5 | 76 E   | 18*     | 69* |
| 8 9  | 16 6.08         | -76 1.7         | 0.944    | 1.588 | 37.3    | 19.2 | 108 E  | 40      | 11 12  | 20 29.32        | -26 11.6        | 1.693    | 1.703 | 33.9    | 20.5 | 74 E   | 19*     | 67* |
| 8 11   | 16 14.08        | -75 35.2        | 0.946    | 1.585 | 37.5    | 19.2 | 108 E  | 40      | 11 17  | 20 42.55        | -25 22.2        | 1.741    | 1.711 | 33.3    | 20.6 | 72 E   | 20*     | 64* |
| 8 13   | 16 22.33        | -75 7.4         | 0.948    | 1.581 | 37.7    | 19.2 | 107 E  | 41      | 11 22  | 20 55.69        | -24 28.8        | 1.790    | 1.720 | 32.6    | 20.6 | 70 E   | 21*     | 62* |
| 8 15   | 16 30.77        | -74 38.1        | 0.950    | 1.578 | 37.9    | 19.2 | 107 E  | 41      | 11 27  | 21 8.70         | -23 31.6        | 1.839    | 1.729 | 31.9    | 20.7 | 68 E   | 21*     | 59* |
| 8 17   | 16 39.37        | -74 7.3         | 0.952    | 1.575 | 38.1    | 19.2 | 107 E  | 42      | 12 2   | 21 21.58        | -22 30.9        | 1.889    | 1.739 | 31.2    | 20.7 | 66 E   | 22*     | 56* |
| 8 19   | 16 48.07        | -73 34.8        | 0.954    | 1.572 | 38.2    | 19.2 | 106 E  | 42      | 12 7   | 21 34.31        | -21 27.0        | 1.939    | 1.749 | 30.4    | 20.8 | 64 E   | 23*     | 54* |
| 8 21   | 16 56.85        | -73 0.7         | 0.957    | 1.569 | 38.4    | 19.2 | 106 E  | 43      | 12 12  | 21 46.88        | -20 20.3        | 1.989    | 1.760 | 29.6    | 20.8 | 62 E   | 24*     | 51* |
| 8 23   | 17 5.65         | -72 24.9        | 0.959    | 1.566 | 38.5    | 19.2 | 105 E  | 44      | 12 17  | 21 59.29        | -19 11.0        | 2.040    | 1.772 | 28.8    | 20.9 | 60 E   | 25*     | 48* |
| 8 25   | 17 14.45        | -71 47.3        | 0.962    | 1.563 | 38.7    | 19.2 | 105 E  | 44      | 12 22  | 22 11.54        | -17 59.6        | 2.092    | 1.784 | 28.0    | 20.9 | 58 E   | 26*     | 46* |
| 8 27   | 17 23.22        | -71 7.9         | 0.965    | 1.561 | 38.8    | 19.2 | 104 E  | 45      | 12 27  | 22 23.62        | -16 46.2        | 2.143    | 1.796 | 27.1    | 20.9 | 56 E   | 27*     | 43* |
| 8 29   | 17 31.92        | -70 26.7        | 0.968    | 1.558 | 39.0    | 19.2 | 104 E  | 46      | 1 1  | 22 35.54        | -15 31.3        | 2.194    | 1.809 | 26.2    | 21.0 | 54 E   | 27*     | 41* |
| 8 31   | 17 40.53        | -69 43.7        | 0.972    | 1.556 | 39.1    | 19.3 | 104 E  | 46      | 1 6  | 22 47.29        | -14 15.2        | 2.246    | 1.822 | 25.3    | 21.0 | 52 E   | 28*     | 38* |
| 9 2  | 17 49.03        | -68 58.9        | 0.975    | 1.554 | 39.2    | 19.3 | 103 E  | 47      | 1 11   | 22 58.89        | -12 58.0        | 2.297    | 1.836 | 24.4    | 21.1 | 51 E   | 28*     | 36* |
| 9 4  | 17 57.41        | -68 12.3        | 0.979    | 1.552 | 39.3    | 19.3 | 103 E  | 48      | 1 16   | 23 10.35        | -11 40.1        | 2.348    | 1.850 | 23.5    | 21.1 | 49 E   | 28*     | 33* |
| 9 6  | 18 5.65         | -67 23.8        | 0.983    | 1.551 | 39.4    | 19.3 | 102 E  | 49      | <p><b>160510 1990 RG<sub>1</sub></b></p>                 |                 |                 |          |       |         |      |        |         |     |
| 9 8  | 18 13.74        | -66 33.6        | 0.988    | 1.549 | 39.5    |      |        |         |  |                 |                 |          |       |         |      |        |         |     |



EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 20/21                                | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | 45° | -26° | 20/21                                | $\alpha_{2000}$ | $\delta_{2000}$                    | $\Delta$ | $r$      | $\beta$  | $V$   | $\psi$ | 45°  | -26° |     |   |     |     |
|--------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|-----|------|--------------------------------------|-----------------|------------------------------------|----------|----------|----------|-------|--------|------|------|-----|---|-----|-----|
| <b>160510</b> 1990 RG <sub>1</sub>   |                 |                 |          |       |         |      |        |     |      | <b>313477</b> 2002 TA <sub>180</sub> |                 |                                    |          |          |          |       |        |      |      |     |   |     |     |
| <i>(continuation)</i>                |                 |                 |          |       |         |      |        |     |      | <i>(continuation)</i>                |                 |                                    |          |          |          |       |        |      |      |     |   |     |     |
| 7                                    | 10              | 15 31.57        | -28 29.1 | 1.793 | 2.558   | 18.0 | 20.1   | 129 | E    | 17*                                  | 88              | 1                                  | 1        | 22 19.33 | -14 9.4  | 2.111 | 1.678  | 27.1 | 20.1 | 51  | E | 28* | 36* |
| 7                                    | 20              | 15 30.47        | -27 59.9 | 1.877 | 2.534   | 20.5 | 20.3   | 119 | E    | 17*                                  | 88              | 1                                  | 6        | 22 31.37 | -12 18.0 | 2.152 | 1.686  | 26.3 | 20.1 | 49  | E | 29* | 34* |
| 7                                    | 30              | 15 32.52        | -27 39.7 | 1.970 | 2.509   | 22.3 | 20.4   | 110 | E    | 16*                                  | 88              | 1                                  | 11       | 22 43.28 | -10 26.5 | 2.193 | 1.695  | 25.4 | 20.1 | 48  | E | 29* | 31* |
| 8                                    | 9               | 15 37.44        | -27 28.9 | 2.069 | 2.483   | 23.6 | 20.6   | 102 | E    | 15*                                  | 89              | 1                                  | 16       | 22 55.04 | -8 35.1  | 2.235 | 1.705  | 24.5 | 20.1 | 46  | E | 30* | 29* |
| 8                                    | 19              | 15 44.94        | -27 26.5 | 2.171 | 2.457   | 24.3 | 20.7   | 94  | E    | 14*                                  | 87*             | <b>307918</b> 2004 EU <sub>9</sub> |          |          |          |       |        |      |      |     |   |     |     |
| 8                                    | 29              | 15 54.76        | -27 31.1 | 2.272 | 2.430   | 24.5 | 20.7   | 87  | E    | 13*                                  | 80*             | 2                                  | 11       | 16 30.10 | -1 32.1  | 1.083 | 1.281  | 48.4 | 21.4 | 76  | W | 43* | 54* |
| 9                                    | 8               | 16 6.61         | -27 40.6 | 2.372 | 2.402   | 24.4 | 20.8   | 80  | E    | 13*                                  | 73*             | 2                                  | 21       | 17 2.68  | +1 19.7  | 0.989 | 1.249  | 50.8 | 21.2 | 78  | W | 45* | 54* |
| 9                                    | 18              | 16 20.28        | -27 52.8 | 2.468 | 2.374   | 23.9 | 20.9   | 73  | E    | 12*                                  | 66*             | 3                                  | 2        | 17 38.24 | +4 55.8  | 0.901 | 1.208  | 53.7 | 21.0 | 79  | W | 48* | 53* |
| 9                                    | 28              | 16 35.59        | -28 5.8  | 2.557 | 2.345   | 23.1 | 20.9   | 66  | E    | 11*                                  | 60*             | 3                                  | 12       | 18 17.80 | +9 14.4  | 0.824 | 1.158  | 57.2 | 20.9 | 79  | W | 51* | 50* |
| 10                                   | 8               | 16 52.35        | -28 17.1 | 2.640 | 2.315   | 22.0 | 20.9   | 60  | E    | 11*                                  | 54*             | 3                                  | 22       | 19 2.66  | +14 5.3  | 0.761 | 1.098  | 61.7 | 20.7 | 76  | W | 53* | 45* |
| 10                                   | 18              | 17 10.43        | -28 25.0 | 2.715 | 2.285   | 20.8 | 20.9   | 54  | E    | 10*                                  | 48*             | 4                                  | 1        | 19 54.14 | +19 3.9  | 0.717 | 1.029  | 67.1 | 20.6 | 72  | W | 53* | 40* |
| 10                                   | 28              | 17 29.67        | -28 27.3 | 2.782 | 2.255   | 19.4 | 20.9   | 49  | E    | 10*                                  | 43*             | 4                                  | 11       | 20 53.15 | +23 27.3 | 0.694 | 0.949  | 73.3 | 20.6 | 65  | W | 51* | 34* |
| 11                                   | 7               | 17 49.94        | -28 22.3 | 2.839 | 2.224   | 17.8 | 20.8   | 43  | E    | 9*                                   | 37*             | 4                                  | 21       | 21 59.24 | +26 23.8 | 0.697 | 0.859  | 79.7 | 20.6 | 57  | W | 45* | 29* |
| 11                                   | 17              | 18 11.10        | -28 8.4  | 2.887 | 2.192   | 16.1 | 20.8   | 38  | E    | 9*                                   | 31*             | 5                                  | 1        | 23 9.77  | +27 10.9 | 0.728 | 0.760  | 85.3 | 20.6 | 49  | W | 37* | 25* |
| 11                                   | 27              | 18 33.01        | -27 44.2 | 2.925 | 2.161   | 14.3 | 20.7   | 33  | E    | 8*                                   | 26*             | 5                                  | 11       | 0 21.11  | +25 40.1 | 0.791 | 0.654  | 88.1 | 20.6 | 40  | W | 28* | 22* |
| 12                                   | 7               | 18 55.53        | -27 8.4  | 2.952 | 2.129   | 12.4 | 20.6   | 28  | E    | 7*                                   | 21*             | 5                                  | 21       | 1 31.31  | +22 26.6 | 0.894 | 0.549  | 85.6 | 20.4 | 33  | W | 18* | 20* |
| 12                                   | 17              | 19 18.53        | -26 20.3 | 2.970 | 2.097   | 10.4 | 20.5   | 23  | E    | 6*                                   | 15*             | 5                                  | 23       | 1 45.26  | +21 41.2 | 0.919 | 0.530  | 84.1 | 20.3 | 31  | W | 16* | 20* |
| 12                                   | 27              | 19 41.86        | -25 19.2 | 2.979 | 2.066   | 8.4  | 20.4   | 18  | E    | 4*                                   | 11*             | 5                                  | 25       | 1 59.23  | +20 55.0 | 0.946 | 0.511  | 82.2 | 20.2 | 30  | W | 14* | 20* |
| 1                                    | 6               | 20 5.41         | -24 4.7  | 2.978 | 2.034   | 6.4  | 20.3   | 13  | E    | 2*                                   | 6*              | 5                                  | 27       | 2 13.23  | +20 8.8  | 0.975 | 0.494  | 79.9 | 20.1 | 29  | W | 12* | 19* |
| 1                                    | 16              | 20 29.09        | -22 36.7 | 2.968 | 2.002   | 4.4  | 20.2   | 9   | E    | —                                    | 3*              | 5                                  | 29       | 2 27.29  | +19 23.3 | 1.005 | 0.479  | 77.2 | 20.0 | 27  | W | 11* | 19* |
| <b>313477</b> 2002 TA <sub>180</sub> |                 |                 |          |       |         |      |        |     |      | <b>307918</b> 2004 EU <sub>9</sub>   |                 |                                    |          |          |          |       |        |      |      |     |   |     |     |
| 2                                    | 11              | 16 23.48        | -31 39.4 | 2.801 | 2.673   | 20.6 | 21.5   | 72  | W    | 13*                                  | 66*             | 5                                  | 31       | 2 41.42  | +18 39.0 | 1.037 | 0.465  | 74.1 | 19.9 | 26  | W | 9*  | 18* |
| 2                                    | 21              | 16 37.76        | -33 7.9  | 2.630 | 2.630   | 21.7 | 21.4   | 79  | W    | 12*                                  | 73*             | 6                                  | 2        | 2 55.63  | +17 56.7 | 1.070 | 0.454  | 70.6 | 19.8 | 25  | W | 7*  | 17* |
| 3                                    | 2               | 16 51.41        | -34 38.4 | 2.458 | 2.586   | 22.5 | 21.2   | 86  | W    | 10*                                  | 78*             | 6                                  | 4        | 3 9.92   | +17 16.9 | 1.104 | 0.445  | 66.8 | 19.7 | 24  | W | 5*  | 17* |
| 3                                    | 12              | 17 4.21         | -36 12.0 | 2.287 | 2.541   | 23.0 | 21.0   | 93  | W    | 9                                    | 80*             | 6                                  | 6        | 3 24.27  | +16 40.2 | 1.138 | 0.439  | 62.7 | 19.6 | 23  | W | 3*  | 16* |
| 3                                    | 22              | 17 15.87        | -37 50.6 | 2.119 | 2.497   | 23.1 | 20.8   | 100 | W    | 7                                    | 78              | 6                                  | 8        | 3 38.64  | +16 6.8  | 1.173 | 0.436  | 58.4 | 19.5 | 21  | W | 2*  | 15* |
| 4                                    | 1               | 17 25.98        | -39 35.4 | 1.958 | 2.451   | 22.9 | 20.6   | 108 | W    | 5                                    | 76              | 6                                  | 10       | 3 53.01  | +15 37.0 | 1.208 | 0.436  | 54.0 | 19.5 | 20  | W | —   | 14* |
| 4                                    | 11              | 17 34.09        | -41 27.8 | 1.805 | 2.406   | 22.2 | 20.4   | 115 | W    | 4                                    | 75              | 6                                  | 15       | 4 28.56  | +14 37.7 | 1.294 | 0.450  | 43.5 | 19.4 | 18  | W | —   | 12* |
| 4                                    | 16              | 17 37.23        | -42 27.1 | 1.732 | 2.383   | 21.7 | 20.2   | 119 | W    | 3                                    | 74              | 6                                  | 20       | 5 2.90   | +13 57.0 | 1.375 | 0.480  | 34.5 | 19.4 | 16  | W | —   | 9*  |
| 4                                    | 21              | 17 39.64        | -43 28.4 | 1.662 | 2.360   | 21.0 | 20.1   | 123 | W    | 2                                    | 73              | 6                                  | 25       | 5 35.45  | +13 28.8 | 1.450 | 0.522  | 27.6 | 19.5 | 14  | W | —   | 7*  |
| 4                                    | 26              | 17 41.25        | -44 31.4 | 1.595 | 2.338   | 20.3 | 20.0   | 126 | W    | —                                    | 71              | 6                                  | 30       | 6 5.92   | +13 7.3  | 1.521 | 0.572  | 22.4 | 19.7 | 12  | W | —   | 5*  |
| 5                                    | 1               | 17 41.95        | -45 35.8 | 1.532 | 2.315   | 19.4 | 19.8   | 130 | W    | —                                    | 70              | 7                                  | 5        | 6 34.30  | +12 48.3 | 1.588 | 0.624  | 18.7 | 19.8 | 11  | W | —   | 3*  |
| 5                                    | 6               | 17 41.68        | -46 41.1 | 1.474 | 2.292   | 18.5 | 19.7   | 134 | W    | —                                    | 69              | 7                                  | 10       | 7 0.70   | +12 29.4 | 1.651 | 0.678  | 15.9 | 20.0 | 11  | W | —   | 2*  |
| 5                                    | 11              | 17 40.35        | -47 46.3 | 1.419 | 2.269   | 17.5 | 19.6   | 138 | W    | —                                    | 68              | 7                                  | 15       | 7 25.30  | +12 9.1  | 1.711 | 0.731  | 13.8 | 20.2 | 10  | W | —   | 1*  |
| 5                                    | 16              | 17 37.90        | -48 50.6 | 1.369 | 2.246   | 16.5 | 19.4   | 141 | W    | —                                    | 67              | 7                                  | 20       | 7 48.29  | +11 46.6 | 1.769 | 0.783  | 12.0 | 20.3 | 9   | W | —   | —   |
| 5                                    | 21              | 17 34.27        | -49 52.5 | 1.323 | 2.223   | 15.5 | 19.3   | 144 | W    | —                                    | 66              | 7                                  | 30       | 8 30.17  | +10 54.4 | 1.875 | 0.880  | 9.0  | 20.6 | 8   | W | —   | —   |
| 5                                    | 26              | 17 29.48        | -50 50.4 | 1.283 | 2.201   | 14.7 | 19.2   | 147 | W    | —                                    | 65              | 8                                  | 9        | 9 7.60   | +9 53.2  | 1.969 | 0.968  | 6.6  | 20.8 | 6   | W | —   | —   |
| 5                                    | 31              | 17 23.61        | -51 42.8 | 1.248 | 2.178   | 14.0 | 19.1   | 149 | W    | —                                    | 64              | 8                                  | 19       | 9 41.65  | +8 44.6  | 2.050 | 1.045  | 4.9  | 21.0 | 5   | W | —   | —   |
| 6                                    | 5               | 17 16.79        | -52 27.9 | 1.218 | 2.156   | 13.7 | 19.0   | 150 | W    | —                                    | 64              | 8                                  | 29       | 10 13.10 | +7 30.3  | 2.116 | 1.113  | 4.3  | 21.1 | 5   | W | —   | —   |
| 6                                    | 10              | 17 9.25         | -53 4.3  | 1.193 | 2.133   | 13.8 | 18.9   | 150 | E    | —                                    | 63              | 9                                  | 8        | 10 42.60 | +6 12.1  | 2.167 | 1.170  | 5.2  | 21.4 | 6   | W | —   | —   |
| 6                                    | 15              | 17 1.25         | -53 30.7 | 1.174 | 2.111   | 14.3 | 18.9   | 149 | E    | —                                    | 62              | <b>328563</b> Mosplanetarium       |          |          |          |       |        |      |      |     |   |     |     |
| 6                                    | 20              | 16 53.16        | -53 46.5 | 1.159 | 2.089   | 15.2 | 18.9   | 147 | E    | —                                    | 62              | 2                                  | 11       | 16 33.48 | -24 44.2 | 2.306 | 2.193  | 25.2 | 21.5 | 71  | W | 20* | 64* |
| 6                                    | 25              | 16 45.35        | -53 51.4 | 1.150 | 2.067   | 16.3 | 18.9   | 145 | E    | —                                    | 62              | 2                                  | 21       | 16 52.75 | -25 1.5  | 2.156 | 2.156  | 26.5 | 21.3 | 77  | W | 20* | 70* |
| 6                                    | 30              | 16 38.21        | -53 46.2 | 1.145 | 2.045   | 17.7 | 18.9   | 142 | E    | —                                    | 62              | 3                                  | 2        | 17 11.62 | -25 6.8  | 2.005 | 2.118  | 27.6 | 21.2 | 83  | W | 20* | 76* |
| 7                                    | 5               | 16 32.06        | -53 31.8 | 1.144 | 2.024   | 19.3 | 18.9   | 139 | E    | —                                    | 62              | 3                                  | 12       | 17 29.90 | -24 59.7 | 1.856 | 2.081  | 28.5 | 21.0 | 88  | W | 20* | 82* |
| 7                                    | 10              | 16 27.15        | -53 9.7  | 1.148 | 2.003   | 20.9 | 18.9   | 135 | E    | —                                    | 63              | 3                                  | 22       | 17 47.35 | -24 39.8 | 1.709 | 2.044  | 29.1 | 20.8 | 94  | W | 20* | 88* |
| 7                                    | 15              | 16 23.63        | -52 41.3 | 1.155 | 1.982   | 22.5 | 19.0   | 132 | E    | —                                    | 63              | 4                                  | 1        | 18 3.67  | -24 7.1  | 1.566 | 2.007  | 29.3 | 20.6 | 101 | W | 21* | 88  |
| 7                                    | 20              | 16 21.64        | -52 8.1  | 1.165 | 1.961   | 24.1 | 19.0   | 128 | E    | —                                    | 64              | 4                                  | 11       | 18 18.54 | -23 21.7 | 1.429 | 1.971  | 29.1 | 20.3 | 107 | W | 22* | 87  |
| 7                                    | 25              | 16 21.19        | -51 31.6 | 1.178 | 1.941   | 25.6 | 19.1   | 124 | E    | —                                    | 64              | 4                                  | 21       | 18 31.60 | -22 23.8 | 1.298 | 1.935  | 28.4 | 20.1 | 114 | W | 23* | 86  |
| 7                                    | 30              | 16 22.30        | -50 53.0 | 1.193 | 1.921   | 27.0 | 19.1   | 121 | E    | —                                    | 65              | 5                                  | 1        | 18 42.41 | -21 13.7 | 1.175 | 1.901  | 27.0 | 19.8 | 121 | W | 24  | 85  |
| 8                                    | 4               | 16 24.88        | -50 13.2 | 1.211 | 1.902   | 28.3 | 19.2   | 117 | E    | —                                    | 66              | 5                                  | 11       | 18 50.54 | -19 52.3 | 1.063 | 1.868  | 25.0 | 19.4 | 129 | W | 25  | 84  |
| 8                                    | 9               | 16 28.86        | -49 32.8 | 1.230 | 1.883   | 29.5 | 19.2   | 114 | E    | —                                    | 66              | 5                                  | 21       | 18 55.55 | -18 20.6 | 0.963 | 1.836  | 22.2 | 19.1 | 137 | W | 27  | 82  |
| 8                                    | 14              | 16 34.14        | -48 52.1 | 1.251 | 1.864   | 30.6 | 19.3   | 110 | E    | —                                    | 67              | 5                                  | 31       | 18 57.08 | -16 40.4 | 0.876 | 1.806  | 18.5 | 18.7 | 146 | W | 28  | 81  |
| 8                                    | 19              | 16 40.65        | -48 11.2 | 1.273 | 1.846   | 31.6 | 19.3   | 107 | E    | —                                    | 68              | 6                                  | 10       | 18 55.09 | -14 55.1 | 0.805 | 1.777  | 14.1 | 18.4 | 155 | W | 30  | 79  |
| 8                                    | 24              | 16 48.28        | -47 30.2 | 1.296 | 1.829   | 32.4 | 19.3   | 104 | E    | —                                    | 68              | 6                                  | 15       | 18 52.86 | -14 1.9  | 0.777 | 1.764  | 11.8 | 18.2 | 159 | W | 31  | 78  |
| 8                                    | 29              | 16 56.93        | -46 48.7 | 1.319 | 1.812   | 33.1 | 19.4   | 101 | E    | —                                    | 69              | 6                                  | 20       | 18 49.92 | -13 9.5  | 0.753 | 1.751  | 9.5  | 18.0 | 163 | W | 32  | 77  |
| 9                                    | 3               | 17 6.50         | -46 6.6  | 1.344 | 1.796   | 33.7 | 19.4   | 99  | E    | —                                    | 70              | 6                                  | 25       | 18 46.42 | -12 18.8 | 0.733 | 1.738  | 7.7  | 17.9 | 167 | W | 33  | 76  |
| 9                                    | 8               | 17 16.89        | -45 23.2 | 1.369 | 1.780   | 34.3 | 19.5   | 96  | E    | —                                    | 71*             |                                    |          |          |          |       |        |      |      |     |   |     |     |

EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 20/21                                       | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | 45°-26° | 20/21   | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | 45°-26° |     |     |
|---|-----------------|-----------------|----------|-------|---------|------|--------|---------|---|-----------------|-----------------|----------|-------|---------|------|--------|---------|-----|-----|
| <b>328563</b> Mosplanetarium (continuation) |                 |                 |          |       |         |      |        |         | <b>363421</b> 2003 RG <sub>8</sub> (continuation) |                 |                 |          |       |         |      |        |         |     |     |
| 11 27                                       | 21 32.87        | -5 47.3         | 1.639    | 1.742 | 33.8    | 20.5 | 79 E   | 39      | 6 30  | 20 34.36        | +27 15.2        | 0.768    | 1.566 | 33.4    | 18.9 | 122 W  | 72      | 37  |     |
| 12 7  | 21 56.43        | -4 27.8         | 1.749    | 1.767 | 32.5    | 20.6 | 75 E   | 41      | 7 5   | 20 34.85        | +28 52.0        | 0.751    | 1.560 | 33.0    | 18.8 | 123 W  | 74      | 35  |     |
| 12 17                                       | 22 19.85        | -2 58.3         | 1.862    | 1.795 | 31.1    | 20.8 | 71 E   | 42*     | 7 10  | 20 34.67        | +30 15.1        | 0.736    | 1.555 | 32.7    | 18.8 | 124 W  | 75      | 34  |     |
| 12 27                                       | 22 43.06        | -1 20.6         | 1.978    | 1.825 | 29.6    | 20.9 | 66 E   | 43*     | 7 15  | 20 33.88        | +31 22.8        | 0.723    | 1.551 | 32.3    | 18.7 | 125 W  | 76      | 33  |     |
| 1 6   | 23 5.98         | +0 23.2         | 2.096    | 1.856 | 28.0    | 21.0 | 62 E   | 43*     | 7 20  | 20 32.60        | +32 13.3        | 0.711    | 1.548 | 31.9    | 18.7 | 126 W  | 77      | 32  |     |
| 1 16  | 23 28.61        | +2 11.3         | 2.215    | 1.889 | 26.2    | 21.1 | 58 E   | 43*     | 7 25  | 20 30.97        | +32 45.2        | 0.701    | 1.546 | 31.4    | 18.6 | 127 W  | 78      | 31  |     |
| <b>474441</b> 2003 OE <sub>13</sub>         |                 |                 |          |       |         |      |        |         | <b>27031</b> 1998 RO <sub>4</sub>                 |                 |                 |          |       |         |      |        |         |     |     |
| 2 11  | 16 52.39        | -27 54.3        | 2.124    | 1.953 | 27.6    | 21.4 | 66 W   | 16*     | 60*   | 2 11            | 17 3.92         | -20 13.5 | 1.788 | 1.630   | 33.1 | 21.4   | 65 W    | 23* | 56* |
| 2 16  | 17 5.08         | -28 18.0        | 2.053    | 1.928 | 28.5    | 21.3 | 69 W   | 16*     | 63*   | 2 16            | 17 19.36        | -20 17.8 | 1.726 | 1.603   | 34.3 | 21.3   | 66 W    | 23* | 58* |
| 2 21  | 17 17.97        | -28 38.1        | 1.982    | 1.903 | 29.4    | 21.3 | 71 W   | 15*     | 65*   | 2 21            | 17 35.17        | -20 16.1 | 1.665 | 1.576   | 35.4 | 21.2   | 67 W    | 23* | 60* |
| 2 26  | 17 31.05        | -28 54.4        | 1.911    | 1.878 | 30.3    | 21.2 | 73 W   | 15*     | 67*   | 2 26            | 17 51.34        | -20 7.8  | 1.606 | 1.550   | 36.5 | 21.2   | 69 W    | 23* | 61* |
| 3 2   | 17 44.31        | -29 6.8         | 1.842    | 1.854 | 31.1    | 21.1 | 75 W   | 15*     | 69*   | 3 2             | 18 7.85         | -19 52.7 | 1.549 | 1.524   | 37.6 | 21.1   | 70 W    | 23* | 62* |
| 3 7   | 17 57.73        | -29 15.0        | 1.773    | 1.830 | 31.9    | 21.0 | 77 W   | 15*     | 71*   | 3 7             | 18 24.68        | -19 30.3 | 1.495 | 1.498   | 38.7 | 21.0   | 71 W    | 23* | 64* |
| 3 12  | 18 11.30        | -29 18.8        | 1.706    | 1.806 | 32.7    | 20.9 | 79 W   | 14*     | 73*   | 3 12            | 18 41.83        | -19 0.3  | 1.443 | 1.473   | 39.8 | 20.9   | 72 W    | 23* | 65* |
| 3 17  | 18 25.00        | -29 18.0        | 1.640    | 1.783 | 33.5    | 20.8 | 81 W   | 14*     | 75*   | 3 17            | 18 59.26        | -18 22.5 | 1.393 | 1.449   | 40.9 | 20.8   | 73 W    | 23* | 65* |
| 3 22  | 18 38.81        | -29 12.4        | 1.576    | 1.760 | 34.2    | 20.7 | 83 W   | 14*     | 77*   | 3 22            | 19 16.94        | -17 36.7 | 1.346 | 1.425   | 42.0 | 20.8   | 73 W    | 23* | 66* |
| 3 27  | 18 52.70        | -29 1.9         | 1.513    | 1.738 | 34.9    | 20.6 | 85 W   | 14*     | 78*   | 3 27            | 19 34.83        | -16 42.8 | 1.301 | 1.402   | 43.1 | 20.7   | 74 W    | 23* | 67* |
| 4 1   | 19 6.63         | -28 46.3        | 1.451    | 1.716 | 35.6    | 20.5 | 87 W   | 14*     | 80*   | 4 1             | 19 52.88        | -15 40.9 | 1.260 | 1.380   | 44.2 | 20.6   | 74 W    | 23* | 67* |
| 4 6   | 19 20.59        | -28 25.6        | 1.391    | 1.695 | 36.2    | 20.4 | 89 W   | 14*     | 82*   | 4 6             | 20 11.06        | -14 31.2 | 1.221 | 1.359   | 45.2 | 20.5   | 75 W    | 23* | 67* |
| 4 11  | 19 34.54        | -27 59.5        | 1.333    | 1.674 | 36.8    | 20.3 | 90 W   | 15*     | 84*   | 4 11            | 20 29.34        | -13 14.1 | 1.186 | 1.340   | 46.3 | 20.5   | 75 W    | 24* | 67* |
| 4 16  | 19 48.45        | -27 28.1        | 1.277    | 1.654 | 37.3    | 20.2 | 92 W   | 15*     | 86*   | 4 21            | 21 5.98         | -10 20.0 | 1.124 | 1.304   | 48.2 | 20.3   | 75 W    | 25* | 67* |
| 4 21  | 20 2.29         | -26 51.3        | 1.223    | 1.635 | 37.8    | 20.1 | 94 W   | 15*     | 88*   | 5 1             | 21 42.43        | -7 4.5   | 1.075 | 1.275   | 49.9 | 20.2   | 75 W    | 26* | 65* |
| 4 26  | 20 15.99        | -26 9.2         | 1.171    | 1.617 | 38.3    | 20.0 | 96 W   | 16*     | 90*   | 5 11            | 22 18.40        | -3 35.9  | 1.036 | 1.252   | 51.3 | 20.2   | 75 W    | 27* | 64* |
| 5 1   | 20 29.53        | -25 21.9        | 1.121    | 1.599 | 38.7    | 19.9 | 97 W   | 16*     | 89  | 5 16            | 22 36.12        | -1 49.5  | 1.021 | 1.244   | 51.9 | 20.1   | 75 W    | 28* | 63* |
| 5 6   | 20 42.87        | -24 29.4        | 1.073    | 1.583 | 39.0    | 19.8 | 99 W   | 17*     | 88  | 5 21            | 22 53.61        | -0 3.1   | 1.007 | 1.237   | 52.4 | 20.1   | 76 W    | 29* | 61* |
| 5 11  | 20 55.97        | -23 32.0        | 1.027    | 1.568 | 39.3    | 19.7 | 101 W  | 18*     | 88  | 5 26            | 23 10.86        | +1 42.0  | 0.996 | 1.232   | 52.8 | 20.1   | 76 W    | 30* | 60* |
| 5 21  | 21 21.27        | -21 23.1        | 0.941    | 1.540 | 39.6    | 19.5 | 104 W  | 20*     | 85  | 5 31            | 23 27.81        | +3 24.8  | 0.986 | 1.230   | 53.1 | 20.1   | 76 W    | 31* | 59* |
| 5 31  | 21 44.99        | -18 58.0        | 0.864    | 1.517 | 39.6    | 19.3 | 108 W  | 23*     | 83  | 6 5             | 23 44.47        | +5 4.3   | 0.978 | 1.229   | 53.3 | 20.1   | 76 W    | 32* | 58* |
| 6 10  | 22 6.76         | -16 20.0        | 0.795    | 1.500 | 39.1    | 19.0 | 111 W  | 26*     | 80  | 6 10            | 0 0.80          | +6 39.7  | 0.971 | 1.231   | 53.3 | 20.0   | 77 W    | 34* | 57* |
| 6 20  | 22 26.11        | -13 33.5        | 0.733    | 1.487 | 38.1    | 18.8 | 116 W  | 30*     | 78  | 6 15            | 0 16.77         | +8 10.4  | 0.965 | 1.235   | 53.3 | 20.0   | 77 W    | 35* | 55* |
| 6 30  | 22 42.48        | -10 43.7        | 0.680    | 1.481 | 36.4    | 18.6 | 120 W  | 34*     | 75  | 6 20            | 0 32.36         | +9 35.7  | 0.960 | 1.240   | 53.2 | 20.0   | 78 W    | 37* | 54* |
| 7 10  | 22 55.39        | -7 56.5         | 0.634    | 1.480 | 33.8    | 18.4 | 126 W  | 37*     | 72  | 6 30            | 1 2.25          | +12 8.1  | 0.950 | 1.258   | 52.6 | 20.0   | 79 W    | 41* | 52* |
| 7 15  | 23 0.37         | -6 35.8         | 0.615    | 1.482 | 32.2    | 18.3 | 129 W  | 38      | 71  | 7 10            | 1 30.21         | +14 14.6 | 0.939 | 1.282   | 51.7 | 20.0   | 82 W    | 46* | 50  |
| 7 20  | 23 4.27         | -5 18.3         | 0.597    | 1.486 | 30.4    | 18.2 | 132 W  | 40      | 69  | 7 20            | 1 55.94         | +15 54.1 | 0.927 | 1.314   | 50.4 | 20.0   | 85 W    | 51* | 48  |
| 7 25  | 23 7.06         | -4 4.8          | 0.582    | 1.490 | 28.3    | 18.0 | 136 W  | 41      | 68  | 7 30            | 2 19.02         | +17 6.2  | 0.911 | 1.351   | 48.7 | 20.0   | 89 W    | 55* | 47  |
| 7 30  | 23 8.74         | -2 56.2         | 0.570    | 1.497 | 25.9    | 17.9 | 140 W  | 42      | 67  | 8 9             | 2 39.05         | +17 51.7 | 0.892 | 1.392   | 46.6 | 19.9   | 94 W    | 59* | 46  |
| 8 4   | 23 9.31         | +1 53.2         | 0.560    | 1.504 | 23.3    | 17.8 | 144 W  | 43      | 66  | 8 19            | 2 55.54         | +18 11.4 | 0.869 | 1.438   | 44.0 | 19.9   | 99 W    | 62* | 46  |
| 8 9   | 23 8.84         | +0 56.7         | 0.553    | 1.513 | 20.5    | 17.7 | 148 W  | 44      | 65  | 8 29            | 3 7.88          | +18 5.9  | 0.844 | 1.487   | 40.7 | 19.8   | 106 W   | 63  | 46  |
| 8 19  | 23 5.12         | +0 34.7         | 0.549    | 1.535 | 14.4    | 17.5 | 158 W  | 46      | 63  | 9 8             | 3 15.57         | +17 36.2 | 0.819 | 1.538   | 36.6 | 19.7   | 114 W   | 63  | 46  |
| 8 29  | 22 58.94        | +1 35.5         | 0.561    | 1.561 | 8.4     | 17.4 | 167 W  | 47      | 62  | 9 18            | 3 18.14         | +16 42.8 | 0.797 | 1.591   | 31.7 | 19.6   | 124 W   | 62  | 47  |
| 9 8   | 22 52.21        | +2 9.1          | 0.589    | 1.592 | 5.5     | 17.4 | 171 E  | 47      | 62  | 9 28            | 3 15.42         | +15 27.2 | 0.781 | 1.646   | 25.8 | 19.4   | 134 W   | 60  | 49  |
| 9 13  | 22 49.22        | +2 17.8         | 0.610    | 1.609 | 6.7     | 17.6 | 169 E  | 47      | 62  | 10 3            | 3 12.20         | +14 42.2 | 0.777 | 1.673   | 22.5 | 19.3   | 140 W   | 60  | 49  |
| 9 18  | 22 46.73        | +2 22.5         | 0.635    | 1.627 | 9.0     | 17.8 | 165 E  | 47      | 62  | 10 8            | 3 7.88          | +13 53.4 | 0.776 | 1.700   | 19.0 | 19.3   | 146 W   | 59  | 50  |
| 9 23  | 22 44.92        | +2 24.7         | 0.664    | 1.646 | 11.5    | 18.0 | 161 E  | 47      | 62  | 10 13           | 3 2.63          | +13 1.9  | 0.780 | 1.728   | 15.4 | 19.2   | 153 W   | 58  | 51  |
| 9 28  | 22 43.89        | +2 25.7         | 0.698    | 1.665 | 14.0    | 18.2 | 156 E  | 47      | 62  | 10 18           | 2 56.68         | +12 8.9  | 0.789 | 1.756   | 11.7 | 19.1   | 159 W   | 57  | 52  |
| 10 3  | 22 43.69        | +2 26.6         | 0.736    | 1.686 | 16.3    | 18.4 | 152 E  | 47      | 62  | 10 23           | 2 50.30         | +11 16.0 | 0.803 | 1.783   | 8.1  | 19.0   | 165 W   | 56  | 53  |
| 10 8  | 22 44.31        | +2 28.1         | 0.778    | 1.707 | 18.4    | 18.7 | 147 E  | 47      | 62  | 10 28           | 2 43.80         | +10 25.2 | 0.823 | 1.811   | 4.8  | 19.0   | 171 W   | 55  | 54  |
| 10 18                                       | 22 47.95        | +2 36.1         | 0.874    | 1.750 | 22.1    | 19.1 | 139 E  | 48      | 61  | 11 2            | 2 37.43         | +9 37.8  | 0.848 | 1.838   | 2.9  | 19.0   | 175 W   | 55  | 54  |
| 10 28                                       | 22 54.52        | +2 53.6         | 0.983    | 1.796 | 24.8    | 19.5 | 131 E  | 48      | 61  | 11 7            | 2 31.45         | +8 55.3  | 0.880 | 1.866   | 4.5  | 19.2   | 171 E   | 54  | 55  |
| 11 7  | 23 3.50         | +3 22.4         | 1.104    | 1.844 | 26.8    | 19.8 | 123 E  | 48      | 61  | 11 12           | 2 26.05         | +8 18.8  | 0.918 | 1.893   | 7.3  | 19.4   | 166 E   | 53  | 56  |
| 11 17                                       | 23 14.41        | +4 2.2          | 1.237    | 1.892 | 28.0    | 20.2 | 116 E  | 49      | 60  | 11 17           | 2 21.39         | +7 48.9  | 0.961 | 1.920   | 10.1 | 19.7   | 160 E   | 53  | 56  |
| 11 27                                       | 23 26.84        | +4 52.8         | 1.379    | 1.942 | 28.7    | 20.5 | 109 E  | 50      | 59  |                 |                 |          |       |         |      |        |         |     |     |
| 12 7  | 23 40.43        | +5 52.5         | 1.529    | 1.993 | 28.8    | 20.8 | 103 E  | 51      | 57*   |                 |                 |          |       |         |      |        |         |     |     |
| 12 17                                       | 23 54.91        | +7 0.0          | 1.685    | 2.044 | 28.6    | 21.0 | 96 E   | 52      | 54*   |                 |                 |          |       |         |      |        |         |     |     |
| 12 27                                       | 0 10.08         | +8 13.7         | 1.846    | 2.095 | 28.0    | 21.3 | 90 E   | 53      | 49*   |                 |                 |          |       |         |      |        |         |     |     |
| 1 6   | 0 25.77         | +9 32.2         | 2.011    | 2.146 | 27.1    | 21.5 | 84 E   | 55      | 44*   |                 |                 |          |       |         |      |        |         |     |     |
| <b>363421</b> 2003 RG <sub>8</sub>          |                 |                 |          |       |         |      |        |         | <b>27031</b> 1998 RO <sub>4</sub>                 |                 |                 |          |       |         |      |        |         |     |     |
| 2 11  | 16 54.68        | -17 53.6        | 2.148    | 1.984 | 27.3    | 21.5 | 67 W   | 26*     | 58*   | 6 30            | 1 2.25          | +12 8.1  | 0.950 | 1.258   | 52.6 | 20.0   | 79 W    | 41* | 52* |
| 2 21  | 17 16.73        | -16 58.5        | 2.008    | 1.946 | 28.9    | 21.3 | 72 W   | 27*     | 63*   | 7 10            | 1 30.21         | +14 14.6 | 0.939 | 1.282   | 51.7 | 20.0   | 82 W    | 46* | 50  |
| 3 2   | 17 38.59        | -15 40.7        | 1.870    | 1.908 | 30.4    | 21.2 | 77 W   | 28*     | 67*   | 7 20            | 1 55.94         | +15 54.1 | 0.927 | 1.314   | 50.4 | 20.0   | 85 W    | 51* | 48  |
| 3 12  | 18 0.10         | -13 58.6        | 1.735    | 1.871 | 31.7    | 21.0 | 82 W   | 30*     | 71*   | 7 30            | 2 19.02         | +17 6.2  | 0.911 | 1.351   | 48.7 | 20.0   | 89 W    | 55* | 47  |
| 3 22  | 18 21.11        | -11 50.8        | 1.604    | 1.834 | 32.8    | 20.8 | 86 W   | 32*     | 73*   | 8 9             | 2 39.05         | +17 51.7 | 0.892 | 1.392   | 46.6 | 19.9   | 94 W    | 59* | 46  |
| 4 1   | 18 41.40        | -9 16.1         | 1.479    | 1.798 | 33.8    | 20.6 | 91 W   | 34*     | 73*   | 8 19            | 2 55.54         | +18 11.4 | 0.869 | 1.438   | 44.0 | 19.9   | 99 W    | 62* | 46  |
| 4 11  | 19 0.79         | -6 14.3         | 1.362    | 1.764 | 34.4    | 20.4 | 95 W   | 38*     | 70  | 8 29            | 3 7.88          | +18 5.9  | 0.844 | 1.487   | 40.7 | 19.8   | 106 W   | 63  | 46  |
| 4 21  | 19 19.09        | -2 45.7         | 1.253    | 1.731 | 34.9    |      |        |         |   |                 |                 |          |       |         |      |        |         |     |     |

EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 2020                               | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | $45^{\circ}$ - $26^{\circ}$ | 20/21                              | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | $45^{\circ}$ - $26^{\circ}$ |
|------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|-----------------------------|------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|-----------------------------|
| <b>27031 1998 RO<sub>4</sub></b>   |                 |                 |          |       |         |      |        |                             | <b>244049 2001 TL<sub>13</sub></b> |                 |                 |          |       |         |      |        |                             |
| <i>(continuation)</i>              |                 |                 |          |       |         |      |        |                             | <i>(continuation)</i>              |                 |                 |          |       |         |      |        |                             |
| 11 27                              | 2 14.71         | + 7 10.3        | 1.064    | 1.974 | 15.2    | 20.2 | 148 E  | 52 57                       | 7 15                               | 23 19.13        | + 8 49.5        | 0.628    | 1.422 | 39.2    | 18.5 | 118 W  | 54 55                       |
| 12 7                               | 2 11.66         | + 6 58.5        | 1.187    | 2.027 | 19.1    | 20.6 | 138 E  | 52 57                       | 7 20                               | 23 26.49        | +10 6.3         | 0.606    | 1.422 | 38.1    | 18.4 | 120 W  | 55 54                       |
| 12 17                              | 2 12.03         | + 7 9.6         | 1.325    | 2.079 | 22.0    | 21.0 | 128 E  | 52 57                       | 7 25                               | 23 33.06        | +11 15.7        | 0.587    | 1.423 | 36.8    | 18.3 | 123 W  | 56 53                       |
| 12 27                              | 2 15.43         | + 7 39.0        | 1.475    | 2.130 | 23.9    | 21.3 | 119 E  | 53 56                       | 7 30                               | 23 38.80        | +12 16.7        | 0.569    | 1.424 | 35.3    | 18.2 | 126 W  | 57 52                       |
| <b>453707 2010 XY<sub>72</sub></b> |                 |                 |          |       |         |      |        |                             | <b>244049 2001 TL<sub>13</sub></b> |                 |                 |          |       |         |      |        |                             |
| 2 11                               | 17 5.66         | -21 41.0        | 1.321    | 1.256 | 44.9    | 21.4 | 64 W   | 22* 56*                     | 8 4                                | 23 43.63        | +13 8.4         | 0.553    | 1.428 | 33.6    | 18.1 | 129 W  | 58 51                       |
| 2 16                               | 17 22.54        | -23 38.1        | 1.276    | 1.241 | 46.2    | 21.4 | 65 W   | 19* 58*                     | 8 9                                | 23 47.50        | +13 49.5        | 0.538    | 1.432 | 31.6    | 18.0 | 132 W  | 59 50                       |
| 2 21                               | 17 40.50        | -25 35.6        | 1.231    | 1.226 | 47.5    | 21.3 | 66 W   | 17* 60*                     | 8 14                               | 23 50.35        | +14 19.0        | 0.525    | 1.438 | 29.4    | 17.9 | 136 W  | 59 50                       |
| 2 26                               | 17 59.70        | -27 32.4        | 1.189    | 1.209 | 48.8    | 21.2 | 67 W   | 15* 61*                     | 8 19                               | 23 52.17        | +14 36.0        | 0.515    | 1.444 | 26.8    | 17.8 | 140 W  | 60 49                       |
| 3 2                                | 18 20.31        | -29 27.0        | 1.148    | 1.192 | 50.1    | 21.1 | 67 W   | 13* 61*                     | 8 29                               | 23 52.88        | +14 29.9        | 0.501    | 1.461 | 21.1    | 17.6 | 149 W  | 59 50                       |
| 3 7                                | 18 42.49        | -31 17.2        | 1.110    | 1.175 | 51.4    | 21.1 | 68 W   | 10* 61*                     | 9 8                                | 23 50.48        | +13 32.1        | 0.500    | 1.482 | 14.8    | 17.4 | 158 W  | 59 50                       |
| 3 12                               | 19 6.40         | -33 0.1         | 1.075    | 1.157 | 52.7    | 21.0 | 68 W   | 8* 61*                      | 9 18                               | 23 46.41        | +11 51.8        | 0.512    | 1.507 | 9.1     | 17.3 | 166 W  | 57 52                       |
| 3 17                               | 19 32.13        | -34 32.1        | 1.044    | 1.139 | 54.0    | 21.0 | 68 W   | 5* 60*                      | 9 23                               | 23 44.34        | +10 51.3        | 0.525    | 1.521 | 7.6     | 17.3 | 168 E  | 56 53                       |
| 3 22                               | 19 59.66        | -35 49.1        | 1.017    | 1.121 | 55.3    | 20.9 | 68 W   | 2* 59*                      | 9 28                               | 23 42.57        | + 9 47.8        | 0.541    | 1.536 | 7.7     | 17.3 | 168 E  | 55 54                       |
| 3 27                               | 20 28.86        | -36 46.7        | 0.994    | 1.102 | 56.6    | 20.8 | 67 W   | — 57*                       | 10 3                               | 23 41.28        | + 8 44.3        | 0.562    | 1.551 | 9.3     | 17.5 | 165 E  | 54 55                       |
| 4 1                                | 20 59.40        | -37 20.4        | 0.975    | 1.083 | 57.8    | 20.8 | 66 W   | — 55*                       | 10 8                               | 23 40.59        | + 7 43.3        | 0.588    | 1.567 | 11.7    | 17.7 | 161 E  | 53 56                       |
| 4 6                                | 21 30.81        | -37 26.6        | 0.962    | 1.064 | 58.9    | 20.8 | 66 W   | — 53*                       | 10 13                              | 23 40.61        | + 6 46.9        | 0.617    | 1.584 | 14.2    | 18.0 | 157 E  | 52 57                       |
| 4 11                               | 22 2.50         | -37 3.1         | 0.955    | 1.045 | 60.0    | 20.7 | 64 W   | — 52*                       | 10 18                              | 23 41.39        | + 5 56.6        | 0.651    | 1.602 | 16.7    | 18.2 | 152 E  | 51 58                       |
| 4 16                               | 22 33.83        | -36 9.4         | 0.952    | 1.026 | 60.8    | 20.7 | 63 W   | — 50*                       | 10 23                              | 23 42.96        | + 5 13.7        | 0.688    | 1.619 | 19.1    | 18.4 | 148 E  | 50 59                       |
| 4 21                               | 23 4.19         | -34 47.0        | 0.954    | 1.008 | 61.6    | 20.7 | 62 W   | — 48*                       | 10 28                              | 23 45.31        | + 4 38.8        | 0.730    | 1.638 | 21.2    | 18.6 | 143 E  | 50 59                       |
| 4 26                               | 23 33.11        | -32 58.6        | 0.961    | 0.990 | 62.1    | 20.7 | 60 W   | — 47*                       | 11 7                               | 23 52.13        | + 3 52.9        | 0.823    | 1.676 | 24.8    | 19.0 | 135 E  | 49 60                       |
| 5 1                                | 0 0.31          | -30 48.2        | 0.972    | 0.973 | 62.4    | 20.7 | 59 W   | — 45*                       | 11 17                              | 0 1.40          | + 3 37.0        | 0.929    | 1.716 | 27.4    | 19.4 | 127 E  | 49 60                       |
| 5 6                                | 0 25.68         | -28 19.9        | 0.986    | 0.956 | 62.6    | 20.7 | 57 W   | — 44*                       | 11 27                              | 0 12.72         | + 3 47.3        | 1.046    | 1.756 | 29.3    | 19.8 | 119 E  | 49 60                       |
| 5 11                               | 0 49.24         | -25 37.4        | 1.004    | 0.941 | 62.5    | 20.7 | 56 W   | — 43*                       | 12 7                               | 0 25.62         | + 4 18.8        | 1.173    | 1.798 | 30.4    | 20.1 | 113 E  | 49 60                       |
| 5 16                               | 1 11.14         | -22 44.5        | 1.024    | 0.926 | 62.2    | 20.7 | 54 W   | — 43*                       | 12 17                              | 0 39.77         | + 5 7.0         | 1.308    | 1.840 | 30.9    | 20.4 | 106 E  | 50 59                       |
| 5 21                               | 1 31.54         | -19 44.2        | 1.046    | 0.913 | 61.8    | 20.7 | 53 W   | — 42*                       | 12 27                              | 0 54.90         | + 6 7.7         | 1.450    | 1.883 | 31.0    | 20.7 | 100 E  | 51 56*                      |
| 5 26                               | 1 50.66         | -16 38.6        | 1.069    | 0.902 | 61.1    | 20.7 | 51 W   | — 42*                       | 1 6                                | 1 10.79         | + 7 17.4        | 1.596    | 1.925 | 30.6    | 21.0 | 94 E   | 52 52*                      |
| 5 31                               | 2 8.71          | -13 29.8        | 1.093    | 0.892 | 60.4    | 20.7 | 50 W   | — 41*                       | 1 16                               | 1 27.30         | + 8 32.9        | 1.746    | 1.968 | 30.0    | 21.2 | 88 E   | 54 48*                      |
| 6 5                                | 2 25.90         | -10 19.1        | 1.118    | 0.885 | 59.5    | 20.7 | 49 W   | — 41*                       | <b>483468 2002 JY<sub>8</sub></b>  |                 |                 |          |       |         |      |        |                             |
| 6 10                               | 2 42.44         | - 7 7.6         | 1.142    | 0.879 | 58.6    | 20.7 | 48 W   | — 41*                       | 2 11                               | 17 17.38        | - 0 50.1        | 1.730    | 1.590 | 34.2    | 21.3 | 65 W   | 41* 44*                     |
| 6 15                               | 2 58.53         | - 3 56.3        | 1.165    | 0.875 | 57.6    | 20.7 | 47 W   | — 41*                       | 2 21                               | 17 49.28        | - 0 49.3        | 1.598    | 1.507 | 37.0    | 21.1 | 67 W   | 40* 47*                     |
| 6 20                               | 3 14.33         | - 0 46.2        | 1.188    | 0.874 | 56.6    | 20.7 | 46 W   | 2* 40*                      | 3 2                                | 18 23.66        | - 0 37.8        | 1.476    | 1.424 | 39.9    | 20.9 | 67 W   | 40* 49*                     |
| 6 25                               | 3 29.98         | + 2 22.0        | 1.209    | 0.875 | 55.6    | 20.7 | 45 W   | 5* 39*                      | 3 12                               | 19 0.78         | - 0 17.4        | 1.367    | 1.342 | 43.0    | 20.7 | 67 W   | 38* 50*                     |
| 6 30                               | 3 45.64         | + 5 27.4        | 1.229    | 0.878 | 54.7    | 20.8 | 45 W   | 9* 38*                      | 3 22                               | 19 40.90        | + 0 9.5         | 1.274    | 1.261 | 46.3    | 20.5 | 66 W   | 37* 51*                     |
| 7 5                                | 4 1.42          | + 8 29.1        | 1.248    | 0.883 | 53.8    | 20.8 | 44 W   | 12* 37*                     | 4 1                                | 20 24.08        | + 0 39.7        | 1.197    | 1.185 | 49.6    | 20.3 | 65 W   | 34* 51*                     |
| 7 10                               | 4 17.44         | +11 26.2        | 1.265    | 0.890 | 52.9    | 20.8 | 44 W   | 15* 36*                     | 4 11                               | 21 10.21        | + 1 9.2         | 1.140    | 1.114 | 52.8    | 20.2 | 62 W   | 31* 50*                     |
| 7 15                               | 4 33.80         | +14 17.7        | 1.281    | 0.899 | 52.1    | 20.8 | 44 W   | 19* 34*                     | 4 21                               | 21 58.84        | + 1 35.0        | 1.104    | 1.051 | 55.5    | 20.0 | 60 W   | 27* 49*                     |
| 7 20                               | 4 50.58         | +17 2.6         | 1.295    | 0.910 | 51.3    | 20.9 | 44 W   | 23* 32*                     | 5 1                                | 22 49.10        | + 1 55.4        | 1.089    | 1.001 | 57.5    | 20.0 | 57 W   | 23* 47*                     |
| 7 25                               | 5 7.84          | +19 40.0        | 1.308    | 0.923 | 50.7    | 20.9 | 45 W   | 25* 30*                     | 5 11                               | 23 39.82        | + 2 10.8        | 1.096    | 0.965 | 58.3    | 19.9 | 54 W   | 19* 46*                     |
| 7 30                               | 5 25.63         | +22 8.7         | 1.320    | 0.937 | 50.0    | 20.9 | 45 W   | 28* 28*                     | 5 21                               | 0 29.72         | + 2 23.4        | 1.122    | 0.947 | 57.9    | 19.9 | 52 W   | 15* 45*                     |
| 8 4                                | 5 43.98         | +24 27.8        | 1.330    | 0.952 | 49.4    | 21.0 | 45 W   | 31* 26*                     | 5 31                               | 1 17.56         | + 2 34.7        | 1.164    | 0.948 | 56.3    | 20.0 | 51 W   | 12* 44*                     |
| 8 9                                | 6 2.92          | +26 36.3        | 1.340    | 0.968 | 48.9    | 21.0 | 46 W   | 34* 24*                     | 6 10                               | 2 2.44          | + 2 45.2        | 1.217    | 0.969 | 53.9    | 20.0 | 50 W   | 10* 44*                     |
| 8 14                               | 6 22.44         | +28 33.3        | 1.349    | 0.985 | 48.4    | 21.0 | 47 W   | 36* 22*                     | 6 20                               | 2 43.86         | + 2 53.3        | 1.277    | 1.007 | 51.2    | 20.1 | 51 W   | 10* 44*                     |
| 8 19                               | 6 42.49         | +30 18.1        | 1.357    | 1.003 | 48.0    | 21.1 | 47 W   | 38* 20*                     | 6 30                               | 3 21.60         | + 2 56.3        | 1.338    | 1.059 | 48.5    | 20.3 | 51 W   | 11* 44*                     |
| 8 24                               | 7 3.03          | +31 49.9        | 1.364    | 1.021 | 47.5    | 21.1 | 48 W   | 40* 19*                     | 7 10                               | 3 55.69         | + 2 52.1        | 1.397    | 1.123 | 46.0    | 20.4 | 53 W   | 13* 45*                     |
| 8 29                               | 7 23.96         | +33 8.5         | 1.370    | 1.040 | 47.1    | 21.1 | 49 W   | 42* 17*                     | 7 20                               | 4 26.33         | + 2 39.0        | 1.450    | 1.195 | 43.9    | 20.6 | 55 W   | 16* 47*                     |
| 9 3                                | 7 45.19         | +34 13.4        | 1.376    | 1.059 | 46.7    | 21.2 | 50 W   | 43* 15*                     | 7 30                               | 4 53.67         | + 2 16.0        | 1.494    | 1.272 | 42.1    | 20.7 | 57 W   | 20* 48*                     |
| 9 8                                | 8 6.61          | +35 4.7         | 1.381    | 1.078 | 46.4    | 21.2 | 51 W   | 45* 13*                     | 8 9                                | 5 17.92         | + 1 43.2        | 1.529    | 1.353 | 40.6    | 20.9 | 60 W   | 24* 50*                     |
| 9 13                               | 8 28.09         | +35 42.6        | 1.385    | 1.096 | 46.0    | 21.3 | 52 W   | 46* 12*                     | 8 19                               | 5 39.23         | + 1 1.2         | 1.552    | 1.435 | 39.4    | 21.0 | 64 W   | 29* 53*                     |
| 9 18                               | 8 49.50         | +36 7.5         | 1.389    | 1.115 | 45.7    | 21.3 | 53 W   | 47* 11*                     | 8 29                               | 5 57.65         | + 0 10.9        | 1.563    | 1.518 | 38.2    | 21.1 | 68 W   | 33* 55*                     |
| 9 23                               | 9 10.68         | +36 20.2        | 1.392    | 1.134 | 45.4    | 21.3 | 54 W   | 48* 9*                      | 9 8                                | 6 13.19         | - 0 46.3        | 1.563    | 1.602 | 37.1    | 21.2 | 74 W   | 37* 58*                     |
| 9 28                               | 9 31.54         | +36 21.5        | 1.394    | 1.152 | 45.1    | 21.4 | 55 W   | 48* 8*                      | 9 18                               | 6 25.79         | - 1 48.8        | 1.552    | 1.684 | 35.9    | 21.3 | 79 W   | 40* 61*                     |
| 10 3                               | 9 51.97         | +36 12.4        | 1.395    | 1.170 | 44.8    | 21.4 | 56 W   | 49* 8*                      | 9 28                               | 6 35.27         | - 2 54.3        | 1.531    | 1.766 | 34.5    | 21.3 | 86 W   | 41* 64*                     |
| 10 8                               | 10 11.88        | +35 54.0        | 1.396    | 1.188 | 44.6    | 21.4 | 57 W   | 50* 7*                      | 10 8                               | 6 41.42         | - 3 59.9        | 1.502    | 1.846 | 32.7    | 21.3 | 93 W   | 41* 67*                     |
| 10 13                              | 10 31.23        | +35 27.4        | 1.395    | 1.205 | 44.4    | 21.4 | 58 W   | 51* 6*                      | 10 18                              | 6 43.99         | - 5 2.1         | 1.469    | 1.924 | 30.6    | 21.3 | 101 W  | 40 69                       |
| 10 18                              | 10 49.95        | +34 54.0        | 1.393    | 1.221 | 44.2    | 21.5 | 59 W   | 52* 6*                      | 10 28                              | 6 42.71         | - 5 55.9        | 1.435    | 2.001 | 27.9    | 21.2 | 110 W  | 39 70                       |
| 10 23                              | 11 8.02         | +34 14.8        | 1.390    | 1.237 | 44.0    | 21.5 | 60 W   | 53* 6*                      | 11 7                               | 6 37.49         | - 6 35.0        | 1.405    | 2.076 | 24.7    | 21.2 | 119 W  | 38 71                       |
| 10 28                              | 11 25.44        | +33 30.9        | 1.386    | 1.252 | 43.9    | 21.5 | 61 W   | 54* 6*                      | 11 17                              | 6 28.47         | - 6 52.8        | 1.385    | 2.149 | 21.0    | 21.1 | 129 W  | 38 71                       |
| 11 2                               | 11 42.20        | +32 43.4        | 1.380    | 1.267 | 43.8    | 21.5 | 62 W   | 56* 6*                      | 11 27                              | 6 16.26         | - 6 42.6        | 1.381    | 2.220 | 17.1    | 21.0 | 139 W  | 38 71                       |
| <b>244049 2001 TL<sub>13</sub></b> |                 |                 |          |       |         |      |        |                             | 12 7                               | 6 2.01          | - 6 0.5         | 1.399    | 2.290 | 13.5    | 21.0 | 147 W  | 39 70                       |
| 2 11                               | 17 10.38        | -22 43.0        | 2.113    | 1.881 | 27.8    | 21.4 | 63 W   | 20* 55*                     | 12 17                              | 5 47.22         | - 4 47.2        | 1.443    | 2.357 | 11.4    | 21.1 | 152 W  | 40 69                       |
| 2 21                               | 17 35.61        | -22 44.4        | 1.980    | 1.838 | 29.7    | 21.3 | 67 W   | 20* 60*                     | 12 27                              | 5 33.49         | - 3 8.1         | 1.515    | 2.422 | 11.4    | 21.2 | 151 E  | 42 67                       |
| 3 2                                | 18 1.23         | -22 27.8        | 1.849    | 1.796 | 31.5    | 21.1 | 71 W   | 20* 65*                     | 1 6                                | 5 22.07         | + 1 12.2        | 1.615    | 2.486 | 13.1    | 21.5 | 145 E  | 44 65                       |
| 3 12                               | 18 27.13        | -21 52.0        | 1.720    | 1.755 | 33.2    | 21.0 | 75 W   | 21* 69*                     | 1 16                               | 5 13.68         | + 0 51.4        | 1.741    | 2.547 | 15.4    | 21.8 | 137 E  | 46 63                       |
| 3 22                               | 18 53.22        | -20 56.1        | 1.595    | 1.714 | 34.8    | 20.8 | 79 W   | 21* 73*                     | <b>10567</b>                       |                 |                 |          |       |         |      |        |                             |

EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 20/21                              | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | 45°-26° | 20/21                              | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | 45°-26° |
|------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|---------|------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|---------|
| <b>105674 2000 SQ<sub>42</sub></b> |                 |                 |          |       |         |      |        |         | <b>100341 1995 ST<sub>44</sub></b> |                 |                 |          |       |         |      |        |         |
| <i>(continuation)</i>              |                 |                 |          |       |         |      |        |         | <i>(continuation)</i>              |                 |                 |          |       |         |      |        |         |
| 6 10                               | 17 34.52        | + 8 59.0        | 2.082    | 2.989 | 10.5    | 20.1 | 148 W  | 54 55   | 6 10                               | 19 14.29        | -15 18.5        | 1.233    | 2.175 | 13.3    | 19.0 | 151 W  | 30 79   |
| 6 20                               | 17 24.83        | + 9 17.2        | 2.074    | 2.974 | 10.9    | 20.1 | 146 E  | 54 55   | 6 20                               | 19 7.35         | -15 5.8         | 1.152    | 2.139 | 8.9     | 18.7 | 161 W  | 30 79   |
| 6 30                               | 17 15.54        | + 9 9.9         | 2.090    | 2.959 | 12.2    | 20.2 | 142 E  | 54 55   | 6 30                               | 18 57.95        | -15 3.0         | 1.093    | 2.102 | 4.6     | 18.3 | 170 W  | 30 79   |
| 7 10                               | 17 7.47         | + 8 38.8        | 2.128    | 2.942 | 14.0    | 20.3 | 136 E  | 54 55   | 7 5                                | 18 52.66        | -15 5.2         | 1.072    | 2.084 | 3.8     | 18.2 | 172 E  | 30 79   |
| 7 20                               | 17 1.21         | + 7 47.4        | 2.186    | 2.924 | 15.9    | 20.4 | 128 E  | 53 56   | 7 10                               | 18 47.23        | -15 9.8         | 1.058    | 2.066 | 4.9     | 18.2 | 170 E  | 30 79   |
| 7 30                               | 16 57.17        | + 6 40.4        | 2.260    | 2.905 | 17.6    | 20.5 | 120 E  | 52 57   | 7 15                               | 18 41.83        | -15 16.6        | 1.049    | 2.048 | 7.2     | 18.3 | 165 E  | 30 79   |
| 8 9                                | 16 55.53        | + 5 22.7        | 2.346    | 2.885 | 19.0    | 20.6 | 112 E  | 50* 59  | 7 20                               | 18 36.69        | -15 25.4        | 1.045    | 2.030 | 9.9     | 18.4 | 160 E  | 30 79   |
| 8 19                               | 16 56.26        | + 3 58.8        | 2.442    | 2.864 | 20.0    | 20.7 | 104 E  | 49* 60  | 7 25                               | 18 31.99        | -15 36.0        | 1.048    | 2.012 | 12.6    | 18.5 | 154 E  | 29 80   |
| 8 29                               | 16 59.28        | + 2 32.3        | 2.542    | 2.842 | 20.7    | 20.8 | 97 E   | 46* 61  | 7 30                               | 18 27.93        | -15 48.2        | 1.055    | 1.995 | 15.2    | 18.6 | 149 E  | 29 80   |
| 9 8                                | 17 4.40         | + 1 6.6         | 2.645    | 2.819 | 20.9    | 20.9 | 89 E   | 44* 63* | 8 9                                | 18 22.24        | -16 16.1        | 1.083    | 1.959 | 20.1    | 18.7 | 138 E  | 29 80   |
| 9 18                               | 17 11.43        | + 0 16.3        | 2.748    | 2.795 | 20.9    | 21.0 | 82 E   | 42* 61* | 8 19                               | 18 20.34        | -16 47.1        | 1.125    | 1.925 | 24.3    | 18.9 | 128 E  | 28 81   |
| 9 28                               | 17 20.20        | + 1 34.4        | 2.848    | 2.770 | 20.5    | 21.0 | 75 E   | 40* 58* | 8 29                               | 18 22.53        | -17 18.7        | 1.179    | 1.892 | 27.7    | 19.1 | 119 E  | 28 81   |
| 10 8                               | 17 30.50        | + 2 46.2        | 2.943    | 2.744 | 19.8    | 21.0 | 69 E   | 38* 52* | 9 8                                | 18 28.68        | -17 48.1        | 1.240    | 1.859 | 30.3    | 19.2 | 111 E  | 27 82   |
| 10 18                              | 17 42.17        | + 3 50.7        | 3.032    | 2.717 | 19.0    | 21.0 | 62 E   | 36* 47* | 9 18                               | 18 38.46        | -18 12.7        | 1.305    | 1.828 | 32.3    | 19.4 | 104 E  | 27 82   |
| 10 28                              | 17 55.06        | + 4 46.6        | 3.113    | 2.689 | 17.9    | 21.0 | 56 E   | 34* 40* | 9 28                               | 18 51.51        | -18 29.7        | 1.373    | 1.798 | 33.6    | 19.5 | 97 E   | 27 82   |
| 11 7                               | 18 9.03         | + 5 33.4        | 3.185    | 2.660 | 16.6    | 21.0 | 50 E   | 32* 33* | 10 8                               | 19 7.36         | -18 36.5        | 1.442    | 1.770 | 34.4    | 19.6 | 91 E   | 26 80*  |
| 11 17                              | 18 23.95        | + 6 10.4        | 3.246    | 2.630 | 15.2    | 21.0 | 44 E   | 30* 27* | 10 18                              | 19 25.62        | -18 30.9        | 1.512    | 1.744 | 34.7    | 19.6 | 86 E   | 26* 76* |
| 11 27                              | 18 39.70        | + 6 37.1        | 3.296    | 2.598 | 13.7    | 21.0 | 39 E   | 27* 20* | 10 28                              | 19 45.91        | -18 10.8        | 1.580    | 1.720 | 34.7    | 19.7 | 80 E   | 27* 70* |
| 12 7                               | 18 56.16        | + 6 53.1        | 3.335    | 2.566 | 12.1    | 20.9 | 33 E   | 24* 13* | 11 7                               | 20 7.83         | -17 34.8        | 1.648    | 1.698 | 34.4    | 19.8 | 76 E   | 27* 65* |
| 12 17                              | 19 13.24        | + 6 58.3        | 3.361    | 2.534 | 10.5    | 20.8 | 28 E   | 21* 6*  | 11 17                              | 20 31.05        | -16 42.0        | 1.714    | 1.679 | 33.9    | 19.8 | 71 E   | 28* 59* |
| 12 27                              | 19 30.84        | + 6 52.5        | 3.375    | 2.500 | 8.9     | 20.7 | 23 E   | 17* —   | 11 27                              | 20 55.28        | -15 32.1        | 1.780    | 1.663 | 33.1    | 19.8 | 67 E   | 29* 54* |
| 1 6                                | 19 48.86        | + 6 35.9        | 3.376    | 2.465 | 7.4     | 20.6 | 19 E   | 12* —   | 12 7                               | 21 20.22        | -14 5.4         | 1.844    | 1.650 | 32.1    | 19.9 | 63 E   | 30* 48* |
| 1 16                               | 20 7.25         | + 6 8.7         | 3.364    | 2.429 | 6.2     | 20.5 | 15 E   | 8* —    | 12 17                              | 21 45.66        | -12 22.9        | 1.908    | 1.640 | 31.0    | 19.9 | 59 E   | 31* 43* |
| <b>311321 2005 NP<sub>1</sub></b>  |                 |                 |          |       |         |      |        |         | <b>10860 1995 LE</b>               |                 |                 |          |       |         |      |        |         |
| 2 11                               | 17 29.06        | -50 28.3        | 1.438    | 1.291 | 42.0    | 21.5 | 61 W   | — 49*   | 2 11                               | 17 38.49        | -24 29.5        | 2.159    | 1.809 | 27.0    | 21.4 | 56 W   | 17* 49* |
| 2 16                               | 17 52.81        | -49 48.2        | 1.423    | 1.287 | 42.4    | 21.5 | 61 W   | — 50*   | 2 16                               | 17 52.88        | -24 28.4        | 2.083    | 1.772 | 28.3    | 21.3 | 58 W   | 17* 51* |
| 2 21                               | 18 15.42        | -48 52.0        | 1.407    | 1.286 | 42.8    | 21.4 | 62 W   | — 50*   | 2 21                               | 18 7.68         | -24 21.7        | 2.007    | 1.734 | 29.5    | 21.2 | 60 W   | 17* 53* |
| 2 26                               | 18 36.75        | -47 41.2        | 1.390    | 1.285 | 43.2    | 21.4 | 63 W   | — 51*   | 2 26                               | 18 22.90        | -24 8.9         | 1.932    | 1.697 | 30.8    | 21.1 | 61 W   | 17* 55* |
| 3 2                                | 18 56.71        | -46 17.2        | 1.372    | 1.286 | 43.6    | 21.4 | 64 W   | — 51*   | 3 2                                | 18 38.54        | -23 49.6        | 1.859    | 1.659 | 32.1    | 21.0 | 63 W   | 17* 57* |
| 3 7                                | 19 15.28        | -44 41.6        | 1.354    | 1.288 | 44.0    | 21.4 | 64 W   | — 53*   | 3 7                                | 18 54.61        | -23 23.1        | 1.787    | 1.622 | 33.4    | 20.9 | 64 W   | 17* 58* |
| 3 12                               | 19 32.50        | -42 55.7        | 1.334    | 1.292 | 44.4    | 21.4 | 66 W   | — 54*   | 3 12                               | 19 11.12        | -22 48.8        | 1.718    | 1.584 | 34.7    | 20.8 | 65 W   | 17* 59* |
| 3 17                               | 19 48.42        | -41 0.7         | 1.313    | 1.296 | 44.8    | 21.4 | 67 W   | — 56*   | 3 17                               | 19 28.07        | -22 6.3         | 1.651    | 1.547 | 36.1    | 20.7 | 66 W   | 17* 60* |
| 3 22                               | 20 3.11         | -38 57.6        | 1.291    | 1.302 | 45.2    | 21.4 | 68 W   | — 57*   | 3 22                               | 19 45.45        | -21 14.9        | 1.587    | 1.511 | 37.4    | 20.6 | 67 W   | 17* 61* |
| 3 27                               | 20 16.62        | -36 47.1        | 1.268    | 1.310 | 45.5    | 21.3 | 69 W   | 1* 60*  | 3 27                               | 20 3.24         | -20 14.2        | 1.526    | 1.474 | 38.8    | 20.5 | 68 W   | 17* 62* |
| 4 1                                | 20 29.04        | -34 29.9        | 1.243    | 1.318 | 45.8    | 21.3 | 71 W   | 3* 62*  | 4 1                                | 20 21.42        | -19 3.6         | 1.469    | 1.439 | 40.2    | 20.4 | 68 W   | 17* 62* |
| 4 6                                | 20 40.43        | -32 6.5         | 1.218    | 1.328 | 46.0    | 21.3 | 73 W   | 5* 64*  | 4 6                                | 20 39.99        | -17 42.9        | 1.415    | 1.404 | 41.6    | 20.3 | 69 W   | 17* 62* |
| 4 11                               | 20 50.85        | -29 37.0        | 1.192    | 1.338 | 46.2    | 21.3 | 75 W   | 7* 67*  | 4 11                               | 20 58.91        | -16 12.0        | 1.365    | 1.370 | 43.0    | 20.2 | 69 W   | 18* 62* |
| 4 16                               | 21 0.37         | -27 1.9         | 1.165    | 1.350 | 46.3    | 21.2 | 77 W   | 9* 70*  | 4 21                               | 21 37.72        | -12 39.7        | 1.278    | 1.305 | 45.8    | 20.1 | 69 W   | 19* 62* |
| 4 21                               | 21 9.01         | -24 21.2        | 1.137    | 1.363 | 46.3    | 21.2 | 79 W   | 12* 73* | 5 1                                | 22 17.53        | - 8 30.5        | 1.210    | 1.246 | 48.4    | 19.9 | 68 W   | 20* 60* |
| 4 26                               | 21 16.79        | -21 35.0        | 1.109    | 1.376 | 46.2    | 21.2 | 81 W   | 15* 75* | 5 11                               | 22 57.99        | - 3 53.2        | 1.162    | 1.194 | 50.8    | 19.8 | 68 W   | 21* 58* |
| 5 1                                | 21 23.72        | -18 43.4        | 1.081    | 1.390 | 46.0    | 21.1 | 83 W   | 18* 77* | 5 16                               | 23 18.36        | - 1 28.0        | 1.145    | 1.172 | 51.7    | 19.7 | 65 W   | 22* 56* |
| 5 6                                | 21 29.81        | -15 46.3        | 1.053    | 1.405 | 45.7    | 21.1 | 86 W   | 21* 77* | 5 21                               | 23 38.77        | + 0 59.0        | 1.133    | 1.152 | 52.6    | 19.7 | 65 W   | 22* 55* |
| 5 11                               | 21 35.07        | -12 43.8        | 1.025    | 1.421 | 45.3    | 21.0 | 89 W   | 24* 76* | 5 26                               | 23 59.15        | + 3 25.6        | 1.125    | 1.134 | 53.3    | 19.7 | 64 W   | 23* 53* |
| 5 16                               | 21 39.46        | - 9 36.0        | 0.998    | 1.437 | 44.7    | 21.0 | 91 W   | 28* 74  | 5 31                               | 0 19.47         | + 5 49.8        | 1.122    | 1.120 | 53.8    | 19.7 | 63 W   | 24* 51* |
| 5 21                               | 21 42.95        | - 6 23.2        | 0.972    | 1.454 | 43.9    | 20.9 | 94 W   | 32* 70  | 6 5                                | 0 39.68         | + 8 9.6         | 1.123    | 1.109 | 54.1    | 19.7 | 62 W   | 26* 50* |
| 5 26                               | 21 45.48        | - 3 5.8         | 0.947    | 1.472 | 43.1    | 20.9 | 97 W   | 36* 67  | 6 10                               | 0 59.76         | +10 23.6        | 1.127    | 1.101 | 54.2    | 19.6 | 62 W   | 27* 48* |
| 5 31                               | 21 47.01        | + 0 15.4        | 0.924    | 1.490 | 42.0    | 20.8 | 100 W  | 41* 64  | 6 15                               | 1 19.65         | +12 30.2        | 1.134    | 1.097 | 54.1    | 19.7 | 61 W   | 28* 46* |
| 6 5                                | 21 47.48        | + 3 39.5        | 0.903    | 1.508 | 40.8    | 20.8 | 104 W  | 46* 60  | 6 20                               | 1 39.31         | +14 28.2        | 1.144    | 1.096 | 53.9    | 19.7 | 61 W   | 29* 45* |
| 6 10                               | 21 46.83        | + 7 5.0         | 0.884    | 1.527 | 39.5    | 20.7 | 107 W  | 50* 57  | 6 25                               | 1 58.69         | +16 16.9        | 1.155    | 1.099 | 53.5    | 19.7 | 60 W   | 31* 43* |
| 6 15                               | 21 44.98        | +10 30.1        | 0.868    | 1.546 | 38.1    | 20.7 | 110 W  | 55* 53  | 6 30                               | 2 17.75         | +17 55.7        | 1.168    | 1.105 | 53.0    | 19.7 | 60 W   | 33* 42* |
| 6 20                               | 21 41.87        | +13 52.4        | 0.855    | 1.565 | 36.7    | 20.6 | 113 W  | 59* 50  | 7 10                               | 2 54.71         | +20 42.9        | 1.195    | 1.128 | 51.8    | 19.8 | 61 W   | 36* 39* |
| 6 25                               | 21 37.44        | +17 8.9         | 0.846    | 1.584 | 35.1    | 20.6 | 116 W  | 62 47   | 7 20                               | 3 29.84         | +22 50.4        | 1.223    | 1.163 | 50.3    | 19.8 | 62 W   | 40* 38* |
| 6 30                               | 21 31.70        | +20 16.3        | 0.841    | 1.604 | 33.6    | 20.6 | 119 W  | 65 44   | 7 30                               | 4 2.72          | +24 21.2        | 1.247    | 1.209 | 48.8    | 19.9 | 64 W   | 44* 36* |
| 7 5                                | 21 24.68        | +23 11.3        | 0.839    | 1.623 | 32.2    | 20.5 | 122 W  | 68 41   | 8 9                                | 4 33.05         | +25 20.1        | 1.265    | 1.263 | 47.3    | 20.0 | 66 W   | 49* 36* |
| 7 10                               | 21 16.49        | +25 50.5        | 0.842    | 1.643 | 30.9    | 20.5 | 124 W  | 71 38   | 8 19                               | 5 0.54          | +25 52.6        | 1.276    | 1.324 | 45.8    | 20.1 | 70 W   | 53* 36* |
| 7 15                               | 21 7.27         | +28 10.6        | 0.849    | 1.663 | 29.7    | 20.5 | 126 W  | 73 36   | 8 29                               | 5 24.91         | +26 4.1         | 1.279    | 1.390 | 44.2    | 20.1 | 74 W   | 58* 36* |
| 7 20                               | 20 57.26        | +30 9.2         | 0.860    | 1.683 | 28.7    | 20.6 | 127 W  | 75 34   | 9 8                                | 5 45.95         | +26 0.2         | 1.272    | 1.460 | 42.6    | 20.2 | 79 W   | 63* 36* |
| 7 25                               | 20 46.79        | +31 44.5        | 0.876    | 1.702 | 28.0    | 20.6 | 128 W  | 77 32   | 9 18                               | 6 3.43          | +25 45.6        | 1.257    | 1.532 | 40.8    | 20.2 | 84 W   | 67* 37* |
| 7 30                               | 20 36.24        | +32 55.9        | 0.895    | 1.722 | 27.5    | 20.7 | 129 E  | 78 31   | 9 28                               | 6 17.03         | +25 24.7        | 1.235    | 1.606 | 38.6    | 20.2 | 91 W   | 70* 38* |
| 8 4                                | 20 25.96        | +33 44.3        | 0.919    | 1.742 | 27.1    | 20.7 | 128 E  | 79 30   | 10 8                               | 6 26.48         | +25 1.3         | 1.207    | 1.681 | 36.0    | 20.2 | 99 W   | 70 39*  |
| 8 9                                | 20 16.31        | +34 11.1        | 0.946    | 1.761 | 27.0    | 20.8 | 128 E  | 79 30   | 10 18                              | 6 31.39         | +24 37.9        | 1.176    | 1.756 | 32.7    | 20.2 | 108 W  | 70 39   |
| 8 14                               | 20 7.56         | +34 18.4        | 0.976    | 1.781 | 27.0    | 20.9 | 127 E  | 79 30   | 10 28                              | 6 31.45         | +24 16.2        | 1.146    | 1.831 | 28.7    | 20.1 | 118 W  | 69 40   |
| 8 19                               | 19 59.95        | +34 9.0         | 1.009    | 1.800 | 27.1    | 21.0 | 126 E  | 79 30   | 11 7                               | 6 26.57         | +23 56.2        | 1.123    | 1.906 | 23.9    | 20.0 | 129 W  | 69 40   |
| 8 24                               | 19 53.62        | +33 45.8        | 1.046    | 1.819 | 27.3    | 21.1 | 124 E  | 79 30   | 11 17                              | 6 17.02         | +23 36.6        | 1.112    | 1.980 | 18.4</  |      |        |         |

EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 20/21                              | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | 45° | -26° | 2020                               | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | 45° | -26° |
|------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|-----|------|------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|-----|------|
| <b>10860 1995 LE</b>               |                 |                 |          |       |         |      |        |     |      | <b>518737 2009 OO<sub>9</sub></b>  |                 |                 |          |       |         |      |        |     |      |
| <i>(continuation)</i>              |                 |                 |          |       |         |      |        |     |      |                                    |                 |                 |          |       |         |      |        |     |      |
| 1 11                               | 5 6.37          | +21 19.5        | 1.480    | 2.365 | 13.2    | 20.7 | 147 E  | 66  | 43   | 2 11                               | 19 15.84        | -13 58.9        | 0.727    | 0.556 | 99.7    | 20.4 | 34 W   | 16* | 24*  |
| 1 16                               | 5 3.66          | +21 11.5        | 1.552    | 2.398 | 14.9    | 20.9 | 141 E  | 66  | 43   | 2 13                               | 19 11.27        | -13 19.1        | 0.747    | 0.594 | 94.1    | 20.4 | 37 W   | 18* | 27*  |
| <b>432509 2010 FF<sub>7</sub></b>  |                 |                 |          |       |         |      |        |     |      |                                    |                 |                 |          |       |         |      |        |     |      |
| 2 11                               | 17 58.57        | + 2 27.3        | 0.503    | 0.822 | 93.2    | 20.9 | 56 W   | 40* | 34*  | 2 15                               | 19 7.77         | -12 42.2        | 0.767    | 0.631 | 89.3    | 20.4 | 40 W   | 20* | 30*  |
| 2 16                               | 17 38.68        | + 5 9.7         | 0.496    | 0.908 | 84.0    | 20.7 | 66 W   | 46* | 41*  | 2 17                               | 19 5.12         | -12 7.9         | 0.786    | 0.668 | 85.1    | 20.4 | 42 W   | 21* | 32*  |
| 2 21                               | 17 19.01        | + 7 50.2        | 0.489    | 0.990 | 75.6    | 20.6 | 76 W   | 51* | 46*  | 2 19                               | 19 3.13         | -11 35.8        | 0.805    | 0.705 | 81.5    | 20.4 | 45 W   | 22* | 35*  |
| 2 26                               | 16 58.60        | +10 31.0        | 0.484    | 1.067 | 67.6    | 20.4 | 86 W   | 55* | 50*  | 2 21                               | 19 1.66         | -11 5.6         | 0.822    | 0.741 | 78.3    | 20.5 | 47 W   | 24* | 37*  |
| 3 2                                | 16 36.71        | +13 11.2        | 0.481    | 1.141 | 59.8    | 20.3 | 95 W   | 58  | 50*  | 2 26                               | 18 59.54        | - 9 56.5        | 0.859    | 0.828 | 71.8    | 20.6 | 53 W   | 26* | 42*  |
| 3 7                                | 16 12.93        | +15 46.6        | 0.481    | 1.212 | 52.2    | 20.2 | 105 W  | 61  | 48   | 3 2                                | 18 58.71        | - 8 53.7        | 0.890    | 0.912 | 66.7    | 20.7 | 58 W   | 28* | 47*  |
| 3 12                               | 15 47.21        | +18 10.4        | 0.486    | 1.279 | 44.7    | 20.2 | 115 W  | 63  | 46   | 3 7                                | 18 58.40        | - 7 55.1        | 0.913    | 0.993 | 62.6    | 20.8 | 63 W   | 31* | 51*  |
| 3 17                               | 15 19.98        | +20 13.7        | 0.498    | 1.343 | 37.5    | 20.1 | 125 W  | 65  | 44   | 3 12                               | 18 58.11        | - 6 58.9        | 0.929    | 1.070 | 59.1    | 20.9 | 68 W   | 32* | 55*  |
| 3 22                               | 14 52.08        | +21 48.7        | 0.517    | 1.404 | 30.9    | 20.1 | 134 W  | 67  | 42   | 3 17                               | 18 57.51        | - 6 4.3         | 0.940    | 1.144 | 56.0    | 21.0 | 72 W   | 34* | 59*  |
| 3 27                               | 14 24.72        | +22 50.2        | 0.546    | 1.463 | 25.4    | 20.2 | 141 W  | 68  | 41   | 3 22                               | 18 56.34        | - 5 10.7        | 0.945    | 1.215 | 53.2    | 21.1 | 77 W   | 36* | 62*  |
| 4 1                                | 13 59.09        | +23 17.9        | 0.583    | 1.520 | 21.3    | 20.3 | 146 W  | 68  | 41   | 3 27                               | 18 54.38        | - 4 17.7        | 0.946    | 1.283 | 50.4    | 21.1 | 83 W   | 38* | 65*  |
| 4 6                                | 13 36.13        | +23 15.9        | 0.629    | 1.574 | 19.1    | 20.4 | 149 W  | 68  | 41   | 4 1                                | 18 51.46        | - 3 25.4        | 0.943    | 1.349 | 47.7    | 21.1 | 88 W   | 40* | 66*  |
| 4 11                               | 13 16.30        | +22 50.7        | 0.683    | 1.626 | 18.6    | 20.7 | 149 E  | 68  | 41   | 4 6                                | 18 47.46        | - 2 34.0        | 0.938    | 1.413 | 45.0    | 21.1 | 93 W   | 41* | 67*  |
| 4 16                               | 12 59.72        | +22 9.0         | 0.745    | 1.676 | 19.3    | 21.0 | 146 E  | 67  | 42   | 4 11                               | 18 42.26        | - 1 43.8        | 0.931    | 1.474 | 42.1    | 21.1 | 99 W   | 43* | 69*  |
| 4 21                               | 12 46.21        | +21 16.3        | 0.813    | 1.724 | 20.7    | 21.3 | 143 E  | 66  | 43   | 4 16                               | 18 35.77        | - 0 55.4        | 0.924    | 1.533 | 39.2    | 21.1 | 105 W  | 44* | 65   |
| 4 26                               | 12 35.47        | +20 16.9        | 0.887    | 1.770 | 22.2    | 21.5 | 138 E  | 65  | 44   | 4 21                               | 18 27.93        | - 0 9.5         | 0.917    | 1.590 | 36.0    | 21.1 | 112 W  | 45  | 64   |
| 5 1                                | 12 27.17        | +19 14.0        | 0.966    | 1.814 | 23.7    | 21.8 | 134 E  | 64  | 45   | 4 26                               | 18 18.73        | + 0 32.8        | 0.912    | 1.645 | 32.7    | 21.1 | 118 W  | 46  | 63   |
| 5 6                                | 12 20.95        | +18 9.6         | 1.048    | 1.857 | 25.0    | 22.1 | 129 E  | 63  | 46   | 5 1                                | 18 8.25         | + 1 10.2        | 0.910    | 1.698 | 29.3    | 21.0 | 125 W  | 46  | 63   |
| <b>154993 2005 EA<sub>94</sub></b> |                 |                 |          |       |         |      |        |     |      |                                    |                 |                 |          |       |         |      |        |     |      |
| 2 11                               | 18 39.67        | +16 9.9         | 0.174    | 0.893 | 118.0   | 18.5 | 53 W   | 46* | 18*  | 5 6                                | 17 56.65        | + 1 41.5        | 0.912    | 1.750 | 25.7    | 21.0 | 131 W  | 47  | 62   |
| 2 12                               | 18 28.52        | +18 23.6        | 0.171    | 0.905 | 113.8   | 18.2 | 57 W   | 50* | 20*  | 5 11                               | 17 44.16        | + 2 5.6         | 0.920    | 1.799 | 22.2    | 21.0 | 138 W  | 47  | 62   |
| 2 13                               | 18 16.86        | +20 37.8        | 0.169    | 0.918 | 109.5   | 17.9 | 61 W   | 53* | 21*  | 5 16                               | 17 31.08        | + 2 21.4        | 0.933    | 1.848 | 18.9    | 20.9 | 144 W  | 47  | 62   |
| 2 14                               | 18 4.68         | +22 51.1        | 0.168    | 0.930 | 105.2   | 17.7 | 65 W   | 57* | 23*  | 5 21                               | 17 17.77        | + 2 28.4        | 0.953    | 1.894 | 15.9    | 21.0 | 149 W  | 47  | 62   |
| 2 15                               | 17 52.01        | +25 2.1         | 0.167    | 0.942 | 100.9   | 17.5 | 70 W   | 61* | 24*  | 5 26                               | 17 4.61         | + 2 26.4        | 0.981    | 1.940 | 13.6    | 21.0 | 153 W  | 47  | 62   |
| 2 16                               | 17 38.86        | +27 9.3         | 0.167    | 0.955 | 96.6    | 17.3 | 74 W   | 65* | 25*  | 5 31                               | 16 51.97        | + 2 15.7        | 1.016    | 1.984 | 12.3    | 21.1 | 155 W  | 47  | 62   |
| 2 17                               | 17 25.27        | +29 11.4        | 0.167    | 0.967 | 92.4    | 17.1 | 78 W   | 69* | 26*  | 6 5                                | 16 40.18        | + 1 57.1        | 1.059    | 2.026 | 12.1    | 21.2 | 155 E  | 47  | 62   |
| 2 18                               | 17 11.31        | +31 7.0         | 0.168    | 0.979 | 88.2    | 17.0 | 82 W   | 72* | 26*  | 6 10                               | 16 29.45        | + 1 31.7        | 1.110    | 2.067 | 12.8    | 21.4 | 153 E  | 47  | 62   |
| 2 19                               | 16 57.02        | +32 55.0        | 0.170    | 0.991 | 84.2    | 16.9 | 86 W   | 76* | 26*  | 6 15                               | 16 19.93        | + 1 0.9         | 1.167    | 2.107 | 14.1    | 21.6 | 150 E  | 46  | 63   |
| 2 20                               | 16 42.49        | +34 34.6        | 0.172    | 1.003 | 80.2    | 16.8 | 90 W   | 79* | 26*  | 6 20                               | 16 11.68        | + 0 25.6        | 1.231    | 2.146 | 15.6    | 21.8 | 145 E  | 45  | 64   |
| 2 21                               | 16 27.80        | +36 5.0         | 0.175    | 1.015 | 76.4    | 16.7 | 94 W   | 81* | 26*  | 6 25                               | 16 4.74         | - 0 12.9        | 1.300    | 2.183 | 17.2    | 22.0 | 141 E  | 45  | 64   |
| 2 22                               | 16 13.05        | +37 25.8        | 0.178    | 1.027 | 72.7    | 16.7 | 97 W   | 82  | 26*  | 6 30                               | 15 59.06        | - 0 53.7        | 1.375    | 2.220 | 18.6    | 22.2 | 136 E  | 44  | 65   |
| 2 23                               | 15 58.33        | +38 36.8        | 0.182    | 1.039 | 69.2    | 16.6 | 101 W  | 84  | 25*  | <b>451297 2010 TK<sub>54</sub></b> |                 |                 |          |       |         |      |        |     |      |
| 2 24                               | 15 43.75        | +39 38.1        | 0.186    | 1.051 | 65.8    | 16.6 | 104 W  | 85  | 24*  | 2 11                               | 19 29.30        | -34 55.2        | 1.546    | 0.930 | 37.5    | 21.5 | 35 W   | —   | 28*  |
| 2 25                               | 15 29.39        | +40 29.9        | 0.191    | 1.063 | 62.6    | 16.6 | 108 W  | 85  | 24   | 2 16                               | 19 58.98        | -35 6.7         | 1.563    | 0.934 | 36.8    | 21.5 | 34 W   | —   | 27*  |
| 2 26                               | 15 15.35        | +41 12.8        | 0.196    | 1.075 | 59.6    | 16.6 | 111 W  | 86  | 23   | 2 21                               | 20 28.06        | -34 50.6        | 1.583    | 0.942 | 35.9    | 21.5 | 34 W   | —   | 26*  |
| 2 27                               | 15 1.69         | +41 47.1        | 0.201    | 1.086 | 56.7    | 16.6 | 114 W  | 87  | 22   | 2 26                               | 20 56.08        | -34 9.5         | 1.608    | 0.955 | 34.9    | 21.6 | 34 W   | —   | 24*  |
| 2 28                               | 14 48.49        | +42 13.7        | 0.207    | 1.098 | 54.0    | 16.6 | 116 W  | 87  | 22   | 3 2                                | 21 22.71        | -33 6.7         | 1.635    | 0.971 | 33.9    | 21.6 | 33 W   | —   | 23*  |
| 2 29                               | 14 35.79        | +42 33.1        | 0.214    | 1.110 | 51.4    | 16.6 | 119 W  | 88  | 21   | <b>252399 2001 TX<sub>44</sub></b> |                 |                 |          |       |         |      |        |     |      |
| 3 1                                | 14 23.63        | +42 46.2        | 0.220    | 1.121 | 49.0    | 16.6 | 121 W  | 88  | 21   | 2 11                               | 19 56.60        | -16 56.1        | 0.888    | 0.400 | 92.0    | 20.2 | 24 W   | 8*  | 17*  |
| 3 2                                | 14 12.04        | +42 53.5        | 0.227    | 1.133 | 46.8    | 16.6 | 124 W  | 88  | 21   | 2 13                               | 20 4.04         | -17 41.5        | 0.939    | 0.406 | 84.5    | 20.1 | 24 W   | 7*  | 17*  |
| 3 3                                | 14 1.02         | +42 55.9        | 0.234    | 1.144 | 44.7    | 16.7 | 126 W  | 88  | 21   | 2 15                               | 20 12.38        | -18 18.7        | 0.989    | 0.416 | 77.6    | 20.0 | 24 W   | 6*  | 18*  |
| 3 4                                | 13 50.59        | +42 53.9        | 0.242    | 1.155 | 42.8    | 16.7 | 128 W  | 88  | 21   | 2 17                               | 20 21.39        | -18 47.8        | 1.038    | 0.429 | 71.3    | 19.9 | 24 W   | 5*  | 18*  |
| 3 5                                | 13 40.72        | +42 48.1        | 0.250    | 1.167 | 41.0    | 16.7 | 129 W  | 88  | 21   | 2 19                               | 20 30.87        | -19 9.0         | 1.085    | 0.445 | 65.6    | 19.9 | 24 W   | 4*  | 18*  |
| 3 6                                | 13 31.42        | +42 39.0        | 0.258    | 1.178 | 39.3    | 16.8 | 131 W  | 88  | 21   | 2 21                               | 20 40.63        | -19 23.0        | 1.131    | 0.464 | 60.5    | 20.0 | 24 W   | 3*  | 18*  |
| 3 7                                | 13 22.66        | +42 27.2        | 0.266    | 1.189 | 37.8    | 16.8 | 133 W  | 87  | 22   | 2 23                               | 20 50.52        | -19 30.3        | 1.174    | 0.484 | 56.0    | 20.0 | 24 W   | 2*  | 18*  |
| 3 8                                | 13 14.42        | +42 13.1        | 0.275    | 1.200 | 36.4    | 16.9 | 134 W  | 87  | 22   | 2 25                               | 21 0.43         | -19 31.6        | 1.216    | 0.505 | 52.1    | 20.1 | 24 W   | 2*  | 18*  |
| 3 9                                | 13 6.68         | +41 57.0        | 0.284    | 1.211 | 35.1    | 16.9 | 135 W  | 87  | 22   | 2 27                               | 21 10.26        | -19 27.6        | 1.256    | 0.527 | 48.7    | 20.1 | 24 W   | 1*  | 18*  |
| 3 10                               | 12 59.42        | +41 39.3        | 0.293    | 1.223 | 33.9    | 17.0 | 137 W  | 87  | 22   | 2 29                               | 21 19.96        | -19 19.1        | 1.293    | 0.551 | 45.7    | 20.2 | 23 W   | —   | 17*  |
| 3 11                               | 12 52.60        | +41 20.3        | 0.302    | 1.233 | 32.9    | 17.0 | 138 W  | 86  | 23   | 3 2                                | 21 29.48        | -19 6.6         | 1.329    | 0.574 | 43.1    | 20.3 | 23 W   | —   | 17*  |
| 3 12                               | 12 46.21        | +41 0.1         | 0.312    | 1.244 | 31.9    | 17.1 | 139 W  | 86  | 23   | 3 7                                | 21 52.35        | -18 21.3        | 1.412    | 0.634 | 38.0    | 20.5 | 23 W   | —   | 17*  |
| 3 14                               | 12 34.59        | +40 17.3        | 0.331    | 1.266 | 30.3    | 17.2 | 140 W  | 85  | 24   | 3 12                               | 22 13.77        | -17 21.4        | 1.486    | 0.693 | 34.4    | 20.7 | 23 W   | —   | 17*  |
| 3 16                               | 12 24.38        | +39 32.2        | 0.352    | 1.287 | 29.0    | 17.4 | 141 W  | 85  | 24   | 3 17                               | 22 33.78        | -16 11.8        | 1.551    | 0.751 | 31.8    | 20.9 | 23 W   | —   | 17*  |
| 3 18                               | 12 15.40        | +38 45.8        | 0.373    | 1.309 | 28.1    | 17.5 | 142 W  | 84  | 25   | 3 22                               | 22 52.51        | -14 56.1        | 1.609    | 0.806 | 30.0    | 21.1 | 24 W   | —   | 17*  |
| 3 20                               | 12 7.52         | +37 58.7        | 0.394    | 1.329 | 27.4    | 17.6 | 142 W  | 83  | 26   | 3 27                               | 23 10.08        | -13 36.7        | 1.661    | 0.859 | 28.7    | 21.2 | 24 W   | —   | 17*  |
| 3 22                               | 12 0.60         | +37 11.5        | 0.417    | 1.350 | 26.9    | 17.8 | 142 E  | 82  | 27   | 4 1                                | 23 26.64        | -12 15.4        | 1.707    | 0.908 | 27.9    | 21.4 | 25 W   | —   |      |

EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 2020                                 | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | 45° | -26° | 20/21                               | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | 45° | -26° |
|--------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|-----|------|-------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|-----|------|
| <b>302311 2002 AA (continuation)</b> |                 |                 |          |       |         |      |        |     |      | <b>523609 2005 PJ<sub>2</sub></b>   |                 |                 |          |       |         |      |        |     |      |
| 3 2                                  | 22 11.81        | 9 23.4          | 1.821    | 0.864 | 11.7    | 21.1 | 10 W   | —   | 4*   | 2 11                                | 22 5.86         | 9 37.4          | 1.910    | 0.947 | 9.2     | 21.3 | 9 E    | 3*  | —    |
| 3 7                                  | 22 33.39        | 6 42.5          | 1.810    | 0.846 | 11.0    | 21.0 | 9 W    | —   | 3*   | 2 16                                | 22 22.16        | 7 26.9          | 1.849    | 0.884 | 9.5     | 21.1 | 9 E    | 2*  | —    |
| 3 12                                 | 22 55.05        | 3 56.1          | 1.801    | 0.831 | 10.2    | 20.9 | 9 W    | —   | 2*   | 2 21                                | 22 39.40        | 5 5.1           | 1.783    | 0.818 | 10.3    | 20.9 | 9 E    | 3*  | —    |
| 3 17                                 | 23 16.87        | 1 6.0           | 1.794    | 0.819 | 9.3     | 20.9 | 8 W    | —   | 1*   | 2 26                                | 22 57.78        | 2 31.5          | 1.713    | 0.751 | 11.9    | 20.7 | 9 E    | 3*  | —    |
| 3 22                                 | 23 38.86        | + 4 45.6        | 1.790    | 0.810 | 8.4     | 20.8 | 7 W    | —   | —    | 3 2                                 | 23 17.57        | 0 14.4          | 1.638    | 0.682 | 14.3    | 20.4 | 10 E   | 4*  | —    |
| 3 27                                 | 0 1.09          | + 4 36.5        | 1.789    | 0.804 | 7.5     | 20.7 | 6 W    | —   | —    | 3 7                                 | 23 39.07        | + 3 12.2        | 1.557    | 0.614 | 18.1    | 20.2 | 11 E   | 5*  | —    |
| 4 1                                  | 0 23.59         | + 7 24.3        | 1.790    | 0.801 | 6.8     | 20.7 | 5 W    | —   | —    | 3 12                                | 0 2.69          | + 6 19.5        | 1.470    | 0.547 | 23.7    | 20.0 | 13 E   | 7*  | —    |
| 4 6                                  | 0 46.37         | +10 6.7         | 1.794    | 0.802 | 6.3     | 20.7 | 5 W    | —   | —    | 3 17                                | 0 28.82         | + 9 31.1        | 1.374    | 0.486 | 31.9    | 19.9 | 15 E   | 9*  | —    |
| 4 11                                 | 1 9.46          | +12 41.5        | 1.800    | 0.806 | 6.1     | 20.7 | 5 W    | —   | —    | 3 22                                | 0 57.75         | +12 35.5        | 1.268    | 0.438 | 43.4    | 19.8 | 18 E   | 12* | —    |
| 4 16                                 | 1 32.85         | +15 6.5         | 1.809    | 0.814 | 6.3     | 20.7 | 5 W    | —   | —    | 3 24                                | 1 10.09         | +13 43.2        | 1.223    | 0.425 | 49.0    | 19.8 | 19 E   | 13* | 1*   |
| 4 21                                 | 1 56.52         | +17 19.8        | 1.819    | 0.825 | 6.7     | 20.8 | 5 E    | —   | —    | 3 26                                | 1 22.81         | +14 45.2        | 1.176    | 0.415 | 55.0    | 19.8 | 20 E   | 14* | 2*   |
| 4 26                                 | 2 20.42         | +19 19.9        | 1.832    | 0.838 | 7.2     | 20.9 | 6 E    | —   | —    | 3 28                                | 1 35.85         | +15 39.9        | 1.128    | 0.409 | 61.3    | 19.9 | 21 E   | 15* | 3*   |
| 5 1                                  | 2 44.49         | +21 5.5         | 1.848    | 0.855 | 7.7     | 20.9 | 7 E    | —   | —    | 3 30                                | 1 49.14         | +16 25.9        | 1.079    | 0.408 | 67.8    | 20.0 | 22 E   | 16* | 5*   |
| 5 6                                  | 3 8.62          | +22 35.7        | 1.865    | 0.873 | 8.2     | 21.0 | 7 E    | 1*  | —    | 4 1                                 | 2 2.61          | +17 1.8         | 1.030    | 0.412 | 74.2    | 20.1 | 23 E   | 17* | 6*   |
| 5 11                                 | 3 32.73         | +23 50.0        | 1.884    | 0.893 | 8.7     | 21.1 | 8 E    | 2*  | —    | 4 3                                 | 2 16.17         | +17 26.9        | 0.981    | 0.420 | 80.3    | 20.3 | 24 E   | 18* | 7*   |
| 5 16                                 | 3 56.70         | +24 48.3        | 1.905    | 0.915 | 9.0     | 21.2 | 8 E    | 2*  | —    | 4 5                                 | 2 29.80         | +17 40.7        | 0.933    | 0.432 | 86.0    | 20.4 | 26 E   | 18* | 9*   |
| 5 21                                 | 4 20.41         | +25 30.9        | 1.928    | 0.938 | 9.2     | 21.3 | 8 E    | 2*  | —    | 4 7                                 | 2 43.45         | +17 43.0        | 0.887    | 0.448 | 91.1    | 20.6 | 27 E   | 19* | 10*  |
| 5 26                                 | 4 43.77         | +25 58.2        | 1.951    | 0.962 | 9.2     | 21.4 | 9 E    | 2*  | —    | 4 9                                 | 2 57.14         | +17 33.9        | 0.843    | 0.467 | 95.5    | 20.8 | 28 E   | 19* | 12*  |
| 5 31                                 | 5 6.66          | +26 11.1        | 1.976    | 0.987 | 9.2     | 21.5 | 9 E    | 2*  | —    | 4 11                                | 3 10.89         | +17 13.6        | 0.800    | 0.488 | 99.3    | 20.9 | 29 E   | 20* | 14*  |
| <b>506491 2003 UW<sub>29</sub></b>   |                 |                 |          |       |         |      |        |     |      | <b>506491 2003 UW<sub>29</sub></b>  |                 |                 |          |       |         |      |        |     |      |
| 2 11                                 | 21 27.21        | -14 17.6        | 1.229    | 0.246 | 7.8     | 18.6 | 2 W    | —   | —    | 4 16                                | 3 45.74         | +15 36.2        | 0.706    | 0.549 | 105.6   | 21.3 | 32 E   | 20* | 19*  |
| 2 13                                 | 21 46.75        | -12 43.0        | 1.277    | 0.291 | 4.5     | 18.8 | 1 E    | —   | —    | 4 21                                | 4 21.85         | +12 55.9        | 0.628    | 0.615 | 107.8   | 21.4 | 36 E   | 20* | 24*  |
| 2 15                                 | 22 4.67         | -11 11.8        | 1.319    | 0.340 | 11.2    | 19.6 | 4 E    | —   | —    | 4 26                                | 4 59.74         | + 9 17.9        | 0.568    | 0.684 | 106.6   | 21.3 | 41 E   | 19* | 31*  |
| 2 17                                 | 22 21.10        | - 9 44.6        | 1.357    | 0.388 | 15.6    | 20.1 | 6 E    | —   | —    | 5 1                                 | 5 39.53         | + 4 51.5        | 0.525    | 0.753 | 102.6   | 21.1 | 47 E   | 19* | 38*  |
| 2 19                                 | 22 36.23        | - 8 21.6        | 1.393    | 0.437 | 18.4    | 20.5 | 8 E    | 1*  | —    | 5 6                                 | 6 20.76         | + 0 6.4         | 0.501    | 0.820 | 96.6    | 20.9 | 54 E   | 17* | 46*  |
| 2 21                                 | 22 50.24        | - 7 2.6         | 1.428    | 0.483 | 20.2    | 20.8 | 10 E   | 3*  | —    | 5 11                                | 7 2.42          | - 5 11.0        | 0.494    | 0.886 | 89.5    | 20.8 | 61 E   | 16* | 54*  |
| 2 26                                 | 23 21.29        | - 4 1.5         | 1.516    | 0.594 | 21.9    | 21.4 | 13 E   | 6*  | 2*   | 5 16                                | 7 43.24         | - 9 56.0        | 0.502    | 0.949 | 82.1    | 20.7 | 68 E   | 15* | 62*  |
| 3 2                                  | 23 47.94        | + 1 21.9        | 1.603    | 0.696 | 21.8    | 21.9 | 15 E   | 8*  | 4*   | 5 21                                | 8 22.01         | -14 2.7         | 0.525    | 1.010 | 75.2    | 20.7 | 75 E   | 13* | 68*  |
| 3 7                                  | 0 11.30         | + 0 59.1        | 1.692    | 0.791 | 20.7    | 22.3 | 16 E   | 9*  | 5*   | 5 26                                | 8 57.88         | -17 23.6        | 0.560    | 1.068 | 69.0    | 20.7 | 80 E   | 12* | 74*  |
| 3 7                                  | 0 11.30         | + 0 59.1        | 1.692    | 0.791 | 20.7    | 22.3 | 16 E   | 9*  | 5*   | 5 31                                | 9 30.45         | -20 0.7         | 0.604    | 1.124 | 63.7    | 20.8 | 84 E   | 11* | 78*  |
| 3 12                                 | 0 32.11         | + 3 4.1         | 1.779    | 0.878 | 19.3    | 22.5 | 17 E   | 10* | 5*   | 6 5                                 | 9 59.73         | -22 0.9         | 0.655    | 1.178 | 59.3    | 21.0 | 87 E   | 10* | 81*  |
| <b>508798 2000 QB<sub>149</sub></b>  |                 |                 |          |       |         |      |        |     |      | <b>508798 2000 QB<sub>149</sub></b> |                 |                 |          |       |         |      |        |     |      |
| 2 11                                 | 21 38.48        | -13 36.1        | 2.656    | 1.669 | 0.6     | 21.4 | 1 E    | —   | —    | 6 10                                | 10 25.96        | -23 32.1        | 0.712    | 1.230 | 55.6    | 21.1 | 89 E   | 9*  | 83*  |
| 2 21                                 | 22 4.73         | -10 55.2        | 2.650    | 1.663 | 1.4     | 21.4 | 2 W    | —   | —    | 6 15                                | 10 49.54        | -24 41.6        | 0.774    | 1.279 | 52.6    | 21.3 | 90 E   | 8*  | 84*  |
| 3 2                                  | 22 30.55        | - 8 5.1         | 2.643    | 1.659 | 3.2     | 21.5 | 5 W    | —   | —    | 6 20                                | 11 10.85        | -25 35.4        | 0.839    | 1.326 | 50.0    | 21.5 | 91 E   | 7*  | 84*  |
| 3 12                                 | 22 55.96        | - 5 8.5         | 2.634    | 1.657 | 5.1     | 21.6 | 8 W    | —   | —    | <b>476559 2008 OC<sub>10</sub></b>  |                 |                 |          |       |         |      |        |     |      |
| 3 22                                 | 23 21.04        | - 2 7.7         | 2.623    | 1.658 | 6.9     | 21.7 | 11 W   | —   | —    | 2 11                                | 22 29.45        | - 5 13.5        | 2.806    | 1.879 | 8.4     | 21.4 | 16 E   | 10* | 2*   |
| <b>403775 2011 HS<sub>4</sub></b>    |                 |                 |          |       |         |      |        |     |      | <b>403775 2011 HS<sub>4</sub></b>   |                 |                 |          |       |         |      |        |     |      |
| 2 11                                 | 21 41.46        | -14 52.3        | 1.615    | 0.630 | 2.5     | 21.3 | 2 E    | —   | —    | 2 21                                | 22 51.10        | - 2 27.2        | 2.798    | 1.845 | 6.6     | 21.3 | 12 E   | 6*  | —    |
| 2 16                                 | 22 7.89         | -12 46.8        | 1.533    | 0.549 | 5.7     | 21.1 | 3 E    | —   | —    | 3 2                                 | 23 13.17        | + 0 26.4        | 2.784    | 1.813 | 5.1     | 21.1 | 9 E    | 3*  | —    |
| 2 21                                 | 22 36.62        | -10 14.9        | 1.441    | 0.467 | 11.8    | 20.9 | 6 E    | —   | —    | 3 12                                | 23 35.71        | + 3 25.9        | 2.765    | 1.783 | 3.9     | 21.0 | 7 E    | —   | —    |
| 2 26                                 | 23 7.82         | - 7 12.5        | 1.336    | 0.388 | 22.9    | 20.7 | 9 E    | 1*  | 1*   | 3 22                                | 23 58.81        | + 6 29.9        | 2.742    | 1.754 | 3.5     | 20.9 | 6 W    | —   | —    |
| 3 2                                  | 23 40.90        | - 3 38.8        | 1.209    | 0.325 | 42.0    | 20.6 | 13 E   | 5*  | 3*   | 4 1                                 | 0 22.56         | + 9 36.3        | 2.716    | 1.728 | 4.1     | 20.9 | 7 W    | 1*  | —    |
| 3 7                                  | 0 13.00         | + 0 13.1        | 1.055    | 0.300 | 69.9    | 21.0 | 17 E   | 9*  | 6*   | 4 11                                | 0 47.06         | +12 42.7        | 2.688    | 1.705 | 5.2     | 20.9 | 9 W    | 3*  | —    |
| <b>141874 2002 PO<sub>34</sub></b>   |                 |                 |          |       |         |      |        |     |      | <b>141874 2002 PO<sub>34</sub></b>  |                 |                 |          |       |         |      |        |     |      |
| 2 11                                 | 21 59.87        | -13 11.8        | 2.735    | 1.757 | 3.4     | 21.4 | 6 E    | —   | —    | 4 21                                | 1 12.43         | +15 46.7        | 2.658    | 1.684 | 6.7     | 21.0 | 11 W   | 4*  | 2*   |
| 2 21                                 | 22 24.41        | -11 26.6        | 2.698    | 1.711 | 1.5     | 21.2 | 3 E    | —   | —    | 5 1                                 | 1 38.77         | +18 45.2        | 2.628    | 1.666 | 8.2     | 21.0 | 14 W   | 6*  | 4*   |
| 3 2                                  | 22 49.47        | - 9 30.5        | 2.654    | 1.664 | 1.4     | 21.1 | 2 W    | —   | —    | 5 11                                | 2 6.15          | +21 34.9        | 2.599    | 1.651 | 9.7     | 21.0 | 16 W   | 7*  | 6*   |
| 3 12                                 | 23 15.12        | - 7 24.5        | 2.604    | 1.617 | 3.3     | 21.1 | 5 W    | —   | —    | 5 21                                | 2 34.65         | +24 12.3        | 2.570    | 1.640 | 11.2    | 21.0 | 18 W   | 9*  | 8*   |
| 3 22                                 | 23 41.43        | - 5 9.8         | 2.549    | 1.570 | 5.3     | 21.1 | 8 W    | —   | —    | 5 31                                | 3 4.25          | +26 33.8        | 2.542    | 1.632 | 12.6    | 21.0 | 21 W   | 11* | 9*   |
| 4 1                                  | 0 8.54          | - 2 47.7        | 2.491    | 1.523 | 7.3     | 21.1 | 11 W   | —   | —    | 6 10                                | 3 34.88         | +28 35.9        | 2.516    | 1.628 | 14.0    | 21.1 | 23 W   | 13* | 10*  |
| 4 11                                 | 0 36.53         | + 0 20.1        | 2.432    | 1.477 | 9.2     | 21.1 | 14 W   | —   | —    | 6 20                                | 4 6.38          | +30 15.5        | 2.490    | 1.628 | 15.4    | 21.1 | 25 W   | 15* | 11*  |
| 4 21                                 | 1 5.56          | + 2 10.8        | 2.373    | 1.432 | 11.0    | 21.0 | 16 W   | —   | —    | 6 30                                | 4 38.49         | +31 30.0        | 2.465    | 1.631 | 16.7    | 21.1 | 27 W   | 17* | 12*  |
| 5 1                                  | 1 35.76         | + 4 42.2        | 2.315    | 1.389 | 12.7    | 21.0 | 18 W   | —   | —    | 7 10                                | 5 10.88         | +32 17.9        | 2.441    | 1.638 | 18.0    | 21.1 | 30 W   | 20* | 12*  |
| 5 11                                 | 2 7.22          | + 7 10.9        | 2.261    | 1.348 | 14.2    | 20.9 | 19 W   | —   | —    | 7 20                                | 5 43.15         | +32 38.7        | 2.416    | 1.649 | 19.2    | 21.2 | 32 W   | 23* | 13*  |
| 5 21                                 | 2 40.05         | + 9 33.0        | 2.212    | 1.311 | 15.5    | 20.9 | 20 W   | —   | —    | 7 30                                | 6 14.89         | +32 32.9        | 2.390    | 1.663 | 20.5    | 21.2 | 35 W   | 26* | 13*  |
| 5 31                                 | 3 14.26         | +11 44.2        | 2.168    | 1.277 | 16.7    | 20.8 | 21 W   | —   | —    | 8 9                                 | 6 45.72         | +32 2.4         | 2.363    | 1.680 | 21.7    | 21.2 | 38 W   | 30* | 14*  |
| 6 10                                 | 3 49.80         | +13 39.9        | 2.132    | 1.249 | 17.7    | 20.7 | 22 W   | —   | —    | 8 19                                | 7 15.32         | +31 9.5         | 2.333    | 1.700 | 22.9    | 21.3 | 41 W   | 33* | 15*  |
| 6 20                                 | 4 26.52         | +15 15.5        | 2.102    | 1.225 | 18.4    | 20.7 | 22 W   | —   | —    | 8 29                                | 7 43.43         | +29 57.5        | 2.299    | 1.723 | 24.0    | 21.3 | 44 W   | 37* | 16*  |
| 6 30                                 | 5 4.16          | +16 26.9        | 2.081    | 1.208 | 19.0    | 20.7 | 23 W   | —   | —    | 9 8                                 | 8 9.90          | +28 29.7        | 2.262    | 1.748 | 25.2    | 21.3 | 48 W   | 40* | 18*  |
| 7 10                                 | 5 42.33         | +17 11.3        | 2.066    | 1.198 | 19.3    | 20.6 | 23 W   | —   | —    | 9 18                                | 8 34.64         | +26 49.6        | 2.219    | 1.776 | 26.3    | 21.4 | 51 W   | 44* | 19*  |
| 7 20                                 | 6 20.63         | +17 26.9        | 2.059    | 1.195 | 19.6    | 20.6 | 23 W   | —   | —    | 9 28                                | 8 57.57         | +25 0.6         | 2.171    | 1.806 | 27.3    | 21.4 | 56 W   | 48* | 21*  |
| 7 30                                 | 6 58.57         | +17 13.8        | 2.058    | 1.199 | 19.8    | 20.7 | 24 W   | —   | —    | 10 8                                | 9 18.68         | +23 5.8         | 2.118    | 1.838 | 28.1    | 21.4 | 60 W   | 52* | 24*  |
| 8 9                                  | 7 35.75         | +16 33.7        | 2.062    | 1.210 | 20.0    | 20.7 | 24 W   | —   | —    | 10 18                               | 9 37.93         | +21 8.2         | 2.058    | 1.871 | 28.9    | 21.4 | 65 W   | 55* | 27*  |
| 8 19                                 | 8 11.84         | +15 29.8        | 2.070    | 1.228 | 20.3    | 20.7 | 25 W   | —   | —    | 10 28                               | 9 55.26         | +19 10.4        | 1.992    | 1.906 | 29.4    | 21.4 | 70 W   | 59* | 31*  |
| 8 29                                 | 8 46.57         | +14 5.8         | 2.080    | 1.252 | 20.6    | 20.8 | 26 W   | —   | —    | 11 7                                | 10 10.61        | +17 14.8        | 1.920    | 1.942 | 29.7    |      |        |     |      |

EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 2020                               | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | 45° | -26° | 2020                               | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | 45° | -26° |
|------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|-----|------|------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|-----|------|
| <b>190135 2005 QE<sub>30</sub></b> |                 |                 |          |       |         |      |        |     |      | <b>5786 Talos</b>                  |                 |                 |          |       |         |      |        |     |      |
| <i>(continuation)</i>              |                 |                 |          |       |         |      |        |     |      | <i>(continuation)</i>              |                 |                 |          |       |         |      |        |     |      |
| 4 26                               | 1 46.40         | +13 53.5        | 2.091    | 1.099 | 6.3     | 19.5 | 7 W    | —   | —    | 7 28                               | 9 40.43         | +22 11.4        | 0.887    | 0.306 | 106.1   | 18.2 | 17 E   | 7*  | 7*   |
| 5 1                                | 2 5.34          | +15 21.8        | 2.035    | 1.041 | 6.6     | 19.3 | 7 W    | —   | —    | 7 29                               | 9 48.23         | +22 30.2        | 0.855    | 0.330 | 109.8   | 18.5 | 18 E   | 8*  | 8*   |
| 5 6                                | 2 25.62         | +16 48.4        | 1.979    | 0.984 | 6.7     | 19.1 | 7 W    | —   | —    | 7 30                               | 9 55.92         | +22 47.3        | 0.825    | 0.354 | 112.7   | 18.8 | 19 E   | 9*  | 8*   |
| 5 11                               | 2 47.38         | +18 11.8        | 1.926    | 0.927 | 6.4     | 18.9 | 6 W    | —   | —    | 8 1                                | 10 11.27        | +23 16.8        | 0.768    | 0.402 | 116.8   | 19.2 | 21 E   | 11* | 9*   |
| 5 16                               | 3 10.76         | +19 29.7        | 1.874    | 0.871 | 5.8     | 18.7 | 5 W    | —   | —    | 8 3                                | 10 26.93        | +23 39.1        | 0.716    | 0.450 | 119.3   | 19.4 | 23 E   | 13* | 10*  |
| 5 21                               | 3 35.86         | +20 39.4        | 1.825    | 0.818 | 4.7     | 18.5 | 4 W    | —   | —    | 8 5                                | 10 43.25        | +23 53.5        | 0.669    | 0.496 | 120.4   | 19.6 | 25 E   | 15* | 11*  |
| 5 26                               | 4 2.73          | +21 37.8        | 1.779    | 0.767 | 2.9     | 18.2 | 2 W    | —   | —    | 8 7                                | 11 0.50         | +23 58.7        | 0.627    | 0.540 | 120.6   | 19.6 | 27 E   | 18* | 13*  |
| 5 31                               | 4 31.37         | +22 21.3        | 1.736    | 0.722 | 0.7     | 17.8 | 0 W    | —   | —    | 8 9                                | 11 18.87        | +23 53.1        | 0.588    | 0.583 | 120.0   | 19.6 | 30 E   | 20* | 15*  |
| 6 5                                | 5 1.64          | +22 46.3        | 1.696    | 0.683 | 3.0     | 17.8 | 2 E    | —   | —    | 8 11                               | 11 38.49        | +23 34.9        | 0.554    | 0.624 | 118.6   | 19.5 | 33 E   | 22* | 17*  |
| 6 10                               | 5 33.32         | +22 49.3        | 1.660    | 0.653 | 7.1     | 17.9 | 5 E    | —   | —    | 8 13                               | 11 59.41        | +23 2.1         | 0.524    | 0.664 | 116.5   | 19.4 | 36 E   | 25* | 19*  |
| 6 15                               | 6 6.02          | +22 28.0        | 1.628    | 0.634 | 11.9    | 18.0 | 7 E    | —   | 1*   | 8 15                               | 12 21.59        | +22 12.6        | 0.498    | 0.703 | 113.9   | 19.2 | 39 E   | 27* | 22*  |
| 6 20                               | 6 39.26         | +21 41.1        | 1.599    | 0.627 | 17.0    | 18.1 | 10 E   | —   | 4*   | 8 17                               | 12 44.89        | +21 4.9         | 0.477    | 0.740 | 110.7   | 19.0 | 43 E   | 30* | 25*  |
| 6 25                               | 7 12.51         | +20 29.3        | 1.575    | 0.632 | 22.0    | 18.3 | 13 E   | —   | 7*   | 8 19                               | 13 9.03         | +19 38.3        | 0.460    | 0.777 | 107.0   | 18.9 | 47 E   | 32* | 29*  |
| 6 30                               | 7 45.27         | +18 54.8        | 1.557    | 0.650 | 26.5    | 18.4 | 17 E   | 1*  | 10*  | 8 21                               | 13 33.67        | +17 53.4        | 0.448    | 0.812 | 102.9   | 18.7 | 51 E   | 35* | 33*  |
| 7 5                                | 8 17.14         | +17 1.3         | 1.545    | 0.680 | 30.2    | 18.6 | 20 E   | 2*  | 13*  | 8 23                               | 13 58.37        | +15 52.3        | 0.441    | 0.846 | 98.6    | 18.5 | 56 E   | 37* | 37*  |
| 7 10                               | 8 47.84         | +14 52.8        | 1.541    | 0.718 | 32.9    | 18.8 | 23 E   | 2*  | 16*  | 8 25                               | 14 22.69        | +13 38.5        | 0.439    | 0.880 | 94.1    | 18.4 | 60 E   | 39* | 41*  |
| 7 15                               | 9 17.20         | +12 34.1        | 1.546    | 0.762 | 34.7    | 19.0 | 25 E   | 3*  | 19*  | 8 27                               | 14 46.25        | +11 16.7        | 0.442    | 0.912 | 89.6    | 18.3 | 64 E   | 40* | 45*  |
| 7 20                               | 9 45.12         | +10 9.3         | 1.559    | 0.812 | 35.7    | 19.2 | 28 E   | 3*  | 22*  | 8 29                               | 15 8.70         | +8 51.7         | 0.449    | 0.943 | 85.2    | 18.2 | 69 E   | 41* | 49*  |
| 7 25                               | 10 11.59        | +7 42.4         | 1.581    | 0.865 | 35.9    | 19.3 | 30 E   | 4*  | 24*  | 8 31                               | 15 29.84        | +6 28.2         | 0.460    | 0.974 | 80.9    | 18.2 | 72 E   | 41* | 52*  |
| 7 30                               | 10 36.63        | +5 16.6         | 1.611    | 0.921 | 35.6    | 19.5 | 32 E   | 4*  | 26*  | 9 2                                | 15 49.54        | +4 9.9          | 0.476    | 1.004 | 77.0    | 18.2 | 76 E   | 41* | 56*  |
| 8 4                                | 11 0.28         | +2 54.6         | 1.648    | 0.978 | 34.9    | 19.7 | 33 E   | 4*  | 27*  | 9 4                                | 16 7.77         | +1 59.5         | 0.494    | 1.033 | 73.3    | 18.2 | 79 E   | 41* | 59*  |
| 8 9                                | 11 22.63        | +0 38.2         | 1.693    | 1.035 | 33.9    | 19.8 | 35 E   | 4*  | 29*  | 9 6                                | 16 24.55        | -0 1.4          | 0.516    | 1.061 | 69.9    | 18.2 | 81 E   | 40* | 61*  |
| 8 14                               | 11 43.77        | +1 31.3         | 1.744    | 1.093 | 32.7    | 20.0 | 36 E   | 5*  | 30*  | 9 8                                | 16 39.97        | -1 52.2         | 0.540    | 1.088 | 66.9    | 18.3 | 84 E   | 40* | 64*  |
| 8 19                               | 12 3.79         | -3 33.2         | 1.800    | 1.150 | 31.3    | 20.1 | 36 E   | 5*  | 30*  | 9 13                               | 17 13.26        | -5 45.3         | 0.610    | 1.154 | 60.6    | 18.5 | 88 E   | 37* | 68*  |
| 8 29                               | 12 40.84        | -7 13.0         | 1.924    | 1.264 | 28.3    | 20.4 | 36 E   | 5*  | 30*  | 9 18                               | 17 40.43        | -8 43.6         | 0.689    | 1.216 | 55.7    | 18.7 | 90 E   | 35* | 72*  |
| 9 8                                | 13 14.48        | -10 21.7        | 2.061    | 1.374 | 25.3    | 20.6 | 36 E   | 5*  | 30*  | 9 23                               | 18 3.07         | -10 59.0        | 0.775    | 1.275 | 51.9    | 19.0 | 91 E   | 34* | 74*  |
| 9 18                               | 13 45.37        | -13 2.0         | 2.205    | 1.481 | 22.2    | 20.8 | 34 E   | 5*  | 28*  | 9 28                               | 18 22.35        | -12 42.1        | 0.865    | 1.330 | 48.9    | 19.2 | 90 E   | 32* | 75*  |
| 9 28                               | 14 14.03        | -15 17.4        | 2.350    | 1.584 | 19.3    | 21.0 | 31 E   | 4*  | 25*  | 10 3                               | 18 39.16        | -14 0.7         | 0.958    | 1.381 | 46.4    | 19.5 | 90 E   | 31* | 76*  |
| 10 8                               | 14 40.86        | -17 10.9        | 2.495    | 1.683 | 16.3    | 21.2 | 28 E   | 4*  | 22*  | 10 8                               | 18 54.12        | -15 0.8         | 1.054    | 1.430 | 44.3    | 19.7 | 88 E   | 30* | 76*  |
| 10 18                              | 15 6.19         | -18 45.3        | 2.635    | 1.778 | 13.5    | 21.3 | 25 E   | 3*  | 19*  | 10 13                              | 19 7.70         | -15 46.4        | 1.150    | 1.477 | 42.4    | 19.9 | 87 E   | 29* | 75*  |
| 10 28                              | 15 30.26        | -20 2.9         | 2.768    | 1.870 | 10.7    | 21.4 | 20 E   | 2*  | 14*  | 10 18                              | 19 20.22        | -16 20.5        | 1.247    | 1.520 | 40.7    | 20.1 | 85 E   | 29* | 73*  |
| <b>387487 4169 T-3</b>             |                 |                 |          |       |         |      |        |     |      | <b>385377 2002 RJ<sub>8</sub></b>  |                 |                 |          |       |         |      |        |     |      |
| 2 11                               | 23 3.16         | -8 35.8         | 2.525    | 1.655 | 13.1    | 21.5 | 22 E   | 13* | 11*  | 10 23                              | 19 31.93        | -16 45.3        | 1.344    | 1.561 | 39.2    | 20.3 | 82 E   | 28* | 72*  |
| 2 21                               | 23 28.92        | -5 50.2         | 2.544    | 1.642 | 11.4    | 21.4 | 19 E   | 10* | 8*   | 10 28                              | 19 43.01        | -17 2.4         | 1.441    | 1.600 | 37.7    | 20.4 | 80 E   | 28* | 69*  |
| 3 2                                | 23 54.74        | -2 59.4         | 2.561    | 1.632 | 9.7     | 21.3 | 16 E   | 8*  | 6*   | 11 2                               | 19 53.57        | -17 13.0        | 1.537    | 1.637 | 36.3    | 20.6 | 77 E   | 28* | 67*  |
| 3 12                               | 0 20.64         | 0 6.3           | 2.577    | 1.626 | 8.1     | 21.3 | 13 E   | 5*  | 4*   | 11 7                               | 20 3.72         | -17 18.0        | 1.632    | 1.671 | 34.9    | 20.7 | 75 E   | 28* | 64*  |
| 3 22                               | 0 46.67         | +2 46.5         | 2.593    | 1.623 | 6.4     | 21.2 | 10 E   | 3*  | 2*   | 11 12                              | 20 13.55        | -17 18.3        | 1.726    | 1.703 | 33.5    | 20.8 | 72 E   | 28* | 61*  |
| 4 1                                | 1 12.89         | +5 36.2         | 2.608    | 1.623 | 4.8     | 21.1 | 8 E    | —   | —    | 11 17                              | 20 23.11        | -17 14.3        | 1.818    | 1.734 | 32.2    | 21.0 | 69 E   | 28* | 58*  |
| 4 11                               | 1 39.32         | +8 20.1         | 2.623    | 1.627 | 3.1     | 21.1 | 5 E    | —   | —    | 11 22                              | 20 32.45        | -17 6.6         | 1.908    | 1.762 | 30.9    | 21.1 | 66 E   | 28* | 54*  |
| 4 21                               | 2 5.99          | +10 55.7        | 2.637    | 1.634 | 1.6     | 21.0 | 3 E    | —   | —    | 11 27                              | 20 41.61        | -16 55.5        | 1.996    | 1.788 | 29.6    | 21.2 | 63 E   | 27* | 51*  |
| 5 1                                | 2 32.91         | +13 20.4        | 2.651    | 1.644 | 1.1     | 21.0 | 2 W    | —   | —    | 12 2                               | 20 50.60        | -16 41.4        | 2.082    | 1.812 | 28.3    | 21.2 | 61 E   | 27* | 48*  |
| 5 11                               | 3 0.05          | +15 32.1        | 2.664    | 1.658 | 2.3     | 21.1 | 4 W    | —   | —    | 12 7                               | 20 59.47        | -16 24.6        | 2.165    | 1.835 | 26.9    | 21.3 | 58 E   | 27* | 44*  |
| 5 21                               | 3 27.39         | +17 28.9        | 2.676    | 1.674 | 3.8     | 21.2 | 6 W    | —   | —    | 12 12                              | 21 8.21         | -16 5.2         | 2.244    | 1.856 | 25.6    | 21.4 | 55 E   | 27* | 41*  |
| 5 31                               | 3 54.85         | +19 9.4         | 2.686    | 1.693 | 5.5     | 21.3 | 9 W    | —   | 3*   | 12 17                              | 21 16.87        | -15 43.6        | 2.321    | 1.875 | 24.3    | 21.4 | 52 E   | 27* | 38*  |
| 6 10                               | 4 22.31         | +20 32.4        | 2.694    | 1.715 | 7.1     | 21.4 | 12 W   | —   | 6*   | 12 22                              | 21 25.44        | -15 19.9        | 2.394    | 1.892 | 22.9    | 21.5 | 49 E   | 26* | 34*  |
| <b>5786 Talos</b>                  |                 |                 |          |       |         |      |        |     |      | <b>442559 2012 AU<sub>10</sub></b> |                 |                 |          |       |         |      |        |     |      |
| 2 11                               | 23 6.66         | -10 5.5         | 2.785    | 1.913 | 11.5    | 21.4 | 23 E   | 12* | 12*  | 2 11                               | 23 19.93        | -9 8.3          | 2.665    | 1.831 | 13.7    | 21.4 | 26 E   | 15* | 15*  |
| 2 21                               | 23 22.90        | -8 43.9         | 2.804    | 1.881 | 8.9     | 21.3 | 17 E   | 7*  | 8*   | 2 21                               | 23 43.42        | -7 43.4         | 2.679    | 1.803 | 12.0    | 21.3 | 22 E   | 11* | 11*  |
| 3 2                                | 23 39.55        | -7 18.7         | 2.802    | 1.842 | 6.3     | 21.1 | 12 E   | 2*  | 5*   | 3 2                                | 0 7.39          | -6 12.2         | 2.686    | 1.776 | 10.3    | 21.3 | 19 E   | 8*  | 10*  |
| 3 12                               | 23 56.67        | -5 50.3         | 2.778    | 1.797 | 4.0     | 21.0 | 7 E    | —   | 1*   | 3 12                               | 0 31.82         | -4 36.4         | 2.687    | 1.751 | 8.8     | 21.2 | 16 E   | 4*  | 9*   |
| 3 22                               | 0 14.38         | +4 18.9         | 2.733    | 1.743 | 3.1     | 20.8 | 5 E    | —   | —    | 3 22                               | 0 56.74         | -2 58.0         | 2.683    | 1.728 | 7.6     | 21.1 | 13 E   | —   | 7*   |
| 4 1                                | 0 32.84         | +2 44.9         | 2.668    | 1.682 | 4.5     | 20.8 | 8 W    | —   | —    | 4 1                                | 1 22.17         | -1 18.7         | 2.674    | 1.707 | 6.8     | 21.0 | 12 E   | —   | 6*   |
| 4 11                               | 0 52.22         | +1 8.1          | 2.583    | 1.613 | 7.1     | 20.7 | 12 W   | —   | 4*   | 4 11                               | 1 48.10         | +0 19.1         | 2.662    | 1.688 | 6.4     | 21.0 | 11 E   | —   | 4*   |
| 4 21                               | 1 12.83         | +0 31.5         | 2.479    | 1.535 | 10.1    | 20.7 | 16 W   | —   | 9*   | 4 21                               | 2 14.57         | +1 53.6         | 2.648    | 1.672 | 6.6     | 20.9 | 11 E   | —   | 3*   |
| 5 1                                | 1 35.04         | +2 14.2         | 2.359    | 1.447 | 13.3    | 20.5 | 19 W   | —   | 13*  | 5 1                                | 2 41.55         | +3 22.4         | 2.632    | 1.659 | 7.2     | 20.9 | 12 E   | —   | 1*   |
| 5 11                               | 1 59.38         | +4 0.7          | 2.223    | 1.348 | 16.7    | 20.4 | 23 W   | —   | 16*  | 5 11                               | 3 9.00          | +4 43.3         | 2.616    | 1.648 | 8.0     | 20.9 | 13 W   | —   | —    |
| 5 21                               | 2 26.63         | +5 51.8         | 2.076    | 1.237 | 20.4    | 20.2 | 25 W   | —   | 19*  | 5 21                               | 3 36.88         | +5 54.5         | 2.600    | 1.641 | 9.0     | 21.0 | 15 W   | —   | 4*   |
| 5 31                               | 2 57.91         | +7 48.5         | 1.919    | 1.111 | 24.2    | 19.9 | 27 W   | —   | 21*  | 5 31                               | 4 5.09          | +6 54.1         | 2.584    | 1.636 | 10.1    | 21.0 | 16 W   | —   | 7*   |
| 6 10                               | 3 34.89         | +9 52.0         | 1.758    | 0.970 | 28.4    | 19.5 | 27 W   | —   | 21*  | 6 10                               | 4 33.51         | +7 40.4         | 2.570    | 1.635 | 11.1    | 21.0 | 18 W   | —   | 10*  |
| 6 15                               | 3 56.29         | +10 56.3        | 1.678    | 0.891 | 30.5    | 19.3 | 26 W   | —   | 20*  | 6 20                               | 5 2.02          | +8 12.4         | 2.556    | 1.637 | 12.2    | 21.0 | 20 W   | —   | 12*  |
| 6 20                               | 4 20.17         | +12 2.2         | 1.600    | 0.807 | 32.5    | 19.0 | 25 W   | —   | 19*  | 6 30                               | 5 30.45         | +8 29.3         | 2.544    | 1.642 | 13.2    | 21.1 | 22 W   | —   | 15*  |
| 6 25                               | 4 47.08         | +13 9.2         | 1.525    | 0.716 | 34.3    | 18.7 | 23 W   | —   | 17*  | 7 10                               | 5 58.65         | +8 31.1         | 2.533    | 1.650 | 14.2    | 21.1 | 23 W   | —   | 17*  |
| 6 30                               | 5 17.71         | +14 16.5        | 1.455    | 0.618 | 35.4    | 18.3 | 21 W   | —   | 15*  | 7 20                               | 6 26.46         | +8 18.0         | 2.521    | 1.661 | 15.2    | 21.2 | 25 W   | —   | 19*  |
| 7 5                                | 5 52.96         | +15 22.9        | 1.391    | 0.511 | 35.2    | 17.8 | 17 W   | —   | 11*  | 7 30                               | 6 53.73         | +7 50.9         | 2.510    | 1.675 | 16.2    | 21.2 | 27 W   | —   | 21*  |
| 7 10                               | 6 34.16         | +16             |          |       |         |      |        |     |      |                                    |                 |                 |          |       |         |      |        |     |      |

EPHEMERIDES OF NEAS AND SOME UNUSUAL MINOR PLANETS

| 2020                               | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | 45° | -26° | 20/21                              | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\beta$ | $V$  | $\psi$ | 45° | -26° |
|------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|-----|------|------------------------------------|-----------------|-----------------|----------|-------|---------|------|--------|-----|------|
| <b>442559 2012 AU<sub>10</sub></b> |                 |                 |          |       |         |      |        |     |      | <b>6611 1993 VW</b>                |                 |                 |          |       |         |      |        |     |      |
| <i>(continuation)</i>              |                 |                 |          |       |         |      |        |     |      | <i>(continuation)</i>              |                 |                 |          |       |         |      |        |     |      |
| 5 1                                | 4 2.46          | +3 9.7          | 1.966    | 1.134 | 22.0    | 21.0 | 25 E   | —   | 19*  | 9 3                                | 10 49.98        | +3 24.8         | 1.884    | 0.881 | 4.8     | 18.4 | 4 E    | —   | —    |
| 5 11                               | 4 38.60         | +7 13.7         | 1.988    | 1.137 | 20.8    | 21.0 | 24 E   | —   | 18*  | 9 8                                | 11 12.29        | +1 18.5         | 1.891    | 0.891 | 5.2     | 18.5 | 5 E    | —   | —    |
| 5 21                               | 5 14.71         | +10 57.7        | 2.021    | 1.146 | 19.3    | 21.0 | 22 E   | —   | 16*  | 9 13                               | 11 34.34        | +0 46.8         | 1.902    | 0.905 | 5.8     | 18.5 | 5 E    | —   | —    |
| 5 31                               | 5 50.72         | +14 15.6        | 2.061    | 1.162 | 17.5    | 21.0 | 20 E   | —   | 14*  | 9 18                               | 11 56.10        | +2 49.6         | 1.917    | 0.923 | 6.3     | 18.6 | 6 E    | —   | —    |
| 6 10                               | 6 26.53         | +17 3.4         | 2.107    | 1.185 | 15.5    | 21.0 | 18 E   | —   | 12*  | 9 23                               | 12 17.54        | +4 48.5         | 1.935    | 0.945 | 6.8     | 18.7 | 6 E    | —   | —    |
| 6 20                               | 7 2.03          | +19 19.1        | 2.156    | 1.213 | 13.5    | 21.1 | 16 E   | 1*  | 10*  | 9 28                               | 12 38.66        | +6 42.4         | 1.957    | 0.969 | 7.1     | 18.8 | 7 E    | —   | 1*   |
| 6 30                               | 7 37.12         | +21 2.3         | 2.206    | 1.245 | 11.5    | 21.1 | 14 E   | 1*  | 7*   | 10 3                               | 12 59.43        | +8 30.2         | 1.981    | 0.997 | 7.3     | 18.9 | 7 E    | —   | 1*   |
| 7 10                               | 8 11.65         | +22 14.0        | 2.255    | 1.282 | 9.9     | 21.1 | 12 E   | 2*  | 5*   | 10 8                               | 13 19.85        | +10 11.2        | 2.009    | 1.026 | 7.4     | 19.0 | 8 E    | —   | 1*   |
| 7 20                               | 8 45.51         | +22 56.3        | 2.303    | 1.321 | 8.6     | 21.2 | 11 E   | 3*  | 3*   | 10 18                              | 13 59.61        | +13 10.8        | 2.070    | 1.091 | 7.0     | 19.2 | 8 E    | —   | 2*   |
| 7 30                               | 9 18.59         | +23 11.9        | 2.347    | 1.362 | 7.9     | 21.3 | 11 E   | 4*  | —    | 10 28                              | 14 37.85        | +15 38.8        | 2.139    | 1.160 | 6.2     | 19.4 | 7 E    | —   | 1*   |
| 8 9                                | 9 50.80         | +23 4.0         | 2.388    | 1.406 | 7.8     | 21.4 | 11 E   | 5*  | —    | 11 7                               | 15 14.52        | +17 35.0        | 2.213    | 1.232 | 5.0     | 19.5 | 6 E    | —   | —    |
| <b>11500 Tomaiyowit</b>            |                 |                 |          |       |         |      |        |     |      | <b>162116 1998 SA<sub>15</sub></b> |                 |                 |          |       |         |      |        |     |      |
| 2 11                               | 23 57.21        | +2 49.5         | 1.851    | 1.252 | 29.8    | 21.4 | 39 E   | 30* | 18*  | 2 21                               | 1 1.60          | +2 41.8         | 1.234    | 0.860 | 52.8    | 21.5 | 44 E   | 32* | 25*  |
| 2 21                               | 0 24.76         | +4 55.9         | 1.852    | 1.204 | 29.0    | 21.3 | 36 E   | 28* | 16*  | 2 26                               | 1 22.32         | +5 16.8         | 1.196    | 0.850 | 54.8    | 21.4 | 45 E   | 33* | 25*  |
| 3 2                                | 0 53.56         | +7 5.1          | 1.840    | 1.152 | 28.3    | 21.2 | 33 E   | 25* | 15*  | 3 2                                | 1 43.98         | +7 56.1         | 1.160    | 0.845 | 56.7    | 21.4 | 45 E   | 34* | 25*  |
| 3 12                               | 1 23.89         | +9 14.4         | 1.817    | 1.096 | 28.0    | 21.0 | 31 E   | 23* | 14*  | 3 7                                | 2 6.66          | +10 37.7        | 1.126    | 0.847 | 58.4    | 21.4 | 47 E   | 36* | 25*  |
| 3 22                               | 1 56.08         | +11 20.6        | 1.781    | 1.036 | 28.2    | 20.9 | 29 E   | 21* | 13*  | 3 12                               | 2 30.44         | +13 19.2        | 1.095    | 0.854 | 59.8    | 21.4 | 48 E   | 37* | 25*  |
| 4 1                                | 2 30.51         | +13 19.7        | 1.734    | 0.974 | 28.9    | 20.7 | 27 E   | 19* | 14*  | 3 17                               | 2 55.40         | +15 57.5        | 1.068    | 0.866 | 60.9    | 21.4 | 50 E   | 39* | 26*  |
| 4 11                               | 3 7.55          | +15 6.3         | 1.675    | 0.911 | 30.5    | 20.5 | 27 E   | 18* | 14*  | 3 22                               | 3 21.58         | +18 29.1        | 1.045    | 0.884 | 61.5    | 21.4 | 51 E   | 41* | 26*  |
| 4 21                               | 3 47.53         | +16 34.3        | 1.604    | 0.850 | 33.1    | 20.4 | 27 E   | 16* | 15*  | 3 27                               | 3 48.97         | +20 50.0        | 1.029    | 0.906 | 61.7    | 21.4 | 53 E   | 43* | 27*  |
| 4 26                               | 4 8.71          | +17 9.1         | 1.564    | 0.820 | 34.8    | 20.3 | 28 E   | 16* | 16*  | 4 1                                | 4 17.46         | +22 56.0        | 1.018    | 0.933 | 61.4    | 21.5 | 55 E   | 44* | 27*  |
| 5 1                                | 4 30.70         | +17 36.7        | 1.522    | 0.793 | 36.9    | 20.2 | 28 E   | 15* | 17*  | 2 21                               | 2 15.58         | +13 30.7        | 0.400    | 0.894 | 91.5    | 21.3 | 65 E   | 51* | 33*  |
| 5 6                                | 4 53.49         | +17 56.0        | 1.477    | 0.767 | 39.3    | 20.1 | 29 E   | 15* | 18*  | 2 26                               | 2 46.63         | +17 5.0         | 0.380    | 0.917 | 89.6    | 21.2 | 68 E   | 55* | 33*  |
| 5 11                               | 5 17.06         | +18 6.2         | 1.430    | 0.745 | 42.1    | 20.1 | 30 E   | 15* | 19*  | 3 2                                | 3 20.70         | +20 33.5        | 0.366    | 0.942 | 86.8    | 21.0 | 72 E   | 58* | 33*  |
| 5 16                               | 5 41.37         | +18 6.7         | 1.381    | 0.726 | 45.3    | 20.0 | 31 E   | 14* | 21*  | 3 7                                | 3 57.65         | +23 43.8        | 0.358    | 0.968 | 83.4    | 20.9 | 76 E   | 62* | 34*  |
| 5 21                               | 6 6.36          | +17 57.2        | 1.330    | 0.711 | 48.6    | 20.0 | 32 E   | 14* | 22*  | 3 12                               | 4 36.88         | +26 22.5        | 0.357    | 0.995 | 79.5    | 20.8 | 80 E   | 66* | 34*  |
| 5 26                               | 6 31.97         | +17 37.2        | 1.278    | 0.701 | 52.2    | 20.0 | 33 E   | 14* | 24*  | 3 17                               | 5 17.23         | +28 18.4        | 0.362    | 1.023 | 75.4    | 20.8 | 84 E   | 70* | 34*  |
| 5 31                               | 6 58.11         | +17 7.0         | 1.226    | 0.696 | 55.8    | 20.0 | 35 E   | 14* | 25*  | 3 22                               | 5 57.28         | +29 26.2        | 0.374    | 1.051 | 71.3    | 20.8 | 88 E   | 74* | 34*  |
| 6 5                                | 7 24.71         | +16 26.7        | 1.174    | 0.697 | 59.4    | 20.0 | 36 E   | 14* | 27*  | 3 27                               | 6 35.61         | +29 47.7        | 0.392    | 1.080 | 67.5    | 20.8 | 91 E   | 77* | 34*  |
| 6 10                               | 7 51.70         | +15 36.9        | 1.123    | 0.702 | 62.7    | 20.0 | 38 E   | 14* | 29*  | 4 1                                | 7 11.17         | +29 29.6        | 0.415    | 1.109 | 64.0    | 20.9 | 94 E   | 74* | 35   |
| 6 15                               | 8 19.05         | +14 37.9        | 1.075    | 0.714 | 65.6    | 20.0 | 40 E   | 14* | 31*  | 4 6                                | 7 43.43         | +28 41.4        | 0.443    | 1.138 | 61.0    | 21.0 | 96 E   | 73* | 35   |
| 6 20                               | 8 46.72         | +13 30.3        | 1.030    | 0.729 | 68.1    | 20.1 | 42 E   | 14* | 33*  | 4 11                               | 8 12.31         | +27 32.1        | 0.475    | 1.166 | 58.3    | 21.1 | 98 E   | 72* | 36   |
| 6 25                               | 9 14.68         | +12 14.7        | 0.990    | 0.749 | 70.0    | 20.1 | 44 E   | 14* | 35*  | 4 16                               | 8 38.04         | +26 9.3         | 0.511    | 1.194 | 56.1    | 21.3 | 99 E   | 71* | 38   |
| 6 30                               | 9 42.88         | +10 51.5        | 0.954    | 0.772 | 71.3    | 20.1 | 46 E   | 15* | 37*  | 4 21                               | 9 1.01          | +24 38.4        | 0.550    | 1.222 | 54.2    | 21.4 | 99 E   | 69* | 39   |
| 7 10                               | 10 39.64        | +7 45.8         | 0.901    | 0.826 | 72.0    | 20.2 | 51 E   | 17* | 42*  | 2 21                               | 11 5.29         | +9 53.9         | 1.812    | 2.786 | 4.4     | 22.3 | 167 W  | 55  | 54   |
| 7 20                               | 11 36.13        | +4 22.3         | 0.873    | 0.886 | 70.6    | 20.2 | 55 E   | 19* | 47*  | 2 26                               | 11 0.41         | +10 23.6        | 1.793    | 2.779 | 2.4     | 22.2 | 173 W  | 55  | 54   |
| 7 30                               | 12 31.12        | +0 53.8         | 0.871    | 0.949 | 67.7    | 20.3 | 60 E   | 21* | 51*  | 3 2                                | 10 55.33        | +10 53.2        | 1.782    | 2.771 | 1.3     | 22.1 | 176 W  | 56  | 53   |
| 8 4                                | 12 57.65        | +0 47.6         | 0.879    | 0.981 | 65.9    | 20.3 | 62 E   | 22* | 53*  | 3 7                                | 10 50.18        | +11 21.9        | 1.778    | 2.764 | 2.8     | 22.2 | 172 E  | 56  | 53   |
| 8 9                                | 13 23.37        | +2 25.0         | 0.893    | 1.012 | 64.0    | 20.3 | 64 E   | 23* | 55*  | 3 12                               | 10 45.09        | +11 48.7        | 1.781    | 2.756 | 4.9     | 22.3 | 166 E  | 57  | 52   |
| 8 14                               | 13 48.21        | +3 57.1         | 0.912    | 1.042 | 62.0    | 20.4 | 65 E   | 23* | 56*  | 3 17                               | 10 40.20        | +12 13.1        | 1.792    | 2.748 | 7.1     | 22.4 | 160 E  | 57  | 52   |
| 8 19                               | 14 12.13        | +5 23.0         | 0.936    | 1.072 | 60.1    | 20.5 | 67 E   | 24* | 58*  | 3 22                               | 10 35.64        | +12 34.4        | 1.809    | 2.740 | 9.2     | 22.5 | 154 E  | 58  | 51   |
| 8 29                               | 14 57.18        | +7 54.2         | 0.995    | 1.130 | 56.3    | 20.6 | 69 E   | 25* | 60*  | 2 21                               | 11 9.10         | +5 44.0         | 2.176    | 3.143 | 4.5     | 23.3 | 165 W  | 51  | 58   |
| 9 8                                | 15 38.69        | +9 56.7         | 1.067    | 1.184 | 52.9    | 20.7 | 70 E   | 26* | 61*  | 3 2                                | 10 59.72        | +6 28.7         | 2.177    | 3.167 | 0.6     | 23.0 | 178 W  | 51  | 58   |
| 9 18                               | 16 17.09        | +11 31.7        | 1.149    | 1.233 | 49.7    | 20.9 | 69 E   | 27* | 61*  | 3 12                               | 10 50.35        | +7 12.5         | 2.209    | 3.191 | 3.2     | 23.3 | 170 E  | 52  | 57   |
| 9 28                               | 16 52.91        | +12 41.2        | 1.237    | 1.278 | 46.9    | 21.1 | 69 E   | 27* | 60*  | 3 22                               | 10 41.83        | +7 51.0         | 2.270    | 3.214 | 6.8     | 23.5 | 157 E  | 53  | 56   |
| 10 8                               | 17 26.56        | +13 27.3        | 1.330    | 1.318 | 44.3    | 21.2 | 67 E   | 27* | 58*  | 4 1                                | 10 34.85        | +8 20.8         | 2.360    | 3.235 | 10.0    | 23.8 | 146 E  | 53  | 56   |
| 10 18                              | 17 58.48        | +13 52.0        | 1.425    | 1.354 | 41.9    | 21.4 | 65 E   | 28* | 55*  | <b>480927 2002 YZ<sub>3</sub></b>  |                 |                 |          |       |         |      |        |     |      |
| 10 28                              | 18 28.99        | +13 57.0        | 1.520    | 1.384 | 39.7    | 21.5 | 63 E   | 28* | 52*  | 2 21                               | 11 10.48        | +10 31.2        | 2.369    | 3.337 | 4.1     | 23.0 | 166 W  | 56  | 53   |
| <b>6611 1993 VW</b>                |                 |                 |          |       |         |      |        |     |      | <b>401979 2002 UC<sub>32</sub></b> |                 |                 |          |       |         |      |        |     |      |
| 2 21                               | 0 4.49          | +4 13.2         | 2.746    | 1.970 | 15.1    | 21.4 | 31 E   | 24* | 12*  | 2 26                               | 11 4.27         | +10 59.8        | 2.366    | 3.349 | 2.3     | 22.9 | 172 W  | 56  | 53   |
| 3 2                                | 0 23.16         | +5 50.0         | 2.755    | 1.917 | 13.2    | 21.3 | 26 E   | 19* | 9*   | 3 2                                | 10 57.95        | +11 27.5        | 2.372    | 3.361 | 1.3     | 22.8 | 176 W  | 56  | 53   |
| 3 12                               | 0 42.75         | +7 31.1         | 2.751    | 1.861 | 11.2    | 21.1 | 21 E   | 15* | 6*   | 3 7                                | 10 51.65        | +11 53.6        | 2.387    | 3.372 | 2.4     | 22.9 | 172 E  | 57  | 52   |
| 3 22                               | 1 3.33          | +9 15.4         | 2.734    | 1.802 | 9.2     | 21.0 | 17 E   | 10* | 3*   | 3 12                               | 10 45.50        | +12 17.6        | 2.410    | 3.383 | 4.1     | 23.0 | 166 E  | 57  | 52   |
| 4 1                                | 1 25.01         | +11 1.4         | 2.704    | 1.741 | 7.1     | 20.8 | 12 E   | 6*  | 1*   | 3 17                               | 10 39.59        | +12 39.0        | 2.442    | 3.393 | 5.8     | 23.2 | 160 E  | 58  | 51   |
| 4 11                               | 1 47.94         | +12 47.5        | 2.663    | 1.678 | 5.0     | 20.6 | 8 E    | —   | —    | 3 22                               | 10 34.04        | +12 57.6        | 2.481    | 3.403 | 7.5     | 23.3 | 154 E  | 58  | 51   |
| 4 21                               | 2 12.28         | +14 31.6        | 2.611    | 1.612 | 3.0     | 20.3 | 5 E    | —   | —    |                                    |                 |                 |          |       |         |      |        |     |      |
| 5 1                                | 2 38.23         | +16 11.4        | 2.551    | 1.544 | 1.0     | 20.0 | 2 E    | —   | —    |                                    |                 |                 |          |       |         |      |        |     |      |
| 5 11                               | 3 6.01          | +17 43.9        | 2.483    | 1.474 | 1.0     | 19.9 | 1 W    | —   | —    |                                    |                 |                 |          |       |         |      |        |     |      |
| 5 21                               | 3 35.84         | +19 5.6         | 2.410    | 1.402 | 2.8     | 19.8 | 4 W    | —   | —    |                                    |                 |                 |          |       |         |      |        |     |      |
| 5 31                               | 4 7.95          | +20 12.0        | 2.334    | 1.330 | 4.5     | 19.8 | 6 W    | —   | —    |                                    |                 |                 |          |       |         |      |        |     |      |
| 6 5                                | 4 24.91         | +20 37.9        | 2.295    | 1.293 | 5.3     | 19.7 | 7 W    | —   | 1*   |                                    |                 |                 |          |       |         |      |        |     |      |
| 6 10                               | 4 42.50         | +20 57.9        | 2.256    | 1.256 | 6.0     | 19.6 | 7 W    | —   | 1*   |                                    |                 |                 |          |       |         |      |        |     |      |
| 6 15                               | 5 0.73          | +21 11.3        | 2.218    | 1.220 | 6.7     | 19.6 | 8 W    | —   | 2*   |                                    |                 |                 |          |       |         |      |        |     |      |
| 6 20                               | 5 19.60         | +21 17.2        | 2.180    | 1.184 | 7.3     | 19.5 | 8 W    | —   | 2*   |                                    |                 |                 |          |       |         |      |        |     |      |
| 6 25                               | 5 39.09         | +21 14.9        | 2.143    | 1.148 | 7.7     | 19.4 | 9 W    | —   | 3*   |                                    |                 |                 |          |       |         |      |        |     |      |
| 6 30                               | 5 59.19         | +21 3.5         | 2.107    | 1.114 | 8.1     | 19.3 | 9 W    | —   | 3*   |                                    |                 |                 |          |       |         |      |        |     |      |
| 7 5                                | 6 19.85         | +20 42.4        | 2.073    | 1.080 | 8.4     | 19.2 | 9 W    | —   | 3*   |                                    |                 |                 |          |       |         |      |        |     |      |
| 7 10                               | 6 41.05         | +20 10.8        | 2.040    | 1.047 | 8.5     | 19.1 | 9 W    | —   | 3*   |                                    |                 |                 |          |       |         |      |        |     |      |
| 7 20                               | 7 24.82         | +18 34.8        | 1.983    | 0.987 | 8.4     | 18.9 | 8 W    | —   | 2*   |                                    |                 |                 |          |       |         |      |        |     |      |
| 7 30                               | 8 9.94          | +16 13.7        | 1.936    | 0.937 | 7.6     | 18.7 | 7 W    | —   | 1*   |                                    |                 |                 |          |       |         |      |        |     |      |
| 8 9                                | 8 55.79         | +13 10.4        | 1.903    | 0.900 | 6.3     | 18.6 | 6 W    | —   | —    |                                    |                 |                 |          |       |         |      |        |     |      |
| 8 14                               | 9 18.81         | +11 25.0        | 1.892    | 0.887 | 5.6     | 18.5 | 5 W    | —   | —    |                                    |                 |                 |          |       |         |      |        |     |      |
| 8 19                               | 9 41.80         | +9 32.2         | 1.884    | 0.878 | 5.0     | 18.4 | 4 W    | —   | —    |                                    |                 |                 |          |       |         |      |        |     |      |